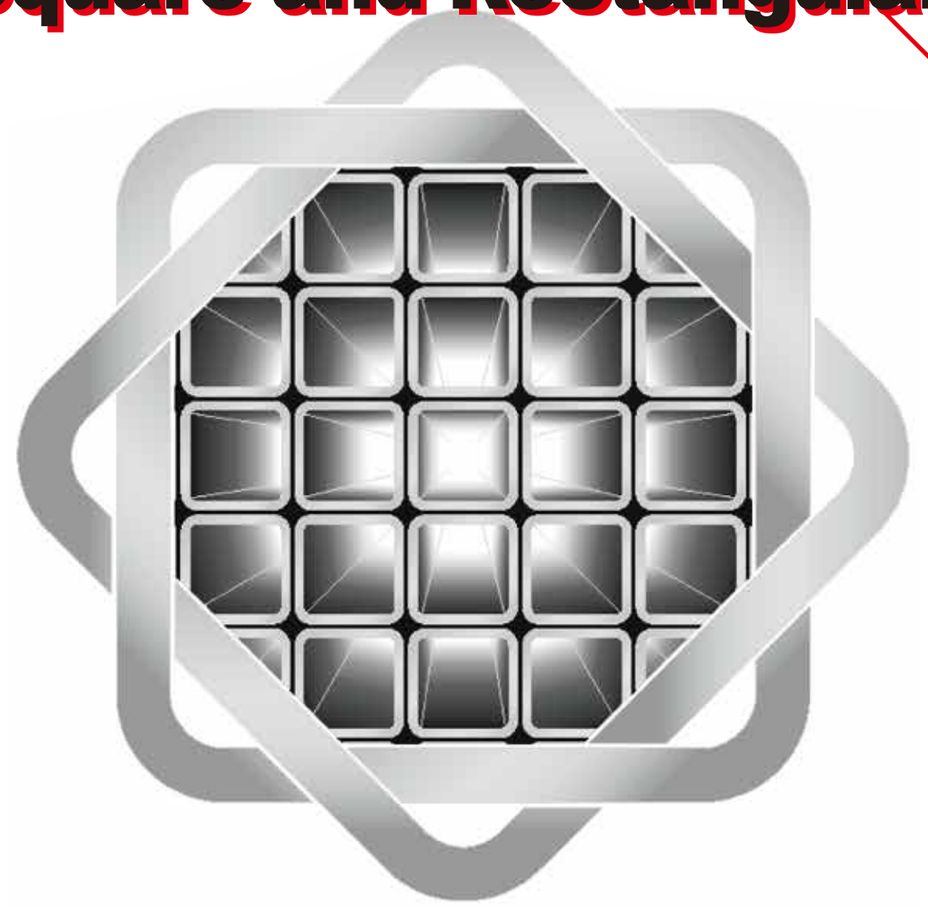
NIPPON STEEL

Design Manual of Hollow Structural Sections

Square and Rectangular



NIPPON STEEL METAL PRODUCTS CO.,LTD.

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Introduction

Features

Square or rectangular Hollow Structural Sections (HSS), because of its box shaped section, has many mechanical properties of advantage, including:

- Great moment of inertia and section modulus per unit area
- Well-balanced sectional performance in the X-Y direction
- Large radius of gyration, which aids in increasing resistance to buckling
- Very great torsional rigidity

In addition, it has a number of appearance and workability features, such as:

- It has a natural sectional configuration as column member
- It may have linearly cut end surfaces at connections
- It needs to have fireproof covering or painting only on one side

On the whole, it can be called an economical material as structural member.

Applications

Main structural members:

- Columns in offices, shopping malls, schools, factories, warehouses, etc.
- Columns and beams in prefabricated houses, detached houses, medium or small stores, etc.
- Truss members of long-span construction, as in stadiums, gymnasiums, meeting halls, hangars, etc.
- Frames in plant structures, advertising towers, etc.

Secondary structural members:

- Auxiliary structural members, such as wind beams, studs, blades, etc.
- Frames in garages, greenhouses, livestock sheds, cages, etc.
- Gates, fences, pergolas, facades, etc.

Road Facilities:

- Bridge railings, guardrails, overhead gantries, poles, etc.
- Pedestrian bridges, bridge trusses, etc.

Mechanical members:

- Frames in cranes, vehicles, construction machinery, farming machinery, etc.
- Frames in multi-level automated warehouses, conveyors, steel furniture, etc.

Large-diameter square or rectangular HSS, particularly in the square section, has the same sectional performance in the X and Y directions; moreover, it exhibits great toughness under severe repeating loads, such as earthquakes and storms. Thus, in the architectural field as listed above it has structurally very favorable merits, especially it is an ideal column member for multi-storied rigid-frame structures. It is also an ideal truss member for long-span constructions because of its excellent workability and large radius of gyration. It therefore gives much promise of future development in this field.

Our Roles

In response to the customer requirements for square and rectangular HSS in these various fields, our company is going ahead with the establishment of production systems for large-diameter and thick-wall square and rectangular HSS as well as with research and development activities for utilization technology.

The present design manual summarizes general matters involved in the design procedure for square and rectangular HSS; at the same time, it carries, for the sake of convenience, tables of the loads calculated concerning the square and rectangular HSS of our company.

Our company's square and rectangular HSS are manufactured, as for inch sizes, pursuant to ASTM A500 Grades B and C. The design procedure has been conformed to the AISC "Steel Construction Manual Thirteenth edition"; only the provisions regarding square and rectangular HSS have been excerpted and reproduced, from which values for the load tables have been computed.

All date contained herein were as accurate as possible at time of publication, but the Company can not assume final responsibility for application of the information or misinterpretation of them.

CONTENTS

Sect.1 Material and Specification

Our company is manufacturing square and rectangular HSS of constant quality under complete quality control from the strip of Nippon Steel Corporation. The welding procedure is high-frequency welding; outside burrs are removed during tube making, and inside burrs are not.

All square and rectangular HSS of our company conforms to ASTM A500 Grades B and C; its chemical requirements and tensile requirements are as shown in Tables 1 and 2. Besides, ROPS HSS that have excellent impact performance at low temperatures may be manufactured, and customer specifications for them will be met subject to negotiation.

The dimensional tolerances are as shown in Tables 3 to 5.

Table 1 Chemical Requirements

	Composition %	
	Grade B	Grade C
Carbon, max.	0.26	0.23
Manganese, max.	1.35	1.35
Phosphorus, max.	0.035	0.035
Sulfur, max.	0.035	0.035

Table 2 Tensile Requirements

Classification	Tensile Strength	Yield Strength	Elongation in 2 in.
	min. psi	min. psi	min. %
Grade B	58,000	46,000	23[B]
Grade C	62,000	50,000	21[C]

B:Applies to specified wall thicknesses equal to or greater than 0.180 in.. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by formula: per cent elongation in 2 in. = 61t + 12, rounded to the nearest percent.

C:Applies to specified wall thicknesses equal to or greater than 0.120 in.. For lighter specified wall thicknesses, the minimum elongation values shall be by agreement with the manufacturer.

Table 3 Permissible Variations in Outside Flat Dimensions

Specified Outside Large Flat Dimension, in.	Permissible Variations Over and Under Specified Outside Flat Dimensions[A], in.
2 1/2 and under	0.020
Over 2 1/2 to 3 1/2, incl.	0.025
Over 3 1/2 to 5 1/2, incl.	0.030
Over 5 1/2	0.01 times large flat dimension

A. The permissible variations include allowance for convexity or concavity. For rectangular sections having a ratio of outside large to small flat dimension less than 1.5, the tolerance in small flat dimension shall be identical to the tolerance in large flat dimension. For rectangular sections having a ratio of outside large to small flat dimension in the range of 1.5 to 3.0 inclusive, the tolerance in small flat dimension shall be 1.5 times the tolerance in large flat dimension. For rectangular sections having a ratio of outside large to small flat dimension greater than 3.0, the tolerance in small flat dimension shall be 2.0 times the tolerance in large flat dimension.

Table 4 Permissible Variations in Twist

Specified Dimension of Longest Side, in.	Maximum Twist in 3 ft. in.
1 1/2 and under	0.050
Over 1 1/2 to 2 1/2, incl.	0.062
Over 2 1/2 to 4, incl.	0.075
Over 4 to 6, incl.	0.087
Over 6 to 8, incl.	0.100
Over 8	0.112

Table 5 Permissible Variations in Other Dimensions

Items	Tolerances
Wall Thickness	The minimum wall thickness at any point of measurement on the HSS shall be not more than 10% less than the specified wall thickness. The maximum wall thickness, excluding the weld seam of welded HSS, shall be not more than 10% greater than the specified wall thickness. The wall thickness requirements shall apply only to the centers of the flats.
Straightness	The permissible variation for straightness of HSS shall be 1/8 in. times the number of feet of total length divided by 5.
Squareness of Sides	Adjacent sides shall be square (90°), with a permissible variation of plus or minus 2° max.
Radius of Corners	The radius of each outside corner of the section shall not exceed three times the specified wall thickness .

Sect.2 Dimensions and Properties

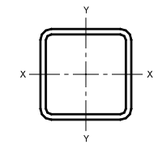


Table 6(a) Dimensions and Properties (SQUARE)

Nominal Size	Wall Thickness		Nominal Wt.		Area	Ix = Iy	Sx = Sy	rx = ry	Zx = Zx	Torsion	
	Nominal	Design*								J	C
in.	in.	in.	kg/ft	lb/ft	$in.^2$	$in.^4$	$in.^3$	in.	$in.^3$	$in.^4$	$in.^3$
2 x 2	0.180	0.167	1.89	4.17	1.153	0.624	0.624	0.736	0.774	1.06	1.10
	0.188	0.174	1.96	4.31	1.193	0.640	0.640	0.732	0.797	1.09	1.14
	0.250	0.233	2.45	5.40	1.507	0.745	0.745	0.703	0.964	1.31	1.41
2.5 x 2.5	0.180	0.167	2.45	5.39	1.487	1.31	1.05	0.940	1.28	2.18	1.80
	0.188	0.174	2.53	5.58	1.541	1.35	1.08	0.937	1.32	2.25	1.86
	0.250	0.233	3.22	7.09	1.973	1.63	1.30	0.908	1.63	2.79	2.35
3 x 3	0.180	0.167	3.00	6.61	1.821	2.39	1.59	1.14	1.91	3.89	2.66
	0.188	0.174	3.11	6.86	1.889	2.46	1.64	1.14	1.97	4.03	2.76
	0.250	0.233	3.99	8.79	2.439	3.02	2.01	1.11	2.48	5.08	3.52
	0.313	0.291	4.79	10.6	2.935	3.45	2.30	1.08	2.90	5.94	4.18
	0.375	0.349	5.51	12.1	3.387	3.77	2.51	1.05	3.25	6.64	4.74
3.5 x 3.5	0.180	0.167	3.56	7.83	2.155	3.92	2.24	1.35	2.66	6.33	3.69
	0.188	0.174	3.69	8.13	2.237	4.05	2.31	1.35	2.76	6.56	3.83
	0.250	0.233	4.76	10.5	2.905	5.04	2.88	1.32	3.50	8.35	4.92
4 x 4	0.180	0.167	4.11	9.06	2.489	6.00	3.00	1.55	3.54	9.61	4.89
	0.188	0.174	4.27	9.40	2.585	6.21	3.10	1.55	3.67	9.96	5.07
	0.250	0.233	5.53	12.2	3.371	7.80	3.90	1.52	4.69	12.8	6.56
	0.313	0.291	6.72	14.8	4.099	9.14	4.57	1.49	5.59	15.3	7.91
	0.375	0.349	7.83	17.2	4.783	10.3	5.13	1.46	6.39	17.5	9.14
	0.500	0.465	9.80	21.6	6.018	11.9	5.95	1.41	7.70	21.0	11.2
4.5 x 4.5	0.180	0.167	4.67	10.3	2.823	8.72	3.87	1.76	4.55	13.9	6.25
	0.188	0.174	4.85	10.7	2.933	9.02	4.01	1.75	4.71	14.4	6.49
	0.250	0.233	6.31	13.9	3.837	11.4	5.08	1.73	6.06	18.5	8.44
	0.313	0.291	7.68	16.9	4.681	13.5	5.99	1.70	7.27	22.3	10.2
5 x 5	0.180	0.167	5.22	11.5	3.157	12.1	4.86	1.96	5.68	19.2	7.78
	0.188	0.174	5.43	11.9	3.281	12.6	5.03	1.96	5.89	19.9	8.08
	0.250	0.233	7.08	15.6	4.303	16.0	6.41	1.93	7.61	25.8	10.5
	0.313	0.291	8.65	19.0	5.263	19.0	7.61	1.90	9.16	31.2	12.8
	0.375	0.349	10.1	22.3	6.179	21.7	8.67	1.87	10.6	36.1	14.9
	0.500	0.465	12.9	28.4	7.878	26.0	10.4	1.82	13.1	44.6	18.7
6 x 6	0.180	0.167	6.33	13.9	3.825	21.5	7.16	2.37	8.3	33.7	11.3
	0.188	0.174	6.58	14.5	3.977	22.3	7.42	2.37	8.6	35.0	11.8
	0.250	0.233	8.62	19.0	5.235	28.6	9.54	2.34	11.2	45.6	15.4
	0.313	0.291	10.6	23.3	6.427	34.3	11.4	2.31	13.6	55.4	18.9
	0.375	0.349	12.5	27.4	7.575	39.4	13.1	2.28	15.8	64.6	22.1
	0.500	0.465	16.0	35.2	9.738	48.2	16.1	2.23	19.8	81.1	28.1
7 x 7	0.180	0.167	7.44	16.4	4.493	34.7	9.91	2.78	11.4	54.0	15.6
	0.188	0.174	7.74	17.0	4.673	36.0	10.3	2.77	11.9	56.1	16.2
	0.250	0.233	10.2	22.4	6.167	46.5	13.3	2.75	15.5	73.5	21.3
	0.313	0.291	12.5	27.5	7.591	56.1	16.0	2.72	18.9	89.7	26.1
	0.375	0.349	14.8	32.5	8.971	64.9	18.6	2.69	22.1	105	30.7
	0.500	0.465	19.1	42.0	11.6	80.5	23.0	2.63	27.9	133	39.3

Note)

*:The wall thickness used in design, is taken as 0.93 times the nominal wall thickness.

