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Final Report

PROPOSED METRIC WIDE-FLANGE SHAPE SERIES

by

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Organization. The proposed metric shapes are organized into (1) an economy beam series consisting of 40 shapes, (2) a shallow beam series consisting of 35 shapes, (3) a deep economy beam series consisting of 8 shapes, and (4) a column series consisting of 56 shapes. Thus, there is a total of 139 proposed metric shapes compared with 295 US shapes presently listed in the AISC manual.

Reducing the number of available shapes provides several benefits. The demand for shapes that have been eliminated is usually shifted to other shapes that can do the same job. This tends to concentrate the demand and thereby permits longer and/or more frequent production runs for each particular shape. The reduction in the number of shapes also tends to reduce storage, handling, production, inventory, and detailing costs.

The economy beam, shallow beam, deep economy beam, and column series are described in Tables 1 through 4, respectively. All shapes from these four series are listed in descending order in Table 5. The beam series are plotted in Figures 1 through 4 and the column series is plotted in Figures 5 through 9.

Most of the shapes in the proposed economy beam and column series are metric conversions of present US shapes, but some have been modified for various reasons explained below. The shallow beam and deep economy beam series utilize new shapes to match the strengths of the economy beams.

Production. It is intended that all proposed metric shapes be produced with existing US rolls. The US rolls that would be used for each metric shape are listed in Tables 1 through 4. To facilitate production, the web (depth/thickness) ratio of all proposed shapes is limited to a maximum of about 57, and the thickness (flange/web) ratio of all proposed shapes is limited to a maximum of about 1.8.

As suggested by one of the producers, all proposed shapes utilize one of the following five metric fillet radii: 30, 25, 20, 15, and 8 mm. This reduces stocks of straightening rolls and downtime for roll changes on the straightening machine. As a result of this approach, the fillet radii used on a few shapes are larger than those previously proposed for the metric shape series. Since all changes increase fillet radii, however, they should not cause any production problems.

Published section properties should be based on fillet radii large enough so that they satisfy the production requirements of all producers. Then no producer would need to use fillet radii larger than those on which the section properties are based. Thus no producer would need to give away material or to offset the extra fillet material by rolling light on the flanges or web. The fillet radii used in the proposed metric series facilitate this approach.

As a part of the metric conversions, slight adjustments, not exceeding 0.02 inch, were made to compensate for the small changes in fillet radii mentioned above. As a result, the rounded

US weights of all converted shapes are equal to, or 1 pound/foot less than, those of the corresponding present shapes.

The web and flange thicknesses of all modified or new shapes are within minimum thickness limits suggested by one of the producers.

Economy Beam Series. Economy beams provide a desired bending strength at the least cost for domestically produced shapes. The proposed economy series provides an orderly progression of masses as indicated in Table 1a. All economy beams satisfy the AISC requirements listed in Table 8 for compact beams of 36-ksi and 50-ksi steels. All except eight also satisfy those requirements for 70-ksi steel. All economy beams are metric conversions of present US shapes except as indicated in the following paragraphs.

To provide a more orderly progression of masses, the present W36x135 shape was replaced by a W36x139 shape and the present W27x94 shape was replaced by a W27x91 shape. These two new US shapes were then converted to metric shapes.

Presently, the W36 series is the only nominal depth beam series that uses two different web depths. To eliminate this inconsistency, the present W36 shapes with a nominal width of 12 inches were slightly modified to use the same web depth as the W36 shapes with a nominal width of 16.5 inches. Each modified W36 shape has about the same footweight and plastic section modulus as the original. Since the overall depths of the modified shapes are slightly smaller those of the original shapes, this change should not cause any problems for producers who have overall depth limitations.

Shallow Beam Series. Shallow beams are less efficient than economy beams, but are useful in applications involving depth limitations. Each proposed shallow beam matches the strength (plastic section modulus) of a corresponding economy beam; this arrangement greatly simplifies beam selection tables as indicated in Table 6.

Each shallow beam is proportioned to provide the highest beam efficiency possible with that depth and satisfies the AISC requirements for compact beams of 36-ksi and 50-ksi steels. All except four also satisfy these requirements for 70-ksi steel. The depth reduction and added mass (cost) for each shallow beam compared with the corresponding economy beam are given in Table 6.

The following four shallow beams are proportioned so they can also be used as columns: W360x71.6, W360x63.9, W310x57.5, W200x37.6. These shapes can be used to extend the ranges of their respective column series to lower capacities. They are shown as open symbols in the plots of the column series.

Deep Economy Beam Series. A deep economy beam series consisting of W1000 shapes is included to cover most of the range of strengths covered by the W920 economy beams. Thus this range of

strengths can be supplied by either domestic or foreign producers. Each deep economy beam matches the strength (plastic section modulus) of a corresponding W920 economy beam as indicated in Table 6.

Each deep economy beam is proportioned for maximum efficiency and satisfies the AISC requirements for compact beams of 36-ksi, 50-ksi, and 70-ksi steels. The deep economy beams are more efficient than the economy beams.

Column Series. Columns are used to carry compressive axial loads, sometimes in combination with bending loads. The column series proposed for each nominal depth provides an orderly progression of areas as indicated in Table 4a. All columns satisfy the AISC requirements listed in Table 8 for columns of 36-ksi and 50-ksi steels. All except four also satisfy these requirements for 70-ksi steel. All columns in Table 4 are metric conversions of present US shapes except those listed in Table 7, which are metric conversions of modified US shapes.

As indicated in Table 7, a few of the lighter shapes of each nominal depth were modified to (1) use the next wider available rolls of the same nominal depth or (2) satisfy the AISC web and flange slenderness requirements in Table 8. These modifications make the shapes more suitable for use as columns. It is expected that the modified shapes will be suitable for rolling because (1) they do not violate the minimum thickness limits suggested by one of the producers and (2) they generally have smaller thickness (flange/web) ratios.

There is overlapping of the ranges of areas (strengths) provided by the various nominal depth series. This is desirable to permit vertical strings of columns with different areas, but the same web depth. The number of overlapping columns, however, has been significantly reduced to concentrate demand as discussed previously. The eliminated shapes were selected by considering sales data.

As mentioned previously, four of the shallow beams were proportioned to serve as columns and thereby extend the available range of areas. Similarly, some of the light columns could be used as very shallow beams. The interrelationship between the light beams and light columns for bending applications is shown in Figure 10.

Table 1a: Economy Beam Series - Listed Dimensions &amp; Properties (12/15/92)

Shape	US					A		Z		Mass Step	
	Rolls	Wt	d	tw	bf	tf	Metric	US	Metric	US	
W920x1186	W36x16.5	797	1065.1	60.0	459.0	108.6	151000	234	58700	3580	
W920x966	W36x16.5	649	1027.5	49.5	448.5	89.8	123000	191	46900	2860	22.8
W920x783	W36x16.5	526	995.7	40.4	439.4	73.9	100000	155	37400	2280	23.4
W920x652	W36x16.5	438	971.9	34.0	433.0	62.0	83100	129	30800	1880	20.1
W920x533	W36x16.5	358	950.1	28.0	427.0	51.1	67900	105	24900	1520	22.3
W920x487	W36x16.5	327	941.7	25.6	424.6	46.9	62100	96.3	22600	1380	9.4
W920x445	W36x16.5	299	933.3	23.7	422.7	42.7	56700	87.9	20600	1260	9.4
W920x416	W36x16.5	279	927.7	22.2	421.2	39.9	53000	82.2	19100	1170	7.0
W920x386	W36x16.5	259	921.1	21.1	420.1	36.6	49200	76.3	17600	1070	7.8
W920x364	W36x16.5	244	916.5	20.1	419.1	34.3	46300	71.8	16500	1010	6.0
W920x341	W36x16.5	229	911.9	19.1	418.1	32.0	43500	67.4	15400	940	6.7
W920x311	W36x12	209	920.3	19.8	308.0	36.2	39600	61.4	13600	830	9.6
W920x287	W36x12	193	914.9	18.3	306.5	33.5	36600	56.7	12600	769	8.4
W920x270	W36x12	181	910.9	17.2	305.4	31.5	34400	53.3	11800	720	6.3
W920x252	W36x12	169	906.5	16.2	304.4	29.3	32100	49.8	11000	671	7.1
W920x237	W36x12	159	902.3	15.5	303.7	27.2	30200	46.8	10200	622	6.3
W920x222	W36x12	149	897.3	15.1	303.3	24.7	28300	43.9	9480	579	6.8
W920x207	W36x12	139	891.9	14.8	303.0	22.0	26400	40.9	8680	530	7.2
W840x192	W33x11.5	129	840.5	14.4	292.0	21.7	24500	38.0	7610	464	7.8
W840x175	W33x11.5	117	833.9	14.0	291.6	18.4	22200	34.4	6730	411	9.7
W760x159	W30x10.5	107	757.7	13.5	265.7	19.3	20300	31.5	5650	345	10.1
W760x146	W30x10.5	98	753.1	12.9	265.1	17.0	18600	28.8	5110	312	8.9
W690x135	W27x10	91	682.3	11.9	253.3	18.2	17200	26.7	4410	269	8.1
W690x125	W27x10	84	677.9	11.6	253.0	16.0	15900	24.6	4000	244	8.0
W610x112	W24x9	75	607.2	10.7	227.9	17.1	14300	22.2	3270	200	11.6
W610x102	W24x9	68	602.2	10.4	227.6	14.6	12900	20.0	2900	177	9.8
W610x91.4	W24x7	61	603.0	10.4	178.2	15.0	11600	18.0	2520	154	11.6
W610x82.3	W24x7	55	597.8	10.0	177.8	12.4	10500	16.3	2210	135	11.1
W530x73.5	W21x6.5	49	529.1	9.3	165.5	13.6	9360	14.5	1790	109	12.0
W530x66.1	W21x6.5	44	524.7	8.9	165.1	11.4	8420	13.1	1570	95.8	11.2
W460x58.6	W18x6	39	453.8	7.8	152.6	12.9	7470	11.6	1270	77.5	12.8
W460x52.7	W18x6	35	449.4	7.6	152.4	10.7	6710	10.4	1100	67.1	11.2
W410x46.5	W16x5.5	31	402.8	7.0	140.4	10.9	5920	9.18	890	54.3	13.3
W410x39.1	W16x5.5	26	397.8	6.4	139.8	8.4	4980	7.72	726	44.3	18.9
W360x33.2	W14x5	22	348.6	5.8	127.0	8.3	4230	6.56	550	33.6	17.8
W310x27.9	W12x4	19	308.9	5.8	101.6	8.9	3550	5.50	402	24.5	19.0
W310x23.9	W12x4	16	304.5	5.6	101.4	6.7	3040	4.71	329	20.1	16.7
W310x21.1	W12x4	14	302.5	5.1	100.9	5.7	2690	4.17	287	17.5	13.3
W250x18.0	W10x4	12	251.0	4.7	100.5	5.5	2290	3.55	210	12.8	17.2
W200x15.5	W8x4	10	201.0	4.3	100.1	5.5	1970	3.05	152	9.28	16.1
								Avg=			10.7

tw = web thickness(mm)    tf = flange thickness(mm)    d = depth(mm)

bf = flange width(mm)

A = area( $\text{mm}^2$  or  $\text{in}^2$ )    Z = plastic section modulus( $1000\text{mm}^3$  or  $\text{in}^3$ )

Mass Step = % interval to next higher mass in series

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m.

US Wt is in lb/ft.

