

1309.0404 SECTION R404, FOUNDATION AND RETAINING WALLS.

Subpart 1. **IRC section R404.1.** Section R404.1 is amended to read as follows:

R404.1 Concrete and masonry foundation walls. Concrete foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.2. Masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.1. Concrete and masonry foundation walls shall be laterally supported at the top and bottom. Foundation walls that meet all of the following shall be considered laterally supported:

1. Full basement floor shall be 3.5 inches (89 mm) thick concrete slab poured tight against the bottom of the foundation wall.
2. Floor joists and blocking shall be connected to the sill plate at the top of wall with an approved connector with listed capacity meeting the top of wall reaction in Table R404.1(1). Maximum spacing of floor joists shall be 24 inches on center. Spacing of blocking shall be in accordance with Table R404.1(1).
3. Bolt spacing for the sill plate shall be no greater than the requirements in Table R404.1(1).
4. The floor shall be blocked perpendicular to the floor joists. Blocking shall be installed in accordance with footnote "e" of Table R404.1(1).

Exception: Cantilevered concrete and masonry foundation walls supporting unbalanced backfill that do not have permanent lateral support at the top of the foundation shall be constructed according to Table R404.1.1(5), Table R404.1.1(6), or Table R404.1.1(7).

(For subsection R404.1.1, see subpart 9. Subsections R404.1.2 through R404.1.9 and their subsections remain unchanged.)

Subp. 2. **IRC Table R404.1(1).** Section R404.1 is amended by adding Table R404.1(1) to read as follows:

TABLE R404.1(1)

MAXIMUM ANCHOR BOLT AND BLOCKING SPACING FOR SUPPORTED FOUNDATION WALL

Max. Wall Height	Max. Un-balanced Backfill Height	Soil Classes ^a	Soil Load (pcf/ft)	Top of Wall Reaction (plf) ^e	1/2" diameter Anchor Bolt Spacing (inches) ^{b,c,d}	Spacing of Blocking Perpendicular To Floor Joists (inches) ^f
		GW, GP, SW, & SP	30	260	72	72
8'-0"	7'-6"	GM, GC, SM, SM-SC, & ML	45	400	72	72

		SC, MH, ML-CL, & I-CL	60	530	48	48
		GW, GP, SW, & SP	30	340	72	72
9'-0"	8'-6"	GM, GC, SM, SM-SC, & ML	45	510	48	48
		SC, MH, ML-CL, & I-CL	60	680	32	32
		GW, GP, SW, & SP	30	430	64	64
10'-0"	9'-6"	GM, GC, SM, SM-SC, & ML	45	640	40	40
		SC, MH, ML-CL, & I-CL	60	860	24	24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

^a Soil classes are in accordance with the Unified Soil Classification System. Refer to table R405.1.

^b Anchor bolts shall be cast in place with a minimum 7-inch embed. Where vertical reinforcing is required by other sections of this code, the anchor bolts shall be within 8 inches of the vertical reinforcing and are to be spaced as required by this table. Anchor bolts installed in masonry shall be grouted in place with not less than 1 inch of grout measured from the inside face of the masonry and the anchor bolt.

^c The sill plate shall be 2 x 6 minimum. Anchor bolts shall be placed at least 2-1/2 inches from the edge of the sill plate and the edge of the foundation wall.

^d Anchor bolts shall have a 2-inch by 1/8-inch thick round or square washer tightened and countersunk 1/4 inch into the top of the sill plate. Use of standard and noncountersunk washers is permitted where anchor bolt spacing is half the spacing required by this table.

^e Minimum load to be used for the sizing of accepted anchors or fasteners if anchor bolts are not used.

^f Perpendicular blocking shall be 2-by the full depth joists or an approved alternative full depth joist material that is installed in the first three joist spaces adjacent to the foundation wall. The blocking shall be connected to the sill plate with an approved fastener sized in accordance with footnote "e." The floor sheathing shall be nailed to the blocking through the subfloor with a minimum of 8d common (2-1/2 x 0.131) nails at 3 inches on center or an equivalent connector. Blocking shall be installed within 8 inches of an anchor bolt location.

