

Chapter 2: Foundations

Crawlspace

[V502.1.2]

Vents. Vents in the crawlspace help keep floor insulation and floor framing dry. Crawlspace vents also reduce the potential for radon buildup under the floor.

Ventilation required is equivalent to the Washington State amendments to the *International Residential Code* (IRC) requirement (1 sq.ft. of net free vent area for each 300 sq.ft. of crawlspace area, or 1/300 sq.ft.).

Vents must be placed below floor insulation (see Figure 2-1) or they must be properly baffled (see Figure 2-2).

Insulation. If you choose a prescriptive compliance path, the *Washington State Energy Code* (WSEC) requires that the floor over the crawlspace be insulated to the required value determined by using WSEC Tables 6-1 or 6-2.

Figure 2-1

Foundation Vent

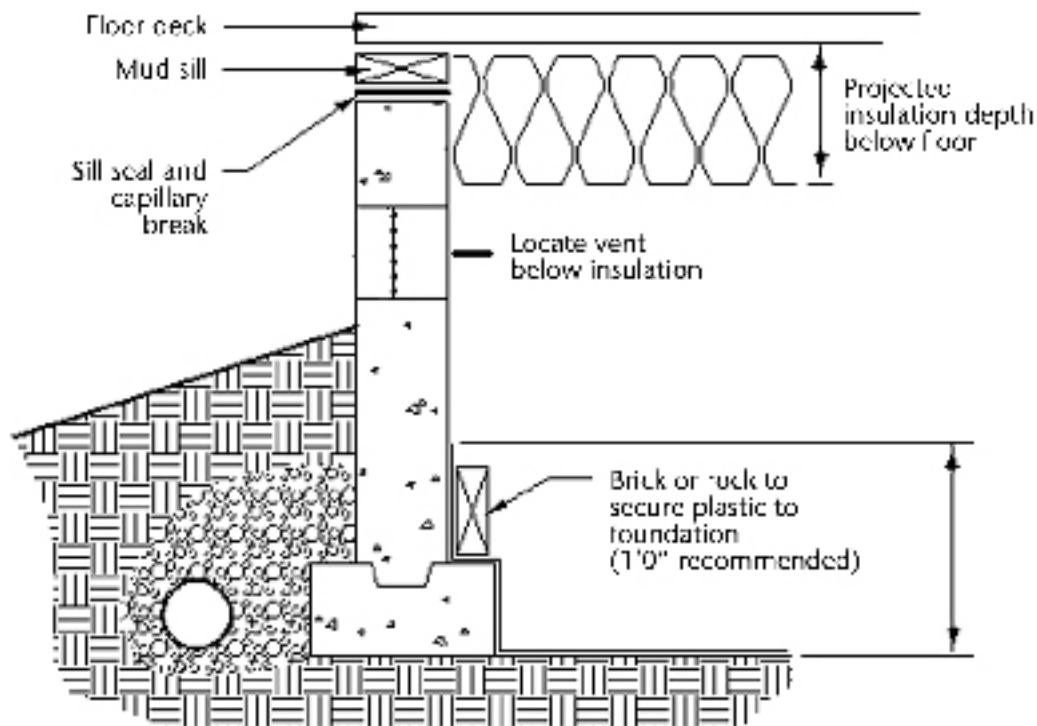
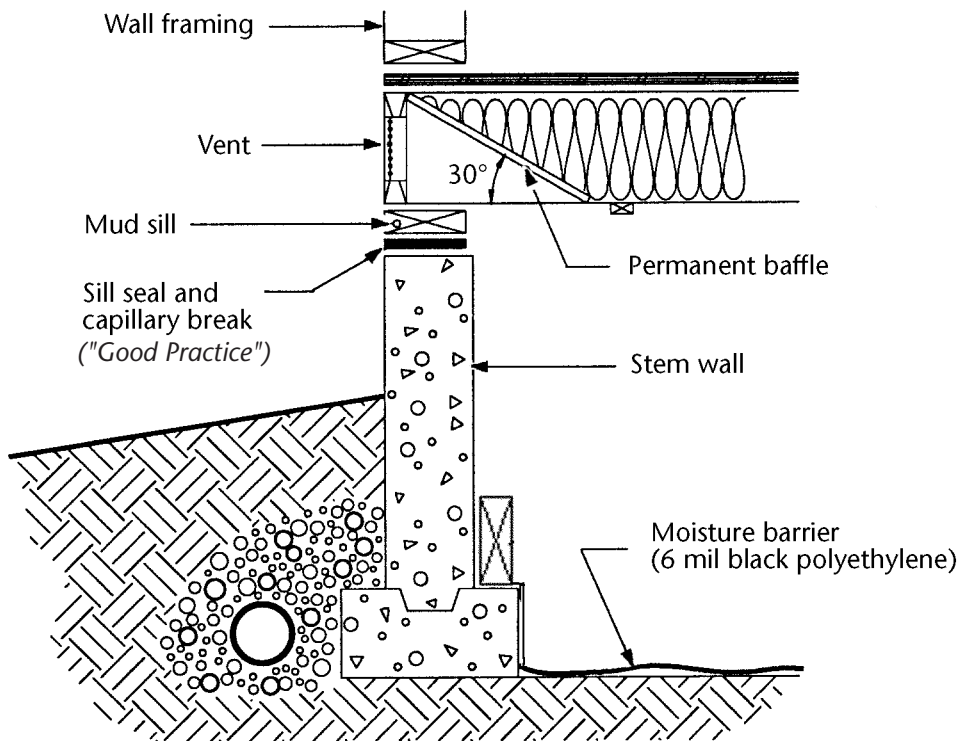