Table 1b: Economy Beam Series - Rolling Dimensions &amp; Ratios (12/15/92)

Shape	US		dw		bp		tw		tf		rf		Rt	Rw	Rf
	Rolls	Wt	Metric	US	Metric	US	Metric	US	Metric	US	M	US			
W920x1186	W36x16.5	797	847.9	33.38	199.5	7.854	60.0	2.362	108.6	4.276	25	0.98	1.81	14.1	4.2
W920x966	W36x16.5	649	847.9	33.38	199.5	7.854	49.5	1.949	89.8	3.535	25	0.98	1.81	17.1	5.0
W920x783	W36x16.5	526	847.9	33.38	199.5	7.854	40.4	1.591	73.9	2.909	25	0.98	1.83	21.0	5.9
W920x652	W36x16.5	438	847.9	33.38	199.5	7.854	34.0	1.339	62.0	2.441	25	0.98	1.82	24.9	7.0
W920x533	W36x16.5	358	847.9	33.38	199.5	7.854	28.0	1.102	51.1	2.012	25	0.98	1.83	30.3	8.4
W920x487	W36x16.5	327	847.9	33.38	199.5	7.854	25.6	1.008	46.9	1.846	25	0.98	1.83	33.1	9.1
W920x445	W36x16.5	299	847.9	33.38	199.5	7.854	23.7	0.933	42.7	1.681	25	0.98	1.80	35.8	9.9
W920x416	W36x16.5	279	847.9	33.38	199.5	7.854	22.2	0.874	39.9	1.571	25	0.98	1.80	38.2	10.6
W920x386	W36x16.5	259	847.9	33.38	199.5	7.854	21.1	0.831	36.6	1.441	25	0.98	1.73	40.2	11.5
W920x364	W36x16.5	244	847.9	33.38	199.5	7.854	20.1	0.791	34.3	1.350	25	0.98	1.71	42.2	12.2
W920x341	W36x16.5	229	847.9	33.38	199.5	7.854	19.1	0.752	32.0	1.260	25	0.98	1.68	44.4	13.1
W920x311	W36x12	209	847.9	33.38	144.1	5.673	19.8	0.780	36.2	1.425	25	0.98	1.83	42.8	8.5
W920x287	W36x12	193	847.9	33.38	144.1	5.673	18.3	0.720	33.5	1.319	25	0.98	1.83	46.3	9.1
W920x270	W36x12	181	847.9	33.38	144.1	5.673	17.2	0.677	31.5	1.240	25	0.98	1.83	49.3	9.7
W920x252	W36x12	169	847.9	33.38	144.1	5.673	16.2	0.638	29.3	1.154	25	0.98	1.81	52.3	10.4
W920x237	W36x12	159	847.9	33.38	144.1	5.673	15.5	0.610	27.2	1.071	25	0.98	1.75	54.7	11.2
W920x222	W36x12	149	847.9	33.38	144.1	5.673	15.1	0.594	24.7	0.972	25	0.98	1.64	56.2	12.3
W920x207	W36x12	139	847.9	33.38	144.1	5.673	14.8	0.583	22.0	0.866	25	0.98	1.49	57.3	13.8
W840x192	W33x11.5	129	797.1	31.38	138.8	5.465	14.4	0.567	21.7	0.854	20	0.79	1.51	55.4	13.5
W840x175	W33x11.5	117	797.1	31.38	138.8	5.465	14.0	0.551	18.4	0.724	20	0.79	1.31	56.9	15.8
W760x159	W30x10.5	107	719.1	28.31	126.1	4.965	13.5	0.531	19.3	0.760	20	0.79	1.43	53.3	13.8
W760x146	W30x10.5	98	719.1	28.31	126.1	4.965	12.9	0.508	17.0	0.669	20	0.79	1.32	55.7	15.6
W690x135	W27x10	91	645.9	25.43	120.7	4.752	11.9	0.469	18.2	0.717	20	0.79	1.53	54.3	13.9
W690x125	W27x10	84	645.9	25.43	120.7	4.752	11.6	0.457	16.0	0.630	20	0.79	1.38	55.7	15.8
W610x112	W24x9	75	573.0	22.56	108.6	4.276	10.7	0.421	17.1	0.673	20	0.79	1.60	53.6	13.3
W610x102	W24x9	68	573.0	22.56	108.6	4.276	10.4	0.409	14.6	0.575	20	0.79	1.40	55.1	15.6
W610x91.4	W24x7	61	573.0	22.56	83.9	3.303	10.4	0.409	15.0	0.591	20	0.79	1.44	55.1	11.9
W610x82.3	W24x7	55	573.0	22.56	83.9	3.303	10.0	0.394	12.4	0.488	20	0.79	1.24	57.3	14.3
W530x73.5	W21x6.5	49	501.9	19.76	78.1	3.075	9.3	0.366	13.6	0.535	15	0.59	1.46	54.0	12.2
W530x66.1	W21x6.5	44	501.9	19.76	78.1	3.075	8.9	0.350	11.4	0.449	15	0.59	1.28	56.4	14.5
W460x58.6	W18x6	39	428.0	16.85	72.4	2.850	7.8	0.307	12.9	0.508	15	0.59	1.65	54.9	11.8
W460x52.7	W18x6	35	428.0	16.85	72.4	2.850	7.6	0.299	10.7	0.421	15	0.59	1.41	56.3	14.2
W410x46.5	W16x5.5	31	381.0	15.00	66.7	2.626	7.0	0.276	10.9	0.429	15	0.59	1.56	54.4	12.9
W410x39.1	W16x5.5	26	381.0	15.00	66.7	2.626	6.4	0.252	8.4	0.331	15	0.59	1.31	59.5	16.6
W360x33.2	W14x5	22	332.0	13.07	60.6	2.386	5.8	0.228	8.3	0.327	15	0.59	1.43	57.2	15.3
W310x27.9	W12x4	19	291.1	11.46	47.9	1.886	5.8	0.228	8.9	0.350	8	0.31	1.53	50.2	11.4
W310x23.9	W12x4	16	291.1	11.46	47.9	1.886	5.6	0.220	6.7	0.264	8	0.31	1.20	52.0	15.1
W310x21.1	W12x4	14	291.1	11.46	47.9	1.886	5.1	0.201	5.7	0.224	8	0.31	1.12	57.1	17.7
W250x18.0	W10x4	12	240.0	9.45	47.9	1.886	4.7	0.185	5.5	0.217	8	0.31	1.17	51.1	18.3
W200x15.5	W8x4	10	190.0	7.48	47.9	1.886	4.3	0.169	5.5	0.217	8	0.31	1.28	44.2	18.2

dw = web depth    bp = projecting flange width    rf = fillet radius

Rt = thickness ratio (flange/web)    Rw = web ratio (depth/thickness)

Rf = flange ratio (width/thickness)

Metric dimensions are in mm and US dimensions are in inches.

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m.

US Wt is in lb/ft.

Table 2a: Shallow Beam Series - Listed Dimensions &amp; Properties (12/15/92)

Shape	US						Metric	A		Z		Matching Economy Beam
	Rolls	Wt	d	tw	bf	tf		US	Metric	US		
W690x799	W27x14	537	824.3	49.6	389.0	89.2	102000	158	30800	1880		W920x652
W690x659	W27x14	443	795.1	41.4	380.8	74.6	83900	130	24900	1520		W920x533
W690x602	W27x14	405	783.3	38.0	377.4	68.7	76700	119	22600	1380		W920x487
W690x553	W27x14	372	772.5	35.2	374.6	63.3	70500	109	20600	1260		W920x445
W690x516	W27x14	346	764.5	32.8	372.2	59.3	65700	102	19100	1170		W920x416
W690x478	W27x14	321	756.1	30.6	370.0	55.1	60900	94.4	17600	1070		W920x386
W690x450	W27x14	302	749.9	28.9	368.3	52.0	57300	88.8	16500	1010		W920x364
W690x422	W27x14	284	743.7	27.2	366.6	48.9	53800	83.4	15400	940		W920x341
W690x375	W27x14	252	733.3	24.3	363.7	43.7	47800	74.1	13600	830		W920x311
W690x349	W27x14	235	727.3	22.7	362.1	40.7	44500	69.0	12600	769		W920x287
W690x328	W27x14	220	722.7	21.2	360.6	38.4	41700	64.6	11800	720		W920x270
W690x307	W27x14	206	717.7	20.0	359.4	35.9	39100	60.6	11000	671		W920x252
W690x285	W27x14	192	712.9	18.6	358.0	33.5	36300	56.3	10200	622		W920x237
W690x266	W27x14	179	708.5	17.4	356.8	31.3	33900	52.5	9490	579		W920x222
W690x245	W27x14	164	703.5	16.0	355.4	28.8	31100	48.2	8680	530		W920x207
W690x216	W27x14	145	696.7	14.2	353.6	25.4	27500	42.6	7620	465		W840x192
W690x191	W27x14	128	691.1	12.5	351.9	22.6	24300	37.7	6730	411		W840x175
W610x179	W24x12.75	120	619.6	12.8	324.0	23.3	22800	35.3	5650	345		W760x159
W610x163	W24x12.75	109	615.2	11.8	323.0	21.1	20700	32.1	5110	312		W760x146
W530x157	W21x12.25	106	545.9	12.2	311.6	22.0	20000	31.0	4410	269		W690x135
W530x143	W21x12.25	96	542.1	11.0	310.4	20.1	18200	28.2	4000	244		W690x125
W460x135	W18x11	91	470.6	11.8	281.2	21.3	17200	26.7	3270	200		W610x112
W460x121	W18x11	81	466.0	10.6	280.0	19.0	15400	23.9	2900	177		W610x102
W460x105	W18x11	71	461.2	9.3	278.7	16.6	13430	20.8	2520	154		W610x91.4
W460x96.6	W18x7.5	65	467.0	10.8	192.2	19.5	12310	19.1	2210	135		W610x82.3
W410x86.8	W16x7	58	419.0	10.5	180.5	19.0	11050	17.1	1790	109		W530x73.5
W410x76.6	W16x7	51	414.6	9.3	179.3	16.8	9760	15.1	1570	95.8		W530x66.1
W360x71.6	W14x8	48	349.6	9.0	204.4	14.8	9120	14.1	1270	77.5		W460x58.6
W360x63.9	W14x8	43	344.8	9.0	204.4	12.4	8140	12.6	1100	67.1		W460x52.7
W310x57.5	W12x8	39	301.5	7.8	203.6	12.2	7320	11.3	894	54.6		W410x46.5
W310x45.4	W12x6.5	31	314.3	6.5	165.5	11.6	5790	8.97	727	44.4		W410x39.1
W250x40.9	W10x5.75	27	264.2	6.7	146.7	12.1	5210	8.08	550	33.6		W360x33.2
W200x37.6	W8x6.5	25	202.5	5.9	164.7	10.7	4790	7.42	403	24.6		W310x27.9
W200x30.3	W8x5.25	20	210.4	5.7	133.3	10.2	3860	5.98	329	20.1		W310x23.9
W200x26.5	W8x5.25	18	208.0	4.9	132.5	9.0	3370	5.22	287	17.5		W310x21.1

tw = web thickness(mm)    tf = flange thickness(mm)    d = depth(mm)

bf = flange width(mm)

A = area( $\text{mm}^2$  or  $\text{in}^2$ )    Z = plastic section modulus( $1000\text{mm}^3$  or  $\text{in}^3$ )

Mass Step = % interval to next higher mass in series

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m

US Wt is in lb/ft

Table 2b: Shallow Beam Series - Rolling Dimensions &amp; Ratios (12/15/92)

