

COMMONLY USED RESIDENTIAL BUILDING CODES

INTERNATIONAL RESIDENTIAL CODE (2009)

form revised 5/10

FOUNDATION

1. DESIGN OF FORMWORK. Section 1906.1 IBC 2009, Section R404.1.2.3.6 IRC 2009, ACI 318 Section 6.1

Forms shall result in a final structure that conforms to shapes, lines and dimensions of the members as required by the design construction documents. Forms shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape. Forms and their supports shall be designed so as not to damage previously placed structure.

2. FOOTING AND FOUNDATION DESIGN. Section R401 - R404 IRC 2009

Footings and foundations shall be designed and constructed in accordance with Sections R401 through R404.14.11. Footings and foundations shall be built on undisturbed soil or engineered fill. The top surface of footings shall be level. The bottom surface of footings are permitted to have a slope not exceeding 1 unit vertical in 10 units horizontal (10-percent slope). Footings shall be stepped where it is necessary to change the elevation of the top surface of the footing or where the surface of the ground slopes more than 1 unit vertical in 10 units horizontal (10-percent slope).

R404.1.2 Concrete foundation walls. Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section 611.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section 611.2 shall be constructed with the provisions of ACI 318, ACI 332 or PCA 100. When ACI 318, ACI 332, PCA 100 or the provisions of this section are used to design concrete foundations walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for the design, unless otherwise required by the state law of the jurisdiction having authority.

3. FOUNDATION DIMENSIONS. Section R403 – R404, Tables R403.1, R404.1 IRC 2009

Assuming normal soil conditions with a minimum load bearing value of 1500 psf and light frame construction (no brick veneer), the following minimum footing shall be provided:

Supporting One Floor: 6"x 12" footing, 30" below grade.

Supporting Two Floors: 6"x 15" footing, 30" below grade.

Supporting Three Floors: 6"x 23" footing, 30" below grade.

Footing projections shall be at least 2 inches (51mm) and shall not exceed the thickness of the footing.

4. REINFORCING STEEL REQUIREMENTS. Sections R403, R404, Tables R404.1.2(2) through R404.1.2(8) IRC 2009

R404.1.2.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top and bottom. Horizontal reinforcement shall be provided in accordance with Table R404.1.2(1). Vertical reinforcement shall be provided in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Vertical reinforcement for flat basement walls retaining 4 feet (1219 mm) or more of unbalanced backfill is permitted to be determined in accordance with Table R404.1.2(9). For basement walls supporting above-grade concrete walls, vertical reinforcement shall the greater of that required by Tables R404.1.2(2) through R404.1.2(8) or by Section R611.6 for above-grade wall. In buildings assigned to Seismic Design Category D₀, D₁, or D₂, concrete foundation wall shall also comply with Section R404.1.4.2.

5. DECK FOOTINGS OR PADS. Section R403.1.1, Table R401.4.1 IRC 2009

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. Attached deck foundations shall meet the same frost depth requirements as a residence. (30" below grade) Posts shall be anchored to ensure against uplift and lateral displacement.

6. GARAGE FOUNDATION. Section R401 - R404 IRC 2009, Ordinance 02-1984 1.4.13

Attached garage foundations shall meet the same requirements as a residence.

7. FOUNDATION PLATES. Section R403.1.6 IRC 2009

Wood sole plate at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slab and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least ½ inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Figure R602.10.4(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in Figure R602.10.4.4(1).

403.1.6.1 Foundation anchorage in Seismic Design Categories C, D₀, D1 and D2.

In addition to the requirements of Section R403.1.6, the following requirements shall apply to wood light-frame structures in Seismic Design Categories D1 and D2 and wood light-frame townhouses in Seismic Design Category C.

