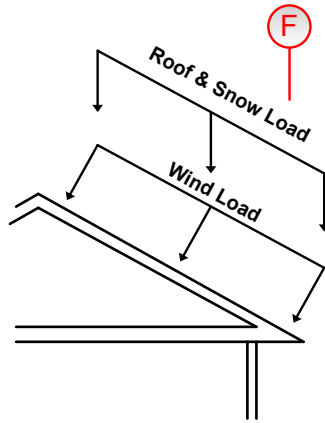
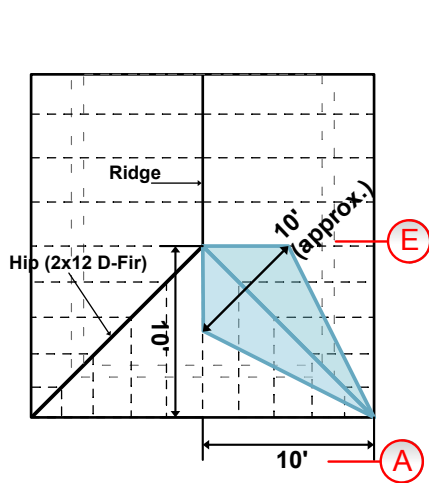


Hip Rafter [USA Timber Beam]

See how to design a Hip Rafter wood beam to ASD or LRFD requirements.

Learn how to translate your CAD plan and elevation directly to a ClearCalcs calculation!



LOADING DATA:

Dead = 10 psf
 Snow = 25 psf
 Wind = 30 psf (acting normal to hip)

DESIGN CRITERIA:

Slope = 9:12
 Rafter spacing = 24" MAX O.C (continuous bracing per NDS)
 Short-Term Defl.: L/180
 Long-Term Defl.: L/120
 End Connection: Nail Plate

Key Properties

Section Type: Standard Sections Database
 Custom Section: 2x12 D, Fir-L No. 1

Size and Grade: 2x12 D, Fir-L No. 1

Number of Plies: 1 piece of wood

Side Length: $L_{side} = 10$ ft (A)

Roof Pitch: $\alpha_{roof} = 9:12$ (B)

Total Material Length: $L = 16$ ft, 0.1 in

Continuous Bracing for Lateral Torsional Buckling: Top Braced (C)

Supports and Braces:

Support/Brace Type	Position From Left x_i (ft)	Support Length $L_{s,i}$ (in)
Pinned	0	0
Pinned	16	0
Pinned		

Automatically Calculated based on Length of Side (for x_i and $L_{s,i}$)

No check required - Set to zero (for $L_{s,i}$)

Add Fitch Plates? No (Ignore when fitch plate not needed)

Loads

Distributed Loads:

Label	x_s (ft)	x_e (ft)	TW_s (ft)	TW_e (ft)	orient	w
Roof Load	0	16	10	0	Gravity	D: 10 psf
Snow Load	0	16	10	0	Gravity	S: 25 psf
Wind Load	0	16	10	0	Aligned	W,dn: 30 psf

Automatically Calculated based on Length of Side (for x_s and x_e)

Vertical arrows for gravity diagonal for aligned (for w)

Tributary Area is approx. half the side width each side of the hip rafter (for TW_s and TW_e)

Area Loads spec'd by client or standard (for w)

Bending Axis: Strong (X-X)

Include Self-weight: No

Live Load Type: Occupancy

Brace at Point Loads? No

Design Conditions

Design Code for Load Combinations: International Building Code (IBC)2018

Beam Incline: Hip/Corner Slope

Repeating Member? Non-Repeating

Service Condition: Dry

Temperature Range: $T \leq 100^\circ\text{F}$

Deflection Limit Absolute Limit: $\Delta_{max} = 1$ in

Live / Short-term Deflection Limit: $(L/)_ST = 180$

Long Term Deflection Limit: $(L/)_LT = 120$

Simplified DL+LL Deflection Limit: $(L/)_DL+LL = 100$

Generally no change required for typical structures (for Δ_{max})

Deflection check will fail when exceeded. (for $(L/)_DL+LL$)