

[1] Load Combinations <I>

Table 1: ASCE 7-05 Load Effects



Beam Geometry _[I]

Bending Stress Formula [Eq 1]

$$\sigma = \frac{M}{S}$$

[2] Loads and Geometry <V>

Table 2: Beam Loads and Properties

variable	value	[value]	description
D_1	3.80 psf	0.18 kPa	joists DL
D_2	2.10 psf	0.10 kPa	plywood DL
D_3	10.00 psf	0.48 kPa	partitions DL
D_4	1.00 klf	14.59 kN_m	fixed machinery DL
L_1	40.00 psf	1.92 kPa	ASCE7-05 LL

Beam Geometry [file: beam1-v.csv]

variable	value	[value]	description
W_1	2.00 ft	0.61 m	beam spacing
S_1	14.00 ft	4.27 m	beam span

dead load : ASCE7-05 2.3.2 [Eq 2]

$$dl_1 = 1.2 * (W_1 * (D_1 + D_2 + D_3) + D_4)$$

dl_1	[dl_1]		D_4	D_2	W_1	D_1	D_3
1.24 klf	18.07 kN_m		klf	2.10 psf	2.00 ft	3.80 psf	10.00 psf

live load : ASCE7-05 2.3.2 [Eq 3]

$$ll_1 = 1.6 * W_1 * L_1$$

ll_1	[ll_1]		W_1	L_1
0.13 klf	1.87 kN_m		2.00 ft	40.00 psf

total load : ASCE7-05 2.3.2 [Eq 4]

$$\omega_1 = \Delta L_1 + I_1$$

omega_1	[omega_1]	dl_1	I_1
1.37 klf	19.94 kN_m	1.24 klf	128.00 ft·psf

[3] Beam Section Properties <V>

rectangular section modulus [Eq 5]

$$section_1 = rectsect(10*inch, 18*inch)$$

section_1	[section_1]	inch
540.00 in ³	8849.01 cm ³	inch

rectangular moment of inertia [Eq 6]

$$inertia_1 = rectinertia(10*inch, 18*inch)$$

inertia_1	[inertia_1]	inch
4860.0 in ⁴	202288.5 cm ⁴	inch

[4] Force and Stress <V>

mid-span UDL moment [Eq 7]

$$m_1 = \omega_1 * S_1^{**2} / 8$$

m_1	[m_1]	S_1	omega_1
33.47 ftkip	45.38 mN	14.00 ft	1.37 klf

bending stress [Eq 8]

$$fb_1 = m_1 / section_1$$

fb_1	[fb_1]	section_1	m_1
743.8 psi	5.1 MPa	540.0 inch ³	33.5 ft ² ·klf