TABLE R608.8(9)

 MAXIMUM ALLOWABLE CLEAR SPANS FOR FLAT LINTELS WITHOUT STIRRUPS IN NONLOAD-BEARING WALLS^{a, b, c, d, e, g}

	NUMBER OF BARS AND BAR SIZE	STEEL YIELD STRENGTH, f _y (psi)	NOMINAL WALL THICKNESS (inches)								
			2	1	6		8		10		
			Lintel Supporting								
(inches)			Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable	
					Maximum	Clear Span	of Lintel (fe	et-inches)	•		
	1_#4	40,000	10-11	11-5	9-7	11-2	7-10	9-5	7-3	9-2	
	1-#4	60,000	12-5	11-7	10-11	13-5	9-11	13-2	9-3	12-10	
	1_#5	40,000	12-7	11-7	11-1	13-8	10-1	13-5	9-4	13-1	
	1-#5	60,000	DR	DR	12-7	16-4	11-6	14-7	10-9	14-6	
Q	2-#4	40,000	DR	DR	12-0	15-3	10-11	15-0	10-2	14-8	
0	1-#6	60,000	DR	DR	DR	DR	12-2	15-3	11-7	15-3	
	2 #5	40,000	DR	DR	DR	DR	12-7	16-7	11-9	16-7	
	2-#3	60,000	DR	DR	DR	DR	DR	DR	13-3	16-7	
	2 #6	40,000	DR	DR	DR	DR	DR	DR	13-2	17-8	
	2-#0	60,000	DR	DR	DR	DR	DR	DR	DR	DR	
	1-#4	40,000	11-5	9-10	10-6	12-0	9-6	11-6	8-9	11-1	
		60,000	11-5	9-10	11-8	13-3	10-11	14-0	10-1	13-6	
	1-#5	40,000	11-5	9-10	11-8	13-3	11-1	14-4	10-3	13-9	
12		60,000	11-5	9-10	11-8	13-3	11-10	16-0	11-9	16-9	
12	2-#4	40,000	DR	DR	11-8	13-3	11-10	16-0	11-2	15-6	
	1-#6	60,000	DR	DR	11-8	13-3	11-10	16-0	11-11	18-4	
	2-#5	40,000	DR	DR	11-8	13-3	11-10	16-0	11-11	18-4	
		60,000	DR	DR	11-8	13-3	11-10	16-0	11-11	18-4	
	1 #4	40,000	13-6	13-0	11-10	13-8	10-7	12-11	9-11	12-4	
	1-#4	60,000	13-6	13-0	13-8	16-7	12-4	15-9	11-5	15-0	
	1 #5	40,000	13-6	13-0	13-10	17-0	12-6	16-1	11-7	15-4	
16	1-#5	60,000	13-6	13-0	13-10	17-1	14-0	19-7	13-4	18-8	
10	2-#4	40,000	13-6	13-0	13-10	17-1	13-8	18-2	12-8	17-4	
	1-#6	60,000	13-6	13-0	13-10	17-1	14-0	20-3	14-1	_	
	2 #5	40,000	13-6	13-0	13-10	17-1	14-0	20-3	14-1	—	
	2-#3	60,000	DR	DR	13-10	17-1	14-0	20-3	14-1	—	
	1 #4	40,000	14-11	15-10	13-0	14-10	11-9	13-11	10-10	13-2	
	1-#-	60,000	15-3	15-10	14-11	18-1	13-6	17-0	12-6	16-2	
	1 #5	40,000	15-3	15-10	15-2	18-6	13-9	17-5	12-8	16-6	
20	1-#5	60,000	15-3	15-10	15-8	20-5	15-9	_	14-7	20-1	
20	2-#4	40,000	15-3	15-10	15-8	20-5	14-11	_	13-10	—	
	1-#6	60,000	15-3	15-10	15-8	20-5	15-10		15-11		
	2.#5	40,000	15-3	15-10	15-8	20-5	15-10		15-11		
	2-#J	60,000	15-3	15-10	15-8	20-5	15-10		15-11		

(continued)

TABLE R608.8(9)—continued MAXIMUM ALLOWABLE CLEAR SPANS FOR FLAT LINTELS WITHOUT STIRRUPS IN NONLOAD-BEARING WALLS^{a, b, c, d, e, g}