Shape	US		dw		bp		tw		tf		rf		Rt	Rw	Rf
	Rolls	Wt	Metric	US	Metric	US	Metric	US	Metric	US	M	US			
W690x799	W27x14	537	645.9	25.43	169.7	6.681	49.6	1.953	89.2	3.512	20	0.79	1.80	13.0	4.4
W690x659	W27x14	443	645.9	25.43	169.7	6.681	41.4	1.630	74.6	2.937	20	0.79	1.80	15.6	5.1
W690x602	W27x14	405	645.9	25.43	169.7	6.681	38.0	1.496	68.7	2.705	20	0.79	1.81	17.0	5.5
W690x553	W27x14	372	645.9	25.43	169.7	6.681	35.2	1.386	63.3	2.492	20	0.79	1.80	18.3	5.9
W690x516	W27x14	346	645.9	25.43	169.7	6.681	32.8	1.291	59.3	2.335	20	0.79	1.81	19.7	6.3
W690x478	W27x14	321	645.9	25.43	169.7	6.681	30.6	1.205	55.1	2.169	20	0.79	1.80	21.1	6.7
W690x450	W27x14	302	645.9	25.43	169.7	6.681	28.9	1.138	52.0	2.047	20	0.79	1.80	22.3	7.1
W690x422	W27x14	284	645.9	25.43	169.7	6.681	27.2	1.071	48.9	1.925	20	0.79	1.80	23.7	7.5
W690x375	W27x14	252	645.9	25.43	169.7	6.681	24.3	0.957	43.7	1.720	20	0.79	1.80	26.6	8.3
W690x349	W27x14	235	645.9	25.43	169.7	6.681	22.7	0.894	40.7	1.602	20	0.79	1.79	28.5	8.9
W690x328	W27x14	220	645.9	25.43	169.7	6.681	21.2	0.835	38.4	1.512	20	0.79	1.81	30.5	9.4
W690x307	W27x14	206	645.9	25.43	169.7	6.681	20.0	0.787	35.9	1.413	20	0.79	1.80	32.3	10.0
W690x285	W27x14	192	645.9	25.43	169.7	6.681	18.6	0.732	33.5	1.319	20	0.79	1.80	34.7	10.7
W690x266	W27x14	179	645.9	25.43	169.7	6.681	17.4	0.685	31.3	1.232	20	0.79	1.80	37.1	11.4
W690x245	W27x14	164	645.9	25.43	169.7	6.681	16.0	0.630	28.8	1.134	20	0.79	1.80	40.4	12.3
W690x216	W27x14	145	645.9	25.43	169.7	6.681	14.2	0.559	25.4	1.000	20	0.79	1.79	45.5	13.9
W690x191	W27x14	128	645.9	25.43	169.7	6.681	12.5	0.492	22.6	0.890	20	0.79	1.81	51.7	15.6
W610x179	W24x12.75	120	573.0	22.56	155.6	6.126	12.8	0.504	23.3	0.917	20	0.79	1.82	44.8	13.9
W610x163	W24x12.75	109	573.0	22.56	155.6	6.126	11.8	0.465	21.1	0.831	20	0.79	1.79	48.6	15.3
W530x157	W21x12.25	106	501.9	19.76	149.7	5.894	12.2	0.480	22.0	0.866	15	0.59	1.80	41.1	14.2
W530x143	W21x12.25	96	501.9	19.76	149.7	5.894	11.0	0.433	20.1	0.791	15	0.59	1.83	45.6	15.4
W460x135	W18x11	91	428.0	16.85	134.7	5.303	11.8	0.465	21.3	0.839	15	0.59	1.81	36.3	13.2
W460x121	W18x11	81	428.0	16.85	134.7	5.303	10.6	0.417	19.0	0.748	15	0.59	1.79	40.4	14.7
W460x105	W18x11	71	428.0	16.85	134.7	5.303	9.3	0.366	16.6	0.654	15	0.59	1.78	46.0	16.8
W460x96.6	W18x7.5	65	428.0	16.85	90.7	3.571	10.8	0.425	19.5	0.768	15	0.59	1.81	39.6	9.9
W410x86.8	W16x7	58	381.0	15.00	85.0	3.346	10.5	0.413	19.0	0.748	15	0.59	1.81	36.3	9.5
W410x76.6	W16x7	51	381.0	15.00	85.0	3.346	9.3	0.366	16.8	0.661	15	0.59	1.81	41.0	10.7
W360x71.6	W14x8	48	320.0	12.60	97.7	3.846	9.0	0.354	14.8	0.583	15	0.59	1.64	35.6	13.8
W360x63.9	W14x8	43	320.0	12.60	97.7	3.846	9.0	0.354	12.4	0.488	15	0.59	1.38	35.6	16.5
W310x57.5	W12x8	39	277.1	10.91	97.9	3.854	7.8	0.307	12.2	0.480	15	0.59	1.56	35.5	16.7
W310x45.4	W12x6.5	31	291.1	11.46	79.5	3.130	6.5	0.256	11.6	0.457	8	0.31	1.78	44.8	14.3
W250x40.9	W10x5.75	27	240.0	9.45	70.0	2.756	6.7	0.264	12.1	0.476	8	0.31	1.81	35.8	12.1
W200x37.6	W8x6.5	25	181.1	7.13	79.4	3.126	5.9	0.232	10.7	0.421	15	0.59	1.81	30.7	15.4
W200x30.3	W8x5.25	20	190.0	7.48	63.8	2.512	5.7	0.224	10.2	0.402	8	0.31	1.79	33.3	13.1
W200x26.5	W8x5.25	18	190.0	7.48	63.8	2.512	4.9	0.193	9.0	0.354	8	0.31	1.84	38.8	14.7

dw = web depth    bp = projecting flange width    rf = fillet radius

Rt = thickness ratio (flange/web)    Rw = web ratio (depth/thickness)

Rf = flange ratio (width/thickness)

Metric dimensions are in mm and US dimensions are in inches.

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m.

US Wt is in lb/ft.

Table 3a: Deep Economy Beam Series - Listed Dimensions &amp; Properties (12/15/92)

Shape	US					Metric	A		Z		Matching Economy Beam
	Rolls	Wt	d	tw	bf		tf	US	Metric	US	
W1000x739	W40x16	496	1065.9	38.3	419.3	68.9	94100	146	37400	2280	W920x783
W1000x615	W40x16	413	1043.7	32.1	413.1	57.8	78300	121	30800	1880	W920x652
W1000x502	W40x16	337	1023.1	26.4	407.4	47.5	64000	99.2	24900	1520	W920x533
W1000x418	W40x16	281	1007.7	22.0	403.0	39.8	53300	82.6	20600	1260	W920x445
W1000x359	W40x16	241	996.5	19.0	400.0	34.2	45800	71.0	17600	1070	W920x386
W1000x316	W40x16	212	988.1	16.8	397.8	30.0	40200	62.3	15400	940	W920x341
W1000x270	W40x12	181	988.1	16.8	300.2	30.0	34400	53.3	12600	769	W920x287
W1000x244	W40x12	164	977.3	16.8	300.2	24.6	31100	48.2	11000	671	W920x252

tw = web thickness(mm)    tf = flange thickness(mm)    d = depth(mm)

bf = flange width(mm)

A = area( $\text{mm}^2$  or  $\text{in}^2$ )    Z = plastic section modulus( $1000\text{mm}^3$  or  $\text{in}^3$ )Shapes are designated by nominal web depth in mm & nominal mass/length in kg/m.  
US Wt is in lb/ft.

Table 3b: Deep Economy Beam Series - Rolling Dimensions &amp; Ratios (12/15/92)

Shape	US		dw		bp		tw		tf		rf		Rf		
	Rolls	Wt	Metric	US	Metric	US	Metric	US	Metric	US	M	US	Rt	Rw	
W1000x739	W40x16	496	928.1	36.54	190.5	7.500	38.3	1.508	68.9	2.713	30	1.18	1.80	24.2	6.1
W1000x615	W40x16	413	928.1	36.54	190.5	7.500	32.1	1.264	57.8	2.276	30	1.18	1.80	28.9	7.1
W1000x502	W40x16	337	928.1	36.54	190.5	7.500	26.4	1.039	47.5	1.870	30	1.18	1.80	35.2	8.6
W1000x418	W40x16	281	928.1	36.54	190.5	7.500	22.0	0.866	39.8	1.567	30	1.18	1.81	42.2	10.1
W1000x359	W40x16	241	928.1	36.54	190.5	7.500	19.0	0.748	34.2	1.346	30	1.18	1.80	48.8	11.7
W1000x316	W40x16	212	928.1	36.54	190.5	7.500	16.8	0.661	30.0	1.181	30	1.18	1.79	55.2	13.3
W1000x270	W40x12	181	928.1	36.54	141.7	5.579	16.8	0.661	30.0	1.181	30	1.18	1.79	55.2	10.0
W1000x244	W40x12	164	928.1	36.54	141.7	5.579	16.8	0.661	24.6	0.969	30	1.18	1.46	55.2	12.2

dw = web depth    bp = projecting flange width    rf = fillet radius

Rt = thickness ratio (flange/web)    Rw = web ratio (depth/thickness)

Rf = flange ratio (width/thickness)

Metric dimensions are in mm and US dimensions are in inches.

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m.

US Wt is in lb/ft.

Table 4a: Columns Series - Listed Dimensions &amp; Properties (12/15/92)

Shape	US						Metric	A					
	Rolls	Wt	d	tw	bf	tf		US	Step	rx	ry	P	
W360x1087	W14x16	730	569.4	78.0	454.4	124.7	138000	214		208	119	43800	
W360x990	W14x16	665	549.6	71.9	448.3	114.8	126000	195	9.5	203	117	39900	
W360x901	W14x16	605	531.4	65.9	442.3	105.7	115000	178	9.6	198	116	36400	
W360x819	W14x16	550	514.0	60.5	436.9	97.0	104000	161	10.6	194	114	32800	
W360x744	W14x16	500	497.8	55.6	432.0	88.9	94800	147	9.7	190	112	29800	
W360x677	W14x16	455	483.0	51.2	427.6	81.5	86300	134	9.8	186	111	27100	
W360x634	W14x16	426	474.2	47.6	424.0	77.1	80800	125	6.8	184	110	25300	
W360x593	W14x16	398	464.6	45.0	421.4	72.3	75500	117	7.0	182	109	23600	
W360x551	W14x16	370	455.2	42.0	418.4	67.6	70200	109	7.5	180	109	21900	
W360x509	W14x16	342	445.4	39.1	415.5	62.7	64800	100	8.3	177	108	20200	
W360x463	W14x16	311	434.8	35.8	412.2	57.4	59000	91.5	9.8	175	107	18400	
W360x422	W14x16	283	425.2	32.8	409.2	52.6	53700	83.2	9.9	172	106	16700	
W360x382	W14x16	257	416.0	29.8	406.2	48.0	48700	75.5	10.3	170	105	15100	
W360x347	W14x16	233	407.4	27.2	403.6	43.7	44200	68.5	10.2	168	104	13700	
W360x314	W14x16	211	399.2	24.9	401.3	39.6	39900	61.8	10.8	166	103	12300	
W360x288	W14x16	193	393.2	22.6	399.0	36.6	36600	56.7	9.0	165	103	11300	
W360x262	W14x16	176	386.6	21.1	397.5	33.3	33400	51.8	9.6	163	102	10300	
W360x236	W14x16	159	380.4	18.9	395.3	30.2	30100	46.7	11.0	162	102	9280	
W360x216	W14x16	145	375.4	17.3	393.7	27.7	27500	42.6	9.5	161	101	8460	
W360x197	W14x14.5	132	372.4	16.4	374.0	26.2	25000	38.8	10.0	160	96	7600	
W360x179	W14x14.5	120	367.8	15.0	372.6	23.9	22800	35.3	9.6	159	95.1	6910	
W360x162	W14x14.5	109	363.6	13.3	370.9	21.8	20600	31.9	10.7	158	94.8	6240	
W360x147	W14x14.5	99	359.6	12.3	369.9	19.8	18800	29.1	9.6	157	94.3	5690	
W360x134	W14x14.5	90	356.0	11.2	368.8	18.0	17100	26.5	9.9	156	94.0	5170	
W360x122	W14x14.5	82	352.4	10.5	368.2	16.2	15500	24.0	10.3	155	93.2	4670	
W360x110	W14x14.5	74	348.8	10.0	367.6	14.4	14000	21.7	10.7	153	92.4	4210	
W360x101	W14x10	68	355.4	11.4	255.8	17.7	12900	20.0	8.5	151	61.9	3280	
W360x90.9	W14x10	61	351.2	10.7	255.1	15.6	11600	18.0	11.2	149	61.1	2920	
W360x79.3	W14x10	53	345.4	10.7	255.1	12.7	10100	15.7	14.9	145	59.0	2490	
W310x107	W12x12	72	311.1	10.9	305.7	17.0	13600	21.1		135	77.1	3850	
W310x96.7	W12x12	65	307.9	9.9	304.7	15.4	12300	19.1	10.6	134	76.8	3480	
W310x86.4	W12x12	58	304.3	9.2	304.0	13.6	11000	17.1	11.8	133	76.1	3100	
W310x78.6	W12x10	53	305.7	9.2	254.4	14.3	10000	15.5	10.0	132	62.6	2560	
W310x72.3	W12x10	49	302.5	9.2	254.4	12.7	9200	14.3	8.7	130	61.6	2330	
W310x66.7	W12x10	45	299.7	9.2	254.4	11.3	8490	13.2	8.4	128	60.5	2130	

tw = web thickness(mm)      tf = flange thickness(mm)      d = depth(mm)

bf = flange width(mm)      A = area( $\text{mm}^2$  or  $\text{in}^2$ )

rx = radius of gyration about x axis(mm)

ry = radius of gyration about y axis(mm)

