

Project Information
Othello Townhome - Unit 1 (Type J)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
Neiman Taber Architects
David Neiman
206-760-5550
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Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 24.85, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1410 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design											
Component Performance, R occupancies				Baseline			Proposed Design				
		U	Area	UA			U	Area	UA		
Doors U =		0.300		20	6.0		0.300		20	6.0	
Overhead Glazing U =		0.500		0	0.0				0	0.0	
Vertical Glazing U =		0.300		294	88.1		0.280		294	82.3	
Flat/Vaulted Ceilings U =		0.027		462	12.5		0.017		462	7.9	
Wall (above grade) U =		0.056	1,958		109.6		0.054	1,958		105.7	
Floors over Crawlspace U =		0.029		0	0.0				0	0.0	
Slab on Grade F =		0.540		58	31.3		0.360		58	20.9	
Below Grade Wall U =		0.042		0	0.0				0	0.0	
Below Grade Slab F =		0.570		0	0.0				0	0.0	
Baseline UA Total					247.6	Proposed UA Total					222.7
Required Credits					3.0	Proposed Credits					5.0
						UA Percent Reduction					10.0%
						UA Reduction					24.9
If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.											

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat<=2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,410	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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	0.0
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule										
Rows to Show										16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt			-						-	-
1 W59	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	3	2	3	5.1	1.42
2 W194	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3.00	5.5	1	10.25	6.4	1.80
3 W222	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	4.25	5.9	1.65
4 W224	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	3	3	0	6.8	1.89
5 W226	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	1	10.25	4.6	1.30
6 W234	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	5		1	10.25	9.3	2.60
7 W235	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	4	6		1	10.25	44.5	12.46
8 W251	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	3	6	9	4	10.25	98.3	27.52
9 W252	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.25	4.8	1.35
10 W266	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	6	6.3	1.75
11 W273	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2		1	10.25	3.7	1.04
12 W288	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	4	10.25	12.1	3.40
13 W290	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	1	6.75	10.5	2.95
14 W293	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	4	4.25	29.4	8.23
15 S100	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	6	10	46.1	12.92
16									-	-
Sum of Area and UA									293.8	82.3
Vertical Glazing Area Weighted U										0.280
Vertical Glazing and Doors Area Weighted U										0.281

Flat/Vaulted Ceilings						
Plan ID	Component Description	Ref.	Attic U		Area	UA
R1	2x12 24" oc R-38 BiB + 4" XPS (R-20)	Custom	0.017		462	7.9
Sum of Area and UA					462	7.9

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,958	106
Sum of Area and UA					1,958	106

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		58	21
Sum of Perimeter and FP					58	21

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,410 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate		Compliance Certificate Instructions
Insulation Certificate for Residential New Construction		Insulation Certificate
Duct Testing Affidavits		
	Existing Construction	Affidavit, Existing
	New Construction	Affidavit, New
Prescriptive Checklist for 2018 WSEC		Prescriptive Checklist
Alterations (Remodel) Worksheet		Worksheet

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	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,410 ft ²	
Conditioned Volume	14,100 ft ³	
Leave blank to use default of 8.5 ft. ceiling height		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	223	
Envelope Heat Load	10,245 Btu / Hour	
Sum of UA X ΔT		
Air Leakage Heat Load	7,005 Btu / Hour	
((Volume X 0.6) X ΔT) X .018))		
Building Design Heat Load	17,250 Btu / Hour	
Air Leakage + Envelope Heat Loss		
Building and Duct Heat Load	17,250 Btu / Hour	
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		
Maximum Heat Equipment Output	21,563 Btu / Hour	
Building and Duct Heat Loss X 1.25 for heat pumps		
Building and Duct Heat Loss X 1.40 for all other systems		

Project Information
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Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 16.39, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1421 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design											
Component Performance, R occupancies				Baseline			Proposed Design				
		U	Area	UA		U	Area	UA			
Doors U =		0.300		20	6.0		0.300		20	6.0	
Overhead Glazing U =		0.500		0	0.0			0	0.0		
Vertical Glazing U =		0.300		223	67.0		0.280		223	62.6	
Flat/Vaulted Ceilings U =		0.027		468	12.6		0.017		468	8.0	
Wall (above grade) U =		0.056	1,055		59.1		0.054	1,055		56.9	
Floors over Crawlspace U =		0.029		0	0.0			0	0.0		
Slab on Grade F =		0.540		29	15.4		0.360		29	10.3	
Below Grade Wall U =		0.042		0	0.0			0	0.0		
Below Grade Slab F =		0.570		0	0.0			0	0.0		
Baseline UA Total					160.1	Proposed UA Total					143.7
Required Credits					3.0	Proposed Credits					5.0
						UA Percent Reduction					10.2%
						UA Reduction					16.4
If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.											

