

# FOUNDATIONS



## Frost-Protected Shallow Foundations Cold-climate alternative uses specialized insulated forms

BY ROE OSBORN

When Mitch Frankenberg decided to build five small cottages to expand his B&B in central Vermont, he looked for a strategy that would fit within his budget. Pouring five separate conventional foundations with 4-foot-deep frost walls was out of the question. Instead, he decided to put each cottage on a frost-protected shallow foundation (FPSF).

### CAPTURING WARMTH FROM THE EARTH

An FPSF works by holding in the ambient warmth of the earth to prevent the soil below a shallow monolithic slab from freezing and heaving (see EPS Forms for a Shallow Foundation, page 42). The FPSF requires minimal excavation and much less concrete, resulting in savings that more than offset the additional cost of the insulation.

For these foundations, Frankenberg's contractor contacted J.E. McLaughlin, a local company, which fabricated L-shaped forms out

of 6-inch EPS foam. The EPS has a 2-pound density for greater compressive strength to withstand backfilling and concrete placement.

### SIMPLE MATERIALS

The beauty of this FPSF is that all the materials were simple and were easy to work with. After the initial excavation, the crew formed the footings with 2x4s. The EPS forms cut easily with a handsaw and fit together like giant Legos.

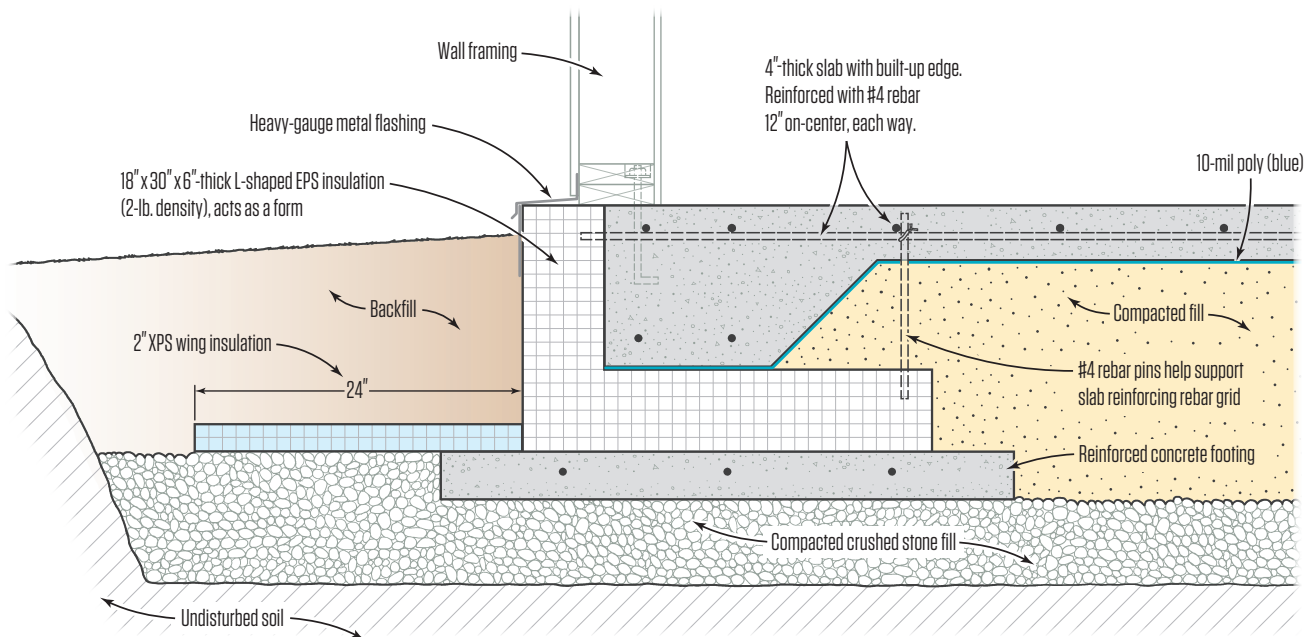
The built-up edges of the slab were formed by adding and compacting soil inside the EPS forms. Extra attention was paid to constructing the rebar grid, and the pour itself was straightforward. When finished, each slab was ready for the framing crew to come in and start building the little cottages.