			NOMINAL WALL THICKNESS (inches)									
LINTEL DEPTH, <i>D</i> ' (inches)			4		6		8		1	0		
	NUMBER OF BARS	STEEL YIELD	EEL YIELD Lintel Supporting									
	AND BAR SIZE	(psi)	Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable	Concrete Wall	Light- frame Gable		
			Maximum Clear Span of Lintel (feet-inches)									
24	1-#4	40,000	16-1	17-1	13-11	15-10	12-7	14-9	11-8	13-10		
		60,000	16-11	18-5	16-1	19-3	14-6	18-0	13-5	17-0		
	1-#5	40,000	16-11	18-5	16-3	19-8	14-9	18-5	13-8	17-4		
		60,000	16-11	18-5	17-4		17-0		15-8	—		
	2-#4	40,000	16-11	18-5	17-4		16-1		14-10	_		
	1-#6	60,000	16-11	18-5	17-4		17-6		17-1			
	2_#5	40,000	16-11	18-5	17-4	_	17-6	_	17-4	_		
	2-#3	2-#3 60,	60,000	16-11	18-5	17-4		17-6		17-8	_	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, Grade 40 = 280 MPa, Grade 60 = 420 MPa. DR = Design Required.

a. See Table R608.3 for tolerances permitted from nominal thickness.

b. Table values are based on concrete with a minimum specified compressive strength of 2,500 psi. See Note e.

c. Deflection criterion is L/240, where L is the clear span of the lintel in inches, or $\frac{1}{2}$, inch, whichever is less.

d. Linear interpolation between lintels depths, D, is permitted provided the two cells being used to interpolate are shaded.

e. Where concrete with a minimum specified compressive strength of 3,000 psi is used, spans in cells that are shaded shall be permitted to be multiplied by 1.05.

f. Lintel depth, D, is permitted to include the available height of wall located directly above the lintel, provided that the increased lintel depth spans the entire length of the lintel.

g. The maximum clear opening width between two solid wall segments shall be 18 feet. See Section R608.7.2.1. Lintel spans in the table greater than 18 feet are shown for interpolation and information purposes only.

	FORM TYPE AND NOMINAL WALL THICKNESS (inches)										
LINTEL DEPTH ^h , <i>D</i> (inches)	6-inch W	affle-grid ^a	8-inch Wa	affle-grid ^a	6-inch Screen-grid⁵						
	Lintel supporting										
	Concrete Wall	Light-frame Gable	Concrete Wall	Light-frame Gable	Concrete Wall	Light-frame Gable					
	Maximum Clear Span of Lintel (feet-inches)										
8	10-3	8-8	8-8	8-3	—	—					
12	9-2	7-6	7-10	7-1	8-8	6-9					
16	10-11	10-0	9-4	9-3							
20	12-5	12-2	10-7	11-2							
24	13-9	14-2	11-10	12-11	13-0	12-9					

TABLE R608.8(10) MAXIMUM ALLOWABLE CLEAR SPANS FOR WAFFLE-GRID AND SCREEN-GRID LINTELS WITHOUT STIRRUPS IN NONLOAD-BEARING WALLS^{c, d, e, f, g}

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, Grade 40 = 280 MPa, Grade 60 = 420 MPa.

a. Where lintels are formed with waffle-grid forms, form material shall be removed, if necessary, to create top and bottom flanges of the lintel that are not less than 3 inches in depth (in the vertical direction), are not less than 5 inches in width for 6-inch waffle-grid forms and not less than 7 inches in width for 8-inch waffle-grid forms. See Figure R608.8(3). Flat-form lintels shall be permitted in lieu of waffle-grid lintels. See Tables R608.8(2) through R608.8(5).

b. Where lintels are formed with screen-grid forms, form material shall be removed if necessary to create top and bottom flanges of the lintel that are not less than 5 inches in width and not less than 2.5 inches in depth (in the vertical direction). See Figure R608.8(4). Flat-form lintels shall be permitted in lieu of screen-grid lintels. See Tables R608.8(2) through R608.8(5).

c. See Table R608.3 for tolerances permitted from nominal thickness and minimum dimensions and spacing of cores.

d. Table values are based on concrete with a minimum specified compressive strength of 2,500 psi. See Note g.

e. Deflection criterion is L/240, where L is the clear span of the lintel in inches, or 1/2 inch, whichever is less.

f. Top and bottom reinforcement shall consist of a No. 4 bar having a minimum yield strength of 40,000 psi.

g. Where concrete with a minimum specified compressive strength of 3,000 psi is used, spans in shaded cells shall be permitted to be multiplied by 1.05.

h. Lintel depth, D, is permitted to include the available height of wall located directly above the lintel, provided that the increased lintel depth spans the entire

length of the lintel.