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat<=2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,421	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule										Rows to Show	16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA	
Exempt					Feet	Inch	Feet	Inch			
1			-						-	-	
2	W194 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3.00	5.5	1	10.25	6.4	1.80	
3	W251 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	3	6	9	4	10.25	98.3	27.52	
4	W252 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.25	4.8	1.35	
5	W266 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	6	6.3	1.75	
6	W288 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	4	10.25	12.1	3.40	
7	W290 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	1	6.75	10.5	2.95	
8	W293 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	4	4.25	29.4	8.23	
9	W294 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	3	0	9.5	2.66	
10	S100 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	6	10	46.1	12.92	
11									-	-	
12									-	-	
13									-	-	
14									-	-	
15									-	-	
16									-	-	
Sum of Area and UA									223.5	62.6	
Vertical Glazing Area Weighted U										0.280	
Vertical Glazing and Doors Area Weighted U										0.282	

Flat/Vaulted Ceilings						
Plan ID	Component Description	Ref.	Attic U		Area	UA
R1	2x12 24" oc R-38 BIB + 4" XPS (R-20)	Custom	0.017		468	8.0
Sum of Area and UA					468	8.0

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,055	57
Sum of Area and UA					1,055	57

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		29	10
Sum of Perimeter and FP					29	10

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,421 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affidavits		
Existing Construction	Affidavit, Existing	
New Construction	Affidavit, New	
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,421 ft ²	
Conditioned Volume	14,210 ft ³	
<small>Leave blank to use default of 8.5 ft. ceiling height</small>		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	144	
Envelope Heat Load	6,612 Btu / Hour	
<small>Sum of UA X ΔT</small>		
Air Leakage Heat Load	7,060 Btu / Hour	
<small>((Volume X 0.6) X ΔT X .018)</small>		
Building Design Heat Load	13,671 Btu / Hour	
<small>Air Leakage + Envelope Heat Loss</small>		
Building and Duct Heat Load	13,671 Btu / Hour	
<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>		
Maximum Heat Equipment Output	17,089 Btu / Hour	
<small>Building and Duct Heat Loss X 1.25 for heat pumps</small>		
<small>Building and Duct Heat Loss X 1.40 for all other systems</small>		

Project Information
Othello Townhome - Unit 5 (Type J)
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Messages / Results ***Review required for custom entries: - Flat/Vaulted Ceilings**

UA Reduction = 23.37, Proposed UA is better than baseline by 12%

UA-reduction meets selected Option 1.3

Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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? **Table R406.3 UA Trade Off**

Project Building Type? **New Construction**

Occupancy Type? **R3 Single family homes and duplexes**

Code Version? **WSEC 2018**

Classification: Small Dwelling Unit – 1360 sq. ft.

Baseline Description: Code Baseline - Baseline and proposed window areas are equal.

About Your Selection: Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design**Component Performance, R occupancies**

	Baseline		
	U	Area	UA
Doors U =	0.300	20	6.0
Overhead Glazing U =	0.500	0	0.0
Vertical Glazing U =	0.300	284	85.2
Flat/Vaulted Ceilings U =	0.027	468	12.6
Wall (above grade) U =	0.056	1,055	59.1
Floors over Crawlspace U =	0.029	105	3.0
Slab on Grade F =	0.540	58	31.5
Below Grade Wall U =	0.042	0	0.0
Below Grade Slab F =	0.570	0	0.0

Baseline UA Total	197.4
Required Credits	3.0

	Proposed Design		
	U	Area	UA
Doors U =	0.300	20	6.0
Overhead Glazing U =		0	0.0
Vertical Glazing U =	0.280	284	79.5
Flat/Vaulted Ceilings U =	0.017	468	8.0
Wall (above grade) U =	0.054	1,055	56.9
Floors over Crawlspace U =	0.025	105	2.6
Slab on Grade F =	0.360	58	21.0
Below Grade Wall U =		0	0.0
Below Grade Slab F =		0	0.0