Subp. 3. [Repealed, 39 SR 91]

Subp. 4. [Repealed, 39 SR 91]

Subp. 5. [Repealed, 39 SR 91]

Subp. 6. **IRC Table R404.1.1(5)**. Section R404 is amended by adding a new table as follows:

TABLE R404.1.1(5)

CANTILEVERED CONCRETE AND MASONRY FOUNDATION WALLS

Maximum Wall Height ^j (feet)	Maximum Unbalanced Backfill Height ^e (feet)	Minimum Vertical Reinforcement Size and Spacing for 8-Inch Nominal Wall Thickness ^{a,b,c,e,f,i,k}		
		Soil Classes ^d		
		GW, GP, SW, and SP	GM, GC, SM, SM-SC, and ML	SC, MH, ML-CL, and inorganic CL
4	3	None required	None required	None required
	4	None required	None required	No. 4 @ 72 in. o.c.
5	3	None required	None required	None required
	4	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^h	No. 4 @ 40 in. o.c. ^g
	5	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^h	No. 4 @ 40 in. o.c. ^g

^a Mortar shall be Type M or S and masonry shall be laid in running bond. Minimum unit compressive strength is 1,900 psi.

^b Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.

^c Vertical reinforcement shall be Grade 60 minimum. The distance from the face of the soil side of the wall to the center of vertical reinforcement shall be no greater than 2.5 inches.

^d Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.

^e Interior concrete floor slab-on-grade shall be placed tight to the wall. The exterior grade level shall be 6 inches minimum below the top of wall. Maximum height from top of slab-on-grade to bottom of floor joists is 10 feet, 0 inches. Unbalanced backfill height is the difference in height of the exterior finish ground levels and the top of the interior concrete slab-on-grade.

^f Minimum footing size of 20 inches by 8 inches shall be placed on soil with a bearing capacity of 2,000 psf. Minimum concrete compressive strength of footing shall be 3,000 psi.

^g Provide propped cantilever wall: top of footing shall be 16 inches below the bottom of the concrete floor slab minimum.

^h Provide #5 Grade 60 dowels, 1 foot, 6 inches long, to connect footing to wall. Embed dowel 5 inches into footing. Place dowels in center of wall thickness spaced at 32 inches on center maximum. No dowels are required where length of the foundation wall between perpendicular walls is two times the foundation wall height or less.

ⁱ This table is applicable where the length of the foundation wall between perpendicular walls is 35 feet or less, or where the length of the foundation laterally supported on only one end by a perpendicular wall is 17 feet or less.

^j Maximum wall height is measured from top of the foundation wall to the bottom of the interior concrete slab-on-grade.

^k Install foundation anchorage per Section R403.1.6.

Subp. 7. **IRC Table R404.1.1(6)**. Section R404 is amended by adding a new table as follows:

TABLE R404.1.1(6)

CANTILEVERED CONCRETE AND MASONRY FOUNDATION WALLS

Maximum Wall Height ^j (feet)	Maximum Unbalanced Backfill Height ^e (feet)	Minimum Vertical Reinforcement Size and Spacing for 10-Inch Nominal Wall Thickness ^{a,b,c,e,f,i,k}		
		Soil Classes ^d		
		GW, GP, SW, and SP	GM, GC, SM, SM-SC, and ML	SC, MH, ML-CL, and inorganic CL
4	3	None required	None required	None required
	4	None required	None required	None required
5	3	None required	None required	None required
	4	None required	No. 4 @ 72 in. o.c.	No. 4 @ 64 in. o.c. ^g
	5	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^g
6	3	None required	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.
	4	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.	No. 4 @ 64 in. o.c. ^h
	5	No. 4 @ 64 in. o.c. ^h	No. 4 @ 40 in. o.c. ^{g,h}	No. 5 @ 48 in. o.c. ^{g,h}
	6	No. 4 @ 64 in. o.c. ^h	No. 4 @ 40 in. o.c. ^{g,h}	No. 5 @ 48 in. o.c. ^{g,h}

^a Mortar shall be Type M or S and masonry shall be laid in running bond. Minimum unit compressive strength is 1,900 psi.

^b Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.

^c Vertical reinforcement shall be Grade 60 minimum. The distance from the face of the soil side of the wall to the center of vertical reinforcement shall be no greater than 2.5 inches.

^d Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.

^e Interior concrete slab-on-grade shall be placed tight to the wall. The exterior grade level shall be 6 inches minimum below the top of wall. Maximum height from top of slab-on-grade to bottom of floor joists is 10 feet, 0 inches. Unbalanced backfill height is the difference in height of the exterior finish ground levels and the top of the interior concrete slab-on-grade.

^f Minimum footing size of 20 inches by 8 inches shall be placed on soil with a bearing capacity of 2,000 psf. Minimum concrete compressive strength of footing shall be 3,000 psi.

