

Aran + Franklin Engineering: General Specifications (last updated 5/15/23)

Please refer to the following information regarding general specifications for all A+F jobs. Should something different be required, those specifications will be called out on the plans.

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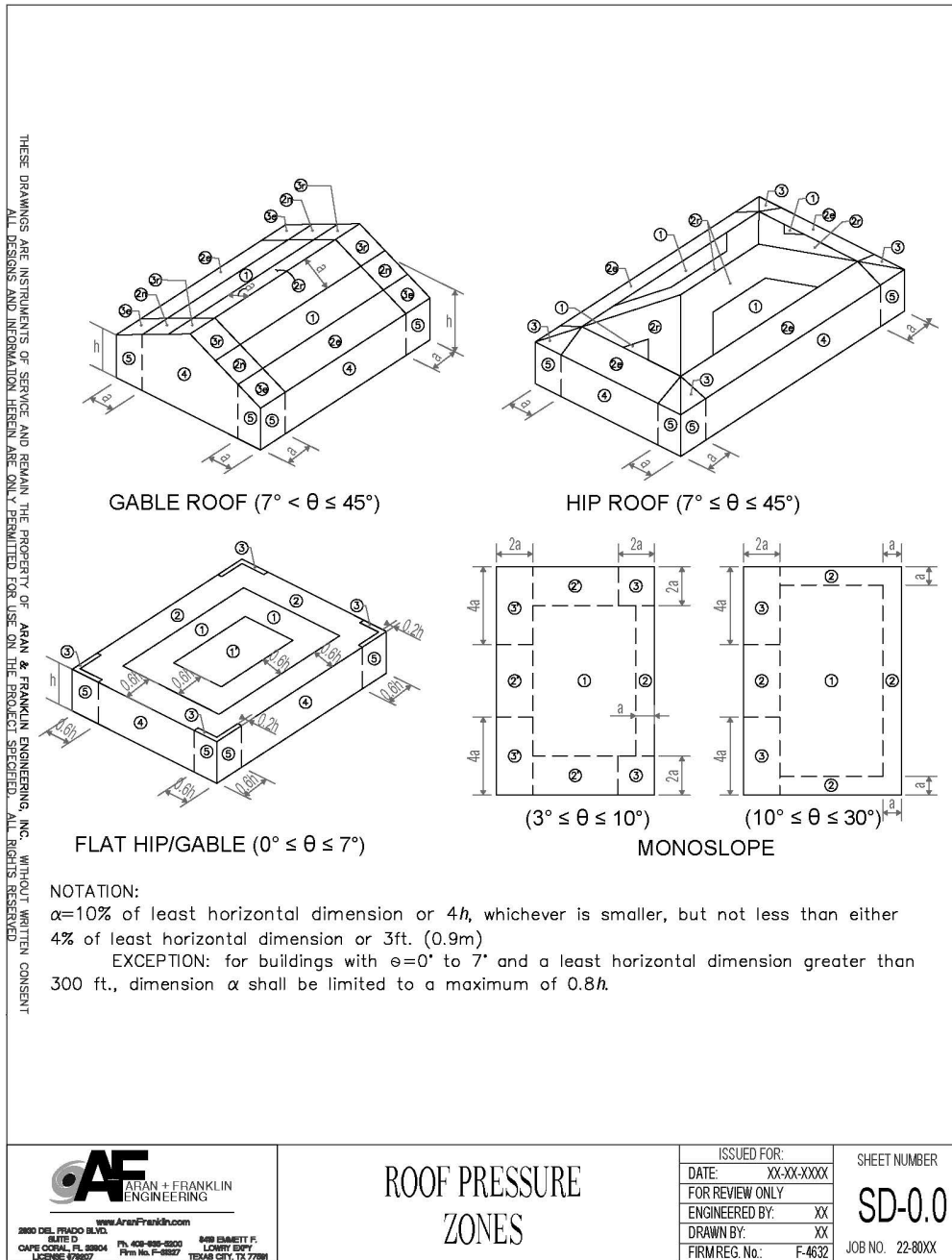