Figure 2-2

Baffled Foundation Vent



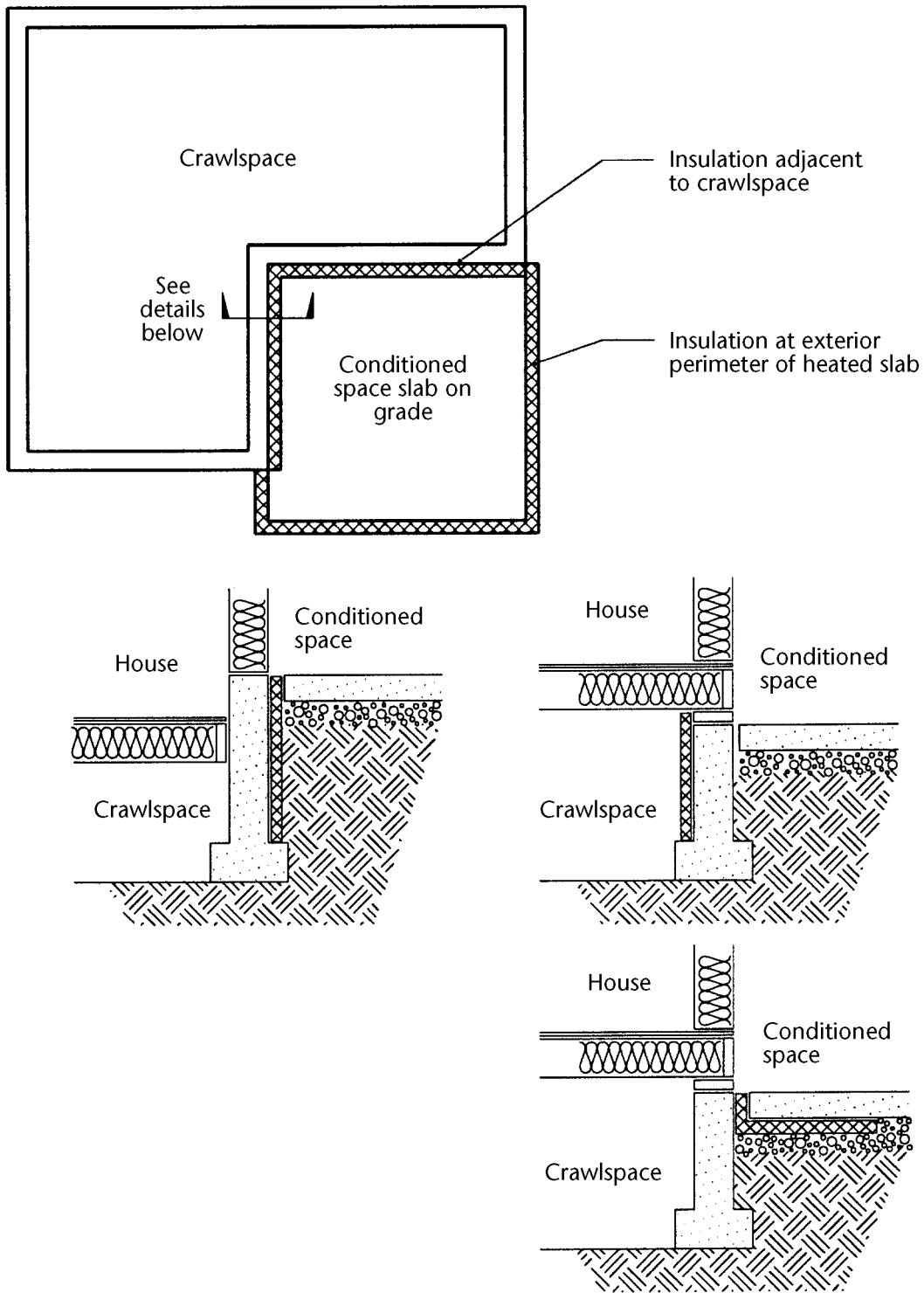
[502.1.4.8] **Thermal Break.** Where a crawlspace stem wall abuts a slab-on-grade within a conditioned space, insulation must be used to create a thermal break (see Figure 2-3 for possible detail.)

[502.1.6.7] **Ground Cover.** Six-mil black polyethylene (or approved equal) must be laid over the ground within all crawlspaces.

The ground cover:

- Must extend to the foundation wall.
- Seams must be lapped 12 inches (see Figures 2-1 and 4-6).
- May be omitted if a minimum 3-1/2-inch concrete slab is poured in the crawlspace.

