

Blount County Department of Building Safety

Vertical Steel Requirements/Basements



REV. 081710

FOUNDATIONS

TABLE R404.1.1(2)
8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING
WHERE d > 5 INCHES^a

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^b	MINIMUM VERTICAL REINFORCEMENT ^{b,c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	6 feet 8 inches	#4 at 48" o.c.	#5 at 48" o.c.	#6 at 48" o.c.
7 feet 4 inches	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	6 feet	#4 at 48" o.c.	#5 at 48" o.c.	#5 at 48" o.c.
	7 feet 4 inches	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 40" o.c.
8 feet	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	6 feet	#4 at 48" o.c.	#5 at 48" o.c.	#5 at 48" o.c.
	7 feet	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 40" o.c.
	8 feet	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 32" o.c.
8 feet 8 inches	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#5 at 48" o.c.
	6 feet	#4 at 48" o.c.	#5 at 48" o.c.	#6 at 48" o.c.
	7 feet	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 40" o.c.
	8 feet 8 inches	#6 at 48" o.c.	#6 at 32" o.c.	#6 at 24" o.c.
9 feet 4 inches	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#5 at 48" o.c.
	6 feet	#4 at 48" o.c.	#5 at 48" o.c.	#6 at 48" o.c.
	7 feet	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 40" o.c.
	9 feet 4 inches	#6 at 48" o.c.	#6 at 40" o.c.	#6 at 24" o.c.
10 feet	4 feet (or less)	#4 at 48" o.c.	#4 at 48" o.c.	#4 at 48" o.c.
	5 feet	#4 at 48" o.c.	#4 at 48" o.c.	#5 at 48" o.c.
	6 feet	#4 at 48" o.c.	#5 at 48" o.c.	#6 at 48" o.c.
	7 feet	#5 at 48" o.c.	#6 at 48" o.c.	#6 at 32" o.c.
	8 feet	#6 at 48" o.c.	#6 at 32" o.c.	#6 at 24" o.c.
	10 feet	#6 at 40" o.c.	#6 at 24" o.c.	#6 at 16" o.c.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond.
- 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 at least 5 inches.
- d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

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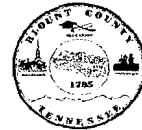


TABLE R404.1.1(3)
10-INCH FOUNDATION WALLS WITH REINFORCING
WHERE d > 6.75 INCHES^a

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^b	MINIMUM VERTICAL REINFORCEMENT ^{b, c}		
		Soil classes and later soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, MH, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet 8 inches	#4 at 56" o.c.	#5 at 56" o.c.	#5 at 56" o.c.
7 feet 4 inches	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet	#4 at 56" o.c.	#4 at 56" o.c.	#5 at 56" o.c.
8 feet	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet	#4 at 56" o.c.	#4 at 56" o.c.	#5 at 56" o.c.
8 feet 8 inches	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet	#4 at 56" o.c.	#4 at 56" o.c.	#5 at 56" o.c.
9 feet 4 inches	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet	#4 at 56" o.c.	#5 at 56" o.c.	#5 at 56" o.c.
10 feet	4 feet (or less)	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	5 feet	#4 at 56" o.c.	#4 at 56" o.c.	#4 at 56" o.c.
	6 feet	#4 at 56" o.c.	#5 at 56" o.c.	#5 at 56" o.c.

For St: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- Mortar shall be Type M or S and masonry shall be laid in running bond.
- 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.
- 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 at least 6.75 inches.
- Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

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Vertical Steel Requirements/Basements

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FOUNDATIONS

TABLE R404.1.1(4)
12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING
WHERE d > 8.75 INCHES^a

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT ^{b,c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	6 feet 8 inches	#4 at 72" o.c.	#4 at 72" o.c.	#5 at 72" o.c.
7 feet 4 inches	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	6 feet	#4 at 72" o.c.	#4 at 72" o.c.	#5 at 72" o.c.
7 feet 4 inches	7 feet 4 inches	#4 at 72" o.c.	#5 at 72" o.c.	#6 at 72" o.c.
	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
8 feet	6 feet	#4 at 72" o.c.	#4 at 72" o.c.	#5 at 72" o.c.
	7 feet	#4 at 72" o.c.	#5 at 72" o.c.	#6 at 72" o.c.
	8 feet	#5 at 72" o.c.	#6 at 72" o.c.	#6 at 64" o.c.
	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
8 feet 8 inches	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	6 feet	#4 at 72" o.c.	#4 at 72" o.c.	#5 at 72" o.c.
	7 feet	#4 at 72" o.c.	#5 at 72" o.c.	#6 at 72" o.c.
	8 feet 8 inches	#5 at 72" o.c.	#7 at 72" o.c.	#6 at 48" o.c.
9 feet 4 inches	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	6 feet	#4 at 72" o.c.	#5 at 72" o.c.	#5 at 72" o.c.
	7 feet	#4 at 72" o.c.	#5 at 72" o.c.	#6 at 72" o.c.
	8 feet	#5 at 72" o.c.	#6 at 72" o.c.	#6 at 56" o.c.
10 feet	9 feet 4 inches	#6 at 72" o.c.	#6 at 48" o.c.	#6 at 40" o.c.
	4 feet (or less)	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	5 feet	#4 at 72" o.c.	#4 at 72" o.c.	#4 at 72" o.c.
	6 feet	#4 at 72" o.c.	#5 at 72" o.c.	#5 at 72" o.c.
	7 feet	#4 at 72" o.c.	#6 at 72" o.c.	#6 at 72" o.c.
	8 feet	#5 at 72" o.c.	#6 at 72" o.c.	#6 at 48" o.c.
10 feet	9 feet	#6 at 72" o.c.	#6 at 56" o.c.	#6 at 40" o.c.
	10 feet	#6 at 64" o.c.	#6 at 40" o.c.	#6 at 32" o.c.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond.
- 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 at least 8.75 inches.
- d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground levels. Where an interior concrete slab-on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.

