

ADVISORY COMMITTEE COMMENT FORM FOR PROPOSED CODE CHANGES (This form must be submitted electronically)

SAC-4

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Proposed Code Change - Language

1309.0404 SECTION R404, FOUNDATION AND RETAINING WALLS.

Subpart 1. **Section R404.1.** IRC Section R404.1, ~~Items 4 and 5,~~ are is amended to read as follows:

~~4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within three joist spaces of the foundation wall.~~

~~5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per linear foot capacity.~~

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) multiplied by the spacing of the joists or blocking. Maximum spacing of floor joists and blocking shall be 24" 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 per Table R404.1(1).

4. Floor shall be blocked perpendicular to the floor joists. Blocking shall be full depth within three joist spaces of the foundation wall. Floor sheathing shall be fastened to blocking in accordance with Table R602.3(1).
5. Where foundation walls support unbalanced load on opposite sides of the building, such as a daylight basement, the rim board shall be attached to the sill with a 20 gage metal angle clip at 24 inches on center, with five 8d nails per leg, or an approved connector supplying 230 pounds per lineal foot capacity.

Exception: Cantilevered concrete and masonry foundation walls that do not have permanent lateral support at the top shall be constructed as set forth in Table R404.1.1(5), Table R404.1.1(6), or Table R404.1.1(7).

Subp. 2. **Table R404.1(1)(2).** IRC Section R404.1 is amended by adding Table R401.1(1)IRC Table R404.1(2) is amended to read as follows:

Table R404.1(1)(2)

Maximum Anchor Bolt and Blocking Spacing for Supported Foundation Wall

Max. Wall Height	Max. Unbalanced Backfill Height	Soil Classes	Soil Load (psf / ft)	Top of Wall Reaction (plf) ^b	1/2" diameter Anchor Bolt Spacing (inches) ^a	Spacing of Blocking Perpendicular to Floor Joists (inches)
8' - 0"	7' - 4"	GW, GP, SW, & SP	30	250	72	<u>60</u>
		GM, GC, SM-SC, & ML	45	370	72	<u>40</u>
		SC, MH, ML-CL & I-CL	60	490	48	<u>30</u>
9' - 0"	8' - 4"	GW, GP, SW, & SP	30	320	72	<u>48</u>
		GM, GC, SM-SC, & ML	45	480	48	<u>32</u>
		SC, MH, ML-CL, & I-CL	60	640	40	<u>24</u>

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

^a Sill plate shall be 2 x 6 minimum. Anchor bolt shall be minimum 0.5" diameter cast in place with 7" embed. Anchor bolt shall have a 2" diameter by 0.125" thick washer tightened and countersunk 0.25" into the top of the sill plate.

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

Subp. 3. [Repeal]Table R404.1(3). IRC Table R404.1(3) is deleted in its entirety.

Subp. 4. [Repeal]Section R404.1.1. IRC Section R404.1.1 is amended to read as follows:

~~**R404.1.1 Masonry foundation walls.** Concrete masonry and clay masonry foundation walls shall be constructed as set forth in Table R404.1.1(1), R404.1.1(2), R404.1.1(3), or R404.1.1(4) and shall also comply with the provisions of Section R404 and the applicable provisions of Sections R606, R607, and R608. Rubble stone masonry foundation walls shall be constructed in accordance with Sections R404.1.8 and R607.2.2. Cantilevered masonry foundation walls shall be constructed as set forth in Table R404.1.1(6), R404.1.1(7), or R404.1.1(8). Cantilevered means: foundation walls that do not have permanent lateral support at the top.~~

Subp. 5. ~~[Repeal]Section R404.1.2.~~ IRC Section R404.1.2 is amended to read as follows:

~~**R404.1.2 Concrete foundation walls.** Concrete foundation walls shall be constructed as set forth in Table R404.1.1(5) and shall also comply with the provisions of Section R404 and the applicable provisions of Section R404.2. Cantilevered concrete foundation walls shall be constructed as set forth in Table R404.1.1(6), R404.1.1(7), or R404.1.1(8). Cantilevered means: foundation walls that do not have permanent lateral support at the top.~~

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

Table R404.1.1(5)(6)

Cantilevered Concrete and Masonry Foundation Walls

Maximum Wall Height ⁱ (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, & SP	GM, GC, SM, SM-CS, & 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 o.c. 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. **Table R404.1.1(6)(7)**. IRC Section R404 is amended by adding a new table as follows:

Table R404.1.1(6)(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 10 – Inch Nominal Wall Thickness ^{a,b,c,e,f,i,k}		
		Soil Classes ^d		
		GW, GP, SW, & SP	GM, GC, SM, SM-CS, & 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 o.c. 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. **Table R404.1.1(7)(8)**. IRC Section R404 is amended by adding a new table as follows:

Table R404.1.1(7)(8)

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, & SP	GM, GC, SM, SM-CS, & 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 o.c. 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 R404.1.3.** IRC Section R404.1.3 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)(6), R404.1.1(6)(7), or R404.1.1(7)(8).

Proposed Code Change – Need and Reason

No change from the 2007 MSBC with the exception of additional options for reduced blocking at smaller top of wall reactions. The previous amendment no longer applies to the wording of the new Code, but is still important in providing a prescriptive option for residential lateral foundation support. The existing MSBC Code language was rewritten to apply to the content of the 2012 IRC, as well as add the blocking spacing column to the anchor bolt table.

Proposed Code Change – Cost/Benefit Analysis

Primarily no change in cost as the majority of the language is the same as the 2007 MSBC. The additional reduced blocking options instead of having one worst case condition will save some construction costs.

Other Factors to Consider Related to Proposed Code Change

1. Is this proposed code change meant to:

change language contained in a published code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in a published code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

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neither; this language will be new language, not found in the code book or in Minnesota Rule.

2. Is this proposed code change required by a Minnesota Statute or new legislation? If so, please provide the citation to the Statute or legislation.

NO

3. Will this proposed code change impact other sections of a published code book or of an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

NO

4. Will this proposed code change impact other parts of the Minnesota State Building Code? If so, please list the affected parts of the Minnesota State Building Code.

NO

5. Who are the parties affected or segments of industry affected by this proposed code change?

Builders, Building Officials, Contractors

6. Can you think of other means or methods to achieve the purpose of the proposed code change? If so, please explain what they are and why your proposed change is the preferred method or means to achieve the desired result.

Builders and contractors can find alternative designs. But it is preferred for the Code to have at least a prescriptive option.

7. Are you aware of any federal requirement or regulation related to this proposed code change? If so, please list the regulation or requirement.

NO