*Roe Osborn is a senior editor at JLC.*

Photo: Tim Healey



## EPS Forms for a Shallow Foundation



**Capturing warmth.** The insulation around a frost-protected shallow foundation captures ambient warmth of the earth to keep the soil beneath the foundation from freezing and heaving. L-shaped EPS forms create a built-up edge for the reinforced monolithic slab and hold in warmth from the ground. XPS wing insulation raises the frostline around the building's perimeter.



**Excavation and footing.** The first step is excavating for the foundation assembly. With the excavation open, the crew can put down a layer of crushed stone. The crew sets up 2x4 forms for the footing, using a laser to make sure that they are perfectly level (1). After the crew stakes the forms in place, a concrete truck carefully fills them (2).

Illustration by Tim Healey; Photos: 1, Roe Osborn; 2, Mitch Frankenberg





**Insulated forms.** After the footings set, the crew cuts and fits insulated forms made from EPS foam for the slab (3). The forms cut easily with a handsaw, and the crew miters the corners. Next, they even out the ground inside the forms with a fresh layer of crushed stone, compacting the layers as they go (4).

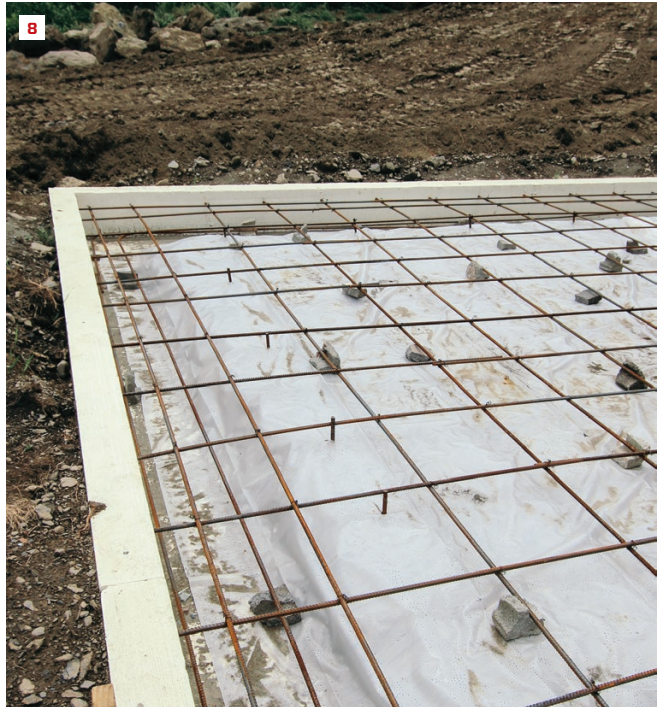


**Prepping for the slab.** After putting down horizontal wings of insulation around the base of the forms, the excavator backfills around the forms to lock them in place. Soil added inside the forms is compacted (5), and then the crew spreads a layer of poly as a vapor barrier below the concrete slab (6). Vertical sections of rebar will tie into the rebar grid for the slab.

Photos this page by Mitch Frankenberg



## FROST-PROTECTED SHALLOW FOUNDATIONS



**Rebar grid.** A grid made from 1/2-inch rebar forms the reinforcement layer for the monolithic slab (7). The ends of the bar insert into the foam, and pieces of CMU act as chairs for the grid to sit on. Each intersection is wire-tied together and anchored to the vertical rebar sections. An additional layer of rebar below the main layer reinforces the built-up edge of the slab (8).



**Slab placement.** The concrete crew places the slab, screeding the mix flush with the top of the forms (9). The treated sills for the walls attach to the slab with concrete screws for positioning (10). Embedded J-bolts around the perimeter of the slab provide permanent anchoring for the framing.

Photos: 7 & 8, 10, Tim Healey; 9, Mitch Frankenberg