Figure 2-3
Thermal Breaks



Slab-On-Grade

- [201.1] Defined by the Code as any slab with its top surface less than 24 inches below the final exterior grade (see Figures 2-4, 2-5, and 2-7). In such cases, you must:
- Maintain a thermal break at the edge of a slab. Slabs must not run continuously from heated to unheated areas (See Figures 2-8 and 2-9).
- [502.1.4.8]
- Extend R-10 insulation for a total of 24 inches either vertically or a combination of vertically and horizontally around the entire on-grade perimeter.
 - Install water-resistant insulation material manufactured for this purpose.
 - Install a cover flashing or parging to protect the insulation from moisture and physical damage above grade.
- [502.1.4.9] **Radiant Slabs.** If a radiant heating system is to be installed in a slab, a minimum of R-10 insulation (all zones) is required under the slab. The entire area of radiant slab in contact with the ground must be thermally isolated (see Figure 2-6).

Notes:

Ducts. Any heating system ductwork in or under a slab must be insulated to R-5 with insulation manufactured for this use.

Pipes. Any hot water pipes buried under a slab must be insulated to the value noted in Table 5-12. (R-3.6 for $\leq 2''$ pipe, R-5.4 for $> 2''$)

Combustion Air. Installation of a wood stove or other solid fuel combustion appliance in a basement must provide combustion air to the appliance.

Figure 2-4

Slab Construction Perimeter Insulation

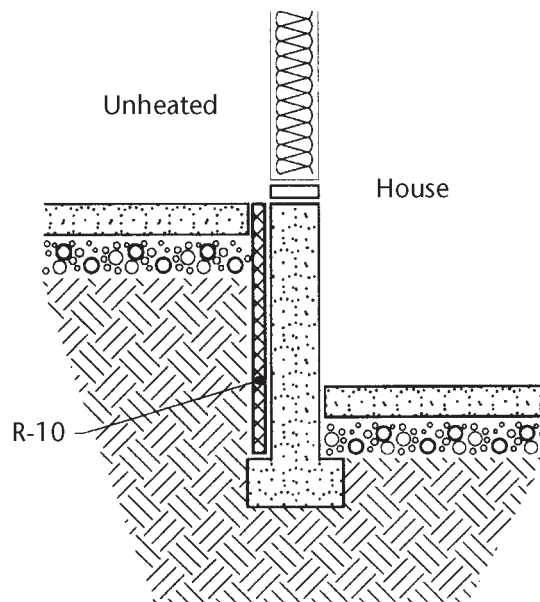
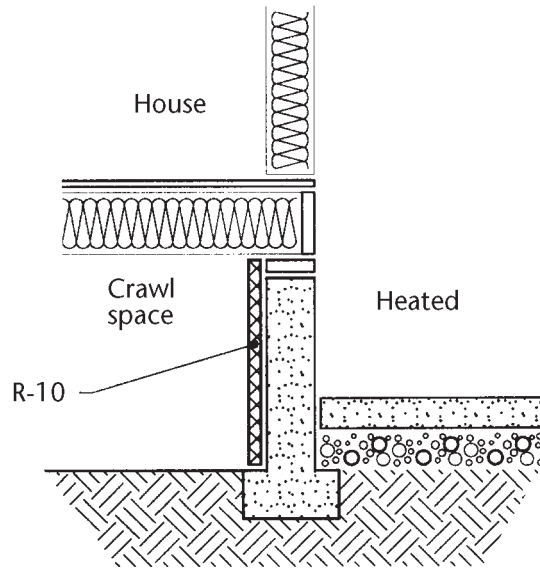


