

POURING A SHALLOW Frost-Protected Slab

by Lee McGinley



High-density foam lines the forms and covers the subgrade of this slab-on-grade. Note the foam “pilasters,” which help stabilize the rigid foam against the 2x12 form boards.

High-density foam board simplifies slab construction in cold climates

I first discovered shallow-grade frost-protected foundations in 1976, while designing a home for the FmHA market. The lead carpenter working with me on the project suggested that I try this “new Scandinavian system,” which he had used twice with success. I was further encouraged when the FmHA county administrator agreed to approve a mortgage for construction using the foundation system. The house sold quickly, and I have been a proponent of the system ever since.

With a frost-protected shallow (FPS) foundation, it isn’t necessary to place footings below the frostline. Instead, high-density rigid foam insulation placed around the perimeter of the slab holds the heat of the earth and prevents the foundation from heaving (see “Frost-Protected Shallow Foundations,” 9/96). A bed of compacted gravel below the foam provides a free-draining base, further protecting against frost action.



Insulated formwork. Two-by-twelve form boards are lined with 1½-inch-thick extruded polystyrene insulation board. The author digs the footing trench a full 24 inches deep (inset) to make use of the full width of the foam board insulation.

Over the years, I've experimented with various methods to form up the slab, secure the foam to the concrete, and protect the foam from harmful UV rays. I was looking for techniques that could be accomplished quickly in the field, and were relatively foolproof. This article describes my latest refinements. The details described here are for my climatic zone in the Northeast. Before designing an FPS foundation, get a copy of the *Design Guide for Frost-Protected Foundations* (\$29 from the NAHB Research Center, 400 Prince Georges Blvd., Upper Marlboro, MD 20774; 800/638-8556).

Getting to Work

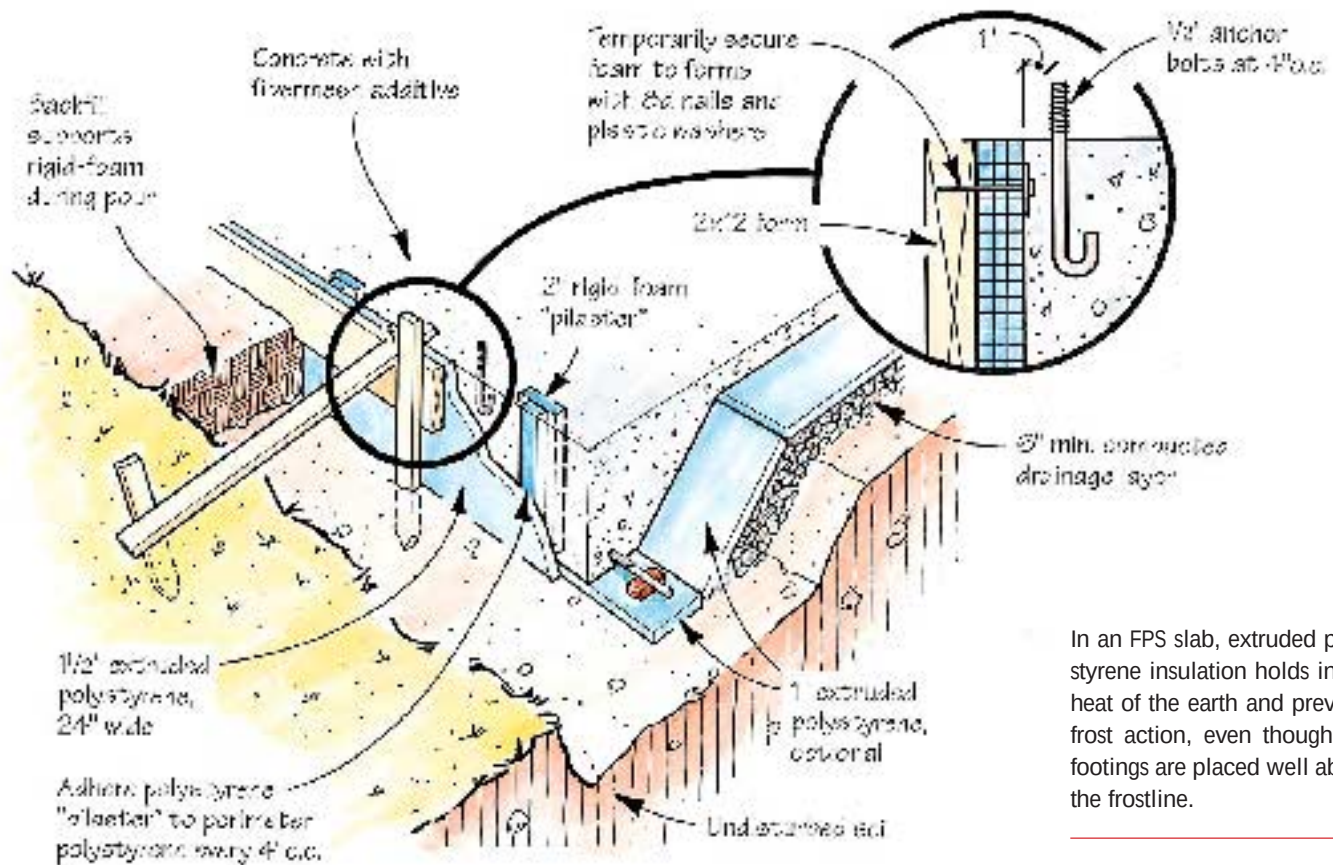
First, the excavator scrapes the topsoil and digs the perimeter trench, sculpting the sides to form a thickened edge and allowing for a 12-inch base of compacted stone or sand.