Step = % interval to next higher metric area in series

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m

P = load capacity in kN for kL=4m &amp; 50-ksi steel

Table 4a: Columns Series - Listed Dimensions &amp; Properties (12/15/92)

Shape	US						Metric	A					
	Rolls	Wt	d	tw	bf	tf		US	Step	rx	ry	P	
W250x167	W10x10	112	288.4	19.2	264.6	31.7	21300	33.0		118	67.9	5700	
W250x149	W10x10	100	281.8	17.3	262.7	28.4	19000	29.5	12.1	117	67.2	5060	
W250x131	W10x10	88	275.2	15.4	260.8	25.1	16800	26.0	13.1	115	66.6	4450	
W250x115	W10x10	77	269.2	13.5	258.9	22.1	14700	22.8	14.3	114	66.0	3880	
W250x102	W10x10	68	264.2	11.9	257.3	19.6	13000	20.2	13.1	113	65.6	3420	
W250x90.0	W10x10	60	259.6	10.7	256.1	17.3	11500	17.8	13.0	112	65.0	3010	
W250x80.5	W10x10	54	256.2	9.4	254.8	15.6	10300	16.0	11.7	111	64.8	2690	
W250x73.3	W10x10	49	253.4	8.6	254.0	14.2	9340	14.5	10.3	110	64.5	2430	
W250x67.6	W10x10	45	251.6	7.5	252.9	13.3	8610	13.3	8.5	110	64.6	2240	
W250x58.4	W10x10	39	247.0	7.5	252.9	11.0	7440	11.5	15.7	108	63.1	1910	
W200x72.1	W8x8	48	215.9	10.1	205.9	17.4	9190	14.2		91.7	52.5	2070	
W200x60.1	W8x8	40	209.5	9.1	204.9	14.2	7660	11.9	20.0	89.6	51.6	1700	
W200x52.7	W8x8	35	206.1	7.9	203.7	12.5	6720	10.4	14.0	89.0	51.2	1480	
W200x46.8	W8x8	31	203.1	7.2	203.0	11.0	5960	9.24	12.8	86.7	50.7	1300	
W200x42.2	W8x8	28	201.1	6.3	202.1	10.0	5380	8.34	10.8	87.9	50.6	1180	
W150x37.4	W6x6	25	162.1	8.1	154.5	11.6	4760	7.38		68.6	38.7	752	
W150x30.0	W6x6	20	157.5	6.6	153.0	9.3	3820	5.92	24.6	67.5	38.2	591	
W150x22.5	W6x6	15	152.1	5.8	152.2	6.6	2870	4.45	33.1	65.2	36.8	417	
W150x18.1	W6x4	12	153.1	5.8	101.6	7.1	2300	3.57	24.8	63.3	23.2	134	
W150x13.8	W6x4	9	149.9	4.3	100.1	5.5	1750	2.71	31.4	63.0	22.9	99	
W100x19.6	W4x4	13	105.7	7.1	103.1	8.8	2500	3.88		43.7	25.4	175	

tw = web thickness(mm)      tf = flange thickness(mm)      d = depth(mm)

bf = flange width(mm)      A = area( $\text{mm}^2$  or  $\text{in}^2$ )

rx = radius of gyration about x axis(mm)

ry = radius of gyration about y axis(mm)

Step = % interval to next higher metric area in series

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m

P = load capacity in kN for kL=4m &amp; 50-ksi steel

Table 4b: Columns Series - Rolling Dimensions &amp; Ratios (12/15/92)

<u>Shape</u>	<u>US</u>	<u>dw</u>	<u>bp</u>	<u>tw</u>	<u>tf</u>	<u>rf</u>					
<u>Shape</u>	<u>Rolls</u>	<u>Wt</u>	<u>Metric US</u>	<u>Metric US</u>	<u>Metric US</u>	<u>Metric US</u>	<u>M</u>	<u>US</u>	<u>Rt</u>	<u>Rw</u>	<u>Rf</u>
W360x1087	W14x16	730	320.0	12.60	188.2	7.409	78.0	3.071	124.7	4.909	15
W360x990	W14x16	665	320.0	12.60	188.2	7.409	71.9	2.831	114.8	4.520	15
W360x901	W14x16	605	320.0	12.60	188.2	7.409	65.9	2.594	105.7	4.161	15
W360x819	W14x16	550	320.0	12.60	188.2	7.409	60.5	2.382	97.0	3.819	15
W360x744	W14x16	500	320.0	12.60	188.2	7.409	55.6	2.189	88.9	3.500	15
W360x677	W14x16	455	320.0	12.60	188.2	7.409	51.2	2.016	81.5	3.209	15
W360x634	W14x16	426	320.0	12.60	188.2	7.409	47.6	1.874	77.1	3.035	15
W360x593	W14x16	398	320.0	12.60	188.2	7.409	45.0	1.772	72.3	2.846	15
W360x551	W14x16	370	320.0	12.60	188.2	7.409	42.0	1.654	67.6	2.661	15
W360x509	W14x16	342	320.0	12.60	188.2	7.409	39.1	1.539	62.7	2.469	15
W360x463	W14x16	311	320.0	12.60	188.2	7.409	35.8	1.409	57.4	2.260	15
W360x422	W14x16	283	320.0	12.60	188.2	7.409	32.8	1.291	52.6	2.071	15
W360x382	W14x16	257	320.0	12.60	188.2	7.409	29.8	1.173	48.0	1.890	15
W360x347	W14x16	233	320.0	12.60	188.2	7.409	27.2	1.071	43.7	1.720	15
W360x314	W14x16	211	320.0	12.60	188.2	7.409	24.9	0.980	39.6	1.559	15
W360x288	W14x16	193	320.0	12.60	188.2	7.409	22.6	0.890	36.6	1.441	15
W360x262	W14x16	176	320.0	12.60	188.2	7.409	21.1	0.831	33.3	1.311	15
W360x236	W14x16	159	320.0	12.60	188.2	7.409	18.9	0.744	30.2	1.189	15
W360x216	W14x16	145	320.0	12.60	188.2	7.409	17.3	0.681	27.7	1.091	15
W360x197	W14x14.5	132	320.0	12.60	178.8	7.039	16.4	0.646	26.2	1.031	15
W360x179	W14x14.5	120	320.0	12.60	178.8	7.039	15.0	0.591	23.9	0.941	15
W360x162	W14x14.5	109	320.0	12.60	178.8	7.039	13.3	0.524	21.8	0.858	15
W360x147	W14x14.5	99	320.0	12.60	178.8	7.039	12.3	0.484	19.8	0.780	15
W360x134	W14x14.5	90	320.0	12.60	178.8	7.039	11.2	0.441	18.0	0.709	15
W360x122	W14x14.5	82	320.0	12.60	178.8	7.039	10.6	0.417	16.2	0.638	15
W360x110	W14x14.5	74	320.0	12.60	178.8	7.039	10.0	0.394	14.4	0.567	15
W360x101	W14x10	68	320.0	12.60	122.2	4.811	11.4	0.449	17.7	0.697	15
W360x90.9	W14x10	61	320.0	12.60	122.2	4.811	10.7	0.421	15.6	0.614	15
W360x79.3	W14x10	53	320.0	12.60	122.2	4.811	10.7	0.421	12.7	0.500	15
W310x107	W12x12	72	277.1	10.91	147.4	5.803	10.9	0.429	17.0	0.669	15
W310x96.7	W12x12	65	277.1	10.91	147.4	5.803	9.9	0.390	15.4	0.606	15
W310x86.4	W12x12	58	277.1	10.91	147.4	5.803	9.2	0.362	13.6	0.535	15
W310x78.6	W12x10	53	277.1	10.91	122.6	4.827	9.2	0.362	14.3	0.563	15
W310x72.3	W12x10	49	277.1	10.91	122.6	4.827	9.2	0.362	12.7	0.500	15
W310x66.7	W12x10	45	277.1	10.91	122.6	4.827	9.2	0.362	11.3	0.445	15

dw = web depth    bp = projecting flange width    rf = fillet radius

Rt = thickness ratio (flange/web)    Rw = web ratio (depth/thickness)

Rf = flange ratio (width/thickness)

Metric dimensions in mm and US dimensions in inches

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m

US Wt is in lb/ft

Table 4b: Columns Series - Rolling Dimensions &amp; Ratios (12/15/92)

Shape	US		dw		bp		tw		tf		rf		Rt	Rw	Rf
	Rolls	Wt	Metric	US	Metric	US	Metric	US	Metric	US	M	US			
W250x168	W10x10	112	225.0	8.86	122.7	4.831	19.2	0.756	31.7	1.248	15	0.59	1.65	11.7	8.3
W250x149	W10x10	100	225.0	8.86	122.7	4.831	17.3	0.681	28.4	1.118	15	0.59	1.64	13.0	9.3
W250x131	W10x10	88	225.0	8.86	122.7	4.831	15.4	0.606	25.1	0.988	15	0.59	1.63	14.6	10.4
W250x115	W10x10	77	225.0	8.86	122.7	4.831	13.5	0.531	22.1	0.870	15	0.59	1.64	16.7	11.7
W250x102	W10x10	68	225.0	8.86	122.7	4.831	11.9	0.469	19.6	0.772	15	0.59	1.65	18.9	13.1
W250x90.0	W10x10	60	225.0	8.86	122.7	4.831	10.7	0.421	17.3	0.681	15	0.59	1.62	21.0	14.8
W250x80.5	W10x10	54	225.0	8.86	122.7	4.831	9.4	0.370	15.6	0.614	15	0.59	1.66	23.9	16.3
W250x73.3	W10x10	49	225.0	8.86	122.7	4.831	8.6	0.339	14.2	0.559	15	0.59	1.65	26.2	17.9
W250x67.6	W10x10	45	225.0	8.86	122.7	4.831	7.5	0.295	13.3	0.524	15	0.59	1.77	30.0	19.0
W250x58.4	W10x10	39	225.0	8.86	122.7	4.831	7.5	0.295	11.0	0.433	15	0.59	1.47	30.0	23.0
W200x72.3	W8x8	48	181.1	7.13	97.9	3.854	10.1	0.398	17.4	0.685	15	0.59	1.72	17.9	11.8
W200x60.1	W8x8	40	181.1	7.13	97.9	3.854	9.1	0.358	14.2	0.559	15	0.59	1.56	19.9	14.4
W200x53.0	W8x8	35	181.1	7.13	97.9	3.854	7.9	0.311	12.5	0.492	15	0.59	1.58	22.9	16.3
W200x46.8	W8x8	31	181.1	7.13	97.9	3.854	7.2	0.283	11.0	0.433	15	0.59	1.53	25.2	18.5
W200x42.2	W8x8	28	181.1	7.13	97.9	3.854	6.3	0.248	10.0	0.394	15	0.59	1.59	28.7	20.2
W150x37.4	W6x6	25	138.9	5.47	73.2	2.882	8.1	0.319	11.6	0.457	8	0.31	1.43	17.1	13.3
W150x30.0	W6x6	20	138.9	5.47	73.2	2.882	6.6	0.260	9.3	0.366	8	0.31	1.41	21.0	16.5
W150x22.5	W6x6	15	138.9	5.47	73.2	2.882	5.8	0.228	6.6	0.260	8	0.31	1.14	23.9	23.1
W150x18.1	W6x4	12	138.9	5.47	47.9	1.886	5.8	0.228	7.1	0.280	8	0.31	1.22	23.9	14.3
W150x13.8	W6x4	9	138.9	5.47	47.9	1.886	4.3	0.169	5.5	0.217	8	0.31	1.28	32.3	18.2
W100x19.6	W4x4	13	88.1	3.47	48.0	1.890	7.1	0.280	8.8	0.346	8	0.31	1.24	12.4	11.7

dw = web depth    bp = projecting flange width    rf = fillet radius

Rt = thickness ratio (flange/web)    Rw = web ratio (depth/thickness)