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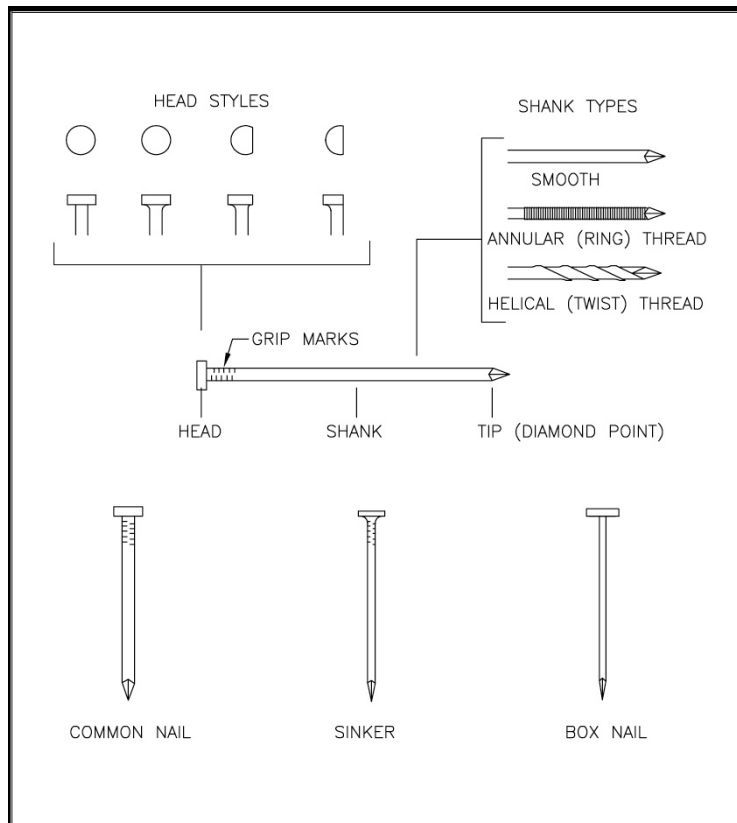


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Wall and Roof Pressure Zones



Standard framing nails sizes and equivalent gun nail sizes
(credit: [International Association of Certified Home Inspectors](#))



The most common nail types used in residential wood construction follow:

1) Common nails are bright, plain-shank nails with a flat head and diamond point. The diameter of a common nail is larger than that of sinkers and box nails of the same length. Common nails are used primarily for rough framing.

2) Sinker nails are bright or coated slender nails with a sinker head and diamond point. The diameter of the head is smaller than that of a common nail with the same designation. Sinker nails are used primarily for rough framing and applications where lumber splitting may be a concern.

3) Box nails are bright, coated or galvanized nails with a flat head and diamond point. They are made of lighter-gauge wire than common nails and sinkers, and are typically used for toe-nailing and many other light framing connections where splitting of lumber is a concern.

4) Cooler nails are generally similar to the nails described above, but with slightly thinner shanks. They are commonly supplied with ring shanks (i.e., annular threads) as a drywall nail.

5) Power-driven nails (and staples) are produced by a variety of manufacturers for several types of power-driven fasteners. Pneumatic-driven nails and staples are the most popular power-driven fasteners in residential construction. Nails are available in a variety of diameters, lengths, and head styles. The shanks are generally cement-coated and are available with deformed shanks for added capacity. Staples are also available in a variety of wire diameters, crown widths, and leg lengths.

Nail lengths and weights are denoted by the penny weight, which is indicated by "d". Given the standardization of common nails, sinkers, and cooler nails, the penny weight also denotes a nail's head and shank diameter. For other nail types, sizes are based on the nail's length and diameter. [The Table below] arrays dimensions for the nails discussed above. The nail length and diameter

are key factors in determining the strength of nailed connections in wood framing. The steel yield strength of the nail may also be important for certain shear connections, yet such information is rarely available for a standard lot of nails.