The corner radii are taken as 2 times the design wall thickness.

Ix,y : Moment of inertia about the principal axes, $in.^4$ Sx,y : Elastic section modulus about the principal axes, $in.^3$

Rx,y : Radius of gyration about the principal axes, in Zx,y : Plastic section modulus about the principal axes, $in.^3$

J : Torsional constant, $in.^4$ C : Torsional shear constant, $in.^3$

Table 6(b) Dimensions and Properties (SQUARE)

Nominal Size	Wall Thickness		Nominal Wt.		Area	Ix = Iy	Sx = Sy	rx = ry	Zx = Zx	Torsion	
	Nominal	Design*								J	C
in.	in.	in.	kg/ft	lb/ft	$in.^2$	$in.^4$	$in.^3$	in.	$in.^3$	$in.^4$	$in.^3$
8 x 8	0.180	0.167	8.55	18.8	5.161	52.4	13.1	3.19	15.1	81.2	20.5
	0.188	0.174	8.90	19.6	5.369	54.4	13.6	3.18	15.7	84.5	21.3
	0.250	0.233	11.7	25.8	7.099	70.7	17.7	3.15	20.5	111	28.1
	0.313	0.291	14.4	31.8	8.755	85.6	21.4	3.13	25.1	136	34.5
	0.375	0.349	17.1	37.6	10.37	99.6	24.9	3.10	29.4	160	40.7
	0.500	0.465	22.1	48.8	13.46	125	31.2	3.04	37.5	204	52.4
	0.625	0.581	26.9	59.2	16.37	146	36.5	2.99	44.7	244	63.2
10 x 10	0.250	0.233	14.8	32.6	8.963	141	28.3	3.97	32.7	220	44.4
	0.313	0.291	18.3	40.3	11.08	172	34.5	3.94	40.1	271	54.8
	0.375	0.349	21.7	47.8	13.16	202	40.4	3.92	47.2	320	64.8
	0.500	0.465	28.3	62.3	17.18	256	51.2	3.86	60.7	412	84.2
	0.625	0.581	34.6	76.2	21.02	304	60.8	3.80	73.2	498	102
	0.750	0.698	40.6	89.3	24.72	347	69.4	3.75	84.7	578	119
12 x 12	0.250	0.233	17.9	39.4	10.83	248	41.4	4.79	47.6	384	64.5
	0.313	0.291	22.1	48.8	13.41	304	50.7	4.76	58.6	474	79.7
	0.375	0.349	26.3	58.0	15.95	357	59.5	4.73	69.2	561	94.6
	0.500	0.465	34.5	75.9	20.90	457	76.2	4.68	89.6	728	123
	0.625	0.581	42.3	93.2	25.67	548	91.3	4.62	109	885	151
	0.750	0.698	49.8	110	30.30	631	105	4.56	127	1030	177
14 x 14	0.313	0.291	26.0	57.2	15.74	490	69.9	5.58	80.5	759	109
	0.375	0.349	31.0	68.2	18.74	577	82.5	5.55	95.4	900	130
	0.500	0.465	40.6	89.5	24.62	743	106	5.49	124	1170	170
	0.625	0.581	50.0	110	30.32	896	128	5.44	151	1430	208
	0.750	0.698	59.1	130	35.88	1040	148	5.38	177	1680	246
	0.875	0.814	67.8	149	41.23	1170	167	5.32	201	1910	281
16 x 16	0.313	0.291	29.8	65.7	18.07	739	92.3	6.39	106	1140	144
	0.375	0.349	35.6	78.4	21.54	873	109	6.37	126	1350	171
	0.500	0.465	46.8	103	28.34	1130	141	6.31	164	1770	224
	0.625	0.581	57.7	127	34.96	1370	171	6.25	200	2170	276
	0.750	0.698	68.3	150	41.47	1590	199	6.20	235	2560	326
	0.875	0.814	78.6	173	47.74	1800	225	6.14	268	2920	373
18 x 18	0.500	0.465	53.0	117	32.06	1630	181	7.13	210	2540	286
	0.625	0.581	65.4	144	39.61	1980	220	7.07	257	3120	352
	0.750	0.698	77.6	171	47.05	2320	257	7.02	302	3690	417
	0.875	0.814	89.4	197	54.25	2630	292	6.96	346	4220	479
20 x 20	0.500	0.465	59.1	130	35.78	2260	226	7.94	261	3510	355
	0.625	0.581	73.1	161	44.26	2750	275	7.89	320	4320	437
	0.750	0.698	86.8	191	52.64	3230	323	7.83	378	5110	519
	0.875	0.814	100	221	60.76	3670	367	7.78	433	5870	597
22 x 22	0.750	0.698	96.1	212	58.22	4350	396	8.65	462	6860	632
	0.875	0.814	111	244	67.28	4970	452	8.59	530	7890	729

Table 6(c) Dimensions and Properties (RECTANGULAR)

Nominal Size	Wall Thickness		Nominal Wt.		Area	Ix	Iy	Sx	Sy	rx	ry	Zx	Zy	Torsion	
	Nominal	Design*												J	C
in.	in.	in.	kg/ft	lb/ft	$in.^2$	$in.^4$	$in.^4$	$in.^3$	$in.^3$	in.	in.	$in.^3$	$in.^3$	$in.^4$	$in.^3$
3 x 2	0.180	0.167	2.45	5.39	1.487	1.71	0.905	1.14	0.905	1.07	0.780	1.43	1.08	1.98	1.72
	0.188	0.174	2.53	5.58	1.541	1.76	0.931	1.18	0.931	1.07	0.777	1.48	1.12	2.05	1.78
	0.250	0.233	3.22	7.09	1.973	2.12	1.11	1.42	1.11	1.04	0.750	1.83	1.38	2.52	2.23
4 x 2	0.180	0.167	3.00	6.61	1.821	3.55	1.19	1.77	1.19	1.40	0.807	2.26	1.39	2.98	2.33
	0.188	0.174	3.11	6.86	1.889	3.66	1.22	1.83	1.22	1.39	0.804	2.34	1.43	3.08	2.41
	0.250	0.233	3.99	8.79	2.439	4.49	1.48	2.25	1.48	1.36	0.778	2.94	1.79	3.82	3.05
4 x 3	0.180	0.167	3.56	7.83	2.155	4.78	3.06	2.39	2.04	1.49	1.19	2.90	2.38	6.04	3.61
	0.188	0.174	3.69	8.13	2.237	4.93	3.16	2.47	2.10	1.49	1.19	3.00	2.46	6.26	3.74
	0.250	0.233	4.76	10.5	2.905	6.15	3.91	3.07	2.61	1.45	1.16	3.81	3.12	7.96	4.81
5 x 2	0.180	0.167	3.56	7.83	2.155	6.29	1.47	2.52	1.47	1.71	0.825	3.25	1.69	4.01	2.94
	0.188	0.174	3.69	8.13	2.237	6.50	1.51	2.60	1.51	1.70	0.822	3.37	1.75	4.15	3.05
	0.250	0.233	4.76	10.50	2.905	8.08	1.84	3.23	1.84	1.67	0.796	4.27	2.20	5.17	3.88
5 x 3	0.180	0.167	4.11	9.06	2.489	8.24	3.73	3.30	2.48	1.82	1.22	4.06	2.85	8.34	4.56
	0.188	0.174	4.27	9.40	2.585	8.53	3.85	3.41	2.57	1.82	1.22	4.21	2.96	8.64	4.73
	0.250	0.233	5.53	12.2	3.371	10.7	4.81	4.29	3.20	1.78	1.19	5.38	3.77	11.0	6.10
	0.313	0.291	6.72	14.8	4.099	12.6	5.59	5.03	3.73	1.75	1.17	6.42	4.48	13.1	7.33
	0.375	0.349	7.83	17.2	4.783	14.1	6.23	5.65	4.16	1.72	1.14	7.34	5.10	14.9	8.44
6 x 2	0.180	0.167	4.11	9.06	2.489	10.1	1.75	3.37	1.75	2.02	0.838	4.42	2.00	5.07	3.55
	0.188	0.174	4.27	9.40	2.585	10.5	1.80	3.49	1.80	2.01	0.835	4.58	2.07	5.24	3.68
	0.250	0.233	5.53	12.2	3.371	13.1	2.21	4.37	2.21	1.97	0.809	5.84	2.61	6.55	4.70
6 x 3	0.180	0.167	4.67	10.3	2.823	13.0	4.40	4.32	2.93	2.14	1.25	5.39	3.33	10.7	5.50
	0.188	0.174	4.85	10.7	2.933	13.4	4.55	4.47	3.03	2.14	1.25	5.59	3.45	11.1	5.71
	0.250	0.233	6.31	13.9	3.837	17.0	5.70	5.66	3.80	2.10	1.22	7.19	4.41	14.2	7.39
	0.313	0.291	7.68	16.9	4.681	20.1	6.66	6.69	4.44	2.07	1.19	8.61	5.27	16.9	8.91
	0.375	0.349	8.98	19.8	5.481	22.7	7.47	7.57	4.98	2.04	1.17	9.90	6.03	19.3	10.3
6 x 4	0.180	0.167	5.22	11.5	3.157	15.8	8.46	5.27	4.23	2.24	1.64	6.36	4.82	17.6	7.45
	0.188	0.174	5.43	11.9	3.281	16.4	8.76	5.46	4.38	2.23	1.63	6.60	5.00	18.2	7.74
	0.250	0.233	7.08	15.6	4.303	20.9	11.1	6.96	5.56	2.20	1.61	8.53	6.45	23.6	10.1
	0.313	0.291	8.65	19.0	5.263	24.8	13.1	8.27	6.57	2.17	1.58	10.3	7.75	28.4	12.2
	0.375	0.349	10.1	22.3	6.179	28.3	14.9	9.43	7.46	2.14	1.55	11.9	8.94	32.8	14.2
	0.500	0.465	12.9	28.4	7.878	33.9	17.7	11.3	8.87	2.08	1.50	14.6	11.0	40.3	17.8
7 x 5	0.313	0.291	10.60	23.30	6.427	43.0	25.5	12.3	10.2	2.59	1.99	15.0	11.9	52.1	18.3
	0.375	0.349	12.50	27.40	7.575	49.5	29.2	14.1	11.7	2.56	1.96	17.5	13.8	60.6	21.4
	0.500	0.465	16.00	35.20	9.738	60.6	35.6	17.3	14.2	2.49	1.91	21.9	17.3	75.8	27.2
8 x 4	0.180	0.167	6.33	13.90	3.825	31.9	10.9	7.98	5.46	2.89	1.69	9.85	6.10	26.2	10.0
	0.188	0.174	6.58	14.50	3.977	33.1	11.3	8.27	5.65	2.88	1.69	10.2	6.33	27.2	10.4
	0.250	0.233	8.62	19.00	5.235	42.5	14.4	10.6	7.21	2.85	1.66	13.3	8.20	35.3	13.6
	0.313	0.291	10.6	23.30	6.427	51.0	17.2	12.8	8.58	2.82	1.63	16.1	9.91	42.6	16.5
	0.375	0.349	12.5	27.40	7.575	58.7	19.6	14.7	9.79	2.78	1.61	18.8	11.5	49.3	19.3
	0.500	0.465	16.0	35.20	9.738	71.7	23.6	17.9	11.8	2.71	1.56	23.5	14.3	61.1	24.4
8 x 6	0.180	0.167	7.44	16.40	4.493	42.2	27.2	10.5	9.05	3.06	2.46	12.5	10.3	51.7	15.2
	0.188	0.174	7.74	17.00	4.673	43.7	28.2	10.9	9.39	3.06	2.46	13.0	10.7	53.7	15.8
	0.250	0.233	10.2	22.40	6.167	56.6	36.4	14.1	12.1	3.03	2.43	16.9	13.9	70.3	20.8
	0.313	0.291	12.5	27.50	7.591	68.3	43.8	17.1	14.6	3.00	2.40	20.6	16.9	85.8	25.5
	0.375	0.349	14.8	32.50	8.971	79.1	50.6	19.8	16.9	2.97	2.38	24.1	19.8	100	30.0
	0.500	0.465	19.1	42.00	11.60	98.2	62.5	24.5	20.8	2.91	2.32	30.5	24.9	127	38.4

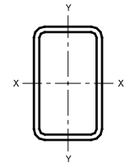


Table 6(d) Dimensions and Properties (RECTANGULAR)