Rf = flange ratio (width/thickness)

Metric dimensions in mm and US dimensions in inches

Shapes are designated by nominal web depth in mm &amp; nominal mass/length in kg/m

US Wt is in lb/ft

Table 5: All Wide-Flange Shapes (12/15/92)

<u>Shape</u>	<u>Type</u>	<u>Shape</u>	<u>Type</u>	<u>Shape</u>	<u>Type</u>
W1000x739	DE	W690x191	S	W360x122	C
W1000x615	DE	W690x135	E	W360x110	C
W1000x502	DE	W690x125	E	W360x101	C
W1000x418	DE	W610x179	S	W360x90.9	C
W1000x359	DE	W610x163	S	W360x79.3	C
W1000x316	DE	W610x112	E	W360x71.6	SC
W1000x270	DE	W610x102	E	W360x63.9	SC
W1000x244	DE	W610x91.4	E	W360x33.2	E
W920x1186	E	W610x82.3	E	W310x107	C
W920x966	E	W530x157	S	W310x96.7	C
W920x783	E	W530x143	S	W310x86.4	C
W920x652	E	W530x73.5	E	W310x78.6	C
W920x533	E	W530x66.1	E	W310x72.3	C
W920x487	E	W460x135	S	W310x66.7	C
W920x445	E	W460x121	S	W310x57.5	SC
W920x416	E	W460x105	S	W310x45.4	S
W920x386	E	W460x96.6	S	W310x27.9	E
W920x364	E	W460x58.6	E	W310x23.9	E
W920x341	E	W460x52.7	E	W310x21.1	E
W920x311	E	W410x86.8	S	W250x167	C
W920x287	E	W410x76.6	S	W250x149	C
W920x270	E	W410x46.5	E	W250x131	C
W920x252	E	W410x39.1	E	W250x115	C
W920x237	E	W360x1087	C	W250x102	C
W920x222	E	W360x990	C	W250x90.0	C
W920x207	E	W360x901	C	W250x80.5	C
W840x192	E	W360x819	C	W250x73.3	C
W840x175	E	W360x744	C	W250x67.6	C
W760x159	E	W360x677	C	W250x58.4	C
W760x146	E	W360x634	C	W250x40.9	S
W690x799	S	W360x593	C	W250x18.0	E
W690x659	S	W360x551	C	W200x72.1	C
W690x602	S	W360x509	C	W200x60.1	C
W690x553	S	W360x463	C	W200x52.7	C
W690x516	S	W360x422	C	W200x46.8	C
W690x478	S	W360x382	C	W200x42.2	C
W690x450	S	W360x347	C	W200x37.6	SC
W690x422	S	W360x314	C	W200x30.3	S
W690x375	S	W360x288	C	W200x26.5	S
W690x349	S	W360x262	C	W200x15.5	E
W690x328	S	W360x236	C	W150x37.4	C
W690x307	S	W360x216	C	W150x30.0	C
W690x285	S	W360x197	C	W150x22.5	C
W690x266	S	W360x179	C	W150x18.1	C
W690x245	S	W360x162	C	W150x13.8	CE
W690x216	S	W360x147	C	W100x19.6	C
		W360x134	C		

E = economy beam

C = column

S = shallow beam

DE = deep economy beam

SC = shallow beam proportioned to also serve as a column

CE = column that is also used as an economy beam

Table 6: Beam Selection Table (12/15/92)

Plastic Section Modulus 1000mm	Deep Economy Beam	Economy Beam	Shallow Beam	Shallow vs Economy	
				Depth Reduction %	Added Mass %
58900		W920x1186			
47000		W920x966			
37500	W1000x739	W920x783			
30800	W1000x615	W920x652	W690x799	15.2	22.5
24900	W1000x502	W920x533	W690x659	16.3	23.6
22700		W920x487	W690x602	16.8	23.6
20500	W1000x418	W920x445	W690x553	17.2	24.3
19100		W920x416	W690x516	17.6	24.0
17600	W1000x359	W920x386	W690x478	17.9	23.8
16500		W920x364	W690x450	18.2	23.6
15400	W1000x316	W920x341	W690x422	18.4	23.8
13700		W920x311	W690x375	20.3	20.6
12600	W1000x270	W920x287	W690x349	20.5	21.6
11800		W920x270	W690x328	20.7	21.5
11000	W1000x244	W920x252	W690x307	20.8	21.8
10200		W920x237	W690x285	21.0	20.3
9520		W920x222	W690x266	21.0	19.8
8740		W920x207	W690x245	21.1	18.4
7660		W840x192	W690x216	17.1	12.5
6830		W840x175	W690x191	17.1	9.1
5700		W750x159	W610x179	18.2	12.6
5150		W760x146	W610x163	18.3	11.6
4450		W690x135	W530x157	20.0	16.3
4060		W690x125	W530x143	20.0	14.4
3350		W610x112	W460x135	22.5	20.7
2950		W610x102	W460x121	22.6	18.3
2570		W610x91.4	W460x105	23.5	15.3
2250		W610x82.3	W460x96.6	21.9	17.4
1820		W530x73.5	W410x86.8	20.8	18.1
1570		W530x66.1	W410x76.6	21.0	15.9
1300		W460x58.6	W360x71.6	23.0	22.2
1110		W460x52.7	W360x63.9	23.3	21.3
907		W410x46.5	W310x57.5	25.1	23.7
748		W410x39.1	W310x45.4	21.0	16.1
559		W360x33.2	W250x40.9	24.2	23.2
407		W310x27.9	W200x37.6	34.4	34.8
329		W310x23.9	W200x30.3	30.9	26.8
287		W310x21.1	W200x26.5	31.2	25.6
210		W250x18.0			
152		W200x15.5	Average =	21.1	20.3
104		W150x13.8			

The W150x13.8 shape is included in the column series, but can also serve as a beam.

Table 7: Modified Columns (12/15/92)

Metric Shape	US Shape		Weight		tw		tf		Rt		Rw		Rf	
	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New
W360x122	W14x10	W14x14.5	82	82	0.510	0.417	0.855	0.638	1.68	1.53	24.7	30.2	11.8	22.7
W360x110	W14x10	W14x14.5	74	74	0.450	0.394	0.785	0.567	1.74	1.44	28.0	32.0	12.8	25.5
W360x101	W14x10	W14x10	68	68	0.415	0.449	0.720	0.697	1.73	1.55	30.4	28.1	13.9	14.4
W360x90.9	W14x10	W14x10	61	61	0.375	0.421	0.645	0.614	1.72	1.46	33.6	29.9	15.5	16.4
W360x79.3	W14x8	W14x10	53	53	0.370	0.421	0.660	0.500	1.78	1.19	34.1	29.9	12.2	20.1
W310x86.4	W12x10	W12x12	58	58	0.360	0.362	0.640	0.535	1.78	1.48	30.3	30.1	15.6	22.4
W310x78.6	W12x10	W12x10	53	53	0.345	0.362	0.575	0.563	1.67	1.56	31.6	30.1	17.4	17.8
W310x72.3	W12x8	W12x10	50	49	0.370	0.362	0.640	0.500	1.73	1.38	29.5	30.1	12.6	20.0
W310x66.7	W12x8	W12x10	45	45	0.335	0.362	0.575	0.445	1.72	1.23	32.6	30.1	14.0	22.5
W250x67.6	W10x8	W10x10	45	45	0.350	0.295	0.620	0.524	1.77	1.78	25.3	30.0	12.9	19.0
W250x58.4	W10x8	W10x10	39	39	0.315	0.295	0.530	0.433	1.68	1.47	28.1	30.0	15.1	23.0
W200x42.2	W8x6.5	W8x8	28	28	0.285	0.248	0.465	0.394	1.63	1.59	25.0	28.8	14.1	20.2

The Old Shape is the present shape; the New Shape is the modified shape.

All dimensions and weights are in US units.

tw = web thickness    tf = flange thickness    Rt = thickness (flange/web) ratio

Rw = web (depth/thickness) ratio    Rf = flange (width/thickness) ratio

Table 8: Limiting Width/Thickness Ratios for Rolled Shapes

Shape	Yield Stress, ksi	Web		Flange	
		AISC	AASHTO	AISC	AASHTO
Beam	36	106.7	101.0	21.7	21.6
	50	90.5	86.0	18.4	18.4
	70	76.5	72.7	15.5	15.5
Column	36	42.2	32.0	31.7	24.0
	50	35.8	27.0	26.9	22.0
	70	30.2	23.0	22.7	18.0

## Notes:

- (1) The web width/thickness ratio is the web depth divided by the web thickness.
- (2) The flange width/thickness ratio is the flange width divided by the flange thickness.
- (3) For beams, the limiting width/thickness ratios are for compact sections.
- (4) All limiting ratios are based on the AISC or AASHTO specifications in effect in December, 1992.

