

**2015 WASHINGTON STATE ENERGY CODE AND 2015 INTERNATIONAL RESIDENTIAL CODE  
RESIDENTIAL ENERGY AND VENTILATION SUBMITTAL FORM**

Applicant: TROY WERELIUS Application #: \_\_\_\_\_ Date: 6/14/2019  
 Job Type:  New  Addition  Remodel Conditioned Square Feet: 3918.5 SF  
 Occupancy:  Single Family / Duplex  Residential Care / Assisted Living / Adult Family Home

**MINIMUM INSULATION REQUIREMENTS – These may need to be increased based on ENERGY CREDITS selected below.**

	Glazing U-Factor		Door U-Factor	Rafter/Joist Vaulted Ceilings	All Other Ceilings	Walls Above Grade	Walls Below Grade	Floors Over Unheated Space	Slab On Grade
	Vertical	Overhead							
	0.30	0.50	0.30	R-38	R-49 or R-38 ADV	R-21 INT	R-10 CI Exterior <u>OR</u> R-15 CI Interior <u>OR</u> R-5 CI + R-13 Batt <u>OR</u> R-21 Batt w/TB @ Slab	R-30	R-10
Equivalent U-Factor	0.30	0.50	0.30	0.026	0.026	0.056	0.042	0.029	N/A
<b>PROPOSED</b>	<u>0.28</u>	<u>0.50</u>	<u>0.30</u>	<u>R-38</u>	<u>R-49</u>	<u>R-21</u>	<u>R-21</u>	<u>R-38</u>	<u>R-10</u>

ADV = Uncompressed R-38 Over Top Plates & Entire Ceiling Area INT = 2x6 at 16" o.c. w/ R-10 Headers CI = Continuous Rigid Insulation TB = Thermal Break

**ENERGY CREDITS – See the Energy Credits descriptions on the back of this form and indicate which options will be used.**

**Small Addition** 0.5 pts required (Additions < 500 s.f.)  
**Small Dwelling Unit / Medium Addition** 1.5 pts required (Dwellings < 1,500 s.f. w/ glazing < 300 s.f., or Additions < 1,500 s.f.)  
**Medium Dwelling Unit / Large Addition** 3.5 pts required (All Dwellings not Small or Large, or Additions > 1,500 s.f.)  
**Large Dwelling Unit** 4.5 pts required (Dwellings > 5,000 s.f.) **TOTAL POINTS = 1.5 PTS**

- 1a (0.5 pts)  1c (2.0 pts)  2a (0.5 pts)  2c (1.5 pts)  3b (1.0 pts)  3d (1.0 pts)  5a (0.5 pts)  5c (1.5 pts)  6 (0.5 pts)  
 1b (1.0 pts)  1d (0.5 pts)  2b (1.0 pts)  3a (1.0 pts)  3c (1.5 pts)  4 (1.0 pts)  5b (1.0 pts)  5d (0.5 pts)

**VAPOR RETARDERS – Select the Vapor Retarder to be used at each location.**

<b>CRAWLSPACE</b>	<input type="checkbox"/> 6-mil Black Poly	<input type="checkbox"/> 3/2" Concrete Slab	<input checked="" type="checkbox"/> N/A (No Crawl Space)
<b>FLOORS</b>	<input type="checkbox"/> 4-mil Poly	<input type="checkbox"/> Face Stapled Backed Batts	<input checked="" type="checkbox"/> 6-mil Poly (Slab On Grade Floor)
<b>WALLS</b>	<input type="checkbox"/> 4-mil Poly	<input type="checkbox"/> Face Stapled Backed Batts	<input checked="" type="checkbox"/> Vapor Barrier Primer* <input type="checkbox"/> N/A (≥ R-3.75 Rigid On Wall Exterior)
<b>CEILINGS</b>	<input type="checkbox"/> 4-mil Poly	<input type="checkbox"/> Face Stapled Backed Batts	<input type="checkbox"/> Vapor Barrier Primer* <input type="checkbox"/> N/A (≥ R-10 Rigid Above Roof Deck)
	* Perm Rating ≤ 1.0	<input type="checkbox"/> N/A (1/150 Ventilation)	<input checked="" type="checkbox"/> N/A (≥ R-10 Spray Below Roof Deck)