Next, we form the slab with 2x12s,



Ready to pour. After the sand base is compacted, 1-inch-thick foam board is laid over the entire subgrade and in the footing trenches. The forms have been backfilled to prevent movement during the pour. Note the pressure-treated 2x6 screed attached to the house.

Frost-Protected Slab Construction



In an FPS slab, extruded polystyrene insulation holds in the heat of the earth and prevents frost action, even though the footings are placed well above the frostline.

using wooden stakes and braces to hold the forms in place and keep them steady. In our zone, we attach 1 1/2-inch-thick extruded polystyrene insulation to the inside of the 2x12s, securing it to the forms with roofing tins and 8d nails or 2 1/2-inch Plasti-Caps. We nail every 12 inches or so, keeping the nails within a few inches of the top surface of the foam so that we can cut them off later with a recip saw. We use the full 2-foot width of the rigid foam, because this allows us to maintain the proper elevation above grade and gives us enough material below grade against which to backfill.

Be sure when you order foam for an FPS slab that you specify a high-density board suitable for use under a slab. We use Dow Styrofoam brand, but several other brands are available.

Making certain that the foam board fits snugly against the slab and remains in place has always been a problem. If this isn't done properly, soil can get between

the foam and the concrete, which reduces the insulation's effectiveness. Recently, we've been accomplishing this by making "pilasters" from 2-inch-thick rigid foam (visible above and in the photo on page 44). We glue these to the form work every 4 feet on-center with a foam-compatible construction adhesive. After the concrete is placed, these help lock the perimeter foam in place. Once the insulation board is snugly in place, we backfill against the outside.

Extra Foam for Extra Energy Savings

Although the design guidelines don't require it, I prefer to place 1-inch-thick rigid foam under the entire slab to save future energy costs. Once this foam is in place, we are ready to pour the slab. While the concrete is firming up, we set anchor bolts around the perimeter every 4 feet on-center, starting 1 foot in from each outside corner.

After the slab has set, I take a recip-

rocating saw with metal blade, slip it between the perimeter foam and the 2x12 form boards, and cut the nails. The forms fall away and we're ready to build.

Just before the final grading, I coat the exposed foam board with a cementitious coating to protect it against UV degradation and physical damage. We use a product called Retro Flex, manufactured by Retro Tek (P.O. Box 220, Waunakee, WI 53597; 800/225-9001). A two-gallon pail was enough to do the slab pictured here; it cost \$37, including shipping.

Cost Considerations

The addition shown here, which my company built in 1995, has a 450-square-foot footprint. Two men were able to set the forms, place the rigid foam, and backfill by hand in less than a day. The savings over a conventional 4-foot concrete frost wall was about \$2,000.



Certified Remodeler Lee McGinley builds and remodels in the Casco, Maine, area.