

Chapter 5

Energy-Efficient Foundations and Floors

Recommendations	First Cost	% Estimated Savings		Radon Prevention Measure
		Cooling	Heating	
1. Choose slab-on-grade foundation, not crawl space foundation.	R	0-10	0-10	—
2. Follow standard recommended slab construction practices, including: wire mesh layer or control joints, gravel/polyethylene/sand layers, isolation joint at footing, ground sloped away from slab, cured slab.	N	—	—	Yes
3. Seal all penetrations.	S	—	—	Yes
4. Use foundation plantings to shade slab perimeter.	S	0-2	—	—
5. Consider using perimeter insulation.	M	0-2	0-10	—
6. Select tile or stamped concrete finish.	H	0-10	0-10	—
7. Seal and insulate crawl space ceiling.	S/M	—	—	Yes
8. Vent crawl space.	N	—	—	Yes
9. Insulate floors over garages or other nonconditioned spaces to R-11.	S/M	0-5	0-10	—
10. Leave space for ductwork in floor of second story.	R/N	0-10	0-10	—
11. Seal sill plate.	S	5	5	Yes
Maximum Combined Total	H	25	25	

Cost Codes: R = reduced
 N = negligible
 S = small (<\$0.25/ft² of floor area)
 M = medium (>\$0.25 and <\$1.00/ft² of floor area)
 H = high (>\$1.00/ft² of floor area)

Marketing Energy-Efficient Foundations and Floors

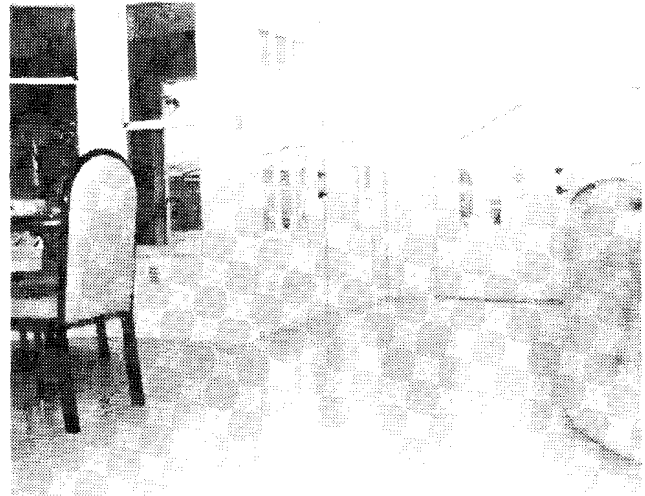
The foundation of a house appears to be an unlikely source of energy savings. However, this chapter offers construction recommendations that are cost-effective for both saving energy and preventing migration of radon or other gases from the soil. Most of these measures already are established practices. Unfortunately, too many builders and subcontractors overlook them. They should be used throughout Florida but are most important where higher radon levels exist.

This chapter also contains information on floor finishes and second-floor construction that can contribute to an energy-efficient home — together with the following tips on how to educate home buyers on the desirability of these features.

Explain to your clients the steps you have taken to minimize the chance of water, heat and cold infiltrating through cracks in and around the foundation. Show photos of other job sites where slabs have cracked or sill plates are not properly caulked, and then show photos of the foundations you built that incorporate the recommendations in this chapter. Clients will grasp the differences and view you as both an energy-conscious home builder and a quality builder.

