1333 IRL / SHELTER / OPEN SOURCE

STILT HOUSE GUIDE + PLANS

A 16 x 20 ft house on stilts with a carport underneath, two floors and a half loft, a rooftop rain deck and a gravity water tower. Published free as a basis for off-grid and sustainable living, for anyone to learn from, adapt and build on.

READ FIRST

Experimental · educational · build at your own risk

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WHAT IT IS

A scale-up of Kaiotei's 12 x 12 A-frame: same waste-cut logic on a 16 x 20 ft plate, which is two 20 ft shipping crates side by side, or wood or foam framing to the same outside size.

Two full floors plus a loft under half of a 45° metal roof. The other half of the top is a flat metal deck that catches rain. The house stands on posts so it stays dry in flood country and a vehicle parks underneath. The stairs are a separate structure that can be unhooked, and a trap door in floor 1 drops onto the vehicle below.

A wood stove on floor 1 heats every level, cooks and heats water. Solar sits on the roof and on the water tower.

PIECE	SPEC
Footprint	16 x 20 ft (two 8 x 20 crates, or wood / foam)
Floors 1 + 2	320 sf each, two ~8 ft stories, 16 ft wall
Loft	16 x 10 ft (160 sf) under a 45° metal roof
Rain deck	16 x 10 ft metal, own gutters
Living total	about 800 sf
Carport	16 x 20, 9 ft clear (8 ft min)
Posts	8x8 or larger, 6-post grid, 45° braces
Stairs	detached, to a small porch, unhook for security
Water tower	8 x 8, ~16 ft, two 275 gal IBC totes
Heat / power	floor-1 wood stove; PV on roof + tower

BEFORE YOU BUILD

1. **Engineer review.** Have a licensed structural engineer size the piers, posts, beams, braces, connections, floors and roof for your site. A raised house on posts takes wind, flood and seismic loads very differently from a house on a slab.
2. **Permits and code.** Ask your building department what applies: residential code, flood zone rules, setbacks, minimum dwelling size, egress, stairs, guards, chimney, plumbing, electrical and solar.
3. **Site.** Check soil bearing, frost depth, flood elevation, drainage, wind and snow loads, wildfire risk and sun path. Put the solar side toward the sun.
4. **Water.** Check local rules on rainwater collection and wells. Plan treatment before anyone drinks stored water.
5. **Budget and skills.** Read the materials estimate below, decide on a shell (crates, wood frame or stucco foam), and be honest about what you can build safely yourself.

MATERIALS ESTIMATE

Calculated from the same dimension file as the drawings. It is an estimate to plan with, not a cut list. Sizes the kit spec does not fix are marked for your engineer.

GROUP	ITEM	QTY	NOTES
Foundation	Concrete piers: house	6	below frost + flood line, size per engineer
Foundation	Concrete piers: porch + tower	2 + 4	size per engineer
Foundation	Stair landing pad	1	about 4′–4″ x 2′–5″
Structure	Posts 8x8 (or larger)	6	about 8′–7″ above pier, plus connection
Structure	Beams, doubled, 20 ft sides	2 (4 plies)	size per engineer
Structure	Crossbeams, 16 ft	3	ends + midspan, size per engineer
Structure	Knee braces, 45°	12	about 5′–8″ each
Floors	Joists @ 24″ o.c., 16 ft	9 per level x 3 levels	floor 1, floor 2, loft / deck; size per span tables
Floors	Subfloor / decking 4x8 sheets	11 per level x 3	includes 10% waste
Envelope	Wall area (gross / net of openings)	1152 / 975 sf	crate pair, wood frame or stucco foam
Envelope	Sheathing or siding 4x8 sheets	34	plus gable ends ~128 sf
Envelope	Windows 3′–0″ x 4′–0″	13	+1 loft window 2′–6″ square
Envelope	Doors	2	porch door 3′–0″ x 7′–0″, loft–to–deck door
Roof	Metal roofing, 45° slopes	about 282 sf	plus ridge cap, trim, fasteners
Roof	Metal rain deck surface	160 sf	pitched to its own gutters
Roof	Deck guard rail	36 ft	3′–6″ high
Access	Stair stringers	2 (3 recommended)	about 15′–8″ each
Access	Treads	14	3′–6″ wide
Access	Porch deck	37.5 sf	5′–0″ x 7′–6″, 2 posts
Access	Porch guard + stair rails	about 44 ft	top + mid rails
Water	IBC totes	2	275 gal each, food–grade, opaque or covered

