Madison Haus, PHIUS Certified  Olympia, Washington

Design Ethos

Urban in fill, respectful of the neighborhood
Mid century inspired with a warm, wood’ish northwest feel
Lots of glass
A large covered front porch
A Parti of long flat lines and strategic views and gains
Madison House Specs
(Nerd Stuff)

• R-35 EPS under slab insulation

• R-41 Total wall insulation (7.5” dense pack fiberglass, 4” EPS)

• R-80 (2’ dense pack fiberglass in trusses, 6” EPS warm cap)

• Zender Novus 300 HRV

• Intellihot Combi unit: domestic hot water and in floor hydronic heating

• Zola Thermo Plus Clad windows

• Approx. 5100 heating degree days
This project suffered from the usual small project challenges of hitting the heat demand, but the PHIUS 'climate optimized' heat demand and higher (likely more realistic) PHIUS internal gains made Passive House pretty manageable. While some may question a project with a 5.45 kbtu/ft/yr heat demand and not the 4.75 target, the peak heat load is barely above 3 btu/hr/sf and could have likely been certifiable under the PHI peak heat load criteria also.

Skylar Swinford
Slab and Footing Detail

We have started wrapping our footings with a heavy butyl membrane, and taping our wall sealing layer down to this foundation wrapping. This also keeps bulk water from migrating under the mudsill during the course of construction.
1. Larsen Truss

2. Double 2x4 w/ Zip Sheathing

3. Homemade Prefab Walls 2x6 w/ Horiz. 2x4 & 2x6

4. 2x6 w/ 6” of Exterior Insul.

5. 2x4 staggered on 2x8 plates w/ 4” of cork or foam

6. Collective Carpentry Prefab wall, 2x4 with Larsen Truss
Detailed Thermal Bridge Analysis

Wall Assembly Analysis
Detailed Thermal Bridge Analysis

Wall Assembly Analysis 2D w/ HTflux

\[
R = 48.291 \text{ h.ft}^2\text{F/BTU} \\
R_{1c} = 52.240 \text{ h.ft}^2\text{F/BTU} \\
R_{\text{top,2c}} = 48.291 \text{ h.ft}^2\text{F/BTU} \\
R_{\text{bottom,2c}} = 48.291 \text{ h.ft}^2\text{F/BTU} \\
\]

\[l_{\text{top}} = 56.00 \text{ in} / l_{\text{bottom}} = 56.00 \text{ in} \]

\[\Phi_{\text{top}} = -5.218 \text{ BTU/h-ft} \]

\[\Phi_{\text{bottom}} = 5.218 \text{ BTU/h-ft} \]

\[\Delta T = 54.0 \text{ °F} \]

**Layers**

\[Rs = 0.738 \text{ h.ft}^2\text{F/BTU} \]

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Material</th>
<th>R \text{/ in}</th>
<th>R \text{/ ft}²F/BTU \text{/ in}</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00 in</td>
<td>EPS Neopor R-4.61</td>
<td>\text{--}</td>
<td>\text{--}</td>
</tr>
<tr>
<td>0.50 in</td>
<td>Oriented strand board (OSB) R-1.39</td>
<td>\text{--}</td>
<td>\text{--}</td>
</tr>
<tr>
<td>7.25 in</td>
<td>Fiberglass R-4.3</td>
<td>\text{--}</td>
<td>\text{--}</td>
</tr>
<tr>
<td>0.50 in</td>
<td>Gypsum R-0.91</td>
<td>\text{--}</td>
<td>\text{--}</td>
</tr>
</tbody>
</table>

\[Rs = 0.738 \text{ h.ft}^2\text{F/BTU} \]
Massing & Shading

Depending on surroundings articulating shape to catch more southern exposure can be worth the extra surface area, and sometimes the only way to get to compliance.
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Depending on surroundings articulating shape to catch more southern exposure can be worth the extra surface area, and sometimes the only way to get to compliance.
TAPED OR COATED OSB SERVES AS AIR BARRIER
BACKER ROD AND AIR DAM SEALANT
WINDOW BUCK SUPPORT
TAPED OR COATED OSB WINDOW BUCK
FOAM INSULATION
WINDOW SET TO EXT OF FRAME
ZOLA THERMO CLAD WINDOW
(SEE WINDOW ORDER)
BACKER ROD AND AIR DAM SEALANT
BEVELED FOAM INSULATION SUPPORTS PAN
WINDOW PAN FLASHING
OSB WINDOW BUCK W/ ANGLED BOTTOM
SIDING SEE ELEVATIONS
3/4 AIRSPACE/ RAINSCREEN
VERTICAL FOAM INSULATION
Detailed Thermal Bridge Analysis
Window Head and Sill Analysis 2D w/ HTflux
Sealed chase way in truss bay

Zehnder Novus Paul unit HRV
Navien Combi Unit

Space Heating

Domestic Hot Water

Showering at your favorite temperature

Showering at one degree colder than your favorite temperature.

PROMISE ME YOU’LL NEVER LET GO, ROSE.
Cost of Passive House ROI Model

<table>
<thead>
<tr>
<th>Cost of Home Options</th>
<th>Cost of Baseline Home</th>
<th>Upgrade to Passive House *</th>
<th>Cost of Passive House</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>509,500</td>
<td>4%</td>
<td>530,000</td>
</tr>
</tbody>
</table>

| Energy Cost, Baseline Home ($ per month) | 157 |
| Annual Rate of increase in Energy Costs Projected | 3% |
| Energy Reduction from Passive House Approach (%) | 68% |

Energy savings available EACH MONTH, after covering the monthly payment related to upgrades.

Future Value of Energy Savings Applied to Extra Down Payment

<table>
<thead>
<tr>
<th>Item</th>
<th>Incremental Costs of Improving The Thermal Performance of The Home</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in cost of framing labor</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>Increase in cost of framing materials</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Zola upvc vs Domestic vinyl and sliding wall glazing</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>Increase in cost of insulation, labor and materials</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Cost of upgrading to whole house Heat Recovery Ventilator vs code required ventilation systems</td>
<td>7,500</td>
<td></td>
</tr>
<tr>
<td>Sanden vs central heating and cooling and heat pump</td>
<td>-10,000</td>
<td></td>
</tr>
</tbody>
</table>

* Total Costs to Upgrade to Passive House | 20,500 |

INFORMATION PRESENTED BY: Randy Foster

Per actual utility bills first year of operation

<table>
<thead>
<tr>
<th>Time Period</th>
<th>kWh per mo. All neighbors</th>
<th>kWh per mo. This PH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-Oct</td>
<td>2,400</td>
<td>900</td>
</tr>
<tr>
<td>Nov-Dec</td>
<td>4,553</td>
<td>1,138</td>
</tr>
<tr>
<td>Jan-Feb</td>
<td>4,400</td>
<td>1,138</td>
</tr>
<tr>
<td>Mar-Apr</td>
<td>3,415</td>
<td>1,000</td>
</tr>
<tr>
<td>May-Jun</td>
<td>2,000</td>
<td>900</td>
</tr>
<tr>
<td>Jul-Aug</td>
<td>2,100</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Total kWh for 1 year | 18,808 | 6,076 |
Ave kWh per mo. | 1,572 | 506 |
Ave $ per mo., @ $0.10/kWh | $157 | $51 |

Cost of Passive House ROI Model
Madison Haus and Heron Haus featured Sheri Koones' new book *Downsize* coming this spring.
Coming Soon- Prefab Passive House outside of Seattle

Coming Soon- Bainbridge Island, Rolling Bay Passive House