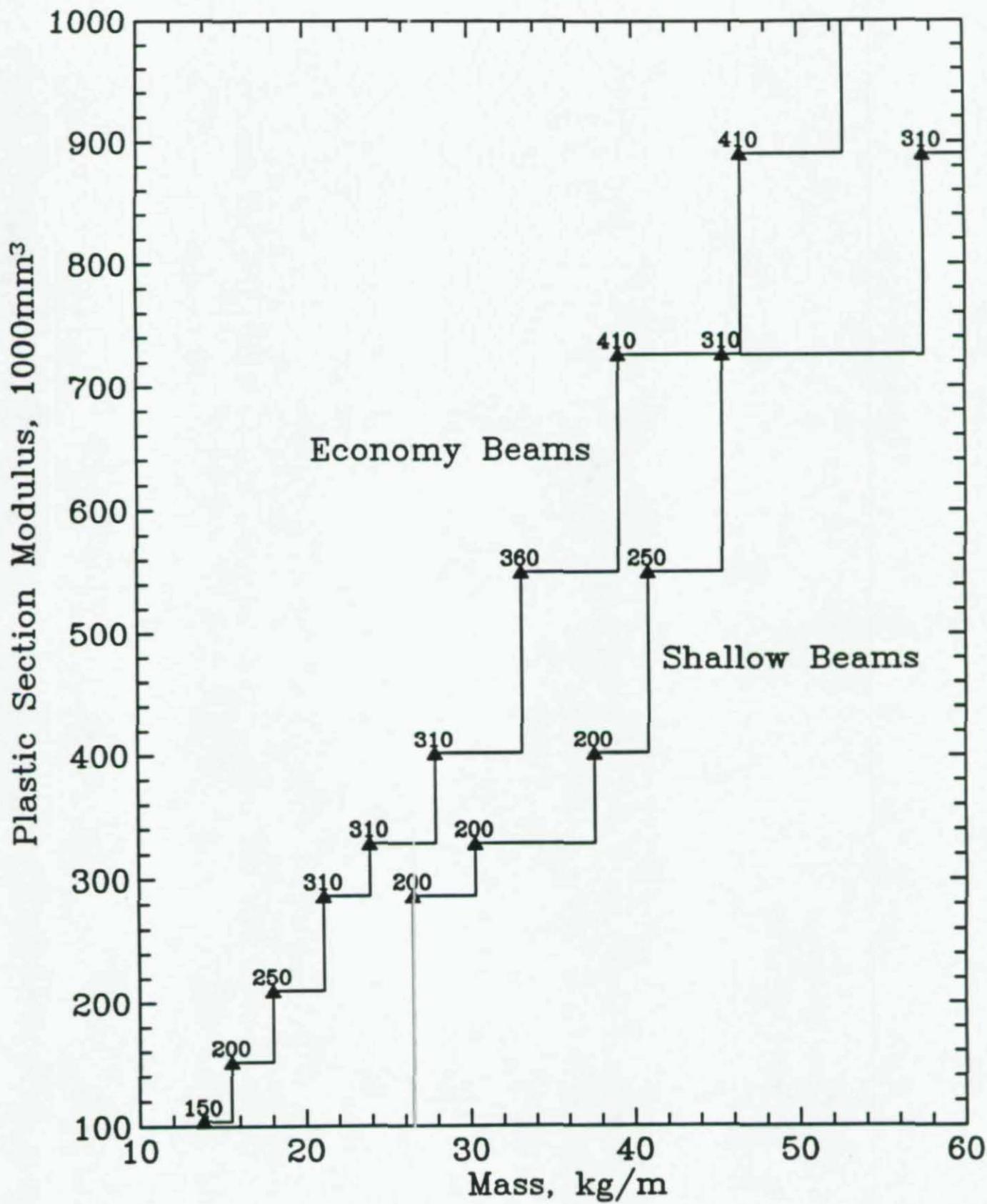


Figure 1: Very Light Beams

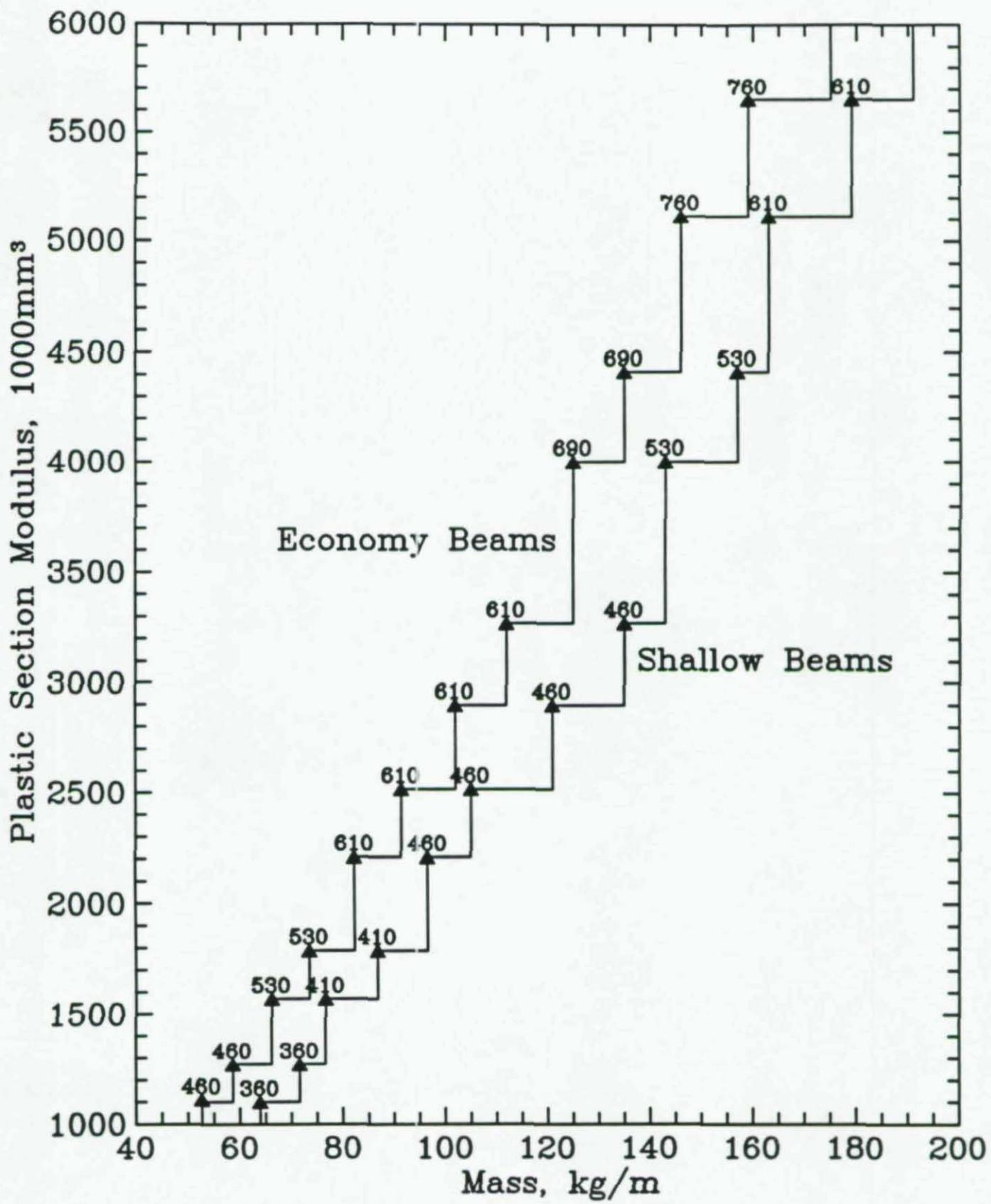


Figure 2: Light Beams

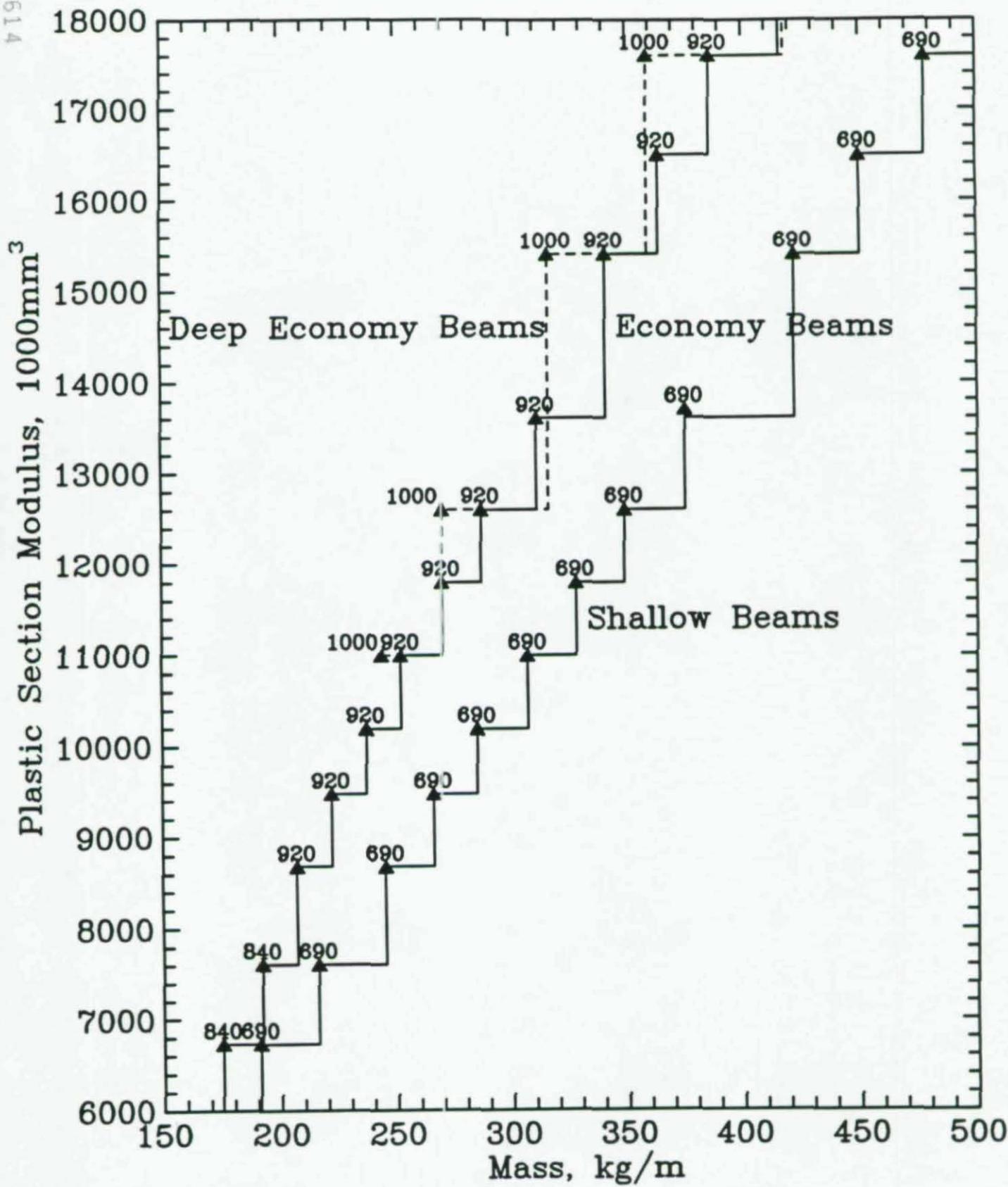


Figure 3: Heavy Beams

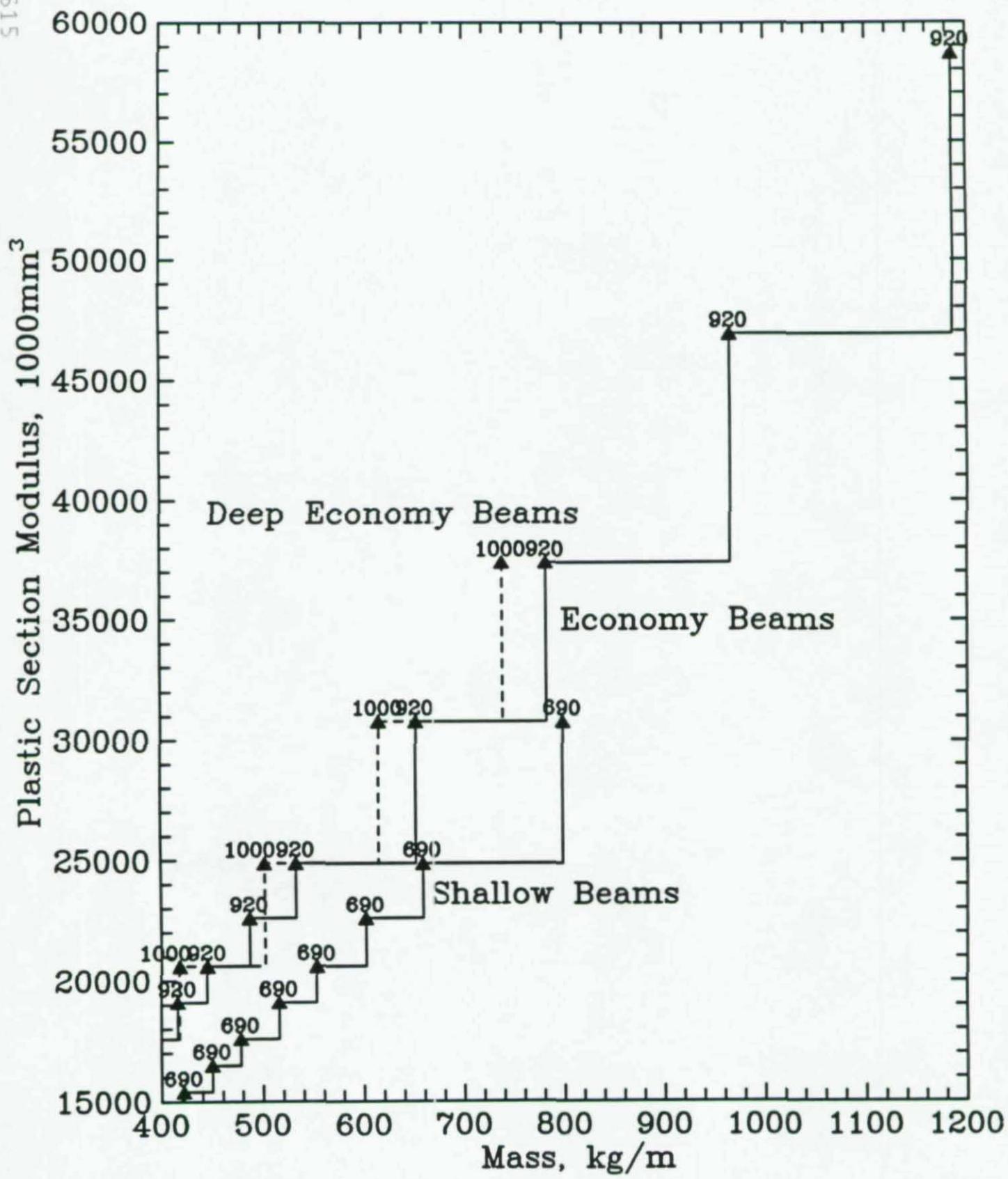


Figure 4: Very Heavy Beams