1. Plate washers conforming to Section R602.11.1 shall be provided for all anchor bolts over the full length of required braced wall lines except where approved anchor straps are used. Properly sized cut washers shall be permitted for anchor bolts in wall lines not containing brace wall panels.
2. Interior braced wall plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) from the ends of each plate section when supported on a continuous foundation.
3. Interior bearing wall sole plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) from the ends of each plate section when supported on a continuous foundation.
4. The maximum anchor bolt spacing shall be 4 feet (1219 mm) for buildings over two stories in height.
5. Stepped cripple walls shall conform to Section R602.11.3.
6. Where continuous wood foundations in accordance with Section R404.2 are used, the force transfer shall have a capacity equal to or greater than the connections required by Section R602.11.1 or the braced wall panel shall be connected to the

8. DAMPROOFING FOUNDATION WALLS: Section R406 IRC 2009

R406.1 Concrete and masonry foundation dampproofing. Except where required to be waterproofed by Section R406.2, foundation walls that retain earth and enclose interior spaces and floors below grade shall be dampproofed from the top of the footing to the finished grade. Masonry walls shall have not less than 3/8 inch (9.5 mm) portland cement parging applied to the exterior of the wall. The parging shall be in accordance with one of the following:

1. Bituminous coating.

2. 3 pounds per square yard (1.63 kg/m²) of acrylic modified cement.
3. 1/8-inch (3.2 mm) coat or surface-bonding cement clomping with ASTM C 887.
4. Any material permitted for waterproofing in section R406.2.
5. Other approved methods or materials.

Exception: Parging of unit masonry walls is not required where a material is approved for direct application to the masonry.

Concrete walls shall be damproofed by applying any one of the above listed damproofing materials or any on of the waterproofing materials listed in Section R406..2 to the exterior of the wall.

9. PROTECTION AGAINST DECAY Section R317 IRC 2009

R317.1 Location required. Protection of wood and wood based products from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWPA U1.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (205 mm) to exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All sills or plates that rest on concrete or masonry exterior walls and are less than 8 inches (203 mm) from exposed ground.
3. Sill and sleepers on a concrete or masonry slab that is in direct contact with ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than 0.5 inch (12.7 mm) on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches (152 mm) from the ground.
6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

R317.1.1 Field treatment. Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWPA M4.

R317.1.2 Ground contact. All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be approved pressure-preservative-treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

R317.1.3 Geographical areas. In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure-preservative-treated wood shall be used for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances when those members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that would prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include:

1. Horizontal members such as girders, joists and decking.
2. Vertical members such as posts, poles and columns.
3. Both horizontal and vertical members.

R317.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood.

Exceptions:

1. Columns exposed to the weather or in basements when supported by concrete piers or metal pedestals projecting 1 inch (25.4 mm) above a concrete floor or 6 inches (152 mm) above exposed earth and the

earth is covered by an approved impervious moisture barrier.

2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building when supported by a concrete pier or metal pedestal at a height more than 8 inches (203mm) from exposed earth and the earth is covered by an impervious moisture barrier.

R317.1.5 Exposed glued-laminated timbers. The portions of glued-laminated timbers that form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave or similar covering shall be pressure treated with preservative, or be manufactured from naturally durable or preservative-treated wood.

10. CRAWLSPACE VENTILATION Section R408 IRC 2009 Washington State Amendments

R408.2 Openings for Under-floor Ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m²) for each 300 square feet (28 m²) of under-floor area. One ventilation opening shall be within 3 feet (914 mm) of each corner of the building, except one side of the building shall be permitted to have no ventilation opens. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4 inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast iron grills or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm).

Exception: The total area of ventilation openings shall be permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited.

Unvented crawl space. AF101.1 General. Appendix F, IRC 2009 Washington State Amendments This appendix contains requirements for new construction in jurisdictions where radon-resistant construction is required.

Inclusion of this appendix by jurisdictions shall be required in high radon potential counties as determined in Figure AF101 and as listed in Table AF101(1).