Nominal Size	Wall Thickness		Nominal Wt.		Area	Ix	Iy	Sx	Sy	rx	ry	Zx	Zy	Torsion	
	Nominal	Design*												J	C
in.	in.	in.	kg/ft	lb/ft	$in.^2$	$in.^4$	$in.^4$	$in.^3$	$in.^3$	in.	in.	$in.^3$	$in.^3$	$in.^4$	$in.^3$
10 x 4	0.313	0.291	12.5	27.5	7.591	90.1	21.2	18.0	10.6	3.44	1.67	23.1	12.1	57.3	20.9
	0.375	0.349	14.8	32.5	8.971	104	24.3	20.8	12.1	3.41	1.64	27.0	14.0	66.5	24.4
	0.500	0.465	19.1	42.0	11.60	129	29.4	25.8	14.7	3.34	1.59	34.1	17.6	82.6	31.0
10 x 6	0.180	0.167	8.55	18.8	5.161	71.8	32.8	14.4	10.9	3.73	2.52	17.3	12.2	71.0	19.1
	0.188	0.174	8.90	19.6	5.369	74.6	34.1	14.9	11.4	3.73	2.52	18.0	12.7	73.8	19.9
	0.250	0.233	11.7	25.8	7.099	96.9	44.1	19.4	14.7	3.69	2.49	23.6	16.6	96.7	26.2
	0.313	0.291	14.4	31.8	8.755	118	53.3	23.5	17.8	3.66	2.47	28.8	20.2	118	32.2
	0.375	0.349	17.1	37.6	10.37	137	61.8	27.3	20.6	3.63	2.44	33.8	23.7	139	37.9
	0.500	0.465	22.1	48.8	13.46	171	76.8	34.3	25.6	3.57	2.39	43.0	30.1	176	48.7
12 x 4	0.250	0.233	11.7	25.8	7.099	119	21.0	19.9	10.5	4.10	1.72	25.6	11.7	59.8	20.6
	0.313	0.291	14.4	31.8	8.755	144	25.2	24.0	12.6	4.06	1.70	31.3	14.2	72.4	25.2
	0.375	0.349	17.1	37.6	10.37	168	28.9	28.0	14.5	4.02	1.67	36.7	16.6	84.1	29.5
	0.500	0.465	22.1	48.8	13.46	209	35.3	34.9	17.6	3.95	1.62	46.7	20.9	105	37.5
10 x 8	0.375	0.349	19.4	42.7	11.76	169	120	33.9	30.0	3.79	3.19	40.5	34.8	224	51.4
	0.500	0.465	25.2	55.5	15.32	214	151	42.7	37.8	3.73	3.14	51.9	44.5	288	66.4
12 x 6	0.375	0.349	19.4	42.7	11.76	215	72.9	35.8	24.3	4.28	2.49	44.8	27.7	178	45.8
	0.500	0.465	25.2	55.5	15.32	271	91.1	45.2	30.4	4.21	2.44	57.4	35.2	227	59.0
12 x 8	0.250	0.233	14.8	32.6	8.963	184	98.8	30.6	24.7	4.53	3.32	36.6	27.8	202	42.5
	0.313	0.291	18.3	40.3	11.08	224	120	37.4	30.1	4.50	3.29	44.9	34.1	248	52.4
	0.375	0.349	21.7	47.8	13.16	262	140	43.7	35.1	4.47	3.27	53.0	40.1	293	62.1
	0.500	0.465	28.3	62.3	17.18	333	177	55.5	44.4	4.40	3.21	68.1	51.5	377	80.4
14 x 6	0.313	0.291	18.3	40.3	11.08	271	72.3	38.7	24.1	4.94	2.55	48.6	26.9	186	45.5
	0.375	0.349	21.7	47.8	13.16	317	84.1	45.3	28.0	4.91	2.53	57.3	31.6	219	53.7
	0.500	0.465	28.3	62.3	17.18	402	105	57.4	35.1	4.84	2.48	73.6	40.4	279	69.3
14 x 10	0.375	0.349	26.3	58.0	15.95	447	267	63.9	53.4	5.29	4.09	76.3	60.7	528	91.8
	0.500	0.465	34.5	75.9	20.90	573	341	81.8	68.1	5.23	4.04	98.8	78.5	685	120
	0.625	0.581	42.3	93.2	25.67	687	407	98.2	81.5	5.17	3.98	120	95.1	832	146
16 x 8	0.250	0.233	17.9	39.4	10.83	368	127	46.1	31.7	5.83	3.42	56.4	35.0	300	57.0
	0.313	0.291	22.1	48.8	13.41	451	155	56.4	38.7	5.80	3.40	69.4	43.0	369	70.4
	0.375	0.349	26.3	58.0	15.95	531	181	66.3	45.3	5.77	3.37	82.1	50.8	436	83.4
	0.500	0.465	34.5	75.9	20.90	679	230	84.9	57.6	5.70	3.32	106	65.5	563	108
	0.625	0.581	42.3	93.2	25.67	815	274	102	68.5	5.63	3.27	129	79.2	681	132
16 x 12	0.375	0.349	31.0	68.2	18.74	702	452	87.7	75.3	6.12	4.91	104	85.5	862	127
	0.500	0.465	40.6	89.5	24.62	904	581	113	96.8	6.06	4.86	135	111	1120	166
	0.625	0.581	50.0	110	30.32	1090	700	136	117	6.00	4.80	165	135	1370	204
	0.750	0.698	59.1	130	35.88	1270	810	158	135	5.94	4.75	193	158	1610	240
20 x 12	0.500	0.465	46.8	103	28.34	1550	705	155	117	7.39	4.99	188	132	1540	209
	0.625	0.581	57.7	127	34.96	1880	851	188	142	7.33	4.93	230	162	1890	257
	0.750	0.698	68.3	150	41.47	2190	988	219	165	7.26	4.88	270	190	2220	303
24 x 12	0.500	0.465	53.0	117	32.06	2420	829	202	138	8.69	5.08	248	154	1980	252
	0.625	0.581	65.4	144	39.61	2940	1000	245	167	8.62	5.03	304	188	2430	310
	0.750	0.698	77.6	171	47.05	3440	1170	287	194	8.55	4.98	359	221	2850	366

Sect.3 Design of Members

3-1. Tension

The design tensile strength, $\Phi_t P_n$, and the allowable tensile strength, P_n/Ω_t, of tension members, shall be the lower value obtained according to the limit states of tensile yielding in the gross section and tensile rupture in the net section:

(a) For tensile yielding in the gross section:

$$P_n = F_y A_g \quad (1)$$

Φ_t = 0.90 (LRFD) Ω_t = 1.67 (ASD)

(b) For tensile repture in the net section:

$$P_n = F_u A_e \quad (2)$$

Φ_t = 0.75 (LRFD) Ω_t = 2.00 (ASD)

where

P_n = nominal axial strength, kips

Φ_t = resistance factor for tension

Ω_t = safety factor for tension

F_y = specified minimum yield stress of HSS, ksi

A_g = gross area of member, in.^{2}

LRFD = design for strength using Load and Resistance Factor Design

ASD = design for strength using Allowable Strength Design

F_u = specified minimum tensile strength of HSS ,ksi

A_e = effective net area, in.^{2}

3-2. Compression

The design compressive strength, $\Phi_c P_n$, and the allowable compressive strength, P_n/Ω_c, are determined as follows: The nominal compressive strength, P_n, shall be lowest value obtained according to the limit states of flexural buckling, torsional buckling and flexural-torsional buckling.

(a) flexural buckling of members without slender elements

The nominal compressive strength, P_n, shall be determined based on the limit state of flexural buckling.

$$P_n = F_{cr} A_g \quad (3)$$

Φ_c = 0.90 (LRFD) Ω_c = 1.67 (ASD)

where

The flexural buckling stress, F_{cr}, is determined as follows:

(i) $KL/r \leqq 4.71\sqrt{E/F_y}$ (or $0.44F_y \leqq F_e$)

$$F_{cr} = \left[0.658^{\frac{F_y}{F_e}}\right] F_y \quad (4\text{-}1)$$

(ii) $4.71\sqrt{E/F_y} < KL/r$ (or $F_e < 0.44F_y$)

$$F_{cr} = 0.877F_e \quad (4\text{-}2)$$

Φ_c = resistance factor for compression

Ω_c = safety factor for compression

K = effective length factor determined in accordance with Table7

L = length of member, in.

r = governing radius of gyration, in.

E = modulus of elasticity of steel = 29,000ksi

F_e = elastic critical buckling stress determined according to Equation (5), section3-2(b), as applicable, ksi

$$F_e = \frac{\pi^2 E}{(KL/r)^2} \quad (5)$$

Calculated values of F_{cr} for F_y = 46 ksi and 50 ksi are listed in Table.9.

(b)torsional and flexural-torsional buckling of members without slender elements

The nominal compressive strength, P_n, shall be determined based on the limit states of torsional and flexural-torsional buckling.

$$P_n = F_{cr} A_g \quad (6)$$

Φ_c = 0.90 (LRFD) Ω_c = 1.67 (ASD)

where

F_{cr} shall be determined according to Equation (4-1) or (4-2), using the torsional or flexural-torsional elastic buckling stress, F_e, determined as follows:

(i) For doubly symmetric members:

$$F_e = \left[\frac{\pi^2 E C_w}{(K_z L)^2} + GJ\right] \frac{1}{I_x + I_y} \quad (7\text{-}1)$$

(ii) For singly symmetric members where y is the axis of symmetry:

$$F_e = \left(\frac{F_{ey} + F_{ez}}{2H}\right)\left[1 - \sqrt{1 - \frac{4F_{ey}F_{ez}H}{(F_{ey} + F_{ez})^2}}\right] \quad (7\text{-}2)$$

C_w = warping constant, in.^{6}

K_z = effective length factor for torsional

G = shear modulus of elasticity of steel = 11,200 ksi

J = torsional constant, in.^{4}

I_x, I_y = moment of inertia about the principal axes, in.^{4}

$$F_{ey} = \frac{\pi^2 E}{(K_y L/r_y)^2} \quad (8)$$

$$F_{ez} = \left(\frac{\pi^2 E C_w}{(K_z L)^2} + GJ\right) \frac{1}{A_g \bar{r}_0^2} \quad (9)$$

$$\bar{r}_0^2 = x_0^2 + y_0^2 + \frac{I_x + I_y}{A_g} \quad (10)$$

x_0, y_0 = coordinates of shear center with respect to the centroid, in.

(c)members with slender elements

The nominal compressive strength, P_n, shall be determined based on the limit state of flexural, torsional and flexural-torsional buckling.

$$P_n = F_{cr} A_g \quad (11)$$

Φ_c = 0.90 (LRFD) Ω_c = 1.67 (ASD)

where

The flexural buckling stress, F_{cr}, is determined as follows:

(i) $KL/r \leqq 4.71\sqrt{E/QF_y}$ (or $0.44QF_y \leqq F_e$)

$$F_{cr} = Q\left[0.658^{\frac{QF_y}{F_e}}\right] F_y \quad (12\text{-}1)$$

(ii) $4.71\sqrt{E/QF_y} < KL/r$ (or $F_e < 0.44QF_y$)

$$F_{cr} = 0.877F_e \quad (12\text{-}2)$$

where

F_e = elastic critical buckling stress, calculated using Equations (5) and (7-1) for doubly symmetric members, Equations (5) and (7-2) for singly symmetric members.

The reduction factor, Q, for slender stiffened elements is defined:

$$Q = A_{eff}/A \quad (13)$$

where

A = total cross-sectional area of member, in.^{2}

A_{eff} = summation of the effective areas of the cross section based on the reduced effective width, b_e, in.^{2}

$$b_e = 1.92t\sqrt{\frac{E}{F_y}}\left[1 - \frac{0.38}{b/t}\sqrt{\frac{E}{F_y}}\right] \leqq b \quad (14)$$

3-3. Flexure

The design flexural strength, $\Phi_b M_n$, and the allowable flexural strength, M_n/Ω_b, shall be determined as follows: The nominal flexural strength, M_n, shall be the lowest value obtained according to the limit states of yielding (plastic moment), flange local buckling and web local buckling under pure flexure.

(a)Yielding

$$M_n = M_p = F_y Z_x \quad (15)$$

Φ_b = 0.90 (LRFD) Ω_b = 1.67 (ASD)

where

M_n = nominal flexural strength, kip-in.

M_p = plastic bending moment, kip-in.

Φ_b = resistance factor for flexure

Ω_b = safety factor for flexure

Z_x = plastic section modulus about the axis of bending

(b)Flange Local Buckling

(i)For compact sections, the limit state of flange local buckling does not apply.

(ii)For sections with noncompact flanges

$$M_n = M_p - (M_p - F_y S)\left(3.57\frac{b}{t}\sqrt{\frac{F_y}{E}} - 4.0\right) \leqq M_p \quad (16)$$

(iii)For sections with slender flanges

$$M_n = F_y S_{eff} \quad (17)$$

where

S = elastic section modulus about the principal axes, in.^{3}

S_{eff} is the effective section modulus determined with the effective width of the compression flange according to Equation (14)

(c)Web Local Buckling

(i)For compact sections, the limit state of web local buckling does not apply.

(ii)For sections with noncompact webs

$$M_n = M_p - (M_p - F_y S)\left(0.305\frac{h}{t_w}\sqrt{\frac{F_y}{E}} - 0.738\right) \leqq M_p \quad (18)$$

3-4. Shear

The design shear strength, $\Phi_v V_n$, and the allowable shear strength, V_n/Ω_v, shall be determined as follows. The nominal shear strength, V_n, of unstiffened or stiffened webs, according to the limit states of shear yielding and shear buckling, is

$$V_n = 0.6F_y A_w C_v \quad (19)$$

Φ_v = 0.90 (LRFD) Ω_v = 1.67 (ASD)

where

V_n = nominal shear strength, kips

Φ_v = resistance factor for shear

Ω_v = safety factor for shear

For the box type section (square or rectangular), the gross section A_w is expressed by the formula.

$$A_w = 2ht \quad (20)$$

h = the width resisting the shear force shall be taken as the clear distance between the flanges less the inside corner radius on each side. If the corner radius is not known, h shall be taken as the corresponding outside dimension minus three times the thickness.

