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Steel Beam Design

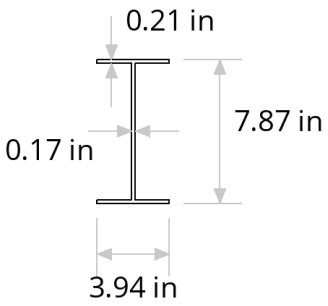
* You can add your own text, diagrams or photos here *

Design summary

	Resistance / Limit	Applied / Actual	Utilization	
Shear resistance (kip)	19.3	4.35	**23 %**	**OK**
Bending resistance (kip-ft)	15.5	13.1	**84 %**	**OK**
Total deflection (in)	0.6	0.38	**63 %**	**OK**
Live deflection (in)	0.4	0.27	**68 %**	**OK**

Beam details

Beam shape	**W 8 x 10**
Effective span	**12** ft
Minimum yield stress F_y	**36,000** psi
Width	**3.94** in
Depth	**7.87** in
Web	**0.17** in
Flange	**0.21** in
Weight per foot	**10.08** lb/ft
Modulus of elasticity	**29,000** ksi
Second moment of area	**30.75** in^4



Lateral bracing & deflection limits

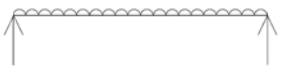
Beam is laterally braced along its length
Length between lateral bracing at least every **2 ft**

Live load deflection limit: **span / 360.00 = 0.40 in**
Total load deflection limit: **span / 240.00 = 0.60 in**

Loading details

Self weight

Dead load	**10.08** lb/ft



Load 1: UDL - Residential Floor

Dead load	**15** psf × **13** ft = **195** lb/ft
Live load	**40** psf × **13** ft = **520** lb/ft

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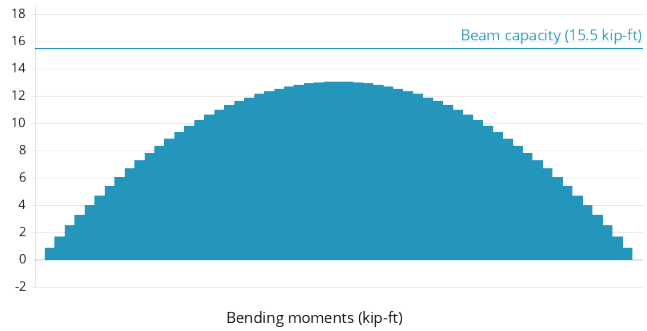
Reactions (unfactored)

	Dead	Live	Total
Left reaction	**1.23** kip	**3.12** kip	**4.35** kip
Right reaction	**1.23** kip	**3.12** kip	**4.35** kip

Check bending moments

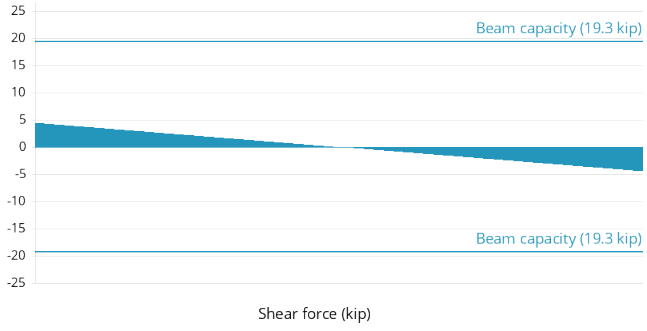


Bending moments (kip-ft)

Beam moment capacity M_R = 15.5 kip-ft >= 13.1 kip-ft, therefore OK

The top flange of the beam is to be laterally braced along its full length. To ensure adequate lateral bracing, bracing members should be attached with fasteners that provide a positive connection. Lateral bracing members should generally be regularly spaced at least every 2 feet.

Check shear force

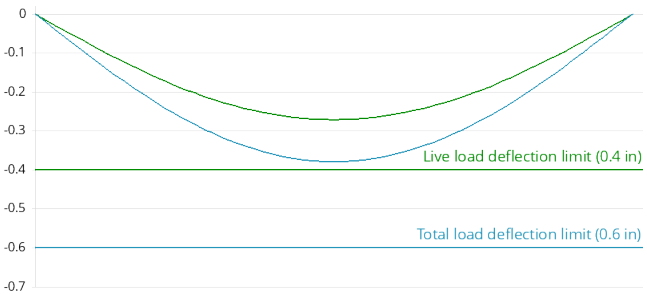


Shear force (kip)

Shear capacity V_c = 19.3 kip >= 4.35 kip, therefore OK

Allowable shear = 0.4 × minimum yield stress × d × t_w

Check deflection



Live load deflection (green) and total load deflection (blue) in inches

Live load deflection = 0.27 in <= 0.4 in, therefore OK
Total load deflection = 0.38 in <= 0.6 in, therefore OK

Notes

These calculations are based on the Manual of Steel Construction, Allowable Stress Design, Ninth Edition by the American Institute of

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Steel Construction.