Proposed UA Total	174.0
Proposed Credits	5.0
UA Percent Reduction	11.8%
UA Reduction	23.4

from Tables 406.2 and 406.3

If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat ≤ 2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,360	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule											Rows to Show	16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA		
Exempt			-		Feet	Inch	Feet	Inch				
1	W59 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	3	2	3	5.1	1.42		
2	W194 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3.00	5.5	1	10.25	6.4	1.80		
3	W222 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	4.25	5.9	1.65		
4	W224 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	3	3	0	6.8	1.89		
5	W226 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	1	10.25	4.6	1.30		
6	W234 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	5	0	1	10.25	9.3	2.60		
7	W235 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	4	6	0	1	10.25	44.5	12.46		
8	W251 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	3	6	9	4	4.25	88.2	24.69		
9	W252 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.75	4.9	1.39		
10	W266 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	6	6.3	1.75		
11	W273 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	0	1	10.25	3.7	1.04		
12	W288 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	4	10.25	12.1	3.40		
13	W290 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	1	6.75	10.5	2.95		
14	W293 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	4	4.5	29.5	8.27		
15	S100 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	6	10	46.1	12.92		
16									-	-		
Sum of Area and UA									283.9	79.5		
Vertical Glazing Area Weighted U										0.280		
Vertical Glazing and Doors Area Weighted U										0.281		

Flat/Vaulted Ceilings							
Plan ID	Component Description	Ref.	Attic U		Area	UA	
R1	2x12 24" oc R-38 BIB + 4" XPS (R-20)	Custom	0.017		468	8.0	
Sum of Area and UA					468	8.0	

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,055	57
Sum of Area and UA					1,055	57

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
F3	R38 vented Joist 16oc (Options 1a-1c, 1.3-1.5)	10-3	0.025		105	3
Sum of Area and UA					105	3

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		58	21
Sum of Perimeter and FP					58	21

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,360 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate		Compliance Certificate Instructions
Insulation Certificate for Residential New Construction		Insulation Certificate
Duct Testing Affidavits		
	Existing Construction	Affidavit, Existing
	New Construction	Affidavit, New
Prescriptive Checklist for 2018 WSEC		Prescriptive Checklist
Alterations (Remodel) Worksheet		Worksheet

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,360 ft ²	
Conditioned Volume	13,600 ft ³	
Leave blank to use default of 8.5 ft. ceiling height		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	174	
Envelope Heat Load	8,004 Btu / Hour	
Sum of UA X ΔT		
Air Leakage Heat Load	6,756 Btu / Hour	
((Volume X 0.6) X ΔT) X .018))		
Building Design Heat Load	14,761 Btu / Hour	
Air Leakage + Envelope Heat Loss		
Building and Duct Heat Load	14,761 Btu / Hour	
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		
Maximum Heat Equipment Output	18,451 Btu / Hour	
Building and Duct Heat Loss X 1.25 for heat pumps		
Building and Duct Heat Loss X 1.40 for all other systems		

Project Information
Othello Townhome - Unit 6 / 9 / 12 (Type D)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
Neiman Taber Architects
David Neiman
206-760-5550
dn@neimantaber.com

Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 19.51, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1298 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design

Component Performance, R occupancies				Proposed Design			
	Baseline				Proposed Design		
	U	Area	UA		U	Area	UA
Doors U =	0.300	20	6.0		0.300	20	6.0
Overhead Glazing U =	0.500	0	0.0			0	0.0
Vertical Glazing U =	0.300	276	82.9		0.280	276	77.4
Flat/Vaulted Ceilings U =	0.027	407	11.0		0.017	407	6.9
Wall (above grade) U =	0.056	1,311	73.4		0.054	1,311	70.8
Floors over Crawlspace U =	0.029	0	0.0			0	0.0
Slab on Grade F =	0.540	41	21.9		0.360	41	14.6
Below Grade Wall U =	0.042	0	0.0			0	0.0
Below Grade Slab F =	0.570	0	0.0			0	0.0
						</	

If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits						
Option No.	Category			Select Options	Energy Credits	Brief Description of Selected Options*
1	Efficient Building Envelope			Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA
2	Air Leakage Control and Efficient Ventilation			Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans
3	High Efficiency HVAC			Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat<=2kW
4	High Efficiency HVAC Distribution System			Not Selected	NA	- Not applicable to ductless system selected in Option 3
5.1	Efficient Water Heating			Not Selected	0.0	-
5.2-5.6	Efficient Water Heating			Option 5.5	2.0	NEEA Tier 3 heat pump water heater
6	Renewable Electric Energy		kWh	Not Selected	0.0	
7	Appliance Package			Not Selected	0.0	-
Energy Credits					4.5	

