



DEFLECTION CALCULATION/LIMITS • RECOMMENDED CAMBERS • NAILING INTO CHORDS

WEB JOIST TRUSS • DESIGN MANUAL

Deflection Calculation

$$\text{Defl. (in.)} = \frac{5wL^4}{384 EI} = \frac{22.5WL^4}{EI}$$

The chord members act as the resistance to deflection. The standard beam equation can be used to calculate the truss deflection. For a uniformly loaded simple span, use equation shown at left. E values are x10⁶

WHERE:

- A = Span Adjustment (in.)
- B = Span Adjustment (ft.)
- C = Chord depth (in.)
- w = Uniform Load (pli)
- W = Uniform Load (plf)
- I = Clear Span (in.) + A
- L = Clear Span (ft.) + B
- I = Moment of Inertia (in.⁴)
- E = Modulus of Elasticity (psi)
- D = Average Out to Out Depth (in.)
- d = Average Pin to Pin Depth (in.)
- d = D - C

Version 1	Version 2
A = 1.3333 in.	A = 1.8333 in.
B = 0.1111 ft.	B = 0.1528 ft.
C = 1.50 in.	C = 2.50 in.
E = 1.80 for 2100f Top & Bottom	
E = 1.90 for 2100f & 2400f Mix	
E = 2.00 for 2400f Top & Bottom	E = 2.10 for LAM-CHORD
E = 2.15 for 2400f & 2850 Mix	
E = 2.30 for 2850f Top & Bottom	
I = 2.62d ² + 1.96875	I = 4.375d ² + 9.11458

Recommended Deflection Limits

	FLOOR*	ROOF
Residential	L/240 @ TL and/or L/360 @ LL (min.) or L/360 @ TL and/or L/480 @ LL (preferred)	Flat (0"/ft to 1/8"/ft) — NOT ALLOWED Slope (1/8"/ft to less than 1/4"/ft) L/240 @ TL and/or L/360 @ LL
Non-Residential	L/360 @ TL and/or L/480 @ LL (min.) or L/480 @ TL and/or L/600 @ LL (preferred)	Slope (1/4"/ft & Greater) L/180 @ TL and/or L/240 @ LL

For cantilevers use 2L/___ @ TL and/or 2L/___ @ LL with limits shown above for downward deflections.

*Movable Partition loads are not to be considered in limits.

With plaster ceiling use L/360 @ LL. TL = Total Load LL = Live Load

Recommended Cambers

FLOOR	CAMBER	
	Normal	Minimum
Residential	1.50 DL	DL
Non-Residential	1.50 DL	DL
	DL + 0.50LL*	DL + 0.25LL*

ROOF	STRESS LEVEL	CAMBER	
		Normal	Minimum
Sloped 1/8"/ft. or Greater (No flat roofs)	115%	DL + 0.50LL	DL + 0.25LL
	125%	1.50 DL	1.25 DL

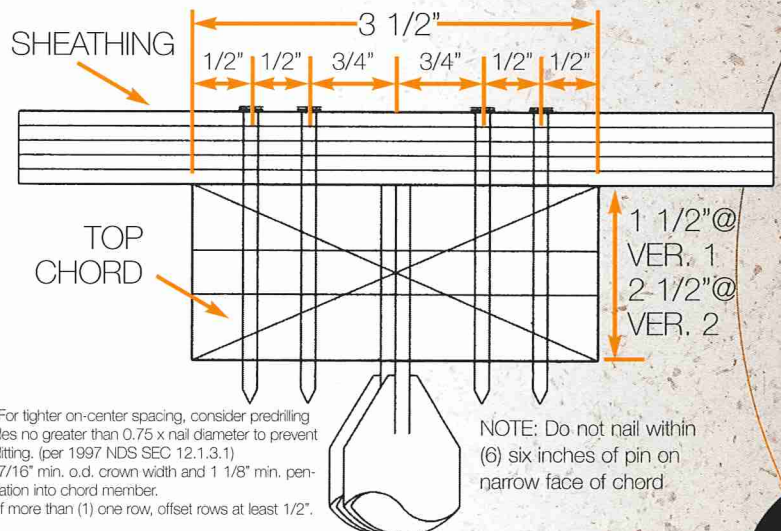
DL = Dead Load LL = Live Load

*For High Live Load (example: 100LL + 20DL)

Nailing into Chords

Recommended minimum on-center spacing for nails and staples in a single row^{1,3}

NAIL SIZE	STAPLE SIZE*	TRUSS	
		Version 1	Version 2
8d Box	15 Ga.	3.75"	3.00"
8d Com	13 Ga.	4.50"	3.50"
10d Box	14 Ga.	4.25"	3.50"
10d Com	12 Ga.	5.00"	4.00"
12d Box	14 Ga.	4.25"	3.50"
12d Com	12 Ga.	5.00"	4.00"
16d Box	13 Ga.	4.50"	3.75"
16d Com	12 Ga.	5.50"	4.50"



- 1** For tighter on-center spacing, consider predrilling holes no greater than 0.75 x nail diameter to prevent splitting. (per 1997 NDS SEC 12.1.3.1)
- 2** 7/16" min. o.d. crown width and 1 1/8" min. penetration into chord member.
- 3** If more than (1) one row, offset rows at least 1/2".

NOTE: Do not nail within (6) six inches of pin on narrow face of chord.