R608.8.2.1 Lintels designed for gravity load-bearing conditions. Where a lintel will be subjected to gravity load conditions 1 through 5 of Table R608.8(1), the clear span of the lintel shall not exceed that permitted by Tables R608.8(2) through R608.8(8). The maximum clear span of lintels with and without stirrups in flat walls shall be determined in accordance with Tables R608.8(2) through R608.8(5), and constructed in accordance with Figure R608.8(2). The maximum clear span of lintels with and without stirrups in waffle-grid walls shall be determined in accordance with Tables R608.8(6) and R608.8(7), and constructed in accordance with Figure R608.8(3). The maximum clear span of lintels with and without stirrups in screen-grid walls shall be determined in accordance with Table R608.8(8), and constructed in accordance with Figure R608.8(4).

Where required by the applicable table, No. 3 stirrups shall be installed in lintels at a maximum spacing of d/2 where d equals the depth of the lintel, D, less the cover of the concrete as shown in Figures R608.8(2) through R608.8(4). The smaller value of d computed for the top and bottom bar shall be used to determine the maximum stirrup spacing. Where stirrups are required in a lintel with a single bar or two bundled bars in the top and bottom, they shall be fabricated like the letter "c" or "s" with 135-degree (2.36 rad) standard hooks at each end that comply with Section R608.5.4.5 and Figure R608.5.4(3) and installed as shown in Figures R608.8(2) through R608.8(4). Where two bars are required in the top and bottom of the lintel and the bars are not bundled, the bars shall be separated by not less than 1 inch (25 mm). The free end of the stirrups shall be fabricated with 90- or 135degree (1.57 or 2.36 rad) standard hooks that comply with Section R608.5.4.5 and Figure R608.5.4(3) and installed as shown in Figures R608.8(2) and R608.8(3). For flat, waffle-grid and screen-grid lintels, stirrups are not required in the center distance, A, portion of spans in accordance with Figure R608.8(1) and Tables R608.8(2) through R608.8(8). See Section R608.8.2.2, Item 5, for requirement for stirrups through out lintels with bundled bars.

R608.8.2.2 Bundled bars in lintels. It is permitted to bundle two bars in contact with each other in lintels if all of the following are observed:

- 1. Bars equal to or less than No. 6 are bundled.
- 2. Where the wall thickness is not sufficient to provide not less than 3 inches (76 mm) of clear space beside bars (total on both sides) oriented horizontally in a bundle, the bundled bars shall be oriented in a vertical plane.
- 3. Where vertically oriented bundled bars terminate with standard hooks to develop the bars in tension beyond the support (see Section R608.5.4.4), the hook extensions shall be stag-

gered to provide not less than 1 inch (25 mm) clear spacing between the extensions.

- 4. Bundled bars shall not be lap spliced within the lintel span and the length on each end of the lintel that is required to develop the bars in tension.
- 5. Bundled bars shall be enclosed within stirrups throughout the length of the lintel. Stirrups and the installation thereof shall comply with Section R608.8.2.1.

R608.8.2.3 Lintels without stirrups designed for nonload-bearing conditions. The maximum clear span of lintels without stirrups designed for nonloadbearing conditions of Table R608.8(1) shall be determined in accordance with this section. The maximum clear span of lintels without stirrups in flat walls shall be determined in accordance with Table R608.8(9), and the maximum clear span of lintels without stirrups in walls of waffle-grid or screen-grid construction shall be determined in accordance with Table R608.8(10).

R608.9 Requirements for connections—general. Concrete walls shall be connected to footings, floors, ceilings and roofs in accordance with this section.

R608.9.1 Connections between concrete walls and light-frame floor, ceiling and roof systems. Connections between concrete walls and light-frame floor, ceiling and roof systems using the prescriptive details of Figures R608.9(1) through R608.9(12) shall comply with this section and Sections R608.9.2 and R608.9.3.