GROUP	ITEM	QTY	NOTES
Water	Tower posts + platforms	4 posts ~16 ft, 2 decks 8 x 8	size per engineer
Water	Tower X braces	24	about 8'–8″ each
Water	Gutters	36 ft	deck edges
Water	First-flush diverter + filter	1 + 1	
Water	Rain line + supply pipe	about 18 ft + 13 ft	route to suit
Heat	Wood stove (listed)	1	with hearth per the maker
Heat	Chimney, listed class-A	about 23'–1″	through floor 2, loft and roof
Power	PV panels	3 roof + 1 tower	about 5'–5″ x 3'–1″ each; controller + battery to suit
Safety	Smoke + CO alarms	4+	every level + loft
Hardware	Post bases, hangers, ties, bolts	as designed	per engineer

MATERIAL COST ESTIMATE · NO LABOR

About $9,018 in lumber + sheet goods · $17,334 to $21,534 for a weathertight shell

Priced November 2026 from US big-box and lumber-yard listings (East Coast typical, expect about 10–15% either way). About 5,898 board feet of dimensional lumber plus 82 4x8 sheets. Add about 10% contingency ($902) on the lumber.

SECTION	BOARD FEET	COST
Stilts + floor 1	1,104	$1,940
Floor 2 + loft / deck	680	$720
Walls, 2x6 @ 16″	1,925	$1,523
Roof, loft half	304	$260
Sheet goods (4x8)	82 sheets	$2,253
Deck guard, porch, stair (PT)	951	$1,234
Water tower (PT)	933	$1,088
Lumber + sheet goods	5,898 bf + 82 sheets	$9,018

SECTION	ITEM	QTY	EACH	TOTAL
Stilts + floor 1	8x8x10 PT posts	6	$130.00	$780
Stilts + floor 1	2x12x20 PT beams, doubled, 20 ft sides *	4	$65.00	$260
Stilts + floor 1	2x12x16 PT crossbeams, doubled	6	$46.00	$276
Stilts + floor 1	2x12x16 PT joists @ 24″ o.c.	9	$46.00	$414
Stilts + floor 1	4x6x12 PT knee braces (2 per board) *	6	$35.00	$210
Floor 2 + loft / deck	2x10x16 floor 2 joists	9	$25.00	$225
Floor 2 + loft / deck	2x10x20 floor 2 rims *	2	$40.00	$80
Floor 2 + loft / deck	2x10x16 PT loft / deck joists	9	$30.00	$270
Floor 2 + loft / deck	2x10x20 PT loft / deck rims *	2	$45.00	$90
Floor 2 + loft / deck	2x4x10 deck slope sleepers *	10	$5.50	$55
Walls, 2x6 @ 16″	2x6 precut studs, two stories	140	$6.25	$875