Figure 2-5

Slab-on-Grade

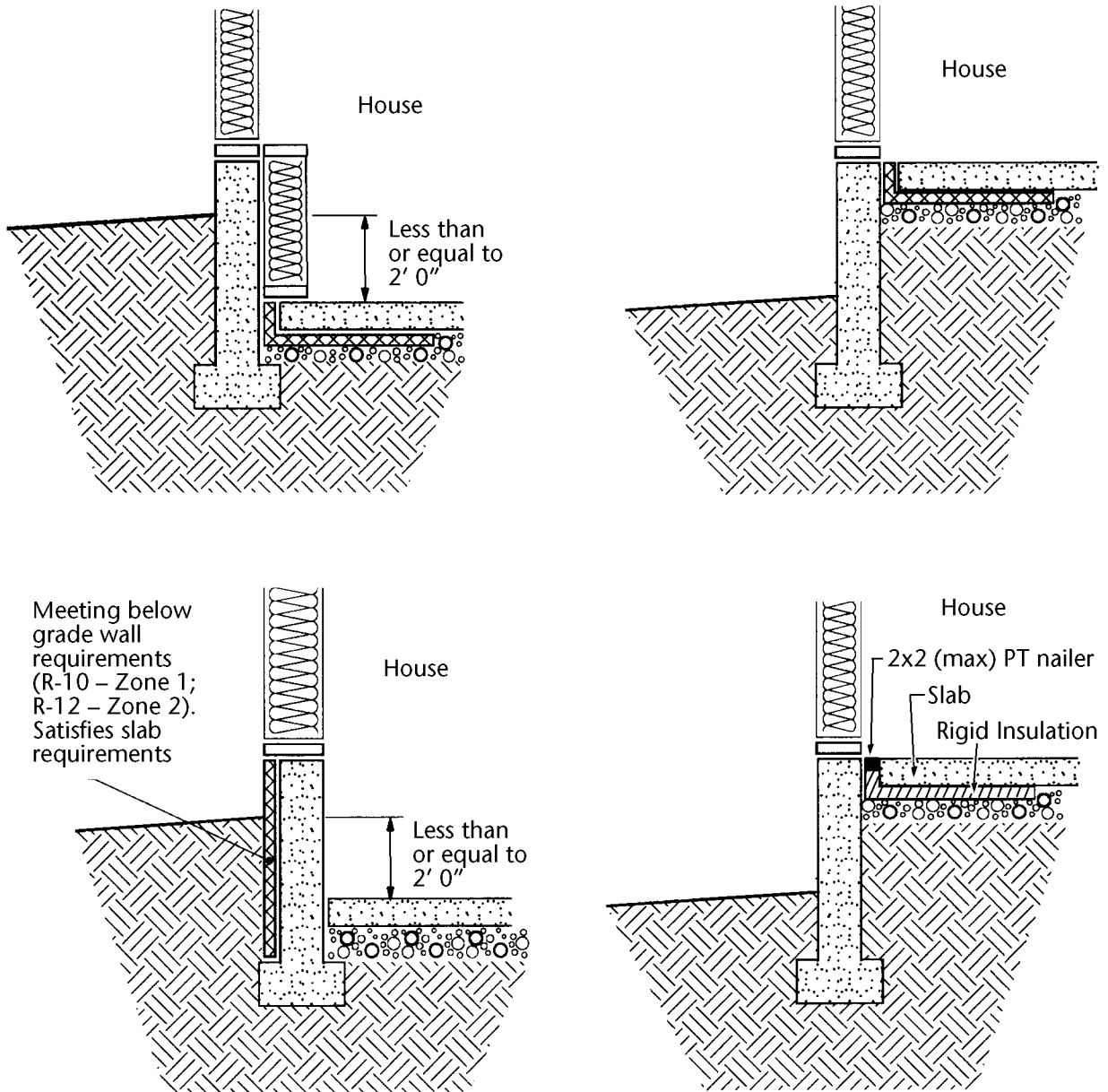


Figure 2-6

Monolithic Slab-on-Grade

Typical Slab with No Radon Source Control

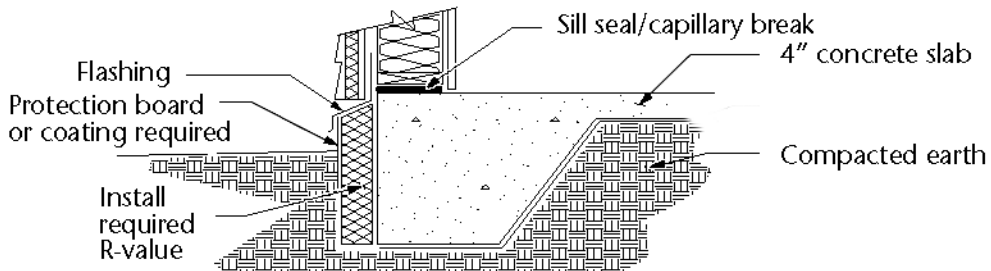
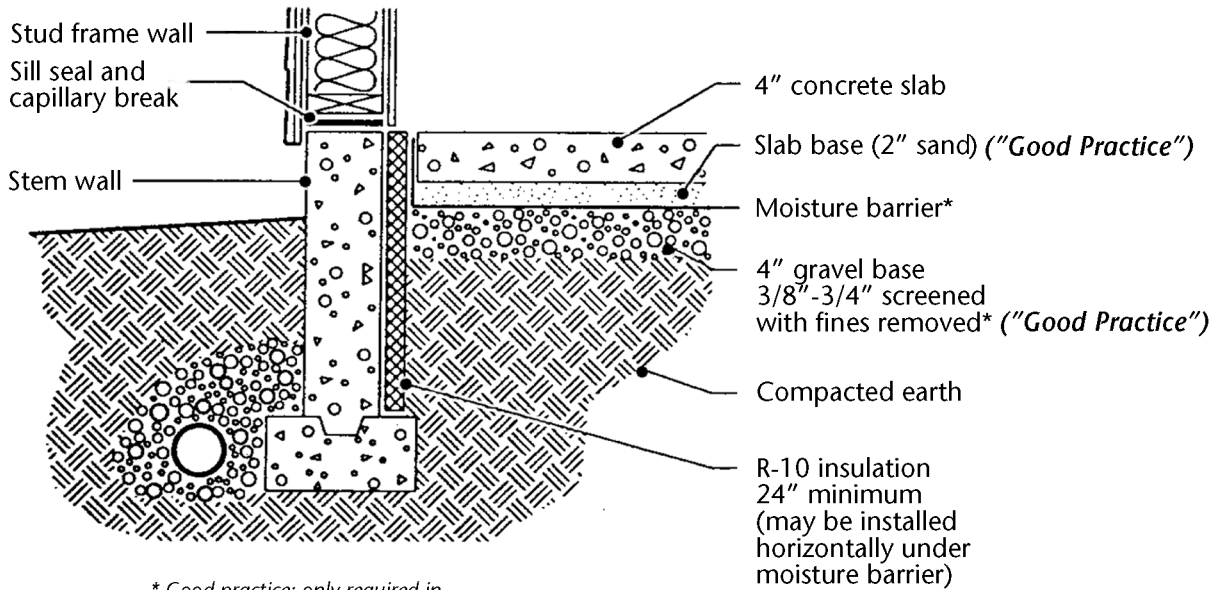