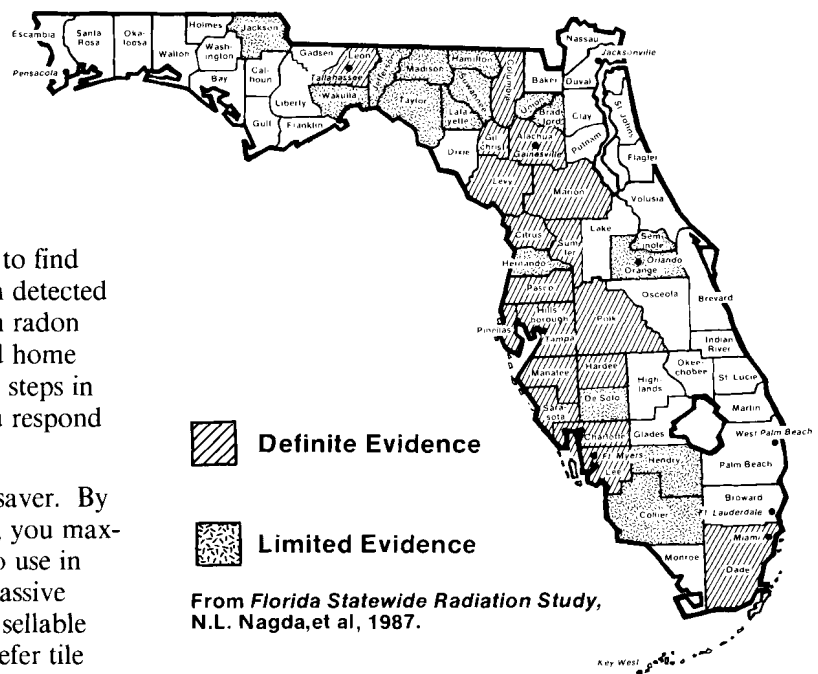
In certain parts of the state, the concentration of radon in the ground is high enough that harmful gases can migrate through cracks in the foundation into the house. The adjacent map shows areas where soil tests indicate potentially harmful levels. However, you should contact local and state health departments to find out if high radon concentrations have been detected near your building site. News coverage on radon has raised the concern of home buyers and home owners. By following the radon-reduction steps in this chapter, you can show clients that you respond to their concern.

You can market a slab floor as an energy saver. By choosing stamped concrete or ceramic tile, you maximize the use of the slab for heat storage to use in conjunction with natural ventilation and passive solar heating. Moreover, you have a very sellable floor: A survey showed that Floridians prefer tile floors to wood ones.



A ceramic tile floor can help sell houses.

One of this chapter's recommended strategies is to plan the construction of the second floor in two-story homes with space for ductwork. Depending on the home layout, the quantity of ducting may be reduced, with an overall cost savings that can give you an edge on a competitor. Moreover, you can inform potential home buyers that you may have saved them 10% on their heating and cooling bills!



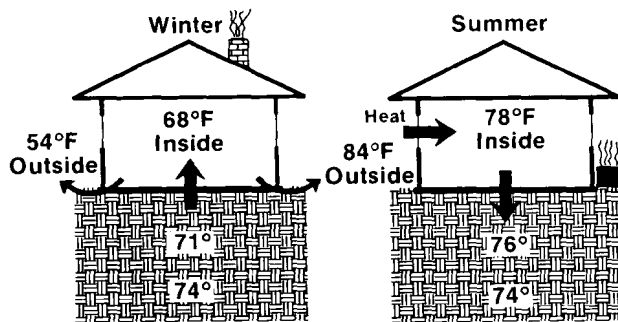
Florida counties with evidence of elevated radon potential.

Constructing Energy-Efficient Foundations and Floors

1. Choose slab-on-grade foundations

Slab-on-grade foundations are usually more energy-efficient than raised (crawl space) foundation systems. Heat flow between the ground and slab varies — depending on the type of soil, amount of rain or shade at site, etc. — but a slab-on-grade foundation may reduce home space conditioning costs by as much as 10%.

In South Florida, slabs can reduce heating requirements by 10% and cooling requirements by 0-3%. Conversely, in North Florida, slabs can reduce cooling requirements by about 10% and heating requirements by 0-3%. This cost savings derives from the fact that year-round deep earth temperature stays constant. In Florida it ranges from 70°F (north end of Florida) to 78°F (south end of Florida).