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,298	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule											Rows to Show	16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA		
					Feet	Inch	Feet	Inch				
Exempt			-						-	-		
1 W207	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	1	6.75	9.4	2.63		
2 W226	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	2.00	6	1	10.25	9.3	2.60		
3 W233	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	2	10.25	17.1	4.80		
4 W234	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	5	0	1	10.25	9.3	2.60		
5 W251	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	4	10.25	32.8	9.17		
6 W252	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.75	4.9	1.39		
7 W265	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	4	10.25	29.1	8.16		
8 W267	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	4	3	5	10.25	24.9	6.97		
9 W283	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	7	10.25	47.1	13.20		
10 W285	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	8	0	3	10.25	30.8	8.63		
11 W286	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	8	1	1	10.25	15.0	4.20		
12 W299	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	0	2	10.25	5.7	1.60		
13 S101	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	6	10	41.0	11.48		
14									-	-		
15									-	-		
16									-	-		
Sum of Area and UA									276.4	77.4		
Vertical Glazing Area Weighted U										0.280		
Vertical Glazing and Doors Area Weighted U										0.281		

Flat/Vaulted Ceilings							
Plan ID	Component Description	Ref.	Attic U		Area	UA	
R1	2x12 24" oc R-38 BIB + 4" XPS (R-20)	Custom	0.017		407	6.9	
Sum of Area and UA					407	6.9	

Refer to WSEC R402.1.1

Walls (Above Grade)							
Plan ID	Component Description	Ref.	Wall U		Net Area	UA	
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,311	71	
Sum of Area and UA					1,311	71	

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		41	15
Sum of Perimeter and FP					41	15

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,298 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate		Compliance Certificate Instructions
Insulation Certificate for Residential New Construction		Insulation Certificate
Duct Testing Affidavits		
	Existing Construction	Affidavit, Existing
	New Construction	Affidavit, New
Prescriptive Checklist for 2018 WSEC		Prescriptive Checklist
Alterations (Remodel) Worksheet		Worksheet

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,298 ft ²	
Conditioned Volume	12,980 ft ³	
<small>Leave blank to use default of 8.5 ft. ceiling height</small>		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	176	
Envelope Heat Load	8,082 Btu / Hour	
<small>Sum of UA X ΔT</small>		
Air Leakage Heat Load	6,448 Btu / Hour	
<small>((Volume X 0.6) X ΔT X .018))</small>		
Building Design Heat Load	14,530 Btu / Hour	
<small>Air Leakage + Envelope Heat Loss</small>		
Building and Duct Heat Load	14,530 Btu / Hour	
<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>		
Maximum Heat Equipment Output	18,163 Btu / Hour	
<small>Building and Duct Heat Loss X 1.25 for heat pumps</small>		
<small>Building and Duct Heat Loss X 1.40 for all other systems</small>		

Project Information
Othello Townhome - Unit 7 / 10 / 13 / 16 (Type E)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
Neiman Taber Architects
David Neiman
206-760-5550
dn@neimantaber.com

Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 18.58, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1120 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design

Component Performance, R occupancies					Proposed Design			
	Baseline				Proposed Design			
	U	Area	UA		U	Area	UA	
Doors U =	0.300	20	6.0		0.300	20	6.0	
Overhead Glazing U =	0.500	0	0.0			0	0.0	
Vertical Glazing U =	0.300	285	85.5		0.280	285	79.8	
Flat/Vaulted Ceilings U =	0.027	351	9.5		0.017	351	6.0	
Wall (above grade) U =	0.056	1,311	73.4		0.054	1,311	70.8	
Floors over Crawlspace U =	0.029	0	0.0			0	0.0	
Slab on Grade F =	0.540	38	20.3		0.360	38	13.5	
Below Grade Wall U =	0.042	0	0.0			0	0.0	
Below Grade Slab F =	0.570	0	0.0			0	0.0	
Baseline UA Total			194.6	Proposed UA Total			176.0	
Required Credits			3.0	Proposed Credits			5.0	
				UA Percent Reduction			9.5%	
				UA Reduction			18.6	

If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.