**VENTILATION SYSTEM – Select a System Type and complete the Ventilation Rate calculation on the back of this form.**

- Not Applicable (Additions less than 500 s.f.) **VENTILATION RATE = 90 CFM**
- Whole-House Exhaust Fan with fresh air port (net 4 sq. in. minimum opening) at each habitable room.  
*A timer operates an exhaust fan which pulls outside air through air inlets located in each habitable room.*
- Integrated System with fresh air duct connected to return air duct of forced-air heating system.  
*A timer operates the furnace blower and a motorized outside air inlet damper to distribute outside air through the heating ducts.*
- Supply Fan with fresh air duct connected to supply air duct or return air duct of forced-air heating system, or other ducts.  
*A timer operates a supply fan connected to an outside air inlet to distribute outside air through the heating ducts or other ducts.*
- Heat Recovery System.  
*A timer operates a heat recovery ventilator (HRV) to distribute outside air to habitable rooms through dedicated ducts.*
- Designed System per IMC with calculations and/or performance testing. Includes:  Whole-house fan  Fresh air ports  
*Typically such systems must be designed, installed, tested, and balanced by a mechanical engineer or other HVAC professional.*

**Continuously operating** ventilation systems shall provide the minimum flow rates specified in Table M1507.3.3(1).

**Intermittently operating** ventilation systems shall provide flow rates per Table M1507.3.3(1) as modified by Table M1507.3.3(2).

**AIR TESTING – These tests must be performed on-site with specialized equipment.**

- Duct Leakage Test** Required when space-conditioning equipment is installed, altered, or replaced (including replacement of air handler, outdoor unit of air conditioner/heat pump, cooling or heating coil, or furnace heat exchanger). Some exceptions apply.
- Building Leakage Test** Required for additions > 500 s.f. and new construction.

**VENTILATION SYSTEM SIZING – Complete the Ventilation Rate calculation below.**

Table M1507.3.3(1) is based on *continuous* operation. The ventilation rate must be increased by the factors from Table M1507.3.3(2) if the system will operate less than 24 hours per day, as follows:

Ventilation System Airflow Rate Requirement from **Table M1507.3.3(1)** 90 cfm

Ventilation Rate Factor from **Table M1507.3.3(2)** 1

**VENTILATION RATE** = 90 cfm

**TABLE M1507.3.3(1) CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS**

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0-1	2-3	4-5	6-7	>7
<1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
>7,500	105	120	135	150	165

**TABLE M1507.3.3(2) INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS<sup>a, b</sup>**

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
	Factor <sup>a</sup>	4	3	2	1.5	1.3

- a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
- b. Extrapolation beyond the table is prohibited.

**TABLE M1507.3.6.2 PRESCRIPTIVE SUPPLY FAN DUCT SIZING**

Supply Fan Tested CFM at 0.40" W.G.		
Specified Volume from Table M1507.3.3(1)	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter
50-90 CFM	4 inch	5 inch
90-150 CFM	5 inch	6 inch
150-250 CFM	6 inch	7 inch
250-400 CFM	7 inch	8 inch

**ENERGY CREDIT DESCRIPTIONS**

To qualify for these credits the building permit drawings shall specify the option(s) selected and shall specify all requirements.