Stevens County is listed as a high radon potential county in Table AF101(1) Appendix F IRC 2009

Unvented crawl spaces are not permitted in any high radon potential county. In other areas, requirements of this appendix apply to any structure constructed with unvented crawl spaces as specified in R408.3

Compliance of the Radon Requirements set forth in Appendix F, IRC 2009 will be required.

11. CRAWLSPACE ACCESS Section R408.4 IRC 2009

Access shall be provided to all under-floor spaces. Access openings through the floor shall be a minimum of 18 inches by 24 inches (457 mm by 610 mm). Openings through a perimeter wall shall be not less than 16 inches by 24 inches (407 mm by 610 mm). When any portion of the through-wall access is below grade, an areaway not less than 16 inches by 24 inches (407 mm by 610 mm) shall be provided. The bottom of the areaway shall be below the threshold of the access opening. Through wall access openings shall not be located under a door to the residence. See Section M1305.1.4 for access requirements where mechanical equipment is located under floors.

12. POST-BEAM CONNECTIONS Section R502.9 IRC 2009

Where post and beam or girder construction is used to support floor framing, positive connections shall be provided to insure against uplift and lateral displacement.

13. COLUMNS IN CONTACT WITH CONCRETE OR MASONRY PIERS. Section R317.1.2 IRC 2009

R317.1.2 Ground contact. All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be approved pressure-preservative-treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

14. SLAB-ON-GRADE. Section 502.1.4.8 Washington State Energy Code (WSC) 2009 Edition

Slab-on Grade insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance of twenty-four (24) inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for a total distance of twenty-four (24) inches. Above grade insulation shall be protected. A two-inch by two-inch (maximum) nailer may be placed at the finished floor elevation for attachment of interior finish materials.

15. RADIANT SLAB. Section 502.1.4.9 Washington State Energy Code (WSC) 2009 Edition

The entire area of a Radiant Slab shall be thermally isolated from the soil with a minimum of R-10 insulation. The insulation shall be an approved product for its intended use. If a soil gas control system is present below the radiant slab, which results in increased convective flow below the radiant slab, the radiant slab shall be thermally isolated from the sub-slab gravel layer. R-10 radiant slab insulation is required for all compliance paths.

**TABLE R402.2
MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF CONCRETE**

TYPE OR LOCATION OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH ^a (f' _c)		
	Weathering Potential ^b		
	Negligible	Moderate	Severe
Basement walls, foundations and other concrete not exposed to the weather	2,500	2,500	2,500 ^c
Basement slabs and interior slabs on grade, except garage floor slabs	2,500	2,500	2,500 ^c
Basement walls, foundation walls, exterior walls and other vertical concrete work exposed to the weather	2,500	3,000 ^d	3,000 ^d
Porches, carport slabs and steps exposed to the weather, and garage floor slabs	2,500	3,000 ^{d, e, f}	3,500 ^{d, e, f}

For SI: 1 pound per square inch = 6.895 kPa.

a. Strength at 28 days psi.

b. See Table R301.2(1) for weathering potential.

c. Concrete in these locations that may be subject to freezing and thawing during construction shall be air-entrained concrete in accordance with Footnote d.

d. Concrete shall be air-entrained. Total air content (percent by volume of concrete) shall be not less than 5 percent or more than 7 percent.

e. See Section R402.2 for maximum cementitious materials content.

f. For garage floors with a steel troweled finish, reduction of the total air content (percent by volume of concrete) to not less than 3 percent is permitted if the specified compressive strength of the concrete is increased to not less than 4,000 psi.