from Tables 406.2 and 406.3

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat<=2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,120	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule										Rows to Show	16	
	Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA	
	Exempt					Feet	Inch	Feet	Inch			
1	W207	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	1	6.75	9.4	2.63	
2	W222	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	2.00	6	2	4.25	11.8	3.30	
3	W235	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	6	0	1	10.25	22.3	6.23	
4	W245	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	6	5	10.25	38.1	10.65	
5	W252	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.75	4.9	1.39	
6	W279	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	9	0	7	10.25	70.7	19.79	
7	W292	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	2	6	6.3	1.75	
8	W297	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	9	0	2	10.25	25.7	7.19	
9	W300	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	3	0	1	10.25	11.1	3.12	
10	W307	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	9	0	4	10.25	43.7	12.23	
11	S101	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	6	10	41.0	11.48	
12										-	-	
13										-	-	
14										-	-	
15										-	-	
16										-	-	
Sum of Area and UA										284.8	79.8	
Vertical Glazing Area Weighted U											0.280	
Vertical Glazing and Doors Area Weighted U											0.281	

Flat/Vaulted Ceilings						
Plan ID	Component Description	Ref.	Attic U		Area	UA
R1	2x12 24" oc R-38 BIB + 4" XPS (R-20)	Custom	0.017		351	6.0
Sum of Area and UA					351	6.0

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,311	71
Sum of Area and UA					1,311	71

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		38	14
Sum of Perimeter and FP					38	14

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,120 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affidavits		
	Existing Construction	Affidavit, Existing
	New Construction	Affidavit, New
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	

Heating System Sizing - Proposed Design		Try Out BetterBuiltNW's HVAC Sizing Tool: https://betterbuiltnw.com/resources/hvac-sizing-tool	
Nearest Weather Station	Seattle: Sea-Tac AP		
Indoor Design Temperature	70 F		
Outdoor Design Temperature	24 F		
Design Temperature Difference (ΔT)	46 F		
Conditioned Floor Area, Proposed Design	1,120 ft ²		
Conditioned Volume	11,200 ft ³		
Leave blank to use default of 8.5 ft. ceiling height			
HVAC System Type	Heat Pump		
Location of HVAC Distribution System	Unducted		
Sum of UA, including exempt door and window	176		
Envelope Heat Load	8,095 Btu / Hour		
Sum of UA X ΔT			
Air Leakage Heat Load	5,564 Btu / Hour		
((Volume X 0.6) X ΔT) X .018))			
Building Design Heat Load	13,660 Btu / Hour		
Air Leakage + Envelope Heat Loss			
Building and Duct Heat Load	13,660 Btu / Hour		
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			
Maximum Heat Equipment Output	17,074 Btu / Hour		
Building and Duct Heat Loss X 1.25 for heat pumps			
Building and Duct Heat Loss X 1.40 for all other systems			

Project Information
Othello Townhome - Unit 8 / 11 / 14 (Type D)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
Neiman Taber Architects
David Neiman
206-760-5550
dn@neimantaber.com

Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 24.91, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1298 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design											
Component Performance, R occupancies					Baseline				Proposed Design		
		U	Area	UA		U	Area	UA			
Doors U =		0.300	20	6.0		0.300	20	6.0			
Overhead Glazing U =		0.500	0	0.0			0	0.0			
Vertical Glazing U =		0.300	323	96.9		0.280	323	90.4			
Flat/Vaulted Ceilings U =		0.027	407	11.0		0.017	407	6.9			
Wall (above grade) U =		0.056	1,836	102.8		0.054	1,836	99.2			
Floors over Crawlspace U =		0.029	0	0.0			0	0.0			
Slab on Grade F =		0.540	60	32.1		0.360	60	21.4			
Below Grade Wall U =		0.042	0	0.0			0	0.0			
Below Grade Slab F =		0.570	0	0.0			0	0.0			
Baseline UA Total				248.8	Proposed UA Total				223.9		
Required Credits				3.0	Proposed Credits				5.0	from Tables 406.2 and 406.3	
					UA Percent Reduction				10.0%		
					UA Reduction				24.9		
If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.											