The web shear coefficient, C_v, is determined as follows:

(i) For $h/t_w \leqq 1.10\sqrt{k_v E/F_y}$

$$C_v = 1.0 \quad (21\text{-}1)$$

(ii) For $1.10\sqrt{k_v E/F_y} < h/t_w \leqq 1.37\sqrt{k_v E/F_y}$

$$C_v = \frac{1.10\sqrt{k_v E/F_y}}{h/t_w} \quad (21\text{-}2)$$

(iii) For $1.37\sqrt{k_v E/F_y} < h/t_w$

$$C_v = \frac{1.51 E k_v}{(h/t_w)^2 F_y} \quad (21\text{-}3)$$

$t_w = t$

$k_v = 5$

Table 7 Approximate Values of Effective Length Factor, K

Buckled shape of column is shown by dashed line	(a)	(b)	(c)	(d)	(e)	(f)
Theoretical K value	0.5	0.7	1.0	1.0	2.0	2.0
Recommended design value when ideal conditions are approximated	0.65	0.80	1.2	1.0	2.10	2.0
End condition code		Rotation fixed and translation fixed Rotation free and translation fixed Rotation fixed and translation free Rotation free and translation free				

Table 8 Limiting Width-Thickness Rations for Compression Elements

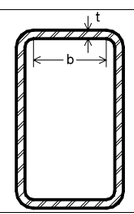
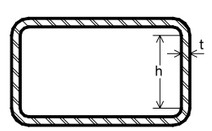
Description of Element	Width-Thickness Ratio	Limiting Width-Thickness Ratios		Example
		λ_p (compact)	λ_r (noncompact)	
Uniform compression in flanges of HSS of unifoform thickness subject to bending or compression	b/t	$1.12\sqrt{E/F_y}$	$1.40\sqrt{E/F_y}$	
Flexure in webs of rectangular HSS	h/t	$2.42\sqrt{E/F_y}$	$5.70\sqrt{E/F_y}$	

Table 9 Fcr-KL/r Relations

Fy = 46 ksi

KL/r	0	1	2	3	4	5	6	7	8	9
0	–	46.00	45.99	45.97	45.95	45.92	45.89	45.85	45.80	45.75
10	45.69	45.63	45.56	45.48	45.40	45.31	45.21	45.11	45.01	44.90
20	44.78	44.66	44.53	44.39	44.25	44.11	43.96	43.80	43.64	43.47
30	43.30	43.12	42.94	42.75	42.56	42.36	42.16	41.95	41.74	41.53
40	41.31	41.08	40.85	40.62	40.38	40.14	39.90	39.65	39.40	39.14
50	38.88	38.62	38.35	38.08	37.81	37.53	37.25	36.97	36.68	36.40
60	36.11	35.81	35.52	35.22	34.92	34.62	34.32	34.01	33.70	33.39
70	33.08	32.77	32.46	32.14	31.83	31.51	31.19	30.87	30.55	30.23
80	29.91	29.59	29.26	28.94	28.62	28.29	27.97	27.65	27.32	27.00
90	26.68	26.35	26.03	25.71	25.39	25.07	24.75	24.43	24.11	23.79
100	23.48	23.16	22.85	22.53	22.22	21.91	21.60	21.30	20.99	20.69
110	20.38	20.08	19.78	19.49	19.19	18.90	18.61	18.32	18.03	17.73
120	17.43	17.14	16.86	16.59	16.33	16.06	15.81	15.56	15.32	15.08
130	14.85	14.63	14.41	14.19	13.98	13.77	13.57	13.37	13.18	12.99
140	12.81	12.63	12.45	12.28	12.11	11.94	11.78	11.62	11.46	11.31
150	11.16	11.01	10.86	10.72	10.58	10.45	10.31	10.18	10.06	9.929
160	9.805	9.684	9.565	9.448	9.333	9.220	9.109	9.000	8.894	8.789
170	8.686	8.584	8.485	8.387	8.291	8.196	8.103	8.012	7.922	7.834
180	7.747	7.662	7.578	7.495	7.414	7.334	7.256	7.178	7.102	7.027
190	6.953	6.881	6.809	6.739	6.670	6.601	6.534	6.468	6.403	6.339
200	6.275									

Fy = 50 ksi

KL/r	0	1	2	3	4	5	6	7	8	9
0	–	50.00	49.99	49.97	49.94	49.91	49.87	49.82	49.77	49.70
10	49.64	49.56	49.48	49.39	49.29	49.18	49.07	48.95	48.83	48.70
20	48.56	48.41	48.26	48.10	47.94	47.77	47.59	47.40	47.21	47.02
30	46.82	46.61	46.39	46.17	45.95	45.72	45.48	45.24	44.99	44.74
40	44.48	44.22	43.95	43.68	43.40	43.12	42.83	42.54	42.25	41.95
50	41.65	41.34	41.03	40.72	40.40	40.08	39.75	39.43	39.10	38.76
60	38.43	38.09	37.75	37.41	37.06	36.71	36.36	36.01	35.66	35.30
70	34.94	34.59	34.23	33.86	33.50	33.14	32.78	32.41	32.05	31.68
80	31.31	30.95	30.58	30.21	29.85	29.48	29.11	28.75	28.38	28.02
90	27.65	27.29	26.93	26.57	26.21	25.85	25.49	25.13	24.77	24.42
100	24.07	23.72	23.37	23.02	22.67	22.33	21.99	21.65	21.31	20.97
110	20.64	20.31	19.98	19.66	19.31	18.98	18.65	18.34	18.03	17.73
120	17.43	17.14	16.86	16.59	16.33	16.06	15.81	15.56	15.32	15.08
130	14.85	14.63	14.41	14.19	13.98	13.77	13.57	13.37	13.18	12.99
140	12.81	12.63	12.45	12.28	12.11	11.94	11.78	11.62	11.46	11.31
150	11.16	11.01	10.86	10.72	10.58	10.45	10.31	10.18	10.06	9.929
160	9.805	9.684	9.565	9.448	9.333	9.220	9.109	9.000	8.894	8.789
170	8.686	8.584	8.485	8.387	8.291	8.196	8.103	8.012	7.922	7.834
180	7.747	7.662	7.578	7.495	7.414	7.334	7.256	7.178	7.102	7.027
190	6.953	6.881	6.809	6.739	6.670	6.601	6.534	6.468	6.403	6.339
200	6.275									

Sect.4 Column

Sect.3-2, the available strength in axial compression for square and rectangular HSS are calculated and given in Table 10(a) to Table 10(ap). In these Table the vertical values show the effective column length Kl in feet and the horizontal show the available strength in axial compression . They are applicable to main members with respect to their weak axis (Y-Y axis in Fig.1), and with Kl/r ratios below 200. The available strength repairing the strong axis of secondary members may be referred to page. 4-5 of the AISC "Steel Construction Manual Thirteenth edition".

When the members are subjected to axially loading and bending moment combined, the available strength may be referred to chapter H of the AISC Specification.

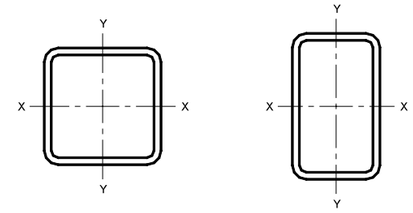


Fig.1 The section of HSS

Table 10(a) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		2 x 2						2.5 x 2.5						3 x 3			
T	Nominal	0.180		0.188		0.250		0.180		0.188		0.250		0.180		0.188	
	Design	0.167		0.174		0.233		0.167		0.174		0.233		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective Length KL (ft) with respect to least radius of gyration ry	1	46.8	31.1	48.5	32.2	61.1	40.7	60.8	40.5	63.0	41.9	80.7	53.7	74.8	49.7	77.6	51.6
	2	44.4	29.5	45.9	30.5	57.6	38.3	58.9	39.1	61.0	40.6	77.9	51.8	73.1	48.6	75.9	50.5
	3	40.6	27.0	41.9	27.9	52.3	34.7	55.7	37.1	57.7	38.4	73.4	48.8	70.5	46.9	73.1	48.6
	4	35.8	23.8	36.9	24.6	45.5	30.3	51.6	34.3	53.4	35.5	67.6	45.0	66.9	44.5	69.4	46.1
	5	30.5	20.3	31.4	20.9	38.2	25.4	46.8	31.1	48.4	32.2	60.8	40.5	62.6	41.6	64.9	43.2
	6	25.0	16.6	25.7	17.1	30.8	20.4	41.4	27.6	42.8	28.5	53.5	35.5	57.7	38.4	59.8	39.8
	7	19.8	13.2	20.3	13.5	23.8	15.8	35.9	23.9	37.1	24.7	45.9	30.5	52.4	34.9	54.3	36.1
	8	15.3	10.1	15.6	10.4	18.2	12.1	30.5	20.3	31.4	20.9	38.5	25.6	46.9	31.2	48.5	32.3
	9	12.0	8.04	12.3	8.24	14.4	9.59	25.3	16.8	26.0	17.3	31.4	20.9	41.4	27.5	42.8	28.4
	10	9.79	6.51	10.0	6.67	11.6	7.77	20.6	13.7	21.2	14.1	25.5	16.9	35.9	23.9	37.1	24.7
	11	8.09	5.38	8.29	5.52	9.65	6.42	17.0	11.3	17.5	11.6	21.0	14.0	30.8	20.5	31.7	21.1
	12	6.80	4.52	6.97	4.63			14.3	9.52	14.7	9.80	17.7	11.7	25.9	17.2	26.8	17.8
	13							12.2	8.11	12.5	8.35	15.0	10.0	22.1	14.7	22.8	15.1
	14							10.5	7.00	10.8	7.20	13.0	8.66	19.0	12.7	19.6	13.1
	15							9.16	6.09	9.43	6.27	11.3	7.54	16.6	11.0	17.1	11.4
	16													14.6	9.72	15.0	10.0
	17													12.9	8.61	13.3	8.88
	18													11.5	7.68	11.9	7.92
	19													10.3	6.89	10.6	7.11
	20																
	21																
	22																
	23																
	24																
	25																
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	28																
	29																
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Nominal Size : in

Wall Thickness(T) : in

Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(b) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		3 x 3						3.5 x 3.5						4 x 4			
T	Nominal	0.250		0.313		0.375		0.180		0.188		0.250		0.180		0.188	
	Design	0.233		0.291		0.349		0.167		0.174		0.233		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	100	66.6	120	80.1	139	92.4	88.7	59.0	92.1	61.2	119	79.5	102	68.2	106	70.9
	2	97.8	65.1	117	78.2	135	90.1	87.3	58.0	90.6	60.3	117	78.2	101	67.4	105	70.0
	3	94.1	62.6	112	75.0	129	86.2	85.0	56.5	88.2	58.7	114	76.0	99.3	66.1	103	68.6
	4	89.0	59.2	106	70.8	121	81.1	81.9	54.5	85.0	56.5	109	73.1	96.6	64.2	100	66.7
	5	83.0	55.2	98.8	65.7	112	75.0	78.0	51.9	81.0	53.9	104	69.5	93.1	62.0	96.7	64.3
	6	76.1	50.6	90.3	60.0	102	68.1	73.6	48.9	76.3	50.8	98.3	65.4	89.1	59.3	92.5	61.5
	7	68.8	45.7	81.1	53.9	91.5	60.8	68.7	45.7	71.2	47.4	91.4	60.8	84.6	56.3	87.8	58.4
	8	61.1	40.7	71.6	47.6	80.3	53.4	63.4	42.2	65.7	43.7	84.1	55.9	79.6	53.0	82.6	55.0
	9	53.5	35.6	62.3	41.4	69.2	46.0	57.9	38.5	60.0	39.9	76.4	50.8	74.4	49.5	77.1	51.3
	10	46.1	30.7	53.2	35.4	58.7	39.0	52.3	34.8	54.2	36.0	68.7	45.7	68.9	45.8	71.4	47.5
	11	39.1	26.0	44.6	29.7	48.8	32.5	46.8	31.1	48.4	32.2	61.1	40.7	63.3	42.1	65.6	43.7
	12	32.8	21.8	37.5	24.9	41.0	27.3	41.4	27.5	42.8	28.5	53.8	35.7	57.7	38.4	59.8	39.8
	13	28.0	18.6	32.0	21.2	34.9	23.2	36.2	24.1	37.4	24.9	46.7	31.1	52.2	34.7	54.1	36.0
	14	24.1	16.0	27.5	18.3	30.1	20.0	31.3	20.8	32.4	21.5	40.3	26.8	46.8	31.2	48.5	32.2
	15	21.0	14.0	24.0	15.9	26.2	17.4	27.3	18.1	28.2	18.7	35.1	23.3	41.7	27.7	43.1	28.7
	16	18.4	12.3	21.1	14.0	23.0	15.3	24.0	15.9	24.8	16.5	30.8	20.5	36.7	24.4	38.0	25.3
	17	16.3	10.9	18.7	12.4	20.4	13.6	21.2	14.1	21.9	14.6	27.3	18.1	32.5	21.6	33.7	22.4
	18	14.6	9.72	16.6	11.1			18.9	12.6	19.6	13.0	24.3	16.2	29.0	19.3	30.0	20.0
	19							17.0	11.3	17.6	11.7	21.8	14.5	26.0	17.3	26.9	17.9
	20							15.3	10.2	15.8	10.5	19.7	13.1	23.5	15.6	24.3	16.2
	21							13.9	9.27	14.4	9.58	17.9	11.9	21.3	14.2	22.0	14.6
	22							12.7	8.45	13.1	8.73			19.4	12.9	20.1	13.3
	23													17.8	11.8	18.4	12.2
	24													16.3	10.8	16.9	11.2
	25													15.0	10.0	15.5	10.3
	26																
	27																
	28																
	29																
	30																

Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(c) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		4 x 4								4.5 x 4.5							
T	Nominal	0.250		0.313		0.375		0.500		0.180		0.188		0.250		0.313	
	Design	0.233		0.291		0.349		0.465		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	138	92.4	168	112	197	131	247	164	116	77.5	121	80.5	158	105	193	128
	2	137	91.3	166	110	194	129	244	162	115	76.7	119	79.7	156	104	191	127
	3	134	89.4	163	108	190	126	238	158	113	75.5	118	78.5	154	102	188	125
	4	130	86.8	158	105	184	122	230	153	111	73.9	115	76.8	150	100	183	122
	5	125	83.6	152	101	176	117	220	146	108	71.8	112	74.6	146	97.4	178	118
	6	120	79.8	145	96.5	168	111	208	138	104	69.4	108	72.1	141	94.0	171	114
	7	113	75.6	137	91.2	158	105	196	130	100	66.6	104	69.2	135	90.1	164	109
	8	106	71.0	128	85.4	148	98.6	182	121	95.6	63.6	99.2	66.0	128	85.8	156	103
	9	99.4	66.1	119	79.4	137	91.3	167	111	90.6	60.3	94.0	62.6	122	81.2	147	98.2
	10	91.8	61.0	109	73.1	126	83.8	152	101	85.3	56.8	88.6	58.9	114	76.3	138	92.1
	11	84.0	55.9	100	66.7	114	76.2	137	91.6	79.9	53.1	82.9	55.1	107	71.2	129	85.8
	12	76.3	50.8	90.7	60.3	103	68.7	123	81.8	74.3	49.4	77.1	51.3	99.4	66.1	119	79.4
	13	68.7	45.7	81.4	54.1	92.2	61.4	108	72.4	68.7	45.7	71.3	47.4	91.6	60.9	109	73.0
	14	61.4	40.8	72.3	48.1	81.6	54.3	95.2	63.4	63.1	42.0	65.5	43.5	83.9	55.8	100	66.7
	15	54.3	36.1	63.7	42.3	71.5	47.5	83.0	55.2	57.6	38.3	59.7	39.7	76.3	50.8	90.9	60.5
	16	47.8	31.8	55.9	37.2	62.8	41.8	72.9	48.5	52.3	34.8	54.2	36.0	69.0	45.9	81.9	54.5
	17	42.3	28.1	49.5	32.9	55.6	37.0	64.6	42.9	47.2	31.4	48.8	32.5	62.0	41.2	73.2	48.7
	18	37.7	25.1	44.2	29.4	49.6	33.0	57.6	38.3	42.2	28.0	43.6	29.0	55.3	36.8	65.2	43.4
	19	33.9	22.5	39.7	26.4	44.5	29.6	51.7	34.4	37.8	25.2	39.2	26.0	49.6	33.0	58.6	38.9
	20	30.5	20.3	35.8	23.8	40.2	26.7	46.6	31.0	34.1	22.7	35.3	23.5	44.8	29.8	52.8	35.1
	21	27.7	18.4	32.5	21.6	36.4	24.2	42.3	28.1	31.0	20.6	32.0	21.3	40.6	27.0	47.9	31.9
	22	25.2	16.8	29.6	19.7	33.2	22.1	38.5	25.6	28.2	18.7	29.2	19.4	37.0	24.6	43.7	29.0
	23	23.1	15.3	27.0	18.0	30.4	20.2	35.3	23.4	25.8	17.2	26.7	17.8	33.8	22.5	39.9	26.6
	24	21.2	14.1	24.8	16.5	27.9	18.5			23.7	15.7	24.5	16.3	31.1	20.7	36.7	24.4
	25	19.5	13.0							21.8	14.5	22.6	15.0	28.6	19.0	33.8	22.5
	26									20.2	13.4	20.9	13.9	26.5	17.6	31.2	20.8
	27									18.7	12.4	19.4	12.9	24.5	16.3	29.0	19.3
	28									17.4	11.6	18.0	12.0	22.8	15.2	26.9	17.9
	29									16.2	10.8	16.8	11.1				
	30																
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(d) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		5 x 5												6 x 6			
T	Nominal	0.180		0.188		0.250		0.313		0.375		0.500		0.180		0.188	
	Design	0.167		0.174		0.233		0.291		0.349		0.465		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	130	86.7	135	90.1	177	118	217	144	255	169	325	216	158	105	164	109
	2	129	86.0	134	89.4	176	117	215	143	253	168	322	214	157	104	163	108
	3	127	85.0	132	88.3	174	115	212	141	249	166	317	211	155	103	162	107
	4	125	83.5	130	86.7	170	113	208	138	244	162	311	207	154	102	160	106
	5	122	81.6	127	84.8	166	111	203	135	238	158	303	201	151	100	157	104
	6	119	79.4	124	82.5	162	107	197	131	231	154	293	195	148	99.0	154	102
	7	115	76.8	120	79.8	156	104	191	127	223	148	282	187	145	96.8	151	100
	8	111	74.0	115	76.8	150	100	183	122	214	142	270	179	141	94.3	147	98.0
	9	106	70.9	110	73.6	144	96.0	175	116	204	136	257	171	137	91.6	143	95.2
	10	101	67.5	105	70.1	137	91.3	166	110	194	129	243	161	133	88.6	138	92.1
	11	96.3	64.1	100	66.5	130	86.5	157	104	183	121	228	152	128	85.5	133	88.8
	12	90.9	60.5	94.4	62.8	122	81.4	148	98.5	171	114	213	142	123	82.1	128	85.3
	13	85.3	56.8	88.6	58.9	114	76.3	138	92.1	160	106	198	132	118	78.7	122	81.7
	14	79.7	53.0	82.7	55.0	106	71.1	128	85.7	148	99.0	183	122	112	75.1	117	78.0
	15	74.1	49.3	76.9	51.1	99.2	66.0	119	79.3	137	91.4	168	112	107	71.4	111	74.2
	16	68.6	45.6	71.1	47.3	91.5	60.9	109	73.0	126	83.9	153	102	101	67.7	105	70.3
	17	63.1	42.0	65.4	43.5	84.0	55.8	100	66.8	115	76.6	139	92.8	96.1	63.9	99.8	66.4
	18	57.8	38.4	59.9	39.8	76.6	51.0	91.4	60.8	104	69.5	125	83.7	90.5	60.2	94.0	62.5
	19	52.6	35.0	54.5	36.3	69.6	46.3	82.7	55.0	94.2	62.7	112	75.1	84.9	56.5	88.1	58.6
	20	47.6	31.6	49.3	32.8	62.8	41.8	74.6	49.6	85.0	56.5	101	67.8	79.4	52.8	82.4	54.8
	21	43.2	28.7	44.7	29.7	57.0	37.9	67.7	45.0	77.1	51.3	92.4	61.5	74.0	49.2	76.7	51.0
	22	39.3	26.1	40.7	27.1	51.9	34.5	61.6	41.0	70.2	46.7	84.2	56.0	68.7	45.7	71.2	47.4
	23	36.0	23.9	37.3	24.8	47.5	31.6	56.4	37.5	64.3	42.7	77.0	51.2	63.5	42.3	65.9	43.8
	24	33.0	22.0	34.2	22.7	43.6	29.0	51.8	34.4	59.0	39.2	70.7	47.0	58.5	38.9	60.6	40.3
	25	30.4	20.2	31.5	21.0	40.2	26.7	47.7	31.7	54.4	36.2	65.2	43.4	53.9	35.8	55.9	37.1
	26	28.1	18.7	29.1	19.4	37.1	24.7	44.1	29.3	50.3	33.4	60.3	40.1	49.8	33.1	51.6	34.3
	27	26.1	17.3	27.0	18.0	34.4	22.9	40.9	27.2	46.6	31.0	55.9	37.2	46.2	30.7	47.9	31.8
	28	24.3	16.1	25.1	16.7	32.0	21.3	38.0	25.3	43.3	28.8	52.0	34.5	42.9	28.5	44.5	29.6
	29	22.6	15.0	23.4	15.6	29.8	19.8	35.5	23.6	40.4	26.9	48.4	32.2	40.0	26.6	41.5	27.6
	30	21.1	14.0	21.9	14.5	27.9	18.5	33.1	22.0	37.8	25.1	45.2	30.1	37.4	24.9	38.8	25.8
	31	19.8	13.1	20.5	13.6	26.1	17.4	31.0	20.6	35.4	23.5			35.0	23.3	36.3	24.1
	32	18.6	12.3	19.2	12.8	24.5	16.3							32.9	21.8	34.1	22.7
	33													30.9	20.5	32.0	21.3
	34													29.1	19.3	30.2	20.1
	35													27.5	18.3	28.5	18.9
	36													26.0	17.3	26.9	17.9
	37													24.6	16.3	25.5	16.9
	38													23.3	15.5	24.1	16.1
	39													22.1	14.7	22.9	15.2
	40																

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(e) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		6 x 6								7 x 7							
T	Nominal	0.250		0.313		0.375		0.500		0.180		0.188		0.250		0.313	
	Design	0.233		0.291		0.349		0.465		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	216	143	265	176	313	208	402	267	177	118	189	126	254	169	313	208
	2	215	143	264	175	311	207	400	266	176	117	189	125	254	169	312	208
	3	213	141	261	174	308	205	396	263	175	117	188	125	252	167	310	206
	4	210	140	258	171	304	202	390	259	174	116	186	124	250	166	307	204
	5	207	137	254	169	299	199	383	255	172	114	184	122	247	164	304	202
	6	203	135	249	165	293	195	375	250	170	113	181	120	243	162	299	199
	7	198	132	243	161	286	190	366	243	167	111	178	119	239	159	294	196
	8	193	128	236	157	278	185	355	236	164	109	175	116	235	156	288	192
	9	187	124	229	152	269	179	344	228	161	107	172	114	230	153	282	188
	10	181	120	221	147	260	173	331	220	157	104	168	111	224	149	275	183
	11	174	116	213	142	250	166	318	211	153	102	163	108	218	145	268	178
	12	167	111	204	136	239	159	304	202	149	99.5	159	105	212	141	260	173
	13	160	106	195	130	229	152	289	192	145	96.5	154	102	205	136	251	167
	14	153	101	186	124	217	144	274	182	140	93.4	149	99.2	198	132	243	161
	15	145	96.7	176	117	206	137	259	172	135	90.3	143	95.7	191	127	234	155
	16	137	91.6	167	111	194	129	244	162	130	87.0	138	92.1	183	122	224	149
	17	129	86.4	157	104	183	121	229	152	125	83.6	133	88.4	176	117	215	143
	18	122	81.2	147	98.3	171	114	213	142	120	80.1	127	84.7	168	112	205	136
	19	114	76.0	138	91.9	160	106	198	132	115	76.7	121	80.9	160	106	195	130
	20	106	70.9	128	85.6	149	99.1	184	122	110	73.2	115	77.1	152	101	186	123
	21	99.2	66.0	119	79.5	138	91.8	170	113	104	69.6	110	73.3	144	96.4	176	117
	22	91.9	61.1	110	73.5	127	84.8	156	104	99.4	66.1	104	69.5	137	91.2	166	110
	23	84.8	56.4	101	67.6	116	77.8	143	95.1	94.2	62.7	98.8	65.7	129	86.1	157	104
	24	77.9	51.8	93.4	62.1	107	71.4	131	87.3	89.0	59.2	93.2	62.0	121	81.0	147	98.2
	25	71.8	47.7	86.1	57.2	99.0	65.8	121	80.5	84.0	55.8	87.7	58.4	114	76.1	138	92.1
	26	66.4	44.1	79.6	52.9	91.5	60.9	111	74.4	79.0	52.5	82.4	54.8	107	71.3	129	86.2
	27	61.5	40.9	73.8	49.1	84.8	56.4	103	69.0	74.1	49.3	77.1	51.3	100	66.6	120	80.3
	28	57.2	38.1	68.6	45.6	78.9	52.5	96.5	64.2	69.4	46.1	72.0	47.9	93.0	61.9	112	74.6
	29	53.3	35.5	63.9	42.5	73.5	48.9	89.9	59.8	64.6	43.0	67.1	44.6	86.7	57.7	104	69.6
	30	49.8	33.1	59.7	39.7	68.7	45.7	84.0	55.9	60.4	40.2	62.7	41.7	81.0	53.9	97.8	65.0
	31	46.7	31.0	55.9	37.2	64.4	42.8	78.7	52.3	56.6	37.6	58.7	39.0	75.9	50.5	91.5	60.9
	32	43.8	29.1	52.5	34.9	60.4	40.2	73.8	49.1	53.1	35.3	55.1	36.6	71.2	47.4	85.9	57.1
	33	41.2	27.4	49.4	32.8	56.8	37.8	69.4	46.2	49.9	33.2	51.8	34.4	67.0	44.5	80.8	53.7
	34	38.8	25.8	46.5	30.9	53.5	35.6	65.4	43.5	47.0	31.3	48.8	32.4	63.1	42.0	76.1	50.6
	35	36.6	24.3	43.9	29.2	50.5	33.6	61.7	41.0	44.4	29.5	46.0	30.6	59.5	39.6	71.8	47.8
	36	34.6	23.0	41.5	27.6	47.7	31.7	58.3	38.8	41.9	27.9	43.5	28.9	56.3	37.4	67.9	45.1
	37	32.7	21.8	39.3	26.1	45.2	30.0	55.2	36.7	39.7	26.4	41.2	27.4	53.3	35.4	64.2	42.7
	38	31.0	20.6	37.2	24.7	42.8	28.5			37.6	25.0	39.0	26.0	50.5	33.6	60.9	40.5
	39									35.7	23.7	37.1	24.6	47.9	31.9	57.8	38.5
	40									34.0	22.6	35.2	23.4	45.6	30.3	55.0	36.6

Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(f) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		7 x 7				8 x 8											
T	Nominal	0.375		0.500		0.180		0.188		0.250		0.313		0.375		0.500	
	Design	0.349		0.465		0.167		0.174		0.233		0.291		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	370	246	479	319	185	123	198	132	293	195	362	240	428	285	556	370
	2	369	245	477	317	184	122	198	131	292	194	361	240	427	284	554	369
	3	366	244	474	315	184	122	197	131	291	193	359	239	425	282	551	367
	4	363	241	469	312	182	121	196	130	289	192	356	237	422	280	547	364
	5	359	238	463	308	181	120	194	129	286	190	353	235	418	278	542	361
	6	353	235	456	303	179	119	192	128	283	188	349	232	413	275	536	357
	7	347	231	448	298	178	118	190	126	280	186	345	229	408	271	529	352
	8	340	226	439	292	175	116	188	125	276	183	340	226	402	267	521	346
	9	333	221	428	285	173	115	185	123	271	180	334	222	395	263	511	340
	10	324	216	417	277	170	113	182	121	266	177	328	218	388	258	501	333
	11	315	210	405	269	167	111	179	119	261	173	321	213	379	252	490	326
	12	306	203	392	261	164	109	175	116	255	169	314	209	371	246	479	318
	13	296	197	379	252	161	107	172	114	249	165	306	203	361	240	466	310
	14	285	190	365	243	157	104	168	111	242	161	298	198	352	234	453	301
	15	274	182	350	233	153	102	164	109	236	157	290	192	342	227	440	292
	16	263	175	335	223	149	99.7	159	106	229	152	281	187	331	220	426	283
	17	252	167	320	213	145	97.1	155	103	221	147	272	181	320	213	411	273
	18	240	160	305	203	141	94.3	150	100	214	142	262	174	309	205	396	264
	19	229	152	290	193	137	91.4	146	97.1	206	137	253	168	298	198	381	254
	20	217	144	274	182	133	88.5	141	93.9	199	132	243	162	286	190	366	243
	21	205	136	259	172	128	85.6	136	90.7	191	127	234	155	275	183	351	233
	22	194	129	244	162	124	82.6	131	87.4	183	122	224	149	263	175	335	223
	23	182	121	229	152	119	79.6	126	84.1	175	116	214	142	251	167	320	213
	24	171	114	214	142	115	76.5	121	80.8	167	111	204	136	240	159	304	202
	25	160	107	200	133	110	73.5	116	77.5	159	106	195	129	228	152	289	192
	26	150	100	186	124	105	70.4	111	74.2	152	101	185	123	217	144	274	182
	27	139	92.9	173	115	101	67.4	106	70.9	144	96.1	176	117	205	136	259	172
	28	129	86.4	161	107	96.8	64.4	101	67.6	137	91.1	166	110	194	129	245	163
	29	121	80.6	150	99.8	92.4	61.4	96.8	64.4	129	86.2	157	104	183	122	231	153
	30	113	75.3	140	93.3	88.0	58.5	92.0	61.2	122	81.4	148	98.8	173	115	217	144
	31	106	70.5	131	87.4	83.6	55.6	87.4	58.1	115	76.7	139	92.9	162	108	203	135
	32	99.5	66.2	123	82.0	79.4	52.8	82.8	55.1	108	72.0	131	87.2	152	101	190	127
	33	93.5	62.2	115	77.1	75.2	50.0	78.3	52.1	101	67.7	123	82.0	143	95.4	179	119
	34	88.1	58.6	109	72.6	71.1	47.3	73.8	49.1	95.8	63.8	116	77.3	135	89.9	169	112
	35	83.1	55.3	103	68.5	67.1	44.6	69.6	46.3	90.4	60.2	109	72.9	127	84.8	159	106
	36	78.6	52.3	97.4	64.8	63.4	42.2	65.8	43.8	85.5	56.9	103	68.9	120	80.1	150	100
	37	74.4	49.5	92.2	61.3	60.0	39.9	62.3	41.4	80.9	53.8	98.1	65.2	114	75.9	142	95.0
	38	70.5	46.9	87.4	58.1	56.9	37.8	59.1	39.3	76.7	51.0	93.0	61.8	108	71.9	135	90.0
	39	66.9	44.5	83.0	55.2	54.0	35.9	56.1	37.3	72.8	48.4	88.3	58.7	102	68.3	128	85.5
	40	63.6	42.3	78.9	52.5	51.3	34.1	53.3	35.4	69.2	46.0	83.9	55.8	97.6	64.9	122	81.2

Table 10(g) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		8 x 8		10 x 10										12 x 12	
T	Nominal	0.625		0.250		0.313		0.375		0.500		0.625		0.750		0.250	
	Design	0.581		0.233		0.291		0.349		0.465		0.581		0.698		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	677	450	347	231	458	305	544	362	710	472	869	578	1020	680	366	244
	2	674	449	347	230	457	304	543	361	709	471	867	577	1020	678	366	243
	3	671	446	346	230	456	303	541	360	707	470	865	575	1010	676	365	243
	4	666	443	344	229	454	302	539	358	703	468	860	572	1010	673	365	242
	5	659	438	342	228	451	300	536	356	699	465	855	569	1000	669	363	242
	6	651	433	340	226	448	298	532	354	694	462	849	565	998	664	362	241
	7	642	427	338	225	445	296	528	351	688	458	842	560	989	658	360	240
	8	632	420	335	223	440	293	523	348	682	453	833	554	979	651	359	238
	9	620	412	332	220	436	290	517	344	674	448	824	548	967	643	356	237
	10	608	404	328	218	431	286	511	340	666	443	813	541	955	635	354	235
	11	594	395	324	215	425	283	504	335	657	437	802	533	941	626	352	234
	12	579	385	320	213	419	279	497	330	647	430	790	525	926	616	349	232
	13	564	375	315	209	413	274	489	325	637	423	777	517	910	605	346	230
	14	547	364	310	206	406	270	481	320	626	416	763	507	893	594	343	228
	15	530	353	305	203	398	265	472	314	614	408	748	498	876	582	339	225
	16	513	341	300	199	391	260	463	308	602	400	733	487	857	570	335	223
	17	495	329	294	195	383	254	453	301	589	392	717	477	838	557	332	220
	18	476	317	288	192	374	249	443	295	576	383	700	466	818	544	328	218
	19	457	304	282	188	366	243	433	288	562	374	683	454	797	530	323	215
	20	438	292	276	183	357	237	423	281	548	364	665	442	776	516	319	212
	21	419	279	269	179	348	231	412	274	533	355	647	430	754	502	315	209
	22	400	266	263	175	339	225	401	266	519	345	629	418	732	487	310	206
	23	381	253	256	170	330	219	390	259	504	335	610	406	710	472	305	203
	24	362	241	249	166	320	213	378	251	489	325	591	393	687	457	300	200
	25	343	228	242	161	310	206	367	244	473	315	572	381	664	442	295	196
	26	325	216	235	156	301	200	355	236	458	304	553	368	641	427	290	193
	27	307	204	228	152	291	193	343	228	442	294	534	355	618	411	285	189
	28	289	192	221	147	281	187	332	220	427	284	514	342	595	396	279	186
	29	271	180	214	142	271	180	320	213	411	273	495	329	572	381	274	182
	30	254	169	207	137	261	174	308	205	396	263	476	316	549	365	268	178
	31	238	158	200	133	252	167	296	197	380	253	457	304	527	350	263	175
	32	223	148	192	128	242	161	285	189	365	243	438	291	504	335	257	171
	33	210	139	185	123	232	154	273	182	350	233	419	279	482	321	251	167
	34	198	131	178	118	223	148	262	174	335	223	401	267	460	306	246	163
	35	186	124	171	114	213	142	251	167	320	213	383	254	439	292	240	159
	36	176	117	164	109	204	136	240	159	306	203	365	243	418	278	234	155
	37	167	111	158	105	195	130	229	152	292	194	348	231	397	264	228	152
	38	158	105	151	100	186	124	218	145	278	185	330	219	376	250	222	148
	39	150	100	144	96.4	177	118	208	138	263	175	313	208	357	238	216	144
	40	143	95.2	138	92.1	169	112	197	131	250	166	298	198	340	226	211	140

Table 10(h) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		12 x 12										14 x 14					
T	Nominal	0.313		0.375		0.500		0.625		0.750		0.313		0.375		0.500	
	Design	0.291		0.349		0.465		0.581		0.698		0.291		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	535	356	660	439	864	575	1060	706	1250	834	562	374	762	507	1010	677
	2	534	355	659	438	863	574	1060	705	1250	833	561	373	761	506	1010	677
	3	533	354	657	437	861	573	1050	704	1240	831	561	373	760	506	1010	676
	4	531	353	655	436	859	571	1050	701	1240	828	559	372	758	504	1010	674
	5	529	352	653	434	855	569	1050	699	1230	824	558	371	756	503	1010	672
	6	527	350	650	432	851	566	1040	695	1230	820	556	370	754	501	1000	670
	7	524	349	646	430	846	563	1030	691	1220	815	555	369	751	499	1000	667
	8	521	346	642	427	841	559	1030	686	1210	810	552	367	747	497	998	664
	9	517	344	637	424	834	555	1020	681	1200	803	550	366	743	494	993	660
	10	513	341	632	420	827	550	1010	675	1190	796	547	364	739	491	987	656
	11	509	338	626	416	820	545	1000	669	1180	788	544	362	734	488	980	652
	12	504	335	620	412	811	540	995	662	1170	780	541	359	729	485	973	647
	13	499	332	613	408	802	534	984	654	1150	771	537	357	723	481	965	642
	14	493	328	606	403	793	527	972	646	1140	761	533	354	717	477	957	636
	15	487	324	599	398	783	521	959	638	1120	751	529	352	711	473	948	630
	16	481	320	591	393	772	513	946	629	1110	740	525	349	704	468	938	624
	17	475	316	582	387	761	506	932	620	1090	729	520	346	697	464	928	618
	18	468	311	574	381	749	498	917	610	1070	717	515	342	689	459	918	611
	19	461	306	564	375	737	490	902	600	1060	705	510	339	682	453	907	603
	20	454	302	555	369	724	482	886	589	1040	692	505	336	673	448	896	596
	21	446	297	545	363	711	473	869	578	1020	679	499	332	665	442	884	588
	22	438	291	535	356	698	464	853	567	1000	666	493	328	656	436	872	580
	23	430	286	525	349	684	455	835	556	980	652	487	324	647	430	860	572
	24	422	280	514	342	670	446	818	544	959	638	481	320	638	424	847	563
	25	413	275	503	335	656	436	800	532	938	624	475	316	628	418	833	554
	26	405	269	492	327	641	426	782	520	916	609	468	312	618	411	820	545
	27	396	263	481	320	626	416	763	507	893	594	462	307	608	405	806	536
	28	387	257	470	313	611	406	744	495	871	579	455	303	598	398	792	527
	29	378	251	459	305	596	396	725	482	848	564	448	298	588	391	778	517
	30	369	245	447	297	580	386	706	470	825	549	441	293	577	384	763	507
	31	360	239	435	289	565	376	687	457	802	533	434	289	566	376	748	498
	32	351	233	424	282	549	365	667	444	779	518	427	284	555	369	733	488
	33	341	227	412	274	534	355	648	431	756	502	419	279	544	362	718	478
	34	332	221	400	266	518	344	628	418	732	487	412	274	533	354	703	467
	35	323	214	388	258	502	334	609	405	709	472	404	269	522	347	687	457
	36	313	208	377	250	487	324	590	392	686	456	396	264	510	339	672	447
	37	304	202	365	243	471	313	571	379	663	441	389	258	499	332	656	436
	38	295	196	353	235	456	303	551	367	640	426	381	253	488	324	641	426
	39	286	190	342	227	441	293	533	354	618	411	373	248	476	317	625	416
	40	276	184	330	219	425	283	514	342	596	396	365	243	465	309	609	405

Table 10(i) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		14 x 14						16 x 16									
T	Nominal	0.625		0.750		0.875		0.313		0.375		0.500		0.625		0.750	
	Design	0.581		0.698		0.814		0.291		0.349		0.465		0.581		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1250	834	1480	988	1700	1130	582	387	797	530	1170	780	1440	962	1710	1140
	2	1250	833	1480	987	1700	1130	581	387	797	530	1170	779	1440	962	1710	1140
	3	1250	832	1480	985	1700	1130	581	386	796	529	1170	778	1440	960	1710	1130
	4	1240	830	1470	983	1690	1120	580	386	795	529	1160	777	1440	959	1700	1130
	5	1240	828	1470	980	1690	1120	579	385	793	527	1160	775	1430	957	1700	1130
	6	1240	825	1460	976	1680	1120	578	384	791	526	1160	773	1430	954	1700	1130
	7	1230	821	1460	972	1670	1110	576	383	789	525	1150	771	1430	951	1690	1120
	8	1220	817	1450	967	1660	1110	575	382	786	523	1150	768	1420	947	1680	1120
	9	1220	813	1440	962	1660	1100	573	381	784	521	1150	765	1410	943	1680	1110
	10	1210	808	1430	955	1640	1090	571	380	780	519	1140	761	1410	939	1670	1110
	11	1200	802	1420	949	1630	1080	569	378	777	517	1130	757	1400	934	1660	1100
	12	1190	796	1410	941	1620	1080	566	377	773	514	1130	753	1390	929	1650	1100
	13	1180	790	1400	934	1610	1070	564	375	769	511	1120	749	1380	923	1640	1090
	14	1170	783	1390	925	1590	1060	561	373	765	509	1110	744	1370	917	1630	1080
	15	1160	775	1370	916	1580	1050	558	371	760	505	1110	738	1360	910	1620	1070
	16	1150	767	1360	907	1560	1040	555	369	755	502	1100	733	1350	903	1600	1070
	17	1140	759	1340	897	1540	1020	551	367	750	499	1090	727	1340	896	1590	1060
	18	1120	750	1330	886	1520	1010	548	364	744	495	1080	721	1330	888	1580	1050
	19	1110	741	1310	876	1500	1000	544	362	738	491	1070	714	1320	880	1560	1040
	20	1100	732	1290	864	1480	990	540	359	732	487	1060	708	1310	872	1550	1030
	21	1080	722	1280	852	1460	976	536	357	726	483	1050	701	1290	863	1530	1020
	22	1070	712	1260	840	1440	962	532	354	719	478	1040	693	1280	854	1510	1010
	23	1050	702	1240	828	1420	947	528	351	712	474	1030	686	1260	844	1500	999
	24	1030	691	1220	815	1400	932	523	348	705	469	1010	678	1250	835	1480	987
	25	1020	680	1200	801	1370	917	518	345	697	464	1000	670	1230	825	1460	975
	26	1000	669	1180	788	1350	901	513	341	690	459	995	662	1220	814	1440	963
	27	988	657	1160	774	1330	885	508	338	682	454	982	653	1200	804	1420	950
	28	970	645	1140	760	1300	868	503	335	674	448	969	645	1190	793	1400	937
	29	952	633	1120	746	1280	852	498	331	666	443	956	636	1170	782	1380	923
	30	934	621	1090	731	1250	835	493	328	658	437	942	627	1150	770	1360	910
	31	916	609	1070	716	1220	817	487	324	649	432	928	617	1140	759	1340	896
	32	897	597	1050	701	1200	800	481	320	640	426	914	608	1120	747	1320	882
	33	878	584	1030	686	1170	782	476	316	632	420	900	598	1100	735	1300	867
	34	859	571	1000	671	1140	765	470	312	623	414	885	589	1080	723	1280	853
	35	840	559	986	656	1120	747	464	309	613	408	870	579	1060	711	1260	838
	36	820	546	963	640	1090	729	458	304	604	402	855	569	1050	698	1230	823
	37	801	533	939	625	1060	711	452	300	595	396	840	559	1030	686	1210	808
	38	782	520	916	609	1040	693	446	296	585	389	825	549	1010	673	1190	793
	39	762	507	893	594	1010	675	439	292	576	383	810	539	993	660	1160	778
	40	743	494	869	578	988	657	433	288	566	376	794	528	974	648	1140	763