TABLE R404.1.2(8)
MINIMUM VERTICAL REINFORCEMENT FOR 6-, 8-, 10-INCH AND 12-INCH NOMINAL FLAT BASEMENT WALLS^{b, c, d, e, f, h, i, k, n}

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^g (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches)											
		Soil classes ^a and design lateral soil (psf per foot of depth)											
		GW, GP, SW, SP 30				GM, GC, SM, SM-SC and ML 45				SC, ML-CL and Inorganic CL 60			
		Minimum nominal wall thickness (inches)											
		6	8	10	12	6	8	10	12	6	8	10	12
5	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR ¹	NR	NR	4 @ 35	NR ¹	NR	NR
	6	NR	NR	NR	NR	5 @ 48	NR	NR	NR	5 @ 36	NR	NR	NR
7	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 47	NR	NR	NR
	6	NR	NR	NR	NR	5 @ 42	NR	NR	NR	6 @ 43	5 @ 48	NR ¹	NR
	7	5 @ 46	NR	NR	NR	6 @ 42	5 @ 46	NR ¹	NR	6 @ 34	6 @ 48	NR	NR
8	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 38	NR ¹	NR	NR	5 @ 43	NR	NR	NR
	6	4 @ 37	NR ¹	NR	NR	5 @ 37	NR	NR	NR	6 @ 37	5 @ 43	NR ¹	NR
	7	5 @ 40	NR	NR	NR	6 @ 37	5 @ 41	NR ¹	NR	6 @ 34	6 @ 43	NR	NR
	8	6 @ 43	5 @ 47	NR ¹	NR	6 @ 34	6 @ 43	NR	NR	6 @ 27	6 @ 32	6 @ 44	NR
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 35	NR ¹	NR	NR	5 @ 40	NR	NR	NR
	6	4 @ 34	NR ¹	NR	NR	6 @ 48	NR	NR	NR	6 @ 36	6 @ 39	NR ¹	NR
	7	5 @ 36	NR	NR	NR	6 @ 34	5 @ 37	NR	NR	6 @ 33	6 @ 38	5 @ 37	NR ¹
	8	6 @ 38	5 @ 41	NR ¹	NR	6 @ 33	6 @ 38	5 @ 37	NR ¹	6 @ 24	6 @ 29	6 @ 39	4 @ 48 ^m
	9	6 @ 34	6 @ 46	NR	NR	6 @ 26	6 @ 30	6 @ 41	NR	6 @ 19	6 @ 23	6 @ 30	6 @ 39
10	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 33	NR ¹	NR	NR	5 @ 38	NR	NR	NR
	6	5 @ 48	NR ¹	NR	NR	6 @ 45	NR	NR	NR	6 @ 34	5 @ 37	NR	NR
	7	6 @ 47	NR	NR	NR	6 @ 34	6 @ 48	NR	NR	6 @ 30	6 @ 35	6 @ 48	NR ¹
	8	6 @ 34	5 @ 38	NR	NR	6 @ 30	6 @ 34	6 @ 47	NR ¹	6 @ 22	6 @ 26	6 @ 35	6 @ 45 ^m
	9	6 @ 34	6 @ 41	4 @ 48	NR ¹	6 @ 23	6 @ 27	6 @ 35	4 @ 48 ^m	DR	6 @ 22	6 @ 27	6 @ 34
	10	6 @ 28	6 @ 33	6 @ 45	NR	DR ^j	6 @ 23	6 @ 29	6 @ 38	DR	6 @ 22	6 @ 22	6 @ 28

- For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa²/m, 1 pound per square inch = 6.895 kPa.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 - Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi.
 - Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).
 - NR indicates no vertical wall reinforcement is required, except for 6-inch nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be #4@48 inches on center.
 - Allowable deflection criterion is $L/240$, where L is the unsupported height of the basement wall in inches.
 - Interpolation is not permitted.
 - Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 - Vertical reinforcement shall be located to provide a cover of 1.25 inches measured from the inside face of the wall. The center of the steel shall not vary from the specified location by more than the greater of 10 percent of the wall thickness or $3/8$ -inch.
 - Concrete cover for reinforcement measured from the inside face of the wall shall not be less than $3/4$ -inch. Concrete cover for reinforcement measured from the outside face of the wall shall not be less than $1\frac{1}{2}$ inches for No. 5 bars and smaller, and not less than 2 inches for larger bars.
 - DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.
 - Concrete shall have a specified compressive strength, f'_c , of not less than 2,500 psi at 28 days, unless a higher strength is required by footnote l or m.
 - The minimum thickness is permitted to be reduced 2 inches, provided the minimum specified compressive strength of concrete, f'_c , is 4,000 psi.
 - A plain concrete wall with a minimum nominal thickness of 12 inches is permitted, provided minimum specified compressive strength of concrete, f'_c , is 3,500 psi.
 - See Table R611.3 for tolerance from nominal thickness permitted for flat walls.