SECTION	ITEM	QTY	EACH	TOTAL
Walls, 2x6 @ 16″	2x6x16 plates (bottom + double top)	27	$12.00	$324
Walls, 2x6 @ 16″	2x10x16 headers	8	$25.00	$200
Walls, 2x6 @ 16″	2x6 precut gable studs	16	$6.25	$100
Walls, 2x6 @ 16″	2x6x16 gable plates	2	$12.00	$24
Roof, loft half	2x8x14 rafters @ 24″ *	12	$16.00	$192
Roof, loft half	2x10x12 ridge board *	1	$20.00	$20
Roof, loft half	2x6x10 collar ties *	6	$8.00	$48
Sheet goods (4x8)	3/4″ T&G subfloor, 3 levels	33	$46.00	$1,518
Sheet goods (4x8)	7/16″ OSB wall + gable sheathing	39	$15.00	$585
Sheet goods (4x8)	7/16″ OSB roof sheathing	10	$15.00	$150
Deck guard, porch, stair (PT)	4x4x8 deck guard posts (2 per board)	4	$11.00	$44
Deck guard, porch, stair (PT)	2x6x12 deck guard cap *	3	$12.00	$36
Deck guard, porch, stair (PT)	2x4x12 deck guard rails *	6	$9.00	$54
Deck guard, porch, stair (PT)	2x2x42″ balusters, deck *	80	$1.50	$120
Deck guard, porch, stair (PT)	6x6x12 porch posts *	2	$60.00	$120
Deck guard, porch, stair (PT)	2x8x8 porch framing *	10	$11.00	$110
Deck guard, porch, stair (PT)	5/4x6x8 porch decking *	12	$9.00	$108
Deck guard, porch, stair (PT)	4x4x8 porch braces	2	$11.00	$22
Deck guard, porch, stair (PT)	2x12x16 stair stringers	3	$46.00	$138
Deck guard, porch, stair (PT)	2x12x8 treads (2 per board) *	7	$22.00	$154
Deck guard, porch, stair (PT)	4x4x10 top newels	2	$19.00	$38
Deck guard, porch, stair (PT)	4x4x8 bottom newels, supports, guard posts	6	$11.00	$66
Deck guard, porch, stair (PT)	2x4x16 porch + stair rails *	6	$14.00	$84
Deck guard, porch, stair (PT)	2x2x42″ balusters, porch + stair *	93	$1.50	$140
Water tower (PT)	6x6x16 posts *	4	$85.00	$340
Water tower (PT)	2x8x8 platform framing *	20	$11.00	$220

SECTION	ITEM	QTY	EACH	TOTAL
Water tower (PT)	2x6x8 platform decking *	36	$8.00	$288
Water tower (PT)	2x6x10 X braces *	24	$10.00	$240

* No listing at that exact size: priced from the nearest stocked size at the same price per foot. 8x8 posts and 20 ft treated boards usually come from a lumber yard.

Other materials, priced

ITEM	QTY	EACH	TOTAL
Concrete, 80 lb bags (66 cu ft: piers + stair pad)	111 bags	$6.15	$683
29 ga ribbed metal, roof + rain deck (+25% for trim, ridge, screws)	442 sq ft	$2.00	$884

Allowances (typical ranges, not price-checked)

ITEM	RANGE
Windows (13 at 3x4 + loft)	$2,800 to $4,900
Exterior doors (2)	$600 to $1,200
Panel siding, T1-11 / LP SmartSide (39 sheets)	$2,100 to $2,700
Housewrap, flashing, roof underlayment	$300 to $500
Hardware: post bases, hangers, ties, bolts, fasteners	$800 to $1,500
Sonotubes / pier forms	$150

Not included: Insulation, interior finish, plumbing, electrical, wood stove + class-A chimney (roughly $2,500-5,000), solar, IBC totes (about $150-350 each), gutters + first-flush, delivery, tax, labor.

Member sizes here are common residential sizes chosen to make an estimate possible (doubled 2x12 beams, 2x12 floor-1 joists, 2x6 walls at 16″, 2x8 rafters). They are not engineering: your engineer may size things up. The water tower carries about 2,400 lb per full tote and will likely need heavier framing than priced. A shipping-crate shell replaces most of the wall framing, wall sheathing and siding with the cost of the crates. Lumber prices move with the market, so re-check before buying.