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat ≤ 2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,298	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors										
Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									20	6.0
Exterior Doors Area Weighted U										0.300

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

Vertical Glazing Schedule											Rows to Show	16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA		
					Feet	Inch	Feet	Inch				
Exempt			-						-	-		
1 W207	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	1	6.75	9.4	2.63		
2 W222	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2.00	6	2	4.25	5.9	1.65		
3 W226	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	2.00	6	1	10.25	9.3	2.60		
4 W233	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	5	0	1	10.25	9.3	2.60		
5 W235	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	3	6	0	1	10.25	33.4	9.35		
6 W252	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.75	4.9	1.39		
7 W265	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	6	0	4	10.25	58.3	16.31		
8 W266	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	4	2	6	2	6	25.0	7.00		
9 W273	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	0	1	10.25	3.7	1.04		
10 W283	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	7	10.25	47.1	13.20		
11 W286	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	8	1	1	10.25	15.0	4.20		
12 W299	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	0	2	10.25	5.7	1.60		
13 S106	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	12	0	8	0	96.0	26.88		
14									-	-		
15									-	-		
16									-	-		
Sum of Area and UA									322.9	90.4		
Vertical Glazing Area Weighted U										0.280		
Vertical Glazing and Doors Area Weighted U										0.281		

Flat/Vaulted Ceilings							
Plan ID	Component Description	Ref.	Attic U		Area	UA	
R1	2x12 24" oc R-38 BIB + 4" XPS (R-20)	Custom	0.017		407	6.9	
Sum of Area and UA					407	6.9	

Refer to WSEC R402.1.1

Walls (Above Grade)							
Plan ID	Component Description	Ref.	Wall U			Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054			1,836	99
Sum of Area and UA						1,836	99

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		60	21
Sum of Perimeter and FP					60	21

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,298 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required?	No	

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affidavits		
Existing Construction	Affidavit, Existing	
New Construction	Affidavit, New	
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,298 ft ²	
Conditioned Volume	12,980	ft ³
Leave blank to use default of 8.5 ft. ceiling height		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	224	
Envelope Heat Load	10,300	Btu / Hour
Sum of UA X ΔT		
Air Leakage Heat Load	6,448	Btu / Hour
((Volume X 0.6) X ΔT) X .018))		
Building Design Heat Load	16,748	Btu / Hour
Air Leakage + Envelope Heat Loss		
Building and Duct Heat Load	16,748	Btu / Hour
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		
Maximum Heat Equipment Output	20,935	Btu / Hour
Building and Duct Heat Loss X 1.25 for heat pumps		
Building and Duct Heat Loss X 1.40 for all other systems		

Project Information
Othello Townhome - Unit 15 (Type A1)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
Neiman Taber Architects
David Neiman
206-760-5550
dn@neimantaber.com

Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 19.73, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1288 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design									
Component Performance, R occupancies				Baseline			Proposed Design		
		U	Area	UA			U	Area	UA
Doors U =		0.300	40	12.0			0.300	40	12.0
Overhead Glazing U =		0.500	0	0.0				0	0.0
Vertical Glazing U =		0.300	286	85.9			0.280	286	80.2
Flat/Vaulted Ceilings U =		0.027	410	11.1			0.017	410	7.0
Wall (above grade) U =		0.056	1,305	73.1			0.054	1,305	70.5
Floors over Crawlspace U =		0.029	0	0.0				0	0.0
Slab on Grade F =		0.540	41	21.9			0.360	41	14.6
Below Grade Wall U =		0.042	0	0.0				0	0.0
Below Grade Slab F =		0.570	0	0.0				0	0.0
Baseline UA Total				203.9	Proposed UA Total				184.2
Required Credits				3.0	Proposed Credits				5.0
					UA Percent Reduction				9.7%
					UA Reduction				19.7
If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.									

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat ≤ 2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,288	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D505	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
Sum of Area and UA (excluding exempt door)									40	12.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule										Rows to Show	16	
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA		
Exempt					Feet	Inch	Feet	Inch				
1	W133 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2		6	4	10.375	12.2	3.41	
2	W223 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	3	2.00		6	4	10.25	36.4	10.19	
3	W226 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	2		6	1	10.25	9.3	2.60	
4	W233 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	6		0	2	10.25	34.3	9.59	
5	W251 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	6		9	4	10.25	65.5	18.35	
6	W252 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3		2	1	6.75	4.9	1.39	
7	W264 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6		9	5	10.25	39.5	11.06	
8	W298 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2		6	5	10.25	14.6	4.10	
9	W300 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3		0	1	10.25	5.6	1.56	
10	W301 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6		0	1	10.25	11.1	3.12	
11	S105 U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6		9	7	10.25	53.0	14.84	
12										-	-	
13										-	-	
14										-	-	
15										-	-	
16										-	-	
Sum of Area and UA										286.4	80.2	
Vertical Glazing Area Weighted U											0.280	
Vertical Glazing and Doors Area Weighted U											0.282	