FOUNDATIONS

TABLE R404.1.2(9)
MINIMUM SPACING FOR ALTERNATE BAR SIZE AND/OR ALTERNATE GRADE OF STEEL^{a, b, c}

BAR SPACING FROM APPLICABLE TABLE IN SECTION R404.1.2.2 (Inches)	BAR SIZE FROM APPLICABLE TABLE IN SECTION R404.1.2.2																	
	#4					#5					#6							
	Alternate bar size and/or alternate grade of steel desired																	
	Grade 60			Grade 40			Grade 60			Grade 40			Grade 60			Grade 40		
	#5	#6	#4	#5	#6	#4	#5	#6	#4	#5	#6	#4	#5	#6	#4	#5	#6	
	Maximum spacing for alternate bar size and/or alternate grade of steel (Inches)																	
8	12	18	5	8	12	5	11	3	5	8	4	6	2	4	5			
9	14	20	6	9	13	6	13	4	6	9	4	6	3	4	6			
10	16	22	7	10	15	6	14	4	7	9	5	7	3	5	7			
11	17	24	7	11	16	7	16	5	7	10	5	8	3	5	7			
12	19	26	8	12	18	8	17	5	8	11	5	8	4	6	8			
13	20	29	9	13	19	8	18	6	9	12	6	9	4	6	9			
14	22	31	9	14	21	9	20	6	9	13	6	10	4	7	9			
15	23	33	10	16	22	10	21	6	10	14	7	11	5	7	10			
16	25	35	11	17	23	10	23	7	11	15	7	11	5	8	11			
17	26	37	11	18	25	11	24	7	11	16	8	12	5	8	11			
18	28	40	12	19	26	12	26	8	12	17	8	13	5	8	12			
19	29	42	13	20	28	12	27	8	13	18	9	13	6	9	13			
20	31	44	13	21	29	13	28	9	13	19	9	14	6	9	13			
21	33	46	14	22	31	14	30	9	14	20	10	15	6	10	14			
22	34	48	15	23	32	14	31	9	15	21	10	16	7	10	15			
23	36	48	15	24	34	15	33	10	15	22	10	16	7	11	15			
24	37	48	16	25	35	15	34	10	16	23	11	17	7	11	16			
25	39	48	17	26	37	16	35	11	17	24	11	18	8	12	17			
26	40	48	17	27	38	17	37	11	17	25	12	18	8	12	17			
27	42	48	18	28	40	17	38	12	18	26	12	19	8	13	18			
28	43	48	19	29	41	18	40	12	19	26	13	20	8	13	19			
29	45	48	19	30	43	19	41	12	19	27	13	20	9	14	19			
30	47	48	20	31	44	19	43	13	20	28	14	21	9	14	20			
31	48	48	21	32	45	20	44	13	21	29	14	22	9	15	21			
32	48	48	21	33	47	21	45	14	21	30	15	23	10	15	21			
33	48	48	22	34	48	21	47	14	22	31	15	23	10	16	22			
34	48	48	23	35	48	22	48	15	23	32	15	24	10	16	23			
35	48	48	23	36	48	23	48	15	23	33	16	25	11	16	23			
36	48	48	24	37	48	23	48	15	24	34	16	25	11	17	24			
37	48	48	25	38	48	24	48	16	25	35	17	26	11	17	25			
38	48	48	25	39	48	25	48	16	25	36	17	27	12	18	25			
39	48	48	26	40	48	25	48	17	26	37	18	27	12	18	26			
40	48	48	27	41	48	26	48	17	27	38	18	28	12	19	27			
41	48	48	27	42	48	26	48	18	27	39	19	29	12	19	27			
42	48	48	28	43	48	27	48	18	28	40	19	30	13	20	28			
43	48	48	29	44	48	28	48	18	29	41	20	30	13	20	29			
44	48	48	29	45	48	28	48	19	29	42	20	31	13	21	29			
45	48	48	30	47	48	29	48	19	30	43	20	32	14	21	30			