Figure 2-7A

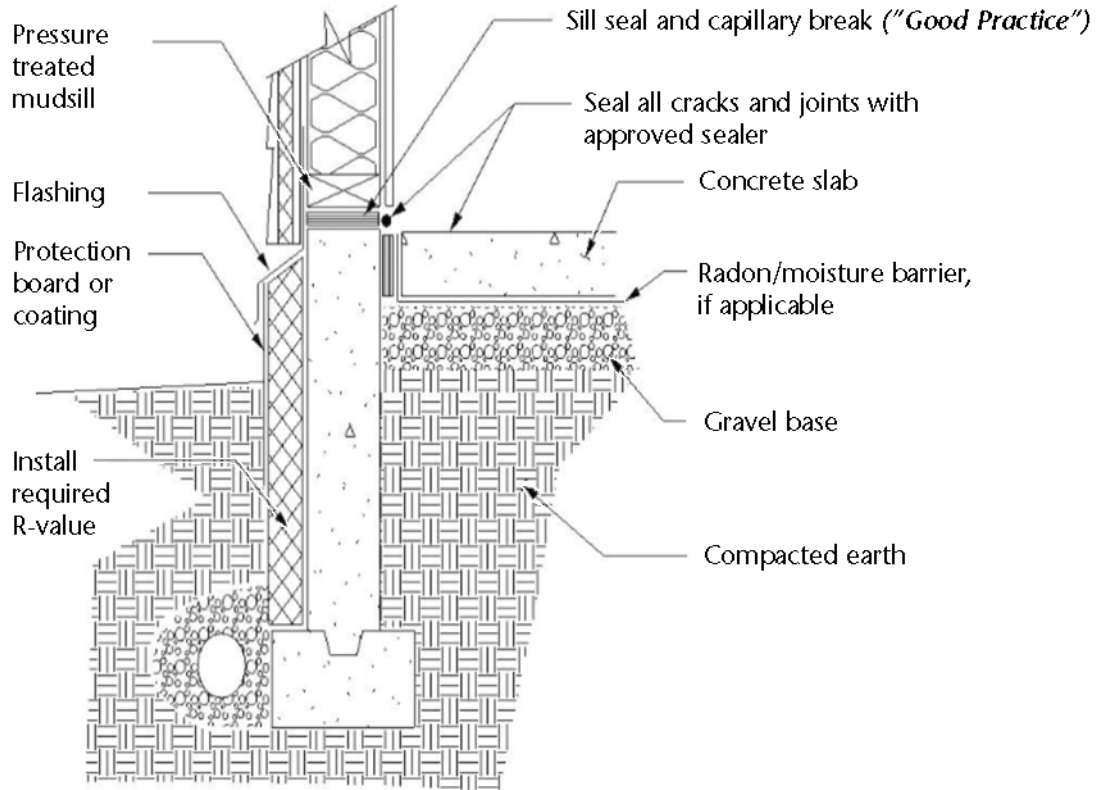
Interior Insulation



* Good practice: only required in higher risk radon counties.

Figure 2-7B

Exterior Insulation



Note: See Appendix F of the International Residential Code for membrane requirements in radon counties.