Flat/Vaulted Ceilings						
Plan ID	Component Description	Ref.	Attic U		Area	UA
R1	2x12 24" oc R-38 BiB + 4" XPS (R-20)	Custom	0.017		410	7.0
Sum of Area and UA					410	7.0

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,305	70
Sum of Area and UA					1,305	70

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		41	15
Sum of Perimeter and FP					41	15

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,288 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required?	No	

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affidavits		
Existing Construction	Affidavit, Existing	
New Construction	Affidavit, New	
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,288 ft ²	
Conditioned Volume	12,880 ft ³	
<small>Leave blank to use default of 8.5 ft. ceiling height</small>		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	184	
Envelope Heat Load	8,473 Btu / Hour	
<small>Sum of UA X ΔT</small>		
Air Leakage Heat Load	6,399 Btu / Hour	
<small>((Volume X 0.6) X ΔT X .018)</small>		
Building Design Heat Load	14,872 Btu / Hour	
<small>Air Leakage + Envelope Heat Loss</small>		
Building and Duct Heat Load	14,872 Btu / Hour	
<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>		
Maximum Heat Equipment Output	18,590 Btu / Hour	
<small>Building and Duct Heat Loss X 1.25 for heat pumps</small>		
<small>Building and Duct Heat Loss X 1.40 for all other systems</small>		

Project Information
Othello Townhome - Unit 17 (Type A1)
7001 42nd Ave S
Seattle, WA 98118
Contact Information
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Messages / Results *
Review required for custom entries: - Flat/Vaulted Ceilings
UA Reduction = 24.55, Proposed UA is better than baseline by 10%
UA-reduction meets selected Option 1.3
Whole House Mechanical Ventilation Airflow Rate: 112.5 CFM with Run Time Percent of 50%, Balanced, Not Distributed

* 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?	Table R406.3 UA Trade Off
Project Building Type?	New Construction
Occupancy Type?	R3 Single family homes and duplexes
Code Version?	WSEC 2018
Classification:	Small Dwelling Unit – 1288 sq. ft.
Baseline Description:	Code Baseline - Baseline and proposed window areas are equal.
About Your Selection:	Up to 15 sf exempt window and 24 sf exempt door allowable

RESULTS - Comparison of Baseline and Proposed Design											
Component Performance, R occupancies					Proposed Design						
		U	Area	UA		U	Area	UA			
Doors U =		0.300	40	12.0		0.300	40	12.0			
Overhead Glazing U =		0.500	0	0.0			0	0.0			
Vertical Glazing U =		0.300	303	90.8		0.280	303	84.7			
Flat/Vaulted Ceilings U =		0.027	410	11.1		0.017	410	7.0			
Wall (above grade) U =		0.056	1,866	104.5		0.054	1,866	100.8			
Floors over Crawlspace U =		0.029	0	0.0			0	0.0			
Slab on Grade F =		0.540	59	32.0		0.360	59	21.3			
Below Grade Wall U =		0.042	0	0.0			0	0.0			
Below Grade Slab F =		0.570	0	0.0			0	0.0			
Baseline UA Total				250.3	Proposed UA Total				225.8		
Required Credits				3.0	Proposed Credits				5.0	from Tables 406.2 and 406.3	
					UA Percent Reduction				9.8%		
					UA Reduction				24.5		
If the Proposed UA ≤ the Target UA, and the Proposed Credits from Table 406 are ≥ those required in Section R406, then the home meets the WSEC.											

Table R406.2 Fuel Normalization 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 based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	Electric Resistance with Ductless Heat Pump	0.5	4.5	5.0

Table R406.3 Energy Credits					
Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*	
1	Efficient Building Envelope	Option 1.3	0.5	U 0.28 Windows / R-38 floors or R-10 Fully insulated slab. Or 5% reduction in UA	
2	Air Leakage Control and Efficient Ventilation	Option 2.1	0.5	3.0 ACH50 / High efficiency fans / For R-2, 0.3 cfm per ft2 at 50 Pa. / High efficiency fans	
3	High Efficiency HVAC	Option 3.4	1.5	Ductless Split System, Zonal Control. Min HSPF of 10. Or Zonal Elec Resist Heat ≤ 2kW	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3	
5.1	Efficient Water Heating	Not Selected	0.0	-	
5.2-5.6	Efficient Water Heating	Option 5.5	2.0	NEEA Tier 3 heat pump water heater	
6	Renewable Electric Energy	Not Selected	0.0		
7	Appliance Package	Not Selected	0.0	-	
Energy Credits			4.5		