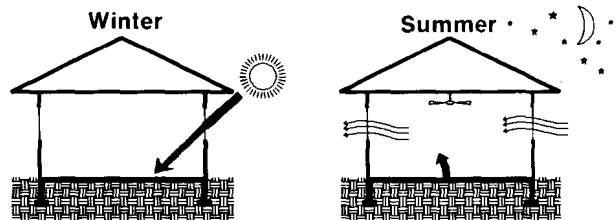


In winter, heat flows in from the earth and out through the slab perimeter. In spring and summer, the ground helps remove heat.

In summer, if occupants keep their house at 78°-82°F, the cooler ground can take heat away from the house. In winter, if occupants keep their house at 65°-70°F, the warmer ground can be a benefit (see drawing above). However, the perimeter of the slab (outside edges) loses heat to the cold outdoors. Unless the perimeter is insulated the slab may not help much in heating the home. But crawl spaces lose heat to the cold outdoors in winter and provide no summer benefit.

Concrete slab floors also can be used to store heat. During the summer, daytime heat can be stored for removal at night by ventilation. During the winter, passive solar heat (see Chapter 4) can be stored dur-

ing the day to keep the occupants comfortable through the evening and night.



Slab floors can store the sun's heat in winter and the coolness from night-vented air in spring, fall and summer.

2. Follow recommended slab construction procedures

For durability of the slab foundation, a number of standard measures should be followed. (See drawings on next page.) They will reduce moisture migration from the ground to the house and keep the air conditioner from working as hard. More important, they may deter the leakage of dangerous gases such as radon or pesticides from the soil into the house.

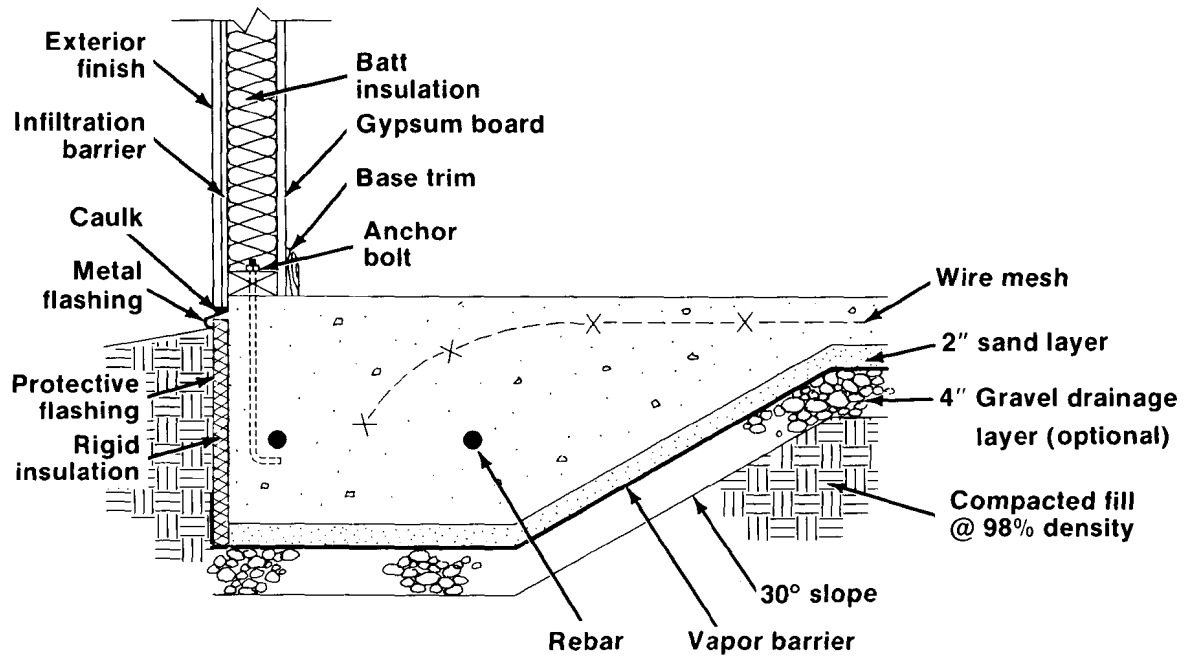
Radon. Despite uncertainties about the causes and effects of radon concentration in houses, there is general agreement that:

- Dangerous levels of naturally occurring radon can be found in some homes.
- Radon usually gets into the home from cracks in or around the foundation.

