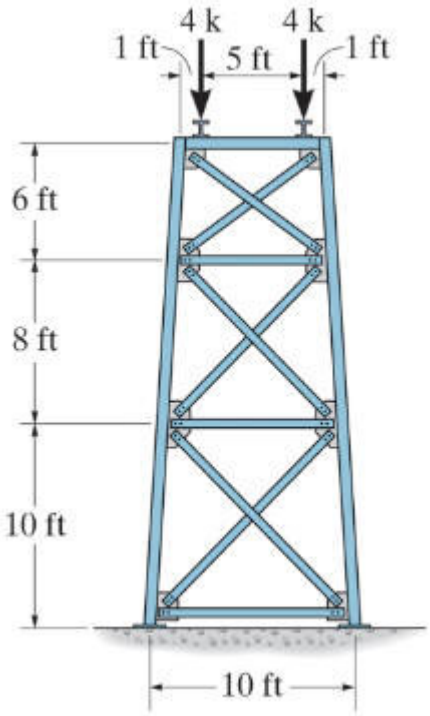
CIVL 4122 Homework #32 **Name: _____**

The steel-trussed bent shown in Figure 1(a) supports a portion of the pedestrian bridge. It is constructed using wide-flange sections for the columns and the top beam, which supports the bridge loading, estimated to be 8 k, as shown in Figure 1(b).

The ends of the top beam are welded to the columns, and the bottoms of the columns are welded to base plates, which are, in turn, bolted into the concrete. The internal truss elements are bolted at their ends to gusset plates, which are welded to the web of each column.

Use the SAP2000 model you developed for 17-3P and design the appropriate elements using the Steel Frame Design tool.

Hand in a copy of the ***cover page*** and an image displaying the selected sizes and stress ratios from the Steel Frame Design tool.



(a) (b)

Figure 1. Structural bent support a walkway (a) photograph, and (b) geometry and loading.

Table 1 lists the wide-flange sections that should be considered for the columns and the top beam. Table 2 lists the round tube sections that should be considered for this design.

Table 1. Available W-sections.

Section		lb./ft.	d (in.)	b (in.)	t_f (in.)	t_w (in.)
W4	x	13	4.16	4.060	.345	.280
W5	x	16	5.01	5.000	.360	.240
		19	5.15	5.030	.430	.270
W6	x	9	5.90	3.940	.215	.170
		12	6.03	4.000	.280	.230
		15	5.99	5.990	.260	.230
		16	6.28	4.030	.405	.260
		20	6.20	6.020	.365	.260
		25	6.38	6.080	.455	.320
W8	x	10	7.89	3.940	.205	.170
		13	7.99	4.000	.255	.230
		15	8.11	4.015	.315	.245
		18	8.14	5.250	.330	.230
		21	8.28	5.270	.400	.250
		24	7.93	6.495	.400	.245
		28	8.06	6.535	.465	.285
		31	8.00	7.995	.435	.285
		35	8.12	8.020	.495	.310
		40	8.25	8.070	.560	.360
		48	8.50	8.110	.685	.400
		58	8.75	8.220	.810	.510
		67	9.00	8.280	.935	.570

Table 2. Available round HHS tube sections.

Section	Wt./ft.	Area (in^2)	O.D. (in.)	Thickness (in.)
HSS1.660X0.140	2.27	0.625	1.66	0.14
HSS1.900X0.120	2.28	0.624	1.9	0.12
HSS1.900X0.145	2.72	0.749	1.9	0.145
HSS1.900X0.188	3.44	0.943	1.9	0.188
HSS2.375X0.125	3.01	0.823	2.375	0.125
HSS2.375X0.154	3.66	1	2.375	0.154
HSS2.375X0.188	4.4	1.2	2.375	0.188
HSS2.375X0.218	5.03	1.39	2.375	0.218
HSS2.375X0.250	5.68	1.57	2.375	0.25
HSS2.500X0.125	3.17	0.869	2.5	0.125
HSS2.500X0.188	4.65	1.27	2.5	0.188
HSS2.500X0.250	6.01	1.66	2.5	0.25
HSS2.875X0.125	3.67	1.01	2.875	0.125
HSS2.875X0.188	5.4	1.48	2.875	0.188
HSS2.875X0.203	5.8	1.59	2.875	0.203
HSS2.875X0.250	7.02	1.93	2.875	0.25
HSS3.500X0.125	4.51	1.23	3.5	0.125
HSS3.500X0.188	6.66	1.82	3.5	0.188
HSS3.500X0.203	7.15	1.97	3.5	0.203
HSS3.500X0.216	7.58	2.08	3.5	0.216
HSS3.500X0.250	8.69	2.39	3.5	0.25
HSS3.500X0.300	10.26	2.82	3.5	0.3
HSS3.500X0.313	10.66	2.93	3.5	0.313
HSS3X0.125	3.84	1.05	3	0.125
HSS3X0.134	4.11	1.12	3	0.134
HSS3X0.152	4.63	1.27	3	0.152
HSS3X0.188	5.65	1.54	3	0.188
HSS3X0.203	6.07	1.67	3	0.203
HSS3X0.216	6.43	1.77	3	0.216
HSS3X0.250	7.35	2.03	3	0.25