

# Footers

## R403.1 General.

All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footings shall be designed and constructed in accordance with the provisions of R403, or in accordance with ACI 332.

**R403.1.1 Minimum size.** Minimum sizes for concrete and masonry footings shall be set forth in Table R403.1 and Figure R403.1(1). The footing width, W, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152 mm) in thickness, T. Footing projections, P, shall be at least 2 inches and shall not exceed the thickness of the footing. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

### R403.1.3.1 Foundations with stem-walls.

Foundations with stem-walls shall be provided with a minimum of one No. 4 bar within 12 inches of the top of the wall, and one No. 4 bar located 3 inches to 4 inches from the bottom of the footing.

**R403.1.3.3 Slabs-on-ground with turned-down footings.** Slabs-on-ground with turned down footings shall have a minimum of one No. 4 bar at the top and bottom of the footing.

### Exception:

- For slabs-on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.

Where the slab is not cast monolithically with the footing, No.3 or larger vertical dowels with standard

hooks on each end shall be provided in accordance with Figure R403.1.3.2. Standard hooks shall comply with Section R611.5.4.5.

**R403.1.4 Minimum depth.** All exterior footings and foundation systems shall extend below the frost line.

**The minimum depth for footings in Richmond / Madison County is 24-inches.** The minimum depth shall be measured from the proposed finished grade to the bottom of the footing. The minimum frost protection depth can be obtained by back-filling with non-compacted soil above the base of the footing to a depth equal or greater than 24-inches plus an additional 4-inches. The maximum slope of that non-compacted soil cannot exceed a 2 to 1 ratio. If solid rock is exposed during the preparation of the finished site grade, then the footing may bear on the solid rock and shall not be required to extend below the specified frost protection depth.

**TABLE R403.1  
MINIMUM WIDTH OF CONCRETE OR  
MASONRY FOOTINGS (inches)**

	LOAD-BEARING VALUE OF SOIL (psf)					
	1,500	2,000	2,500	3,000	3,500	4,000
<b>Conventional light-frame construction</b>						
1-story	16	12	10	8	7	6
2-story	19	15	12	10	8	7
3-story	22	17	14	11	10	9
<b>4-inch brick veneer over light frame or 8-inch hollow concrete masonry</b>						
1-story	19	15	12	10	8	7
2-story	25	19	15	13	11	10
3-story	31	23	19	16	13	12
<b>8-inch solid or fully grouted masonry</b>						
1-story	22	17	13	11	10	9
2-story	31	23	19	16	13	12
3-story	40	30	24	20	17	15

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kN/m<sup>2</sup>

**R403.1.4.1 Frost Protection** Except where otherwise protected from frost, foundation walls, piers, and other permanent supports of buildings and structures shall be protected from frost by one or more of the following:

- Extend below the frost line.
- Construct in accordance with R403.3
- Construct in accordance with ASCE 32, or
- If erected on solid rock.

### Exceptions:

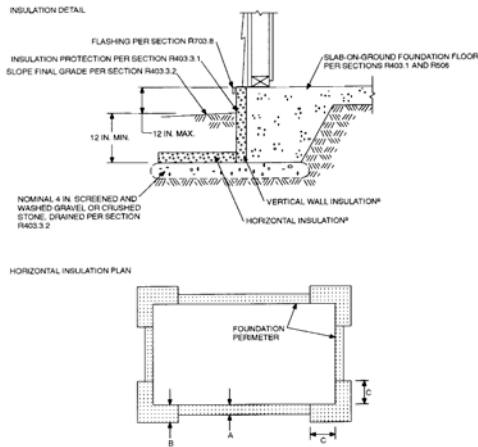
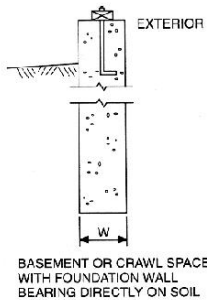
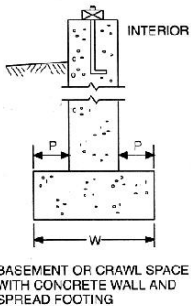
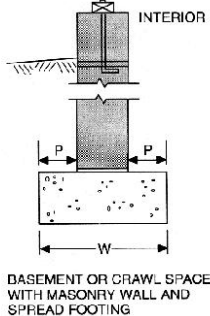
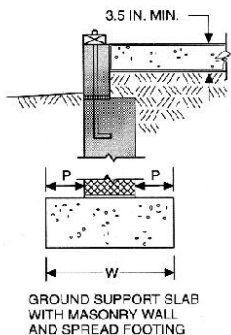
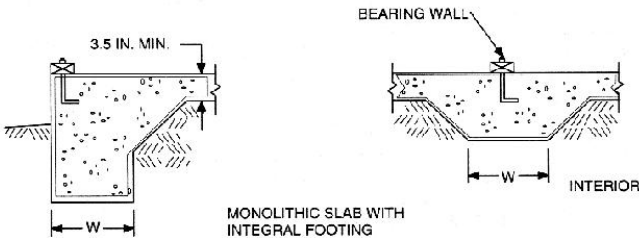
- Freestanding accessory structures 600 sq. ft. or less of light-frame construction, with an eave height of 10-feet or less.
- Freestanding accessory structures 400 sq. ft. or less of other than light frame construction with an eave height of 10-feet or less.
- Decks not supported by the dwelling.

Footings shall not bear on frozen soil unless the frozen soil is permanent.

**R403.3 Frost protected shallow foundations.** For buildings where the monthly mean temperature of the building is maintained at a minimum of 64°F, footings are not required to extend below the frost line when protected from frost by insulation in accordance with Figure R403.3(1) and Table R403.3. These foundations shall not be used for unheated spaces such as porches, garages, and carports, and shall not be attached to basement or crawl spaces that are not maintained at a monthly mean temperature of 64 degrees (F). Materials used below grade for the purpose of insulating footings against frost shall be labeled as complying with ASTM C 578.

**R403.3.2 Protection of horizontal insulation below ground.** Horizontal insulation placed less than 12 inches below the ground surface or that portion of horizontal insulation extending outward more than 24 inches from the foundation edge shall be protected against damage by use of a concrete slab or asphalt paving on the ground surface directly above the insulation or by cementitious board, plywood rated for below-ground use, or other approved materials placed below ground, directly above the top surface of the insulation.

**R403.3.3 Drainage.** Final grade shall be sloped in accordance with Section R401.3. In other than Group I Soils, as detailed in Table R405.1, gravel or crushed stone beneath horizontal insulation below ground shall drain to daylight or into an approved sewer system.



For SI: 1 inch = 25.4 mm.  
 a. See Table R403.3 for required dimensions and R-values for vertical and horizontal insulation.

FIGURE R403.3(1)  
 INSULATION PLACEMENT FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS

**Footers**  
 2018 KRC



**City of Richmond**

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