Type of Nail	Nominal Size (penny weight, d)	Length (inches)	Diameter (inches)
Common	6d	2	0.113
	8d	2 1/2	0.131
	10d	3	0.148
	12d	3 1/4	0.148
	16d	3 1/2	0.162
	20d	4	0.192
Box	6d	2	0.099
	8d	2 1/2	0.113
	10d	3	0.128
	12d	3 1/4	0.128
	16d	3 1/2	0.135
Sinker	6d	1 7/8	0.092
	8d	2 3/8	0.113
	10d	2 7/8	0.120
	12d	3 1/8	0.135
	16d	3 1/4	0.148
Pneumatic	6d	1 7/8 to 2	0.092 to 0.113
	8d	2 3/8 to 2 1/2	0.092 to 0.131
	10d	3	0.120 to 0.148
	12d	3 1/4	0.120 to 0.131
	16d	3 1/2	0.131 to 0.162
	20d	4	0.131
Cooler	4d	1 3/8	0.067
	5d	1 5/8	0.080
	6d	1 7/8	0.092

Lumber Span Tables (SYP)- (Residential)

<https://www.southernpine.com/span-tables/joists-rafters/>

Floor- 30 LL 10 DL (Bedrooms)

TABLE 1 FLOOR JOISTS – 30 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	12-6	11-10	11-3	9-2	12-9	11-7	11-10	12-0	12-0	11-10
	16.0	11-4	10-9	10-3	7-11	11-7	10-6	10-9	10-11	10-11	10-9
	19.2	10-8	10-1	9-6	7-3	10-10	9-10	10-1	10-4	10-4	10-1
	24.0	9-11	9-4	8-6	6-5	10-1	9-2	9-4	9-7	9-7	9-4
2 x 8	12.0	16-6	15-7	14-11	11-6	16-9	15-3	15-7	15-10	15-10	15-7
	16.0	15-0	14-2	13-3	10-0	15-3	13-10	14-2	14-5	14-5	14-2
	19.2	14-1	13-4	12-1	9-1	14-4	13-0	13-4	13-7	13-7	13-4
	24.0	13-1	12-4	10-10	8-2	13-4	12-1	12-4	12-7	12-7	12-4
2 x 10	12.0	21-0	19-10	18-1	13-11	21-5	19-5	19-10	20-3	20-3	19-10
	16.0	19-1	18-0	15-8	12-1	19-5	17-8	18-0	18-5	18-5	18-0
	19.2	18-0	16-5	14-4	11-0	18-3	16-7	17-0	17-4	17-4	17-0
	24.0	16-8	14-8	12-10	9-10	17-0	15-5	15-9	16-1	16-1	15-9
2 x 12	12.0	25-7	24-2	21-4	16-6	26-0	23-7	24-2	24-8	24-8	24-2
	16.0	23-3	21-4	18-6	14-4	23-7	21-6	21-11	22-5	22-5	21-11
	19.2	21-10	19-6	16-10	13-1	22-3	20-2	20-8	21-1	21-1	20-8
	24.0	20-3	17-5	15-1	11-8	20-8	18-9	19-2	19-7	19-7	19-2

Floor- 40 LL 10 DL (Other residential living areas/ decks)

TABLE 2 FLOOR JOISTS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	11-4	10-9	10-3	8-2	11-7	10-6	10-9	10-11	10-11	10-9
	16.0	10-4	9-9	9-4	7-1	10-6	9-6	9-9	9-11	9-11	9-9
	19.2	9-8	9-2	8-6	6-5	9-10	9-0	9-2	9-4	9-4	9-2
	24.0	9-0	8-6	7-7	5-9	9-2	8-4	8-6	8-8	8-8	8-6
2 x 8	12.0	15-0	14-2	13-6	10-3	15-3	13-10	14-2	14-5	14-5	14-2
	16.0	13-7	12-10	11-10	8-11	13-10	12-7	12-10	13-1	13-1	12-10
	19.2	12-10	12-1	10-10	8-2	13-0	11-10	12-1	12-4	12-4	12-1
	24.0	11-11	11-3	9-8	7-3	12-1	11-0	11-3	11-5	11-5	11-3
2 x 10	12.0	19-1	18-0	16-2	12-6	19-5	17-8	18-0	18-5	18-5	18-0
	16.0	17-4	16-1	14-0	10-10	17-8	16-0	16-5	16-9	16-9	16-5
	19.2	16-4	14-8	12-10	9-10	16-7	15-1	15-5	15-9	15-9	15-5
	24.0	15-2	13-1	11-5	8-10	15-5	14-0	14-4	14-7	14-7	14-4
2 x 12	12.0	23-3	21-11	19-1	14-9	23-7	21-6	21-11	22-5	22-5	21-11
	16.0	21-1	19-1	16-6	12-10	21-6	19-6	19-11	20-4	20-4	19-11
	19.2	19-10	17-5	15-1	11-8	20-2	18-4	18-9	19-2	19-2	18-9
	24.0	18-5	15-7	13-6	10-5	18-9	17-0	17-5	17-9	17-9	17-5