Figure 2-8

Possible Slab Insulation Details

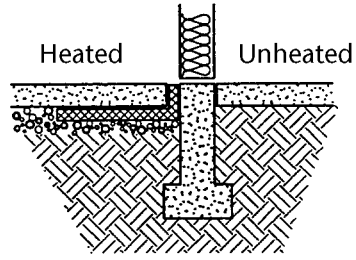
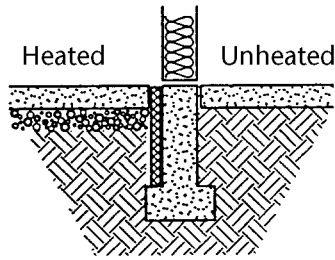
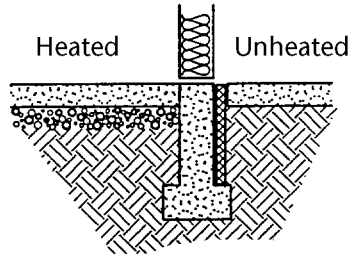
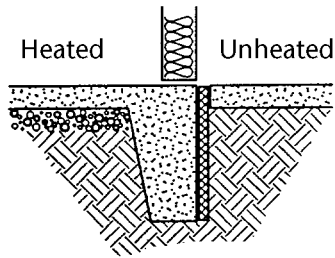
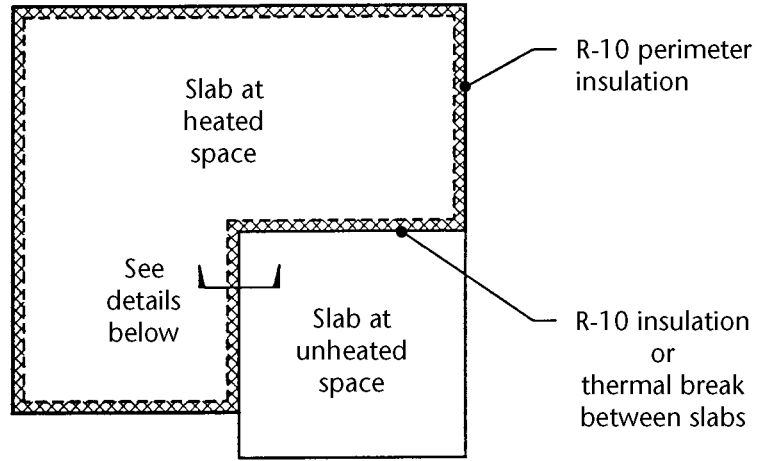
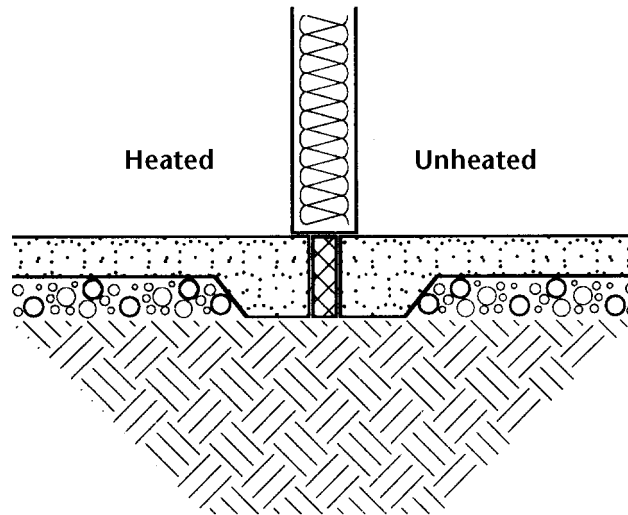
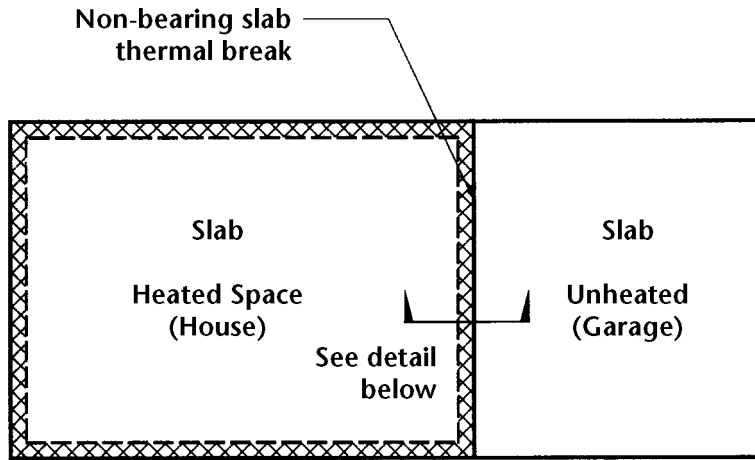


Figure 2-9

Non-Bearing Slab Thermal Break



Basements

Any basement with a heat source must have insulated walls. For a basement to be considered unheated and not require wall insulation, there must be no heat supplied. An unheated basement must be thermally isolated from adjoining conditioned spaces. This would include:

- Ceiling insulation (i.e. the floor above).
- Insulated stairwell walls.
- A weatherstripped access door.
- Insulated and sealed ducts and pipes.

[502.1.4.10]

Below-Grade Walls. For the purposes of the Code, wall sections that extend 24 inches or less above grade may be considered below-grade walls.

Insulation:

- May be placed on either the interior or the exterior of the wall.
- The minimum required R-value is determined by the compliance path chosen.

Exterior insulation must:

- Be approved for below-grade installation.
- Extend from the top of the below-grade wall to the top of the footing.
- Be protected where it extends above grade (see Figure 2-10).

Interior insulation must:

- Extend from the top of the below-grade wall to the top of the below-grade floor (see Figure 2-11).