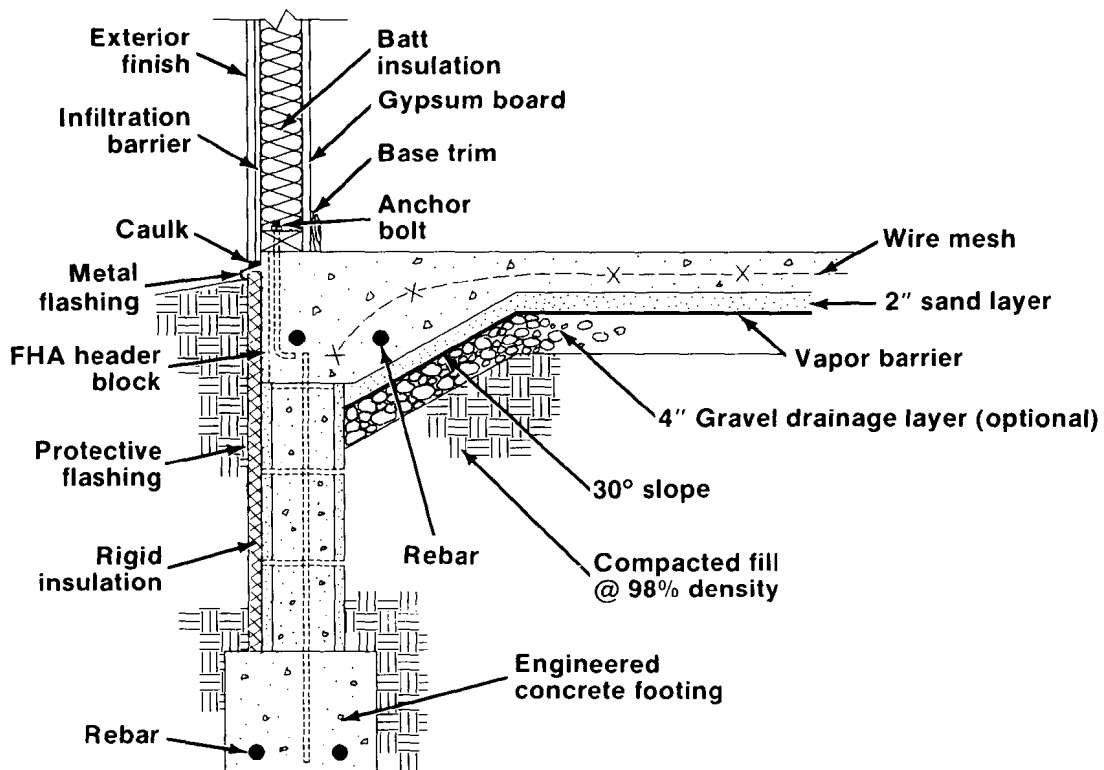
The following radon-reducing steps are suggested measures at this time. The State of Florida may come out with standards in the near future that would supercede any recommendations given here.

- Place wire-mesh reinforcement in the concrete floor slab to minimize cracking. Support the mesh while the concrete is being poured so that it is embedded at the mid-height of the slab.
- Pour the floor slab on 2 inches of sand over a 6-mil polyethylene sheet. The 2-inch sand layer helps cure the concrete to minimize shrinkage cracking, and it also reduces the risk of damage to the gas barrier during the pouring of the concrete. The 6-mil polyethylene sheet is a barrier for

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Recommended monolithic slab-on-grade construction.



Recommended stem wall construction.