Floor- 50 LL 10 DL (Balconies- cantilevered)

TABLE 3 FLOOR JOISTS – 50 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	10-6	9-11	9-6	7-5	10-9	9-9	9-11	10-2	10-2	9-11
	16.0	9-7	9-1	8-6	6-5	9-9	8-10	9-1	9-3	9-3	9-1
	19.2	9-0	8-6	7-9	5-11	9-2	8-4	8-6	8-8	8-8	8-6
	24.0	8-4	7-11	6-11	5-3	8-6	7-9	7-11	8-1	8-1	7-11
2 x 8	12.0	13-11	13-1	12-6	9-5	14-2	12-10	13-1	13-5	13-5	13-1
	16.0	12-7	11-11	10-10	8-2	12-10	11-8	11-11	12-2	12-2	11-11
	19.2	11-11	11-3	9-10	7-5	12-1	11-0	11-3	11-5	11-5	11-3
	24.0	11-0	10-3	8-10	6-8	11-3	10-2	10-5	10-8	10-8	10-5
2 x 10	12.0	17-9	16-9	14-9	11-5	18-0	16-5	16-9	17-1	17-1	16-9
	16.0	16-1	14-8	12-10	9-10	16-5	14-11	15-2	15-6	15-6	15-2
	19.2	15-2	13-5	11-8	9-0	15-5	14-0	14-4	14-7	14-7	14-4
	24.0	14-1	12-0	10-5	8-1	14-4	13-0	13-3	13-7	13-7	13-3
2 x 12	12.0	21-7	20-1	17-5	13-6	21-11	19-11	20-4	20-9	20-9	20-4
	16.0	19-7	17-5	15-1	11-8	19-11	18-1	18-6	18-10	18-10	18-6
	19.2	18-5	15-11	13-9	10-8	18-9	17-0	17-5	17-9	17-9	17-5
	24.0	17-1	14-3	12-4	9-6	17-5	15-10	16-2	16-6	16-6	16-2

Floor- 40 LL 10 DL (wet service areas- docks/ piers)

TABLE 12 WET-SERVICE FLOOR JOISTS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	11-0	10-4	9-11	8-2	11-2	10-2	10-4	10-7	10-7	10-4
	16.0	10-0	9-5	9-0	7-1	10-2	9-2	9-5	9-7	9-7	9-5
	19.2	9-4	8-10	8-6	6-5	9-6	8-8	8-10	9-0	9-0	8-10
	24.0	8-8	8-2	7-7	5-9	8-10	8-0	8-3	8-5	8-5	8-3
2 x 8	12.0	14-5	13-8	13-1	10-3	14-8	13-4	13-8	13-11	13-11	13-8
	16.0	13-2	12-5	11-10	8-11	13-4	12-2	12-5	12-8	12-8	12-5
	19.2	12-4	11-7	10-10	8-2	12-7	11-5	11-8	11-11	11-11	11-8
	24.0	11-6	10-4	9-8	7-3	11-8	10-7	10-10	11-1	11-1	10-10
2 x 10	12.0	18-5	17-5	16-2	12-6	18-9	17-0	17-5	17-9	17-9	17-5
	16.0	16-9	15-10	14-0	10-10	17-0	15-6	15-10	16-2	16-2	15-10
	19.2	15-9	14-8	12-10	9-10	16-0	14-7	14-11	15-2	15-2	14-11
	24.0	14-8	13-1	11-5	8-10	14-11	13-6	13-10	14-1	14-1	13-10
2 x 12	12.0	22-5	21-2	19-1	14-9	22-10	20-9	21-2	21-7	21-7	21-2
	16.0	20-4	19-1	16-6	12-10	20-9	18-10	19-3	19-8	19-8	19-3
	19.2	19-2	17-5	15-1	11-8	19-6	17-9	18-1	18-6	18-6	18-1
	24.0	17-10	15-7	13-6	10-5	18-1	16-5	16-10	17-2	17-2	16-10