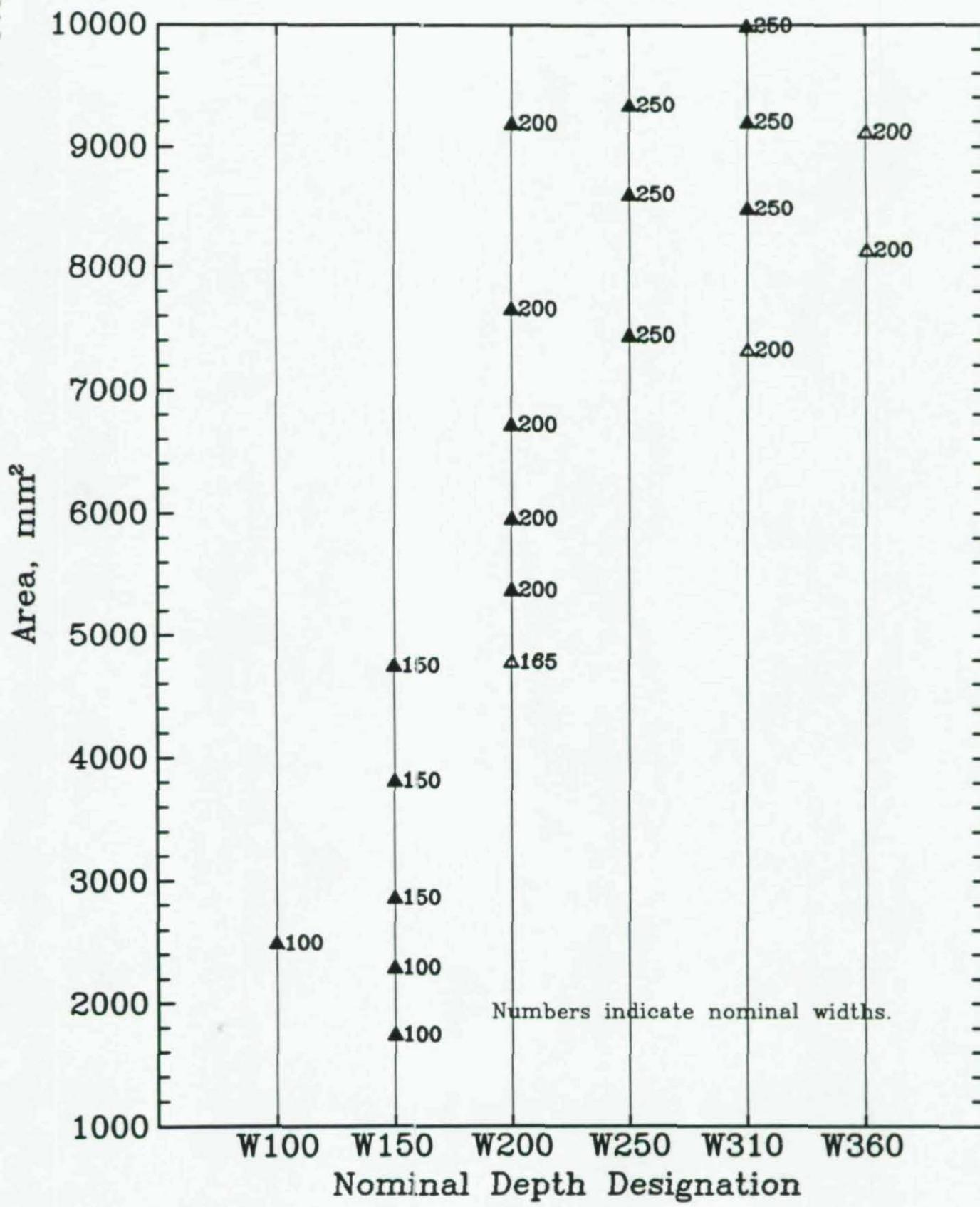


Figure 5: Light Columns

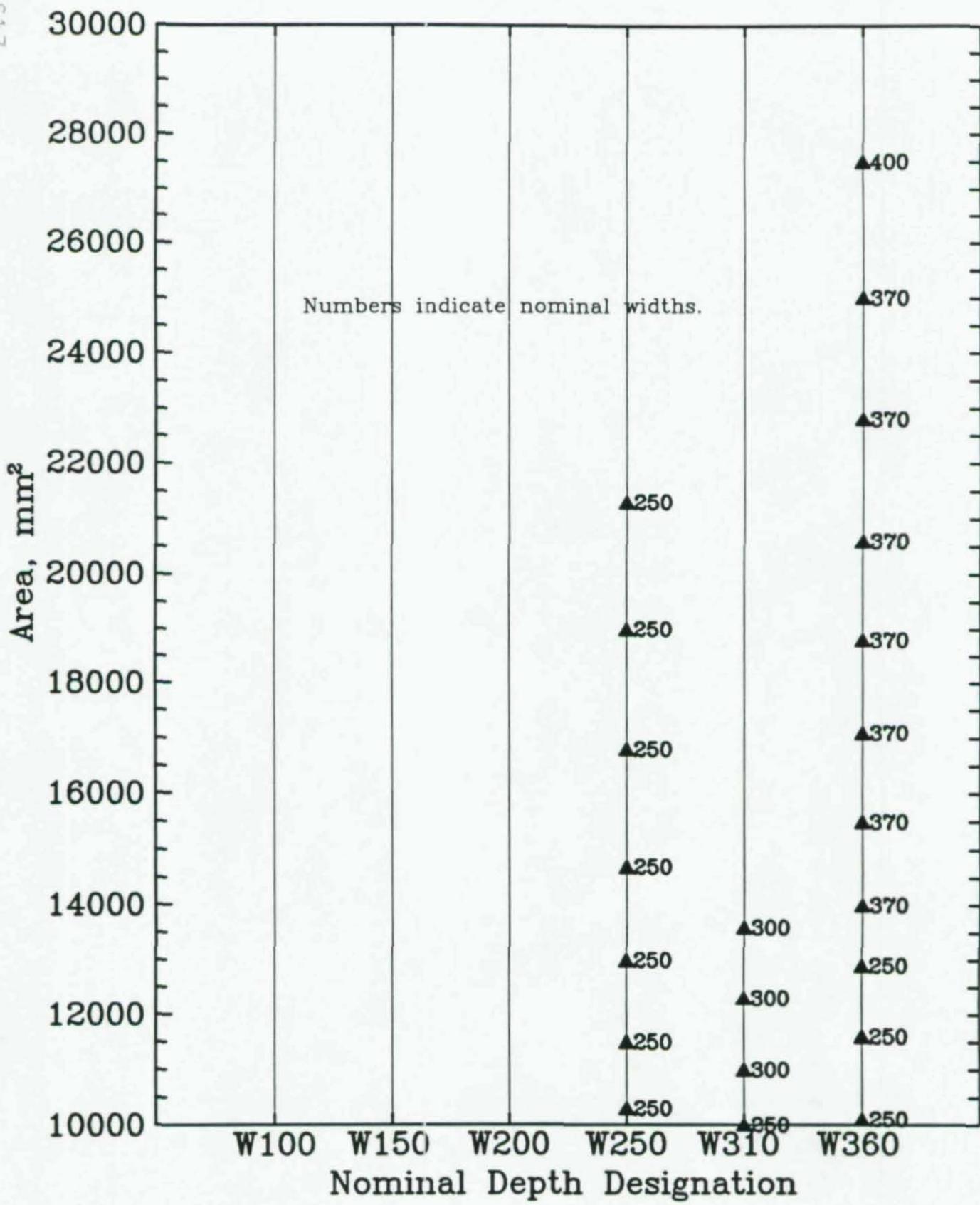


Figure 6: Medium Columns

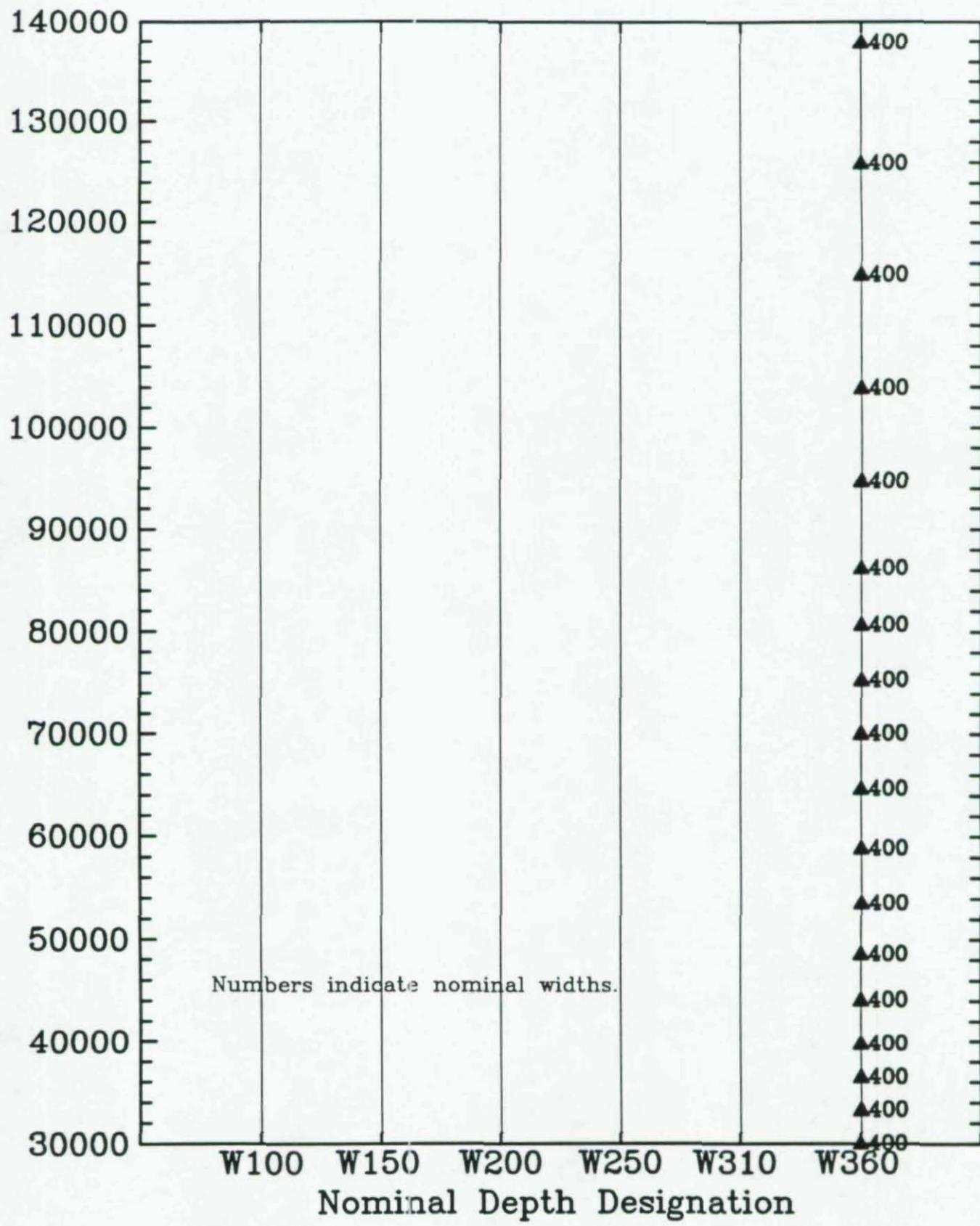
Area, mm<sup>2</sup>

Figure 7: Heavy Columns

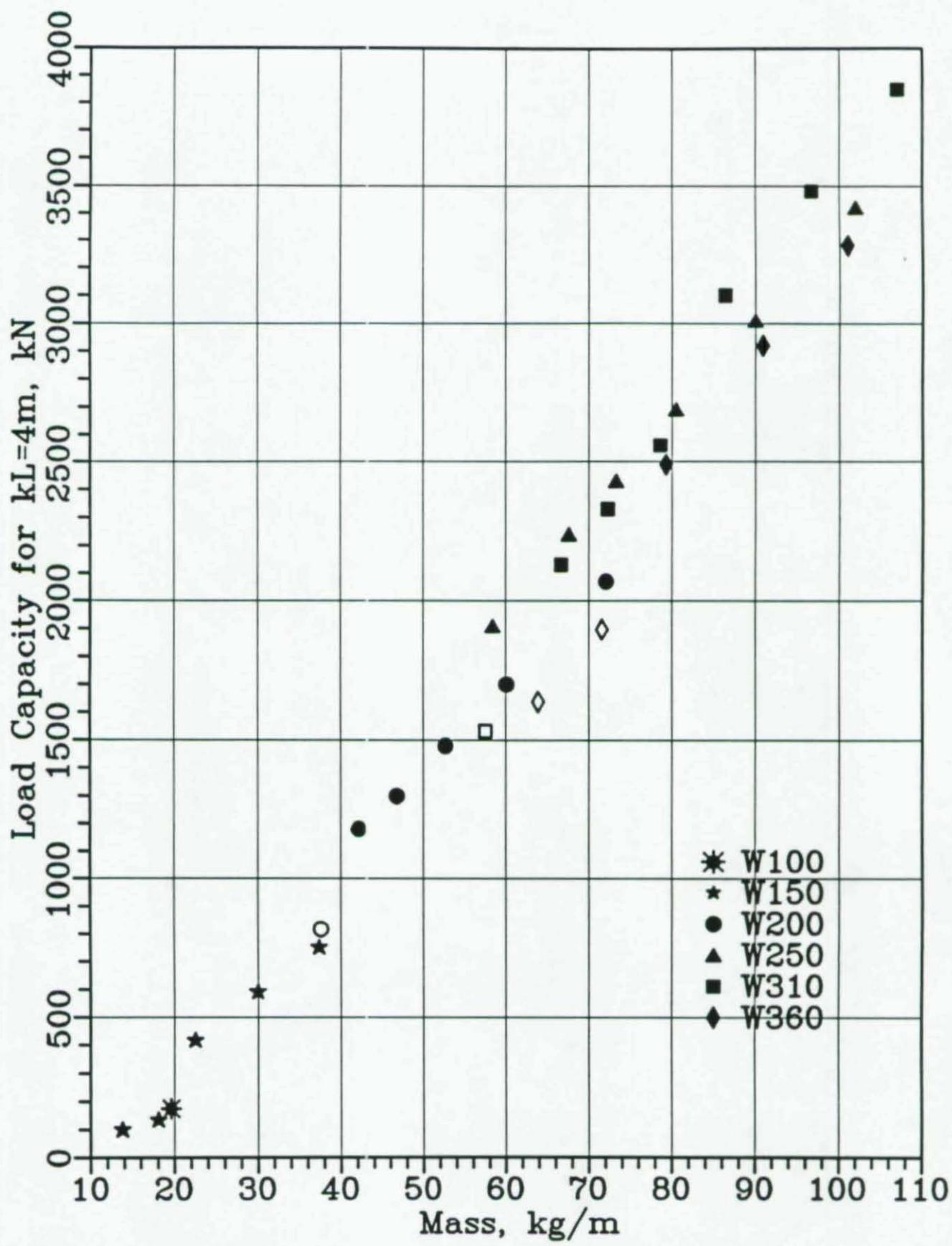