Table 10(j) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		16 x 16		18 x 18						20 x 20					
T	Nominal	0.875		0.500		0.625		0.750		0.875		0.500		0.625		0.750	
	Design	0.814		0.465		0.581		0.698		0.814		0.465		0.581		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1970	1310	1320	882	1630	1090	1940	1290	2240	1490	1380	923	1830	1210	2170	1440
	2	1970	1310	1320	882	1630	1090	1940	1290	2240	1490	1380	923	1830	1210	2170	1440
	3	1970	1310	1320	881	1630	1080	1940	1290	2240	1490	1380	922	1820	1210	2170	1440
	4	1960	1300	1320	880	1630	1080	1940	1290	2230	1480	1380	921	1820	1210	2170	1440
	5	1960	1300	1320	878	1630	1080	1930	1280	2230	1480	1380	920	1820	1210	2170	1440
	6	1950	1300	1310	877	1620	1080	1930	1280	2220	1480	1380	918	1820	1210	2160	1440
	7	1950	1290	1310	874	1620	1080	1920	1280	2220	1470	1370	917	1810	1200	2160	1430
	8	1940	1290	1310	872	1610	1070	1920	1270	2210	1470	1370	915	1810	1200	2150	1430
	9	1930	1280	1300	869	1610	1070	1910	1270	2200	1470	1370	913	1800	1200	2150	1430
	10	1920	1280	1300	866	1600	1070	1910	1270	2200	1460	1360	910	1800	1200	2140	1420
	11	1910	1270	1290	862	1600	1060	1900	1260	2190	1450	1360	907	1790	1190	2130	1420
	12	1900	1260	1290	859	1590	1060	1890	1250	2180	1450	1350	904	1790	1190	2130	1410
	13	1890	1250	1280	855	1580	1050	1880	1250	2170	1440	1350	901	1780	1180	2120	1410
	14	1870	1250	1270	850	1570	1050	1870	1240	2150	1430	1340	898	1770	1180	2110	1400
	15	1860	1240	1270	845	1570	1040	1860	1230	2140	1420	1340	894	1760	1170	2100	1390
	16	1850	1230	1260	840	1560	1030	1850	1230	2130	1410	1330	890	1760	1170	2090	1390
	17	1830	1220	1250	835	1550	1030	1840	1220	2110	1410	1330	886	1750	1160	2080	1380
	18	1810	1210	1240	830	1540	1020	1820	1210	2100	1400	1320	881	1740	1150	2070	1370
	19	1800	1190	1230	824	1520	1010	1810	1200	2080	1390	1310	876	1730	1150	2050	1360
	20	1780	1180	1220	818	1510	1000	1800	1190	2070	1370	1310	872	1720	1140	2040	1360
	21	1760	1170	1220	811	1500	1000	1780	1180	2050	1360	1300	866	1710	1130	2030	1350
	22	1740	1160	1210	805	1490	993	1770	1170	2030	1350	1290	861	1690	1130	2010	1340
	23	1720	1140	1190	798	1480	984	1750	1160	2020	1340	1280	856	1680	1120	2000	1330
	24	1700	1130	1180	791	1460	975	1730	1150	2000	1330	1270	850	1670	1110	1980	1320
	25	1680	1120	1170	783	1450	966	1720	1140	1980	1310	1260	844	1660	1100	1970	1310
	26	1660	1100	1160	776	1430	957	1700	1130	1960	1300	1250	838	1640	1090	1950	1300
	27	1630	1090	1150	768	1420	947	1680	1120	1940	1290	1250	831	1630	1080	1940	1290
	28	1610	1070	1140	760	1400	937	1660	1110	1920	1270	1240	825	1620	1070	1920	1280
	29	1590	1050	1130	752	1390	927	1650	1090	1890	1260	1230	818	1600	1060	1900	1260
	30	1560	1040	1110	743	1370	916	1630	1080	1870	1240	1210	811	1590	1050	1890	1250
	31	1540	1020	1100	735	1360	905	1610	1070	1850	1230	1200	804	1570	1040	1870	1240
	32	1510	1010	1090	726	1340	894	1590	1050	1830	1210	1190	797	1560	1030	1850	1230
	33	1490	994	1070	717	1320	883	1570	1040	1800	1200	1180	789	1540	1020	1830	1220
	34	1460	977	1060	708	1310	872	1550	1030	1780	1180	1170	782	1530	1010	1810	1200
	35	1440	960	1050	699	1290	860	1530	1010	1750	1160	1160	774	1510	1000	1790	1190
	36	1410	942	1030	689	1270	848	1500	1000	1730	1150	1150	766	1490	996	1770	1180
	37	1390	925	1020	680	1250	836	1480	989	1700	1130	1140	758	1480	985	1750	1160
	38	1360	907	1000	670	1230	824	1460	975	1680	1110	1120	750	1460	973	1730	1150
	39	1330	889	993	660	1220	812	1440	960	1650	1100	1110	742	1440	962	1710	1140
	40	1310	871	978	650	1200	800	1420	945	1630	1080	1100	733	1420	950	1690	1120

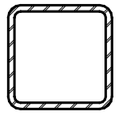

Table 10(k) Available Strength in Axial Compression, Kips

Fy = 46 ksi							
Nominal Size		20 x 20		22 x 22			
T	Nominal	0.875		0.750		0.875	
	Design	0.814		0.698		0.814	
		LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	2510	1670	2400	1600	2780	1850
	2	2510	1670	2400	1600	2780	1850
	3	2510	1670	2400	1600	2780	1850
	4	2500	1660	2400	1600	2770	1840
	5	2500	1660	2400	1590	2770	1840
	6	2500	1660	2390	1590	2770	1840
	7	2490	1660	2390	1590	2760	1840
	8	2480	1650	2390	1590	2760	1830
	9	2480	1650	2380	1580	2750	1830
	10	2470	1640	2370	1580	2740	1820
	11	2460	1640	2370	1570	2740	1820
	12	2450	1630	2360	1570	2730	1810
	13	2440	1620	2350	1560	2720	1810
	14	2430	1620	2340	1560	2710	1800
	15	2420	1610	2340	1550	2700	1790
	16	2410	1600	2330	1550	2690	1790
	17	2400	1590	2320	1540	2680	1780
	18	2380	1580	2310	1530	2660	1770
	19	2370	1570	2300	1530	2650	1760
	20	2350	1560	2280	1520	2640	1750
	21	2340	1550	2270	1510	2620	1740
	22	2320	1540	2260	1500	2610	1730
	23	2310	1530	2250	1490	2590	1720
	24	2290	1520	2230	1480	2580	1710
	25	2270	1510	2220	1470	2560	1700
	26	2250	1500	2200	1460	2540	1690
	27	2230	1480	2190	1450	2530	1680
	28	2210	1470	2170	1440	2510	1670
	29	2190	1460	2160	1430	2490	1650
	30	2170	1440	2140	1420	2470	1640
	31	2150	1430	2120	1410	2450	1630
	32	2130	1420	2110	1400	2430	1620
	33	2110	1400	2090	1390	2410	1600
	34	2090	1390	2070	1380	2390	1590
	35	2060	1370	2050	1360	2370	1570
	36	2040	1350	2030	1350	2340	1560
	37	2020	1340	2010	1340	2320	1540
	38	1990	1320	1990	1330	2300	1530
	39	1970	1310	1970	1310	2280	1510
	40	1940	1290	1950	1300	2250	1500