Ceiling- 10 LL, 5 DL (no attic storage)

TABLE 15 CEILING JOISTS – 10 PSF LIVE LOAD, 5 PSF DEAD LOAD, 240 DEFLECTION											
Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	13-2	12-5	11-10	10-1	13-4	12-2	12-5	12-8	12-8	12-5
	16.0	11-11	11-3	10-9	8-9	12-2	11-0	11-3	11-6	11-6	11-3
	19.2	11-3	10-7	10-2	8-0	11-5	10-4	10-7	10-10	10-10	10-7
	24.0	10-5	9-10	9-3	7-2	10-7	9-8	9-10	10-0	10-0	9-10
2 x 6	12.0	20-8	19-6	18-8	14-11	21-0	19-1	19-6	19-11	19-11	19-6
	16.0	18-9	17-8	16-11	12-11	19-1	17-4	17-8	18-1	18-1	17-8
	19.2	17-8	16-8	15-7	11-9	17-11	16-4	16-8	17-0	17-0	16-8
	24.0	16-4	15-6	13-11	10-7	16-8	15-2	15-6	15-9	15-9	15-6
2 x 8	12.0	26-0*	25-8	24-7	18-9	26-0*	25-2	25-8	26-0*	26-0*	25-8
	16.0	24-8	23-4	21-7	16-3	25-2	22-10	23-4	23-10	23-10	23-4
	19.2	23-3	21-11	19-8	14-10	23-8	21-6	21-11	22-5	22-5	21-11
	24.0	21-7	20-5	17-7	13-3	21-11	19-11	20-5	20-10	20-10	20-5
2 x 10	12.0	26-0*	26-0*	26-0*	22-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	26-0*	25-7	19-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	26-0*	23-5	18-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	23-11	20-11	16-1	26-0*	25-5	26-0	26-0*	26-0*	26-0

Ceiling- 20 LL, 10 DL (light storage in attic)

TABLE 16 CEILING JOISTS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION											
Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	10-5	9-10	9-3	7-2	10-7	9-8	9-10	10-0	10-0	9-10
	16.0	9-6	8-11	8-0	6-2	9-8	8-9	8-11	9-1	9-1	8-11
	19.2	8-11	8-5	7-4	5-8	9-1	8-3	8-5	8-7	8-7	8-5
	24.0	8-3	7-8	6-7	5-1	8-5	7-8	7-8	8-0	7-9	7-10
2 x 6	12.0	16-4	15-6	13-11	10-7	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-0	12-0	9-2	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	12-9	11-0	8-4	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	11-5	9-10	7-5	13-3	12-0	12-0	12-6	12-3	12-3
2 x 8	12.0	21-7	20-5	17-7	13-3	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	17-9	15-3	11-6	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	16-2	13-11	10-6	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	14-6	12-6	9-5	17-5	15-10	15-10	16-6	16-2	16-2
2 x 10	12.0	26-0*	23-11	20-11	16-1	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	20-9	18-1	13-11	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	18-11	16-6	12-9	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	16-11	14-9	11-5	22-3	20-2	20-3	21-1	20-7	20-8

Roof- 20 LL, 10 DL, CD= 1.15 (With typical roof covering- shingle, metal, modified)

TABLE 17 RAFTERS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	14-9	11-4	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-1	12-11	9-9	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	13-3	11-9	8-11	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	12-3	10-7	8-0	13-3	12-0	12-3	12-6	12-6	12-3
2 x 8	12.0	21-7	20-5	18-11	14-3	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	18-6	16-4	12-4	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	17-4	14-11	11-3	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	15-6	13-4	10-1	17-5	15-10	16-2	16-6	16-6	16-2
2 x 10	12.0	26-0*	25-8	22-5	17-3	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	22-3	19-5	15-0	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	20-4	17-9	13-8	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	18-2	15-10	12-3	22-3	20-2	20-8	21-1	21-1	20-8
2 x 12	12.0	26-0*	26-0*	26-0*	20-5	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	26-0*	22-10	17-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	24-1	20-11	16-2	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	21-7	18-8	14-6	26-0*	24-7	25-1	25-7	25-7	25-1

Commercial loads, heavy residential roof covering (slate, tile, concrete) should be designed based on actual live and dead loads.