*Refer to WSEC 2018 Table R406.3 for complete option descriptions and requirements

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design		1,288	sq. ft
Classification		Small Dwelling Unit	
Notes		3-Story Townhome	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch	Feet	Inch		
Exempt	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D213	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
D505	Code Baseline, U=0.30	-	0.30	1	3	0	6	8	20	6.0
									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
Sum of Area and UA (excluding exempt door)									40	12.0
Exterior Doors Area Weighted U										0.300

Overhead Glazing

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

Vertical Glazing Schedule										Rows to Show	16
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA	
Exempt					Feet	Inch	Feet	Inch			
1	W210	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	5	10.25	35.1	9.84
2	W222	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	2.00	6	2	4.25	11.8	3.30
3	W235	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	2	6	0	1	10.25	22.3	6.23
4	W242	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	9	0	4	10.25	43.7	12.23
5	W251	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	9	4	10.25	32.8	9.17
6	W252	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	2	1	6.75	4.9	1.39
7	W263	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	2	6	5	10.25	14.6	4.10
8	W266	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	8	2	6	2	6	50.0	14.00
9	W300	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	3	0	1	10.25	5.6	1.56
10	W301	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	6	0	1	10.25	11.1	3.12
11	S107	U=0.28 (Options 1a, 1.3, 1.7)	Table 406.2	0.28	1	9	0	7	10.25	70.7	19.79
12										-	-
13										-	-
14										-	-
15										-	-
16										-	-
Sum of Area and UA										302.6	84.7
Vertical Glazing Area Weighted U											0.280
Vertical Glazing and Doors Area Weighted U											0.282

Flat/Vaulted Ceilings						
Plan ID	Component Description	Ref.	Attic U		Area	UA
R1	2x12 24" oc R-38 BiB + 4" XPS (R-20)	Custom	0.017		410	7.0
Sum of Area and UA					410	7.0

Refer to WSEC R402.1.1

Walls (Above Grade)						
Plan ID	Component Description	Ref.	Wall U		Net Area	UA
E1	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		1,866	101
Sum of Area and UA					1,866	101

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
Sum of Area and UA					0	0

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 Fully insulated (Options 1a-1c, 1.3-1.5)	10-2	0.360		59	21
Sum of Perimeter and FP					59	21

Below Grade Walls and Slabs								
Plan ID	Component Description	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
Sum of Area, Length and UA				0	0.0		0	0

Ventilation Requirements	
Conditioned Floor Area	1,288 sq. ft.
Number of Bedrooms	3
Run-Time Percent in Each 4-Hour Segment	50%
Is the system Balanced?	Balanced
Is the system Distributed?	Not Distributed
Ventilation Code Section	IRC, Chapter 15
Whole House Mechanical Ventilation Airflow Rate	113 CFM

Verify system meets definition of 'Balanced Whole-House Ventilation'

HVAC Thermal Distribution System		Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
Is Duct Testing Required? No		

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affidavits		
Existing Construction	Affidavit, Existing	
New Construction	Affidavit, New	
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	

Heating System Sizing - Proposed Design

Try Out BetterBuiltNW's HVAC Sizing Tool: <https://betterbuiltnw.com/resources/hvac-sizing-tool>

Nearest Weather Station	Seattle: Sea-Tac AP	
Indoor Design Temperature	70 F	
Outdoor Design Temperature	24 F	
Design Temperature Difference (ΔT)	46 F	
Conditioned Floor Area, Proposed Design	1,288 ft ²	
Conditioned Volume	12,880	ft ³
Leave blank to use default of 8.5 ft. ceiling height		
HVAC System Type	Heat Pump	
Location of HVAC Distribution System	Unducted	
Sum of UA, including exempt door and window	226	
Envelope Heat Load	10,386	Btu / Hour
Sum of UA X ΔT		
Air Leakage Heat Load	6,399	Btu / Hour
((Volume X 0.6) X ΔT) X .018))		
Building Design Heat Load	16,785	Btu / Hour
Air Leakage + Envelope Heat Loss		
Building and Duct Heat Load	16,785	Btu / Hour
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		
Maximum Heat Equipment Output	20,981	Btu / Hour
Building and Duct Heat Loss X 1.25 for heat pumps		
Building and Duct Heat Loss X 1.40 for all other systems		