(continued)

TABLE R404.1.2(9)—continued
MINIMUM SPACING FOR ALTERNATE BAR SIZE AND/OR ALTERNATE GRADE OF STEEL^{a,b,c}

BAR SPACING FROM APPLICABLE TABLE IN SECTION R404.1.2.2 (Inches)	BAR SIZE FROM APPLICABLE TABLE IN SECTION R404.1.2.2														
	#4					#5					#6				
	Alternate bar size and/or alternate grade of steel desired to be used														
	Grade 60		Grade 40			Grade 60		Grade 40			Grade 60		Grade 40		
	#5	#6	#4	#5	#6	#4	#6	#4	#5	#6	#4	#5	#4	#5	#6
	Maximum spacing for alternate bar size and/or alternate grade of steel (Inches)														
46	48	48	31	48	48	30	48	20	31	44	21	32	14	22	31
47	48	48	31	48	48	30	48	20	31	44	21	33	14	22	31
48	48	48	32	48	48	31	48	21	32	45	22	34	15	23	32

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa.

- a. This table is for use with tables in Section R404.1.2.2 that specify the minimum bar size and maximum spacing of vertical wall reinforcement for foundation walls and above-grade walls. Reinforcement specified in tables in Sections R404.1.2.2 is based on Grade 60 steel reinforcement.
- b. Bar spacing shall not exceed 48 inches on center and shall not be less than one-half the nominal wall thickness.
- c. For Grade 50 steel bars (ASTM A 996, Type R), use spacing for Grade 40 bars or interpolate between Grades 40 and 60.

TABLE R404.1.2(1)
MINIMUM HORIZONTAL REINFORCEMENT FOR CONCRETE BASEMENT WALLS^{a,b}

MAXIMUM UNSUPPORTED HEIGHT OF BASEMENT WALL (feet)	LOCATION OF HORIZONTAL REINFORCEMENT
≤ 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near mid-height of the wall story
> 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near third points in the wall story

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa.

- a. Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength of 40,000 psi and concrete with a minimum concrete compressive strength 2,500 psi.
- b. See Section R404.1.2.2 for minimum reinforcement required for foundation walls supporting above-grade concrete walls.

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

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥4,000
Conventional light-frame construction				
1-story	12	12	12	12
2-story	15	12	12	12
3-story	23	17	12	12
4-inch brick veneer over light frame or 8-inch hollow concrete masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- a. Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.

R403.1.1 Minimum size. Minimum sizes for concrete and masonry footings shall be as 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) thick. Footing projections, *P*, shall be at least 2 inches

**TABLE R401.4.1
PRESUMPTIVE LOAD-BEARING VALUES OF
FOUNDATION MATERIALS^a**

CLASS OF MATERIAL	LOAD-BEARING PRESSURE (pounds per square foot)
Crystalline bedrock	12,000
Sedimentary and foliated rock	4,000
Sandy gravel and/or gravel (GW and GP)	3,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM and GC)	2,000
Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500 ^b

For SI: 1 pound per square foot = 0.0479 kPa.

- a. When soil tests are required by Section R401.4, the allowable bearing capacities of the soil shall be part of the recommendations.
- b. Where the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation.

TYPICAL LOW FOUNDATION WALL