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TABLE R404.1.1(5)
CONCRETE FOUNDATION WALLS^{a, f, g}

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^b (feet)	MINIMUM VERTICAL REINFORCEMENT SIZE AND SPACING ^{c, d, e, f, g}											
		Soil classes ^a and design lateral soil (psf per foot of depth)											
		GW, GP, SW and SP 30				GM, GC, SM, SM-SC and ML 45				SC, ML-CL and inorganic CL 60			
		Minimum wall thickness (inches)											
		5.5	7.5	9.5	11.5	5.5	7.5	9.5	11.5	5.5	7.5	9.5	11.5
5	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
6	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	PC	PC ^e	PC	PC	PC	#4@35"	PC ^e	PC
7	6	PC	PC	PC	PC	#5@48"	PC	PC	PC	PC	#5@36"	PC	PC
	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	PC	PC	PC	PC	PC	#5@47"	PC	PC
	6	PC	PC	PC	PC	#5@42"	PC	PC	PC	PC	#6@43"	#5@48"	PC ^e
8	7	#5@46"	PC	PC	PC	#6@42"	#5@46"	PC ^e	PC	PC	#6@34"	#6@48"	PC
	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	#4@38"	PC ^e	PC	PC	PC	#5@43"	PC	PC
	6	#4@37"	PC ^e	PC	PC	#5@37"	PC	PC	PC	PC	#6@37"	#5@43"	PC ^e
9	7	#5@40"	PC	PC	PC	#6@37"	#5@41"	PC	PC	PC	#6@34"	#6@43"	PC
	8	#6@43"	#5@47"	PC ^e	PC	#6@34"	#6@43"	PC	PC	PC	#6@27"	#6@32"	#6@44"
	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	#4@35"	PC ^e	PC	PC	PC	#5@40"	PC	PC ^e
10	6	#4@34"	PC ^e	PC	PC	#6@48"	PC	PC	PC	PC	#6@36"	#5@39"	PC ^e
	7	#5@36"	PC	PC	PC	#6@34"	#5@37"	PC	PC	PC	#6@33"	#6@38"	#5@37"
	8	#6@38"	#5@41"	PC ^e	PC	#6@33"	#6@38"	#5@37"	PC ^e	PC	#6@24"	#7@39"	#6@39"
	9	#6@34"	#6@46"	PC	PC	#6@26"	#7@41"	#6@41"	PC	PC	#6@19"	#7@31"	#7@41"
10	4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	PC	PC	PC	PC	#4@33"	PC ^e	PC	PC	PC	#5@38"	PC	PC
	6	#5@48"	PC ^e	PC	PC	#6@45"	PC	PC	PC	PC	#6@34"	#5@37"	PC
	7	#6@47"	PC	PC	PC	#6@34"	#6@48"	PC	PC	PC	#6@30"	#6@35"	#6@48"
10	8	#6@34"	#5@38"	PC	PC	#6@30"	#7@47"	#6@47"	PC ^e	PC	#6@22"	#7@35"	#7@48"
	9	#6@34"	#6@41"	#4@48"	PC ^e	#6@23"	#7@37"	#7@48"	#4@48" ^h	DR	#6@22"	#7@37"	#7@47"
	10	#6@28"	#7@45"	#6@45"	PC	DR	#7@31"	#7@40"	#6@38"	DR	#6@22"	#7@30"	#7@38"

- For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa; 1 pound per square foot per foot = 0.157 kPa/mm.
- Soil classes are in accordance with the United Soil Classification System. Refer to Table R405.1
 - Unbalanced backfill height is the difference in height of the exterior and interior finish ground levels. Where there is an interior concrete slab, the unbalanced backfill height shall be measured from the exterior finish ground level to the top of the interior concrete slab.
 - The size and spacing of vertical reinforcement shown in the table is based on the use of reinforcement with a minimum yield strength of 60,000 psi. Vertical reinforcement with a minimum yield strength of 40,000 psi or 50,000 psi is permitted, provided the same size bar is used and the spacing shown in the table is reduced by multiplying the spacing by 0.67 or 0.83, respectively.
 - Vertical reinforcement, when required, shall be placed nearest the inside face of the wall a distance d from the outside face (soil side) of the wall. The distance d is equal to the wall thickness, t , minus 1.25 inches plus one-half the bar diameter, db ($d = t - (1.25 + db/2)$). The reinforcement shall be placed within a tolerance of $\pm 3/8$ inch where d is less than or equal to 8 inches, or $\pm 1/2$ inch where d is greater than 8 inches.
 - In lieu of the reinforcement shown, smaller reinforcing bar sizes and closer spacings resulting in an equivalent cross-sectional area of reinforcement per linear foot of wall are permitted.
 - 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 $1 1/2$ inches for No. 5 bars and smaller, and not less than 2 inches for larger bars.
 - The minimum thickness is permitted to be reduced 2 inches, provided the minimum specified compressive strength of concrete f'_c is 4,000 psi.