OPTION	DESCRIPTION	PTS	OPTION	DESCRIPTION	PTS
1a	EFFICIENT BUILDING ENVELOPE: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration U = 0.28, Floor R-38, Slab on grade R-10 perimeter and under entire slab, Below grade slab R-10 perimeter and under entire slab <b>OR</b> Compliance based on Section R402.1.4: Reduce the Total UA by 5%.	0.5	3c <sup>b</sup>	HIGH EFFICIENCY HVAC EQUIPMENT: Closed-loop ground source heat pump; with a minimum COP of 3.3 <b>OR</b> Open loop water source heat pump with a maximum pumping hydraulic head of 150 feet and minimum COP of 3.6	1.5
1b	EFFICIENT BUILDING ENVELOPE: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration U = 0.25, Wall R-21 plus R-4 CI, Floor R-38, Basement wall R-21 int plus R-5 CI, Slab on grade R-10 perimeter and under entire slab, Below grade slab R-10 perimeter and under entire slab <b>OR</b> Compliance based on Section R402.1.4: Reduce the Total UA by 15%.	1.0	3d <sup>b</sup>	HIGH EFFICIENCY HVAC EQUIPMENT: Ductless Split System Heat Pumps, Zonal Control: In homes where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to the largest zone of the housing unit.	1.0
1c	EFFICIENT BUILDING ENVELOPE: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration U = 0.22, Ceiling and single-rafter or joist-vaulted R-49 advanced, Wood frame wall R-21 int plus R-12 CI, Floor R-38, Basement wall R-21 int plus R-12 CI, Slab on grade R-10 perimeter and under entire slab, Below grade slab R-10 perimeter and under entire slab <b>OR</b> Compliance based on Section R402.1.4: Reduce the Total UA by 30%.	2.0	4	HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM: All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion. For forced air ducts: A maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located outside the conditioned space must be insulated to a minimum of R-8. Locating system components in conditioned crawl spaces is not permitted under this option. Electric resistance heat and ductless heat pumps are not permitted under this option. Direct combustion heating equipment with AFUE less than 80% is not permitted under this option.	1.0
1d <sup>a</sup>	EFFICIENT BUILDING ENVELOPE: Prescriptive compliance is based on Table R402.1.1 with the following modifications: Vertical fenestration U = 0.24	0.5	5a	EFFICIENT WATER HEATING: All showerhead and kitchen sink faucets installed in the house shall be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.	0.5
2a	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION: Compliance based on R402.4.1.2: Reduce the tested air leakage to 3.0 air changes per hour maximum <b>AND</b> All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a high efficiency fan (maximum 0.35 watts/cfm), not interlocked with the furnace fan. Ventilation systems using a furnace including an ECM motor are allowed, provided that they are controlled to operate at low speed in ventilation only mode.	0.5	5b	EFFICIENT WATER HEATING: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.74 <b>OR</b> Water heater heated by ground source heat pump meeting the requirements of Option 3c.	1.0
2b	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 2.0 air changes per hour maximum <b>AND</b> All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.70.	1.0	5c	EFFICIENT WATER HEATING: Water heating system shall include one of the following: Gas, propane or oil water heater with a minimum EF of 0.91 <b>OR</b> Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems <b>OR</b> Electric heat pump water heater with a minimum EF of 2.0 and meeting the standards of NEEA's Northern Climate Specifications for Heat Pump Water Heaters.	1.5
2c	AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION: Compliance based on Section R402.4.1.2: Reduce the tested air leakage to 1.5 air changes per hour maximum <b>AND</b> All whole house ventilation requirements as determined by Section M1507.3 of the <i>International Residential Code</i> shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.85.	1.5	5d	EFFICIENT WATER HEATING: A drain water heat recovery unit(s) shall be installed, which captures waste water heat from all the showers, and has a minimum efficiency of 40% if installed for equal flow or a minimum efficiency of 52% if installed for unequal flow. Such units shall be rated in accordance with CSA B55.1 and be so labeled.	0.5
3a <sup>b</sup>	HIGH EFFICIENCY HVAC EQUIPMENT: Gas, propane or oil-fired furnace with minimum AFUE of 94%, <b>OR</b> Gas, propane or oil-fired boiler with minimum AFUE of 92%	1.0	6	RENEWABLE ELECTRIC ENERGY: For each 1200 kWh of electrical generation per housing unit provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows: For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTS. Documentation noting solar access shall be included on the plans. For wind generation projects designs shall document annual power generation based on the following factors: The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower.	0.5
3b <sup>b</sup>	HIGH EFFICIENCY HVAC EQUIPMENT: Air-source heat pump with minimum HSPF of 9.0	1.0			

a. Projects using this option may not use Option 1a, 1b, or 1c.

b. Projects may only include credit from one space heating option, 3a, 3b, 3c, or 3d. When a housing unit has two pieces of equipment (i.e. two furnaces) both must meet the standard to receive the credit.