

Structural Requirements

An off-grid, expandable home with 720 sq ft usable space + utility room and attached greenhouse. Design follows the “half a good house” concept - house is expandable, but what is initially built (the starter home) must be either “good” or easily repurposed - for example, the rooms should already be of an appropriate size (no tiny, unventilated rooms).

GROUND SNOW LOAD	WIND SPEED				<u>SEISMIC DESIGN CATEGORY</u>	SUBJECT TO DAMAGE FROM		
	<i>Speed (mph)</i>	<i>Topographic Effects</i>	<i>Special Wind Region</i>	<i>Wind-bo rne Debris Zone</i>		<i>Weat herin g</i>	<i>Frost Line Depth</i>	<i>Termite</i>
20 psf	90	No	No	?	A	Seve re	36 inches	Moderate to heavy

WINTER DESIGN TEMP	ICE BARRIER UNDERLAYMENT REQUIRED	FLOOD HAZARDS	AIR FREEZING INDEX	MEAN ANNUAL TEMP
6°F	No	See <u>Ordinance Chapter 28</u>	1000°F-days	54.2°F

WIND EXPOSURE CATEGORY
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BUILDING
One-story Light-frame construction Heated

FLOOR PLAN

- DIMENSIONS
 - House: 48 ft x 16 ft + utility room (dimensions TBD)
 - Greenhouse: 32 ft x 16 ft
- LOCATION & ORIENTATION
 - Solar panels must face south
 - Greenhouse must face south
 - Patio door in living room + porch facing east forest
 - As near as possible to pond
 - In well drained area
- SPACE (720 sf usable area + utility room)
 - Utility room to house all utilities (bio-digester, hydronic stove + panel, inverter, TEG, pumps, water filters etc.)
 - Kitchen
 - Open space (living room)
 - Bathroom (w/ bathtub)
- LAYOUT
 - Bathroom and kitchen next to each other and against utility room wall
 - Natural light and ventilation on all rooms (openable windows), including bathroom
 - Access to utility room from both the inside and outside the house
 - Passive-solar design of south wall
 - 1 double door to allow for large items
- EXPANSION
 - Must allow addition of office, bedroom and laundry room on north side (with doors placed according to expansion plan)
 - Minimum north wall height: 8' for standard walls + 13" for height of roof modules + minimum 12" for rise (see below) = 10' 1" minimum
 - Roof height may not be an issue on the north side if there is no overhang - but we'd have to find another way to prevent water infiltration.
 - Must allow addition of greenhouse on south side
 - Minimum south wall height: 6' for lowest greenhouse walls + 12" for height of roof modules + minimum 12" for rise (see below) = 8' minimum
- ENERGY
 - Hydronic heated floor
 - Passive solar heating via attached greenhouse
 - South-facing solar panels mounted on roof
 - 30° - 40° angle for solar panels?

- Roof slope sufficient to prevent accumulation of snow on solar panels
- MATERIALS
 - 2 CEB wall modules (4x8) - probably located between greenhouse and house to serve as thermal mass for passive solar
 - 1 CEB floor section (in utility room)
 - Wood floor in main rooms (kitchen, living room, bathroom)

CONSTRUCTION

- FOUNDATION
 - Frost Protected Shallow Foundation (FPSF)
 - Building will be unheated the first winter and possibly also during short periods of time after that, so we'll also want to follow FPSF guidelines for unheated buildings.
 - Sill plate fasteners must be compatible with wall modules
- WALLS
 - [All exterior walls must be braced](#) (plywood and proper positioning of windows and doors is sufficient for standard bracing of walls up to 10 ft high and 60 ft long)
 - Lateral bracing must be adequate for [ultimate wind speed design of 100 mph](#)
 - Wall panels must double as finishing on both interior and exterior
 - Insulation and barriers:
 - [Minimum insulation R-value](#): 20 (batt) OR 13 (batt) + 5 (rigid)
 - Moisture barrier on the interior side of walls
 - Air and water barriers on the exterior side of walls
 - Height of load-bearing walls
 - [Maximum 10 ft height](#) (with [continuous studs](#) between foundation and roof) for standard framing.
 - [Maximum 18 ft height](#) if wall meets all of the following conditions: snow load <25 psf; ultimate design wind speed < 130 mph; 2x6 studs on 16" centers; supporting a roof load equal or less than 6 ft of tributary length.
 - Or designed according to accepted engineering practice. Accepted engineering practices for bracing tall or stacked walls with no diaphragms include: [horizontal beam across the wall at the top plate level](#) or [columns](#), spanning from foundation to roof, and attached to studs.
 - Electric wiring installed inside wall cavities
- ROOF
 - Flat roof
 - Load: 20 psf snow load + 10 psf dead load (TBC) + live load (?)
 - Minimum rafter span: 16 ft for skillion roof

- Overhangs on all sides to protect from water infiltration
- [Insulation and barriers](#):
 - [Minimum insulation R-value](#): 49
 - Air and moisture barriers on the ceiling side (to keep moisture from entering roof and cold air from entering the interior)
 - 1" of [vented space](#) above insulation (to allow moisture to escape)