Price sources: Home Depot: 2x12x16 ground-contact PT · Stine: 8x8x10 treated, ground contact · Hamshaw Lumber: 8x8x10 treated SYP · Home Depot: 10 ft pressure-treated lumber · Home Depot: 2x6 framing studs · Framing lumber price list 2026 · Home Depot: 2x10 framing lumber · Home Depot: tongue-and-groove plywood · Plywood vs OSB prices 2026 · Home Depot: 12 ft metal roofing · Home Depot: Quikrete 80 lb concrete · Lumber prices 2026 (market + tariff notes)

BUILD SEQUENCE

1. S-101 Lay out the 16 x 20 plate and the post grid, then pour piers below the frost and flood line.
2. S-101 / S-102 Set the six posts on uplift-rated bases, plumb and brace them temporarily, then fit the 45° knee braces.
3. S-102 Set the doubled beams on the 20 ft sides and the three crossbeams, then joists at 24 in. Frame the trap door opening with doubled headers and trimmers. Deck floor 1.
4. A-101 / A-301 Build or set the shell to 16 ft: crate pair, wood frame or stucco foam, same outside size. Frame floor 2 partway up, leaving the stair opening.
5. A-301 Frame the top: loft and deck floor across the full plate.
6. A-202 / A-301 Raise the 45° roof over the loft half and close both gables, with the loft door onto the deck.
7. A-101 Lay the metal rain deck on the other half, pitched to its own gutters, and build its guard rail.
8. A-201 / A-202 Dry-in: windows, doors, flashing, roofing, siding.
9. A-301 Install the listed wood stove, hearth and class-A chimney, following the maker's clearances. Fit smoke and CO alarms now.
10. S-101 / P-101 Build the water tower on its own piers, set the two IBC totes, and run the rain line through the first-flush and filter to the upper tote. Then run the gravity supply into floor 1.
11. P-101 Solar on the south roof slope and the tower, with the controller and batteries wired by a licensed electrician.
12. A-401 Build the detached porch and stair on their own posts and pad. The porch guard and stair rails meet at the top newel.

SYSTEMS

Water

The deck half is 160 sf. One inch of rain on the whole 320 sf roof is about 200 gallons, so the deck yields about 100 gallons per inch after first-flush. Water goes through a filter into the upper tote, overflows into the lower one, and reaches the house by gravity.

A closed rain loop cannot run a free pump. To lift water without the grid, use a hydraulic ram pump if you have a stream with fall, or a hand or small solar pump, then let gravity do the daily work. Filter and disinfect before drinking.

Heat and power

Floor-1 wood stove, chimney through all three levels. Cook and heat water on it. Stove clearances, hearth size and chimney height come from the stove's listing, NFPA 211 and your local code.

PV on the house roof and the tower. Finish the envelope and the stove before buying more panels. Later additions in the kit notes: an extra bay, a greenhouse under the stilts, a ram pump, a stove-side thermosiphon, a second tower.

SAFETY

- Working at height: the floor sits 10 ft up and the deck 26 ft up. Use guardrails, scaffolding and fall protection, and never work alone at height.
- Smoke and CO alarms on every level and in the loft. Wood stoves and propane heaters both make carbon monoxide.
- Generators run outside only, away from doors, windows and the carport.
- Keep fuel cans out of the carport and away from the stair and piers.
- Electrical, gas and solar work by licensed trades where your code requires it.

BUILD ON IT

Everything is generated from one file, dims.js. Change the plate size, floor heights, window positions or tower layout there, then regenerate. The 3D model, all ten sheets and the materials estimate follow automatically.

- dims.js: every dimension, in feet.
- model.js: the 3D model (three.js), exported as GLB.
- plans.js: the blueprint sheets (SVG) and the materials estimate.
- tools/build_downloads.py: rebuilds the SVGs, PDFs, GLB and ZIP.

Share what you change under CC BY-SA 4.0 so the next builder can learn from it too.

CREDITS

Devised by Kaiotei from lived builds. Math and research support from AI. Published by 13 <33 Covenant.