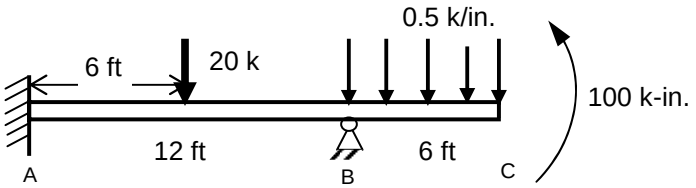
CEE 379 **BEAM EXAMPLE #2**

All members are steel W16 x 57
A36 steel, Fa = 24 ksi



(all spreadsheet quantities in units of kips and inches)

Member AB

	E	I	L	depth	w_{unif}	P_{center}
W16x57	29000	758	144	16.43	0	20

					θ_1			d	kd	q_o	kd+q_o
	$q_{Ny'}$	88.3407	6360.53	-88.341	6360.53	$d_{Ny'}$		0	-8.7	10	1.29
	$m_{Nz'}$	6360.53	610611	-6360.5	305306	$\theta_{Nz'}$		0	-418.0	360.0	-58.00
	$q_{Fy'}$	-88.3407	-6360.5	88.3407	-6360.5	$d_{Fy'}$		0	8.7	10	18.71
M1	$m_{Fz'}$	6360.53	305306	-6360.5	610611	$\theta_{Fz'}$		-0.0014	-836.0	-360.0	-1196.00

Member BC

	E	I	L	depth	w_{unif}	P_{center}
W16x57	29000	758	72	16.43	0.5	0

		θ_1	d2	θ_3			d	kd	q_o	kd+q_o
	$q_{Ny'}$	706.726	25442.1	-706.73	25442.1	$d_{Ny'}$	0	18.0	18	36.00
M1	$m_{Nz'}$	25442.1	1221222	-25442	610611	$\theta_{Nz'}$	-0.0014	980.0	216.0	1196.00
Q2	$q_{Fy'}$	-706.726	-25442	706.726	-25442	$d_{Fy'}$	-0.1632	-18.0	18	0.00
M3	$m_{Fz'}$	25442.1	610611	-25442	1221222	$\theta_{Fz'}$	-0.0025	316.0	-216.0	100.00

Structural System

K_{11}

	θ_1	d2	θ_3
M1	1831833	-25442	610611
Q2	-25442.1	706.726	-25442
M3	610611	-25442	1221222

Q_{01}

-144.0	kip-in.
18	kips
-216.0	kip-in.

K_{11}^{-1}

1.6E-06	0.00012	1.6E-06
0.00012	0.01415	0.00024
1.6E-06	0.00024	4.9E-06

Q_1	Q_1-Q_{01}	$D_1 = K_{11}^{-1}(Q_1-Q_{01})$		
0	144	-0.00137	radians	θ_1
0	-18	-0.16319	inches	d2
100	316	-0.00246	radians	θ_3

Member Ends Flexural Stresses

Member AB (ends only)

S = 2*I/d	92.2702	
m_N	-58.0	k-in.
ft_N	-0.63	ksi
fb_N	0.63	ksi
m_F	-1196.0	k-in.
ft_F	12.96	ksi
fb_F	-12.96	ksi

Member BC (ends only)

S = 2*I/d	92.27	
m_N	1196.0	k-in.
ft_N	12.96	ksi
fb_N	-12.96	ksi
m_F	100.0	k-in.
ft_F	-1.08	ksi
fb_F	1.08	ksi