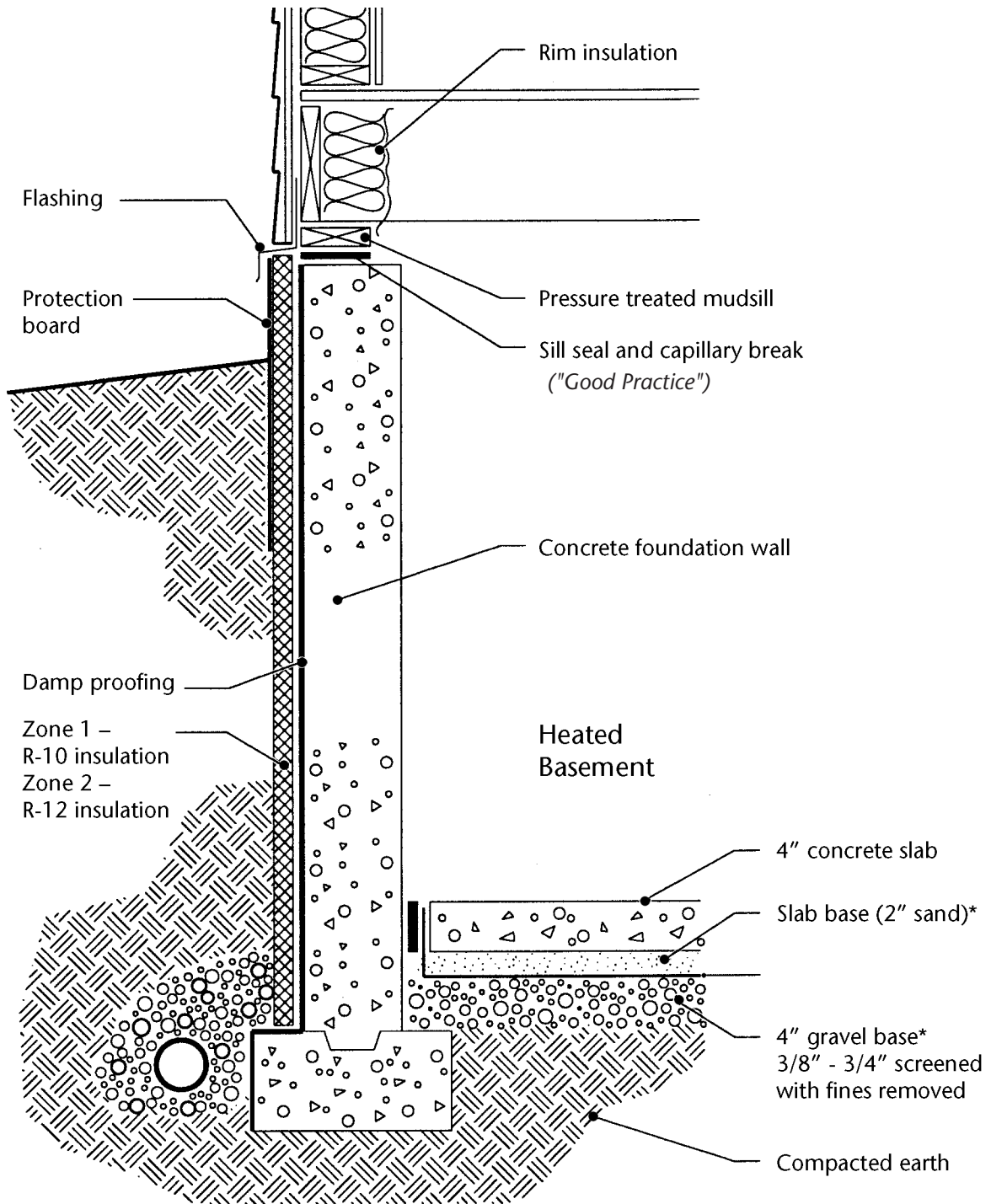
Daylight Basement. Pay attention to corner details when insulating a daylight basement (see Figures 2-12 and 2-13 for examples). Anywhere the slab in a daylight basement is within 24 inches of the finish grade, perimeter slab insulation is required.

Note:

Ducts and pipes in the slab and combustion air requirements are the same for heated basements as they are for slab-on-grade. Unheated basements require R-8 duct insulation. Any hot water pipes buried under a slab must be insulated to the value noted in Table 5-12. (R-3.6 for > 2" pipe, R-5.4 for $\geq 2"$, see *Notes* on page 2-4).