R608.9.1.1 Anchor bolts. Anchor bolts used to connect light-frame floor, ceiling and roof systems to concrete walls in accordance with Figures R608.9(1) through R608.9(12) shall have heads, or shall be rods with threads on both ends with a hex or square nut on the end embedded in the concrete. Bolts and threaded rods shall comply with Section R608.5.2.2. Anchor bolts with J- or L-hooks shall not be used where the connection details in these figures are used.

R608.9.1.2 Removal of stay-in-place form material at bolts. Holes in stay-in-place forms for installing bolts for attaching face-mounted wood ledger boards to the wall shall be not less than 4 inches (102 mm) in diameter for forms not greater than $1^{1}/_{2}$ inches (38 mm) in thickness, and increased 1 inch (25 mm) in diameter for each $1/_{2}$ -inch (12.7 mm) increase in form thickness. Holes in stay-in-place forms for installing bolts for attaching face-mounted cold-formed steel tracks to the wall shall be not less than 4 inches (102 mm) square. The wood ledger board or steel track shall be in direct contact with the concrete at each bolt location.

Exception: A vapor retarder or other material less than or equal to $\frac{1}{16}$ inch (1.6 mm) in thickness is permitted to be installed between the wood ledger or cold-formed track and the concrete.



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 pound-force = 4.448 N.

FIGURE R608.9(1) WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR

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WOOD THAMED FEOOR TO GIDE OF OONONETE WALL, THAMING FERE ENDIODEAR										
		BASIC WIND SPEED (mph)								
ANCHOR BOLT SPACING	TENSION TIE SPACING	115B	120B	130B	140B	150B	160B			
(inches)	(incries)	—	—	110C	119C	127C	136C			
		_	—	—	110D	117D	125D			
12	12									
12	24									
12	36									
12	48									
16	16									
16	32									
16	48									
19.2	19.2									
19.2	38.4									

 TABLE R608.9(1)

 WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b}

For SI:1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R608.9(1). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R608 is required.



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound-force = 4.448 N.

FIGURE R608.9(2) WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PARALLEL

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	TENSION TIE SPACING	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY								
ANCHOR BOLT SPACING		115B	120B	130B	140B	150B	160B			
(inches)	(inches)	-	—	110C	119C	127C	136C			
		_	—	—	110D	117D	125D			
12	12									
12	24									
12	36									
12	48									
16	16									
16	32									
16	48									
19.2	19.2									
19.2	38.4									
24	24									
24	48									

TABLE R608.9(2) WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PARALLEL^{a, b}

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R608.9(2). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R608 is required.



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 pound-force = 4.448 N.

FIGURE R608.9(3) WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR

	TENSION TIE SPACING	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY								
ANCHOR BOLT SPACING		115B	120B	130B	140B	150B	160B			
(inches)	(inches)	_	—	110C	119C	127C	136C			
		_	—	—	110D	117D	125D			
12	12						6			
12	24					6	6			
12	36					6	6			
12	48				6	6	6			
16	16					6	6A			
16	32				6	6	6A			
16	48			6	6	6	6A			
19.2	19.2				6A	6A	6B			
19.2	38.4			6	6A	6A	6B			
24	24			6A	6B	6B	6B			
24	48		6	6A	6B	6B	8B			

 TABLE R608.9(3)

 WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R608.9(3). Use of this detail is permitted where cell is not shaded.

b. Wall design per other provisions in Section R608 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells that do not contain a number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross hatching in Figure R608.9(3). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3×6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3×6 sill plate are required.



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound-force = 4.448 N.

FIGURE R608.9(4) WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL

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	TENSION TIE SPACING	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY								
ANCHOR BOLT SPACING		115B	120B	130B	140B	150B	160B			
(inches)	(inches)	_	—	110C	119C	127C	136C			
		_	—	—	110D	117D	125D			
12	12						6			
12	24					6	6			
12	36					6	6			
12	48				6	6	6			
16	16					6	6A			
16	32				6	6	6A			
16	48			6	6	6	6A			
19.2	19.2				6A	6A	6B			
19.2	38.4			6	6A	6A	6B			
24	24			6A	6B	6B	6B			
24	48		6	6A	6B	6B	8B			

 TABLE R608.9(4)

 WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL^{a, b, c, d, e}

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R608.9(4). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R608 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells that do not contain a number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross hatching in Figure R608.9(4). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3×6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3×6 sill plate are required.