Figure 8 Load Capacity of Light Columns

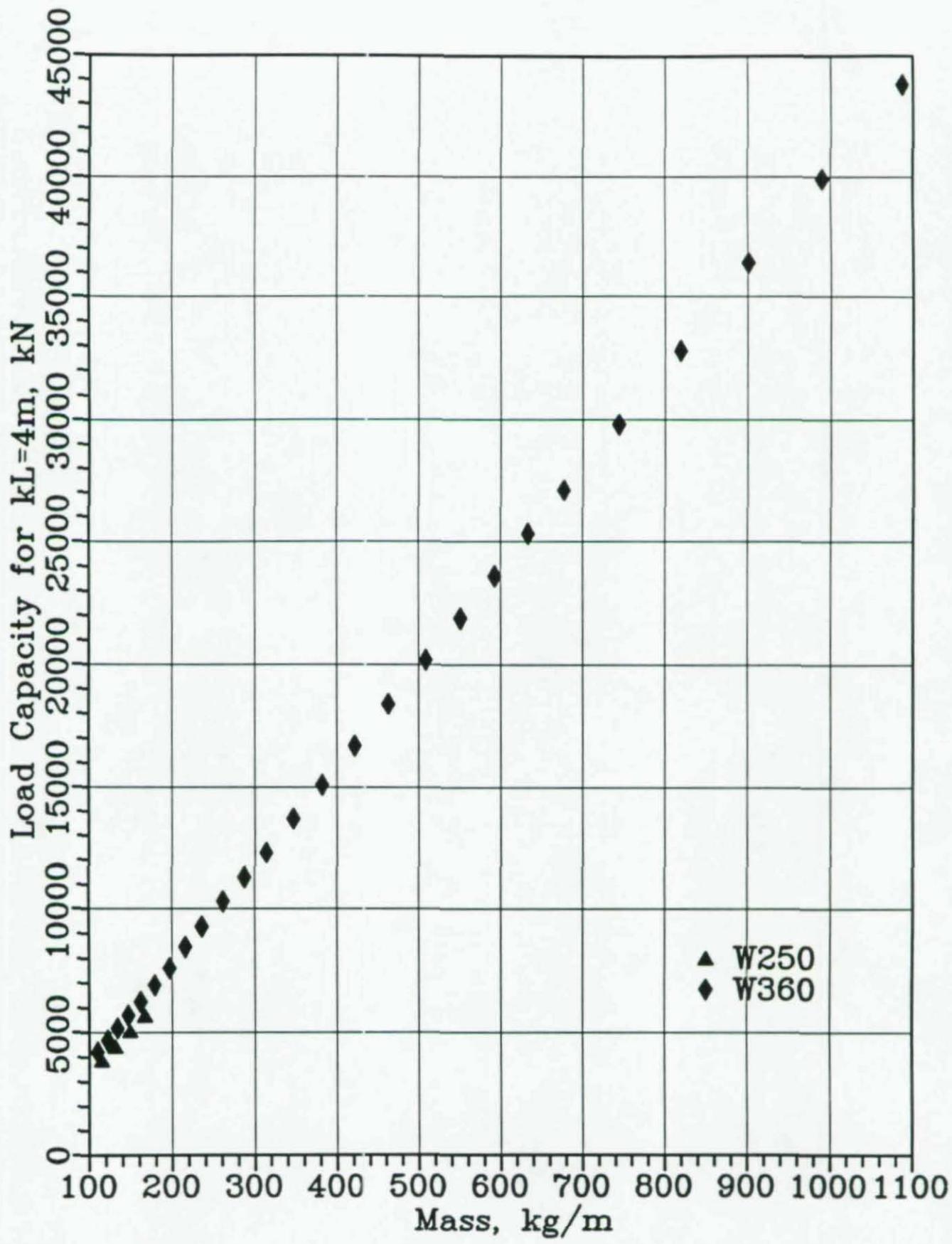


Figure 9 Load Capacity of Heavy Columns

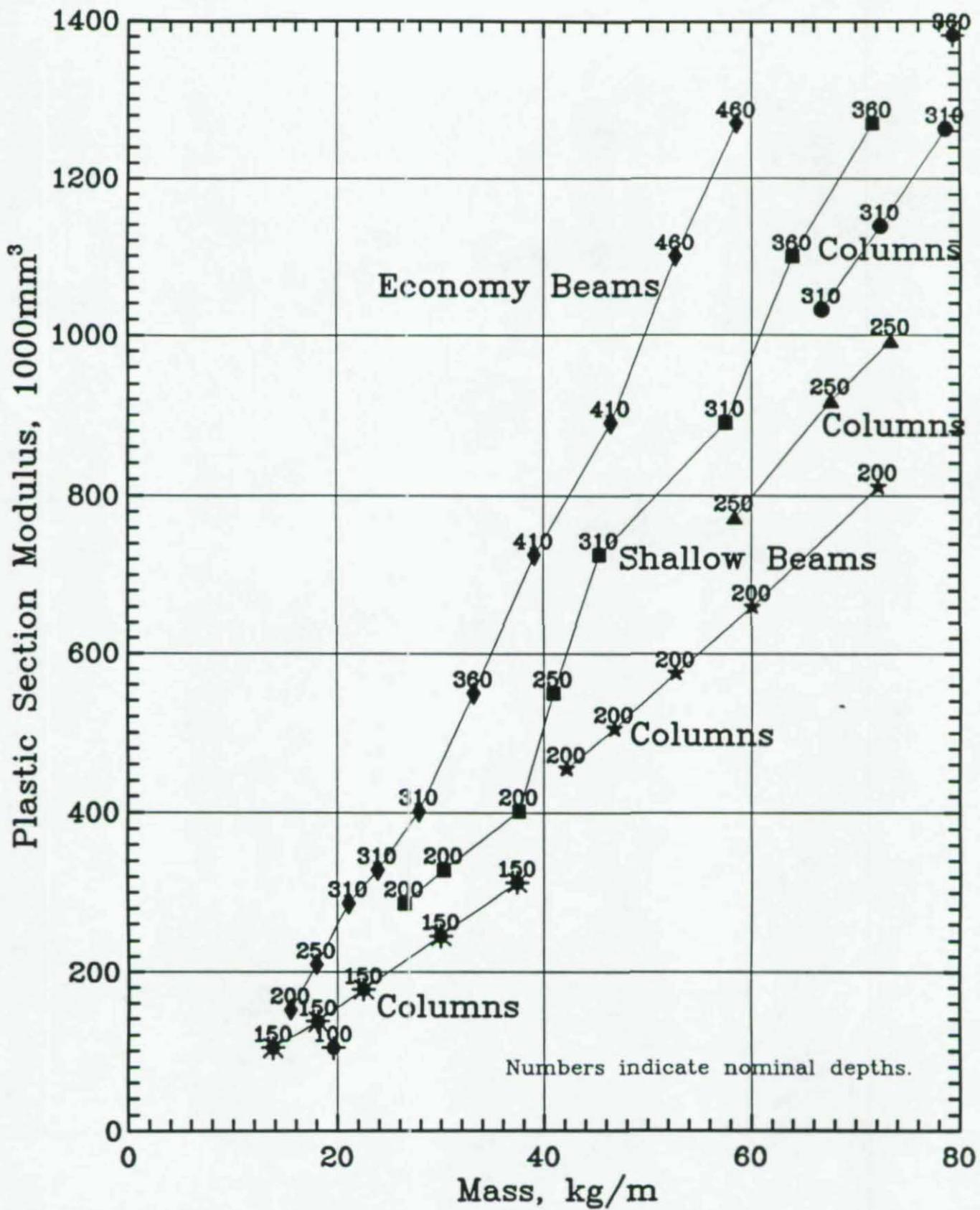


Figure 10 Strength of Light Beams and Columns

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