Figure 2-10

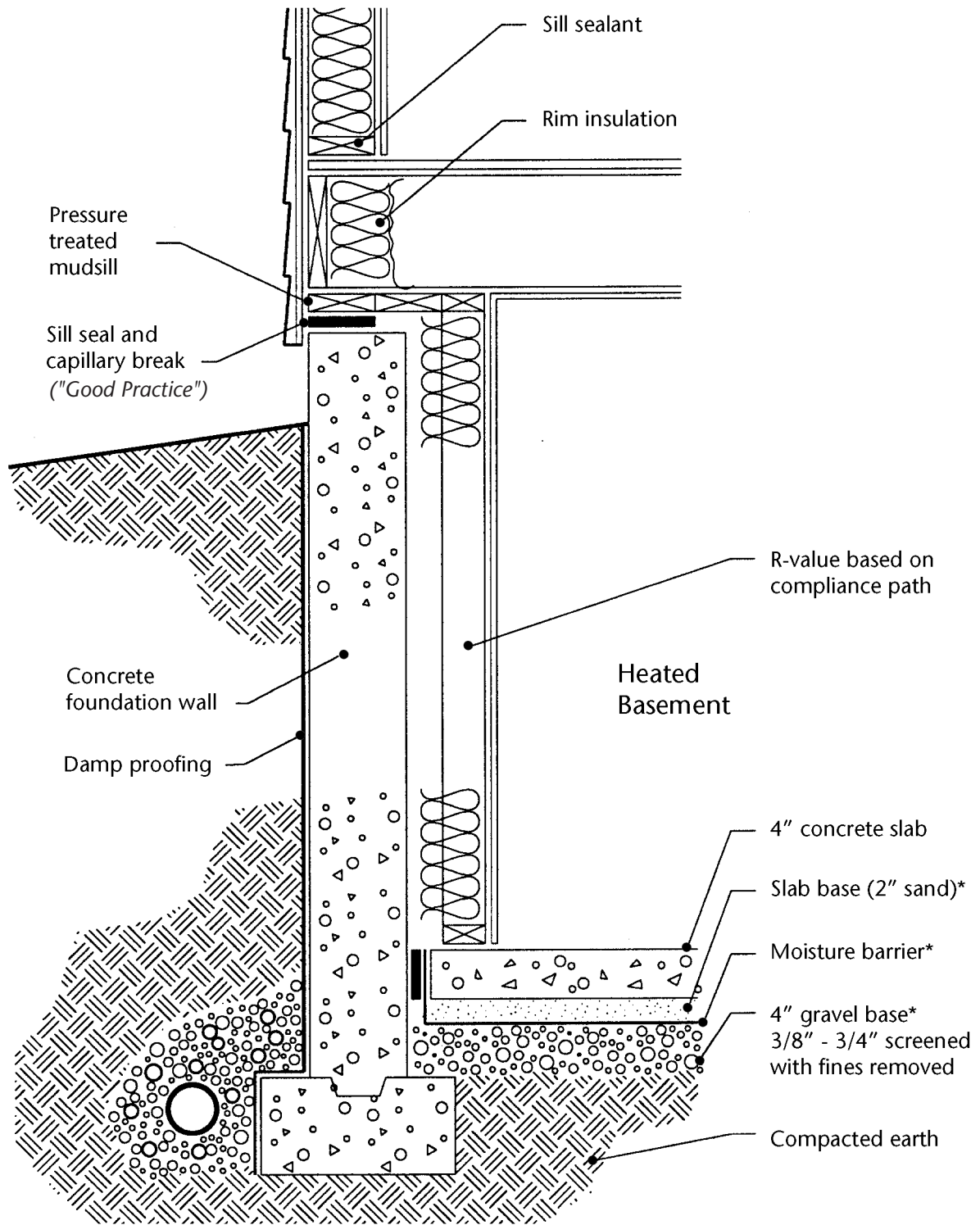
Heated Basement: Exterior Insulation



* Good practice: required only in higher risk radon counties.

Figure 2-11

Heated Basement: Interior Insulation



* Good practice: required only in higher risk radon counties

Figure 2-12

Heated Daylight Basement: Exterior Insulation

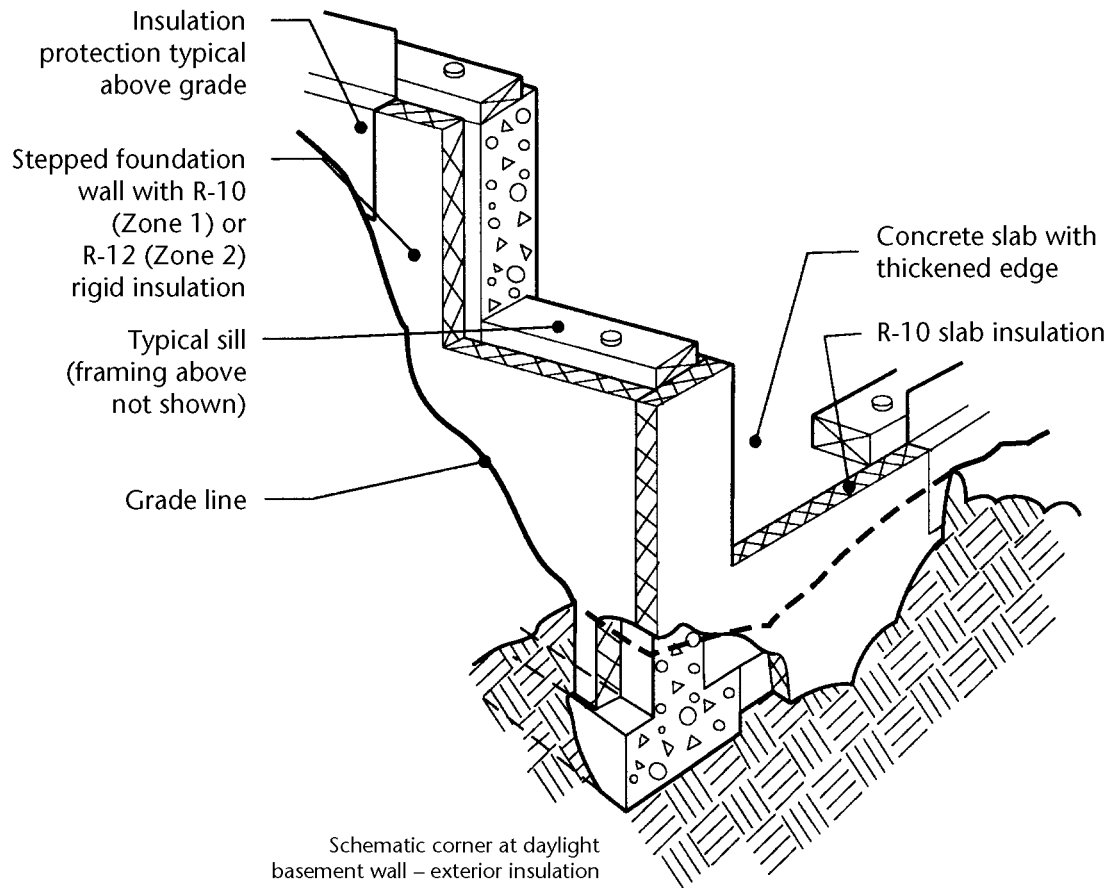


Figure 2-13

Heated Daylight Basement: Interior Insulation

