

DESIGN DATA

 Section Type: Rectangular

Ttop = 0.00 in H = 16.00 in Tbot = 0.00 in
 Btop = 0.00 in Bweb = 16.00 in Bbot = 0.00 in

Area = 256.00 in² Ytop = 8.00 in Stop = 682.7 in³
 I = 5461 in⁴ Ybot = 8.00 in Sbot = 682.7 in³
 r = 4.62 in

Concrete:

f'c = 5.00 ksi wc = 150.0 pcf lambda = 1.00
 Ec = 4287 ksi ecu = 0.0030 B1 = 0.80
 crkg = 12.0

Mild Steel:

fy = 60.0 ksi Es = 29000 ksi

Using ACI 318-11:

Comp. controlled phi = 0.650 Tens. controlled phi = 0.900

Reinforcing Data:

Depth (in)	Area (in ²)	Prestressed Strand or Mild Steel
2.50	2.000	Mild Steel
13.50	2.000	Mild Steel

As/Ac (mild) = 0.016

***** OUTPUT *****

FACTORED LOADS

Nom. zero moment axial strength: phi*Po = 852.1 kips
 Max. design axial load strength: phi*Pn(max)= 681.7 kips, Eq. 10-2

Max. design axial load strength: phi*Pn(max)= -172.8 kips
 Nom. zero moment axial strength: phi*Po = -216.0 kips

0.1*f'c*Area = 128.0 kips

Balanced condition: phi*Pn = 276.7 kips phi*Mn = 2183 k-in (+M)
 phi*Pn = 276.7 kips phi*Mn = -2183 k-in (-M)

Maximum moment: phi*Pn = 211.5 kips phi*Mn = 2469 k-in (+M)
 phi*Pn = 211.5 kips phi*Mn = -2469 k-in (-M)

MOMENT MAGNIFICATION

kLu (ft)	Cm	Bd	M1/M2	App. Pu (k)	App. Mu (k-in)	Mom. Magn.	Mc (k-in)	c (in)	phi	phi*Mn (k-in)
24.00	0.60	0.60	0.00	257.0	1500 ^a	1.18	1772	6.9	0.72	2292
24.00	0.60*	0.60	0.00	300.0	-800 ^a	1.41	-1128	8.4	0.65	-2156

In determining the moment magnifier, the flexural stiffness of the member was determined using ACI Eq. 10-15.

Neutral axis depth, c, is measured from extreme compression fiber for applied Pu and calculated phi*Mn.

* Cm calculated using Eq. 10-16 and given M1/M2

^a NOTE: Mu < M2,min, Eq 10-17. with kLu taken as h

FACTORED LOAD INTERACTION DIAGRAM

 Positive Negative Positive Negative

phi*Pn (k)	phi*Mn (k-in)	Ecc. (in)	phi*Mn (k-in)	Ecc. (in)	phi*Pn (k)	phi*Mn (k-in)	Ecc. (in)	phi*Mn (k-in)	Ecc. (in)
0.0	1368	---	-1368	---	374.9	2049	5.5	-2049	5.5
34.1	1564	45.9	-1564	45.9	409.0	1992	4.9	-1992	4.9
68.2	1754	25.7	-1754	25.7	443.1	1925	4.3	-1925	4.3
102.3	1939	19.0	-1939	19.0	477.2	1848	3.9	-1848	3.9
136.3	2115	15.5	-2115	15.5	511.3	1758	3.4	-1758	3.4
170.4	2283	13.4	-2283	13.4	545.4	1654	3.0	-1654	3.0
204.5	2439	11.9	-2439	11.9	579.5	1545	2.7	-1545	2.7
238.6	2375	10.0	-2375	10.0	613.5	1407	2.3	-1407	2.3
272.7	2207	8.1	-2207	8.1	647.6	1250	1.9	-1250	1.9
306.8	2147	7.0	-2147	7.0	681.7	1074	1.6	-1074	1.6
340.9	2100	6.2	-2100	6.2					

SERVICE LOAD INTERACTION DIAGRAMS - as defined by the lines below:

- Line 1: Controlled by allowable tension in the top (*f_{top}*)
- Line 2: Controlled by allowable compression in top (*f_{top}*)
- Line 3: Controlled by allowable tension in the bottom (*f_{bot}*)
- Line 4: Controlled by allowable compression in bottom (*f_{bot}*)

Stress in top due to final P/S = 0 psi (*f_{top}*)
 Stress in bottom due to final P/S = 0 psi (*f_{bot}*)

Case 1 - Assigned parameters:

Allowable tension = -212 psi
 Allowable compression = 2250 psi

Intersection

Line	of & Line	P (k)	M (k-in)	<i>f_{top}</i> (psi)	<i>f_{bot}</i> (psi)
1	3	-54.3	-0	-212	-212
1	4	260.9	-840	-212	2250
2	3	260.9	840	2250	-212
2	4	576.0	0	2250	2250

NOTE: Above four points are diagram corners

1	P=0	0.0	-145	-212	212
2	P=0	0.0	1536	2250	-2250
3	P=0	0.0	145	212	-212
4	P=0	0.0	-1536	-2250	2250

1	M=0	-54.3	0	-212	-212
2	M=0	576.0	0	2250	2250
3	M=0	-54.3	0	-212	-212
4	M=0	576.0	0	2250	2250

NOTE: Above eight points are intersection points w/ P & M axes