^g Provide propped cantilever wall: top of footing shall be 16 inches below the bottom of the concrete floor slab minimum.

^h Provide #5 Grade 60 dowels, 1 foot, 6 inches long, to connect footing to wall. Embed dowel 5 inches into footing. Place dowels in center of wall thickness spaced at 32 inches on center maximum. No dowels are required where length of the foundation wall between perpendicular walls is two times the foundation wall height or less.

ⁱ This table is applicable where the length of the foundation wall between perpendicular walls is 35 feet or less, or where the length of the foundation laterally supported on only one end by a perpendicular wall is 17 feet or less.

^j Maximum wall height is measured from top of the foundation wall to the bottom of the interior concrete slab-on-grade.

^k Install foundation anchorage per Section R403.1.6.

Subp. 8. **IRC Table R404.1.1(7)**. Section R404 is amended by adding a new table as follows:

TABLE R404.1.1(7)

CANTILEVERED CONCRETE AND MASONRY FOUNDATION WALLS

Maximum Wall Height ^j (feet)	Maximum Unbalanced Backfill Height ^e (feet)	Minimum Vertical Reinforcement Size and Spacing for 12-Inch Nominal Wall Thickness ^{a,b,c,e,f,i,k}	
		Soil Classes ^d	
		GW, GP, SW, and SP	GM, GC, SM, SM-SC, and ML SC, MH, ML-CL, and inorganic CL

4	3	None required	None required	None required
	4	None required	None required	None required
5	3	None required	None required	None required
	4	None required	None required	No. 4 @ 72 in. o.c.
	5	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.
6	3	None required	None required	None required
	4	None required	None required	No. 4 @ 72 in. o.c.
	5	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^h	No. 4 @ 40 in. o.c. ^g
	6	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^g	No. 4 @ 32 in. o.c. ^{g,h}
7	3	None required	None required	None required
	4	None required	No. 4 @ 72 in. o.c.	No. 4 @ 72 in. o.c.
	5	No. 4 @ 72 in. o.c.	No. 4 @ 56 in. o.c. ^h	No. 4 @ 40 in. o.c. ^g
	6	No. 4 @ 48 in. o.c. ^h	No. 5 @ 48 in. o.c. ^{g,h}	No. 6 @ 48 in. o.c. ^{g,h}
	7	No. 4 @ 48 in. o.c. ^h	No. 5 @ 40 in. o.c. ^{g,h}	No. 6 @ 48 in. o.c. ^{g,h}

^a Mortar shall be Type M or S and masonry shall be laid in running bond. Minimum unit compressive strength is 1,900 psi.

^b Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.

^c Vertical reinforcement shall be Grade 60 minimum. The distance from the face of the soil side of the wall to the center of vertical reinforcement shall be no greater than 3 inches.

^d Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.

^e Interior concrete slab-on-grade shall be placed tight to the wall. The exterior grade level shall be 6 inches minimum below the top of wall. Maximum height from top of slab-on-grade to bottom of floor joists is 10 feet, 0 inches. Unbalanced backfill height is the difference in height of the exterior finish ground levels and the top of the interior concrete slab-on-grade.

^f Minimum footing size of 20 inches by 8 inches shall be placed on soil with a bearing capacity of 2,000 psf. Minimum concrete compressive strength of footing shall be 3,000 psi.

^g Provide propped cantilever wall: top of footing shall be 16 inches below the bottom of the concrete floor slab minimum.

^h Provide #5 Grade 60 dowels, 1 foot, 6 inches long, to connect footing to wall. Embed dowel 5 inches into footing. Place dowels in center of wall thickness spaced at 32 inches on center maximum. No dowels are required where length of the foundation wall between perpendicular walls is two times the foundation wall height or less.

ⁱ This table is applicable where the length of the foundation wall between perpendicular walls is 35 feet or less, or where the length of the foundation laterally supported on only one end by a perpendicular wall is 17 feet or less.

^j Maximum wall height is measured from top of the foundation wall to the bottom of the interior concrete slab-on-grade.

^k Install foundation anchorage per Section R403.1.6.

Subp. 9. **IRC section R404.1.1.** Section R404.1.1 is amended by adding the following exception to condition 2:

Exception: Cantilevered concrete and masonry foundation walls constructed in accordance with Table R404.1.1(5), R404.1.1(6), or R404.1.1(7).

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *27 SR 1475; 32 SR 12; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 91; 44 SR 764*

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