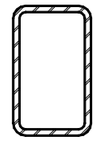

Table 10(l) Available Strength in Axial Compression, Kips

Fy = 46 ksi																	
Nominal Size		3 x 2						4 x 2						4 x 3			
T	Nominal	0.180		0.188		0.250		0.180		0.188		0.250		0.180		0.188	
	Design	0.167		0.174		0.233		0.167		0.174		0.233		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	60.5	40.3	62.7	41.7	80.2	53.4	74.2	49.4	77.0	51.2	99.3	66.1	88.5	58.9	91.9	61.1
	2	57.7	38.4	59.8	39.8	76.2	50.7	71.0	47.2	73.6	49.0	94.7	63.0	86.7	57.7	90.1	59.9
	3	53.3	35.4	55.2	36.7	69.9	46.5	65.9	43.8	68.3	45.4	87.4	58.1	83.8	55.8	87.0	57.9
	4	47.7	31.7	49.3	32.8	62.0	41.2	59.4	39.5	61.5	40.9	78.1	52.0	79.9	53.2	82.9	55.2
	5	41.3	27.5	42.7	28.4	53.1	35.3	51.9	34.5	53.7	35.7	67.6	45.0	75.2	50.0	78.0	51.8
	6	34.7	23.0	35.8	23.8	43.9	29.2	44.1	29.3	45.6	30.3	56.7	37.7	69.7	46.4	72.3	48.1
	7	28.2	18.7	29.0	19.3	35.1	23.3	36.3	24.2	37.5	24.9	46.0	30.6	63.8	42.4	66.1	44.0
	8	22.1	14.7	22.8	15.1	27.2	18.1	29.0	19.3	29.9	19.9	36.1	24.0	57.6	38.3	59.6	39.7
	9	17.5	11.6	18.0	11.9	21.5	14.3	22.9	15.2	23.6	15.7	28.5	19.0	51.3	34.1	53.1	35.3
	10	14.2	9.45	14.6	9.71	17.4	11.5	18.6	12.3	19.1	12.7	23.1	15.4	45.0	29.9	46.6	31.0
	11	11.7	7.81	12.0	8.03	14.3	9.58	15.3	10.2	15.8	10.5	19.1	12.7	39.0	25.9	40.3	26.8
	12	9.86	6.56	10.1	6.74	12.0	8.05	12.9	8.60	13.3	8.85	16.0	10.7	33.2	22.1	34.3	22.8
	13	8.40	5.59					11.0	7.33	11.3	7.54			28.3	18.8	29.2	19.4
	14													24.4	16.2	25.2	16.8
	15													21.3	14.1	22.0	14.6
	16													18.7	12.4	19.3	12.8
	17													16.5	11.0	17.1	11.3
	18													14.7	9.84	15.2	10.1
	19													13.2	8.83	13.7	9.12
	20																
	21																
	22																
	23																
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Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(m) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		4 x 3		5 x 2						5 x 3							
T	Nominal	0.250		0.180		0.188		0.250		0.180		0.188		0.250		0.313	
	Design	0.233		0.167		0.174		0.233		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	119	79.4	87.9	58.5	91.2	60.7	118	78.8	102	68.1	106	70.7	138	92.2	168	112
	2	116	77.7	84.2	56.0	87.4	58.1	113	75.2	100	66.7	104	69.3	135	90.3	164	109
	3	112	75.0	78.4	52.2	81.4	54.1	104	69.7	97.2	64.6	100	67.1	131	87.3	159	105
	4	107	71.3	71.0	47.2	73.6	48.9	94.1	62.6	92.9	61.8	96.4	64.1	125	83.2	151	100
	5	100	66.8	62.5	41.5	64.7	43.0	82.0	54.6	87.6	58.3	90.9	60.5	117	78.3	142	94.5
	6	92.8	61.7	53.4	35.5	55.2	36.7	69.3	46.1	81.6	54.3	84.6	56.3	109	72.7	131	87.4
	7	84.5	56.2	44.4	29.5	45.9	30.5	56.8	37.8	75.0	49.9	77.8	51.7	100	66.5	119	79.7
	8	75.8	50.4	35.9	23.8	37.0	24.6	45.1	30.0	68.1	45.3	70.5	46.9	90.3	60.1	107	71.6
	9	67.1	44.6	28.4	18.9	29.3	19.4	35.6	23.7	61.0	40.5	63.2	42.0	80.4	53.5	95.4	63.5
	10	58.5	38.9	23.0	15.3	23.7	15.7	28.9	19.2	53.9	35.9	55.8	37.1	70.7	47.0	83.4	55.5
	11	50.3	33.5	19.0	12.6	19.6	13.0	23.8	15.8	47.1	31.3	48.7	32.4	61.3	40.8	71.8	47.8
	12	42.6	28.3	15.9	10.6	16.4	10.9	20.0	13.3	40.5	27.0	41.9	27.9	52.3	34.8	60.9	40.5
	13	36.3	24.1	13.6	9.06	14.0	9.34	17.1	11.3	34.6	23.0	35.7	23.7	44.6	29.6	51.9	34.5
	14	31.3	20.8							29.8	19.8	30.8	20.5	38.4	25.5	44.7	29.7
	15	27.2	18.1							25.9	17.2	26.8	17.8	33.5	22.2	38.9	25.9
	16	23.9	15.9							22.8	15.1	23.6	15.7	29.4	19.5	34.2	22.7
	17	21.2	14.1							20.2	13.4	20.9	13.9	26.0	17.3	30.3	20.1
	18	18.9	12.6							18.0	12.0	18.6	12.4	23.2	15.4	27.0	18.0
	19	17.0	11.3							16.1	10.7	16.7	11.1	20.8	13.8	24.2	16.1
	20									14.6	9.72	15.1	10.0				
	21																
	22																
	23																
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(n) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		5 x 3		6 x 2						6 x 3							
T	Nominal	0.375		0.180		0.188		0.250		0.180		0.188		0.250		0.313	
	Design	0.349		0.167		0.174		0.233		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	196	130	101	67.6	105	70.2	137	91.4	116	77.2	120	80.2	157	105	192	128
	2	192	127	97.5	64.8	101	67.3	131	87.5	113	75.8	118	78.7	154	102	188	125
	3	185	123	91.0	60.5	94.4	62.8	122	81.2	110	73.5	114	76.3	149	99.6	182	121
	4	175	116	82.6	54.9	85.7	57.0	110	73.2	105	70.3	109	73.1	143	95.2	173	115
	5	164	109	73.0	48.5	75.6	50.3	96.4	64.1	100	66.5	103	69.1	134	89.7	163	108
	6	151	100	62.7	41.7	64.9	43.1	81.9	54.5	93.4	62.1	96.9	64.5	125	83.5	151	100
	7	137	91.5	52.4	34.8	54.2	36.0	67.6	44.9	86.1	57.3	89.4	59.4	115	76.7	138	92.3
	8	123	81.8	42.6	28.3	44.0	29.2	54.1	36.0	78.5	52.2	81.4	54.1	104	69.6	125	83.4
	9	108	72.1	33.8	22.5	34.9	23.2	42.7	28.4	70.6	46.9	73.2	48.7	93.6	62.3	111	74.3
	10	94.1	62.6	27.4	18.2	28.2	18.8	34.6	23.0	62.7	41.7	65.0	43.2	82.7	55.0	98.1	65.2
	11	80.5	53.6	22.6	15.0	23.3	15.5	28.6	19.0	55.0	36.6	57.0	37.9	72.1	48.0	85.0	56.5
	12	67.9	45.1	19.0	12.6	19.6	13.0	24.0	16.0	47.7	31.7	49.3	32.8	62.1	41.3	72.5	48.2
	13	57.8	38.5	16.2	10.8	16.7	11.1	20.4	13.6	40.8	27.1	42.2	28.0	52.9	35.2	61.8	41.1
	14	49.9	33.2							35.2	23.4	36.3	24.2	45.6	30.3	53.3	35.4
	15	43.4	28.9							30.6	20.4	31.7	21.0	39.7	26.4	46.4	30.9
	16	38.2	25.4							26.9	17.9	27.8	18.5	34.9	23.2	40.8	27.1
	17	33.8	22.5							23.8	15.8	24.6	16.4	30.9	20.5	36.1	24.0
	18	30.1	20.0							21.2	14.1	22.0	14.6	27.6	18.3	32.2	21.4
	19	27.0	18.0							19.1	12.7	19.7	13.1	24.7	16.4	28.9	19.2
	20									17.2	11.4	17.8	11.8	22.3	14.8		
	21																
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(o) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		6 x 3		6 x 4										7 x 5	
T	Nominal	0.375		0.180		0.188		0.250		0.313		0.375		0.500		0.313	
	Design	0.349		0.167		0.174		0.233		0.291		0.349		0.465		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	225	149	130	86.6	135	90.0	177	118	217	144	254	169	324	216	265	176
	2	220	146	128	85.7	133	89.0	175	116	214	142	251	167	320	213	263	175
	3	212	141	126	84.1	131	87.4	172	114	210	140	246	164	313	208	260	173
	4	202	134	123	82.0	128	85.2	167	111	204	136	239	159	304	202	255	170
	5	189	126	119	79.4	124	82.5	162	107	197	131	231	153	292	194	250	166
	6	175	116	114	76.3	119	79.3	155	103	189	126	221	147	279	185	243	162
	7	160	106	109	72.8	113	75.6	148	98.6	180	119	210	139	264	175	236	157
	8	143	95.7	103	68.9	107	71.6	140	93.2	170	113	197	131	247	164	227	151
	9	127	84.8	97.5	64.8	101	67.3	131	87.4	159	105	184	122	230	153	218	145
	10	111	74.1	91.0	60.5	94.4	62.8	122	81.4	147	98.3	171	113	212	141	208	138
	11	96.0	63.8	84.3	56.1	87.5	58.2	113	75.2	136	90.6	157	104	193	128	198	131
	12	81.3	54.1	77.6	51.6	80.5	53.5	103	69.0	124	82.9	143	95.5	175	116	187	124
	13	69.3	46.1	70.9	47.2	73.5	48.9	94.5	62.8	113	75.2	129	86.4	157	104	176	117
	14	59.7	39.7	64.3	42.8	66.6	44.3	85.4	56.8	101	67.7	116	77.5	140	93.4	164	109
	15	52.0	34.6	57.9	38.5	60.0	39.9	76.5	50.9	91.0	60.5	103	69.0	123	82.3	153	102
	16	45.7	30.4	51.7	34.4	53.6	35.6	68.0	45.3	80.5	53.6	91.4	60.8	108	72.3	142	94.7
	17	40.5	26.9	45.9	30.5	47.5	31.6	60.3	40.1	71.3	47.4	81.0	53.8	96.3	64.1	131	87.4
	18	36.1	24.0	40.9	27.2	42.4	28.2	53.8	35.7	63.6	42.3	72.2	48.0	85.9	57.1	120	80.2
	19	32.4	21.5	36.7	24.4	38.0	25.3	48.2	32.1	57.1	38.0	64.8	43.1	77.1	51.3	110	73.3
	20			33.1	22.0	34.3	22.8	43.5	28.9	51.5	34.3	58.5	38.9	69.6	46.3	99.9	66.5
	21			30.0	20.0	31.1	20.7	39.5	26.2	46.7	31.1	53.0	35.3	63.1	42.0	90.6	60.3
	22			27.4	18.2	28.3	18.8	36.0	23.9	42.6	28.3	48.3	32.1	57.5	38.2	82.6	54.9
	23			25.0	16.6	25.9	17.2	32.9	21.9	38.9	25.9	44.2	29.4	52.6	35.0	75.6	50.3
	24			23.0	15.3	23.8	15.8	30.2	20.1	35.8	23.8	40.6	27.0	48.3	32.1	69.4	46.1
	25			21.2	14.1	21.9	14.6	27.8	18.5	33.0	21.9	37.4	24.9	44.5	29.6	63.9	42.5
	26			19.6	13.0	20.3	13.5	25.7	17.1	30.5	20.3					59.1	39.3
	27			18.2	12.1	18.8	12.5									54.8	36.5
	28															51.0	33.9
	29															47.5	31.6
	30															44.4	29.5
	31															41.6	27.6
	32															39.0	25.9
	33															36.7	24.4
	34																
	35																
	36																
	37																
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(p) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		7 x 5				8 x 4											
T	Nominal	0.375		0.500		0.180		0.188		0.250		0.313		0.375		0.500	
	Design	0.349		0.465		0.167		0.174		0.233		0.291		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	312	208	402	267	143	95.6	152	101	215	143	265	176	312	207	401	267
	2	310	206	398	265	142	94.7	151	100	213	142	262	174	308	205	396	263
	3	306	203	393	261	140	93.3	148	98.8	209	139	257	171	303	201	388	258
	4	301	200	386	257	137	91.3	145	96.7	204	136	251	167	295	196	378	251
	5	294	195	377	251	133	88.8	141	94.0	198	132	243	161	285	190	364	242
	6	286	190	366	243	129	85.8	136	90.7	190	127	233	155	274	182	349	232
	7	277	184	354	235	123	82.4	130	87.1	182	121	222	148	261	173	331	220
	8	267	177	340	226	118	78.7	124	83.0	173	115	210	140	246	164	312	207
	9	255	170	325	216	112	74.6	118	78.7	163	108	198	131	231	154	291	194
	10	244	162	309	205	105	70.4	111	74.1	152	101	185	123	215	143	270	179
	11	231	154	292	194	99.2	66.0	104	69.3	141	94.2	171	114	199	132	248	165
	12	218	145	275	183	92.3	61.4	96.9	64.5	130	86.9	157	104	182	121	226	150
	13	205	136	257	171	85.5	56.9	89.5	59.6	119	79.5	144	95.8	166	110	205	136
	14	191	127	239	159	78.6	52.3	82.2	54.7	108	72.3	130	86.9	150	100	184	122
	15	178	118	222	147	71.9	47.8	75.0	49.9	98.2	65.3	117	78.2	135	89.8	163	109
	16	164	109	204	136	65.3	43.4	68.0	45.2	88.1	58.6	105	69.9	120	79.8	144	96.1
	17	151	101	187	124	59.0	39.2	61.2	40.7	78.2	52.0	93.1	61.9	106	70.7	128	85.2
	18	139	92.5	170	113	52.8	35.1	54.7	36.4	69.8	46.4	83.0	55.2	94.8	63.1	114	76.0
	19	126	84.3	154	102	47.4	31.5	49.1	32.6	62.6	41.6	74.5	49.6	85.1	56.6	102	68.2
	20	114	76.3	139	92.8	42.8	28.4	44.3	29.5	56.5	37.6	67.2	44.7	76.8	51.1	92.5	61.5
	21	104	69.2	126	84.2	38.8	25.8	40.2	26.7	51.3	34.1	61.0	40.6	69.6	46.3	83.9	55.8
	22	94.8	63.0	115	76.7	35.3	23.5	36.6	24.3	46.7	31.1	55.6	37.0	63.4	42.2	76.4	50.8
	23	86.7	57.7	105	70.2	32.3	21.5	33.5	22.3	42.7	28.4	50.8	33.8	58.0	38.6	69.9	46.5
	24	79.6	53.0	96.9	64.4	29.7	19.7	30.7	20.4	39.2	26.1	46.7	31.0	53.3	35.4	64.2	42.7
	25	73.4	48.8	89.3	59.4	27.3	18.2	28.3	18.8	36.2	24.0	43.0	28.6	49.1	32.7	59.2	39.4
	26	67.8	45.1	82.5	54.9	25.3	16.8	26.2	17.4	33.4	22.2	39.8	26.4	45.4	30.2		
	27	62.9	41.8	76.5	50.9	23.4	15.6	24.3	16.1	31.0	20.6	36.9	24.5				
	28	58.5	38.9	71.2	47.3	21.8	14.5	22.6	15.0								
	29	54.5	36.3	66.3	44.1												
	30	50.9	33.9	62.0	41.2												
	31	47.7	31.7	58.0	38.6												
	32	44.8	29.8														
	33																
	34																
	35																
	36																
	37																
	38																
	39																
	40																

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(q) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		8 x 6												10 x 4			
T	Nominal	0.180		0.188		0.250		0.313		0.375		0.500		0.313		0.375	
	Design	0.167		0.174		0.233		0.291		0.349		0.465		0.291		0.349	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	171	114	181	120	254	169	313	208	370	246	479	318	313	208	370	246
	2	170	113	180	120	253	168	312	207	368	245	476	317	309	206	366	243
	3	169	112	179	119	251	167	309	205	365	243	472	314	304	202	359	239
	4	167	111	177	118	248	165	305	203	361	240	466	310	297	197	350	233
	5	165	110	175	116	245	163	301	200	355	236	459	305	288	191	339	225
	6	162	108	172	114	240	160	295	196	349	232	450	299	277	184	326	217
	7	159	106	168	112	235	156	289	192	341	227	439	292	265	176	311	207
	8	156	104	165	109	229	152	282	187	332	221	427	284	251	167	295	196
	9	152	101	160	107	223	148	274	182	323	215	415	276	237	157	277	184
	10	148	98.6	156	103	216	144	265	176	312	208	401	266	222	147	259	172
	11	143	95.5	151	100	209	139	256	170	301	200	386	257	206	137	240	160
	12	138	92.3	146	97.3	201	134	246	164	290	192	370	246	190	126	221	147
	13	133	89.0	140	93.7	193	128	236	157	277	184	354	235	174	116	202	134
	14	128	85.5	135	89.9	185	123	226	150	265	176	337	224	159	105	184	122
	15	123	81.9	129	86.1	176	117	215	143	252	167	320	213	143	95.7	165	110
	16	117	78.2	123	82.1	167	111	204	136	239	159	303	201	129	85.9	148	98.7
	17	112	74.5	117	78.1	158	105	193	128	226	150	285	190	114	76.4	131	87.6
	18	106	70.7	111	74.1	149	99.7	182	121	212	141	268	178	102	68.2	117	78.1
	19	100	67.0	105	70.1	141	93.8	171	114	199	132	250	166	92.0	61.2	105	70.1
	20	95.0	63.2	99.3	66.1	132	88.0	160	106	186	124	233	155	83.0	55.2	95.1	63.2
	21	89.4	59.5	93.4	62.1	123	82.3	149	99.7	174	115	217	144	75.3	50.1	86.2	57.4
	22	83.9	55.8	87.5	58.2	115	76.7	139	92.7	161	107	201	133	68.6	45.6	78.6	52.3
	23	78.5	52.2	81.8	54.4	107	71.2	129	86.0	149	99.6	185	123	62.7	41.7	71.9	47.8
	24	73.2	48.7	76.2	50.7	99.0	65.9	119	79.3	137	91.7	170	113	57.6	38.3	66.0	43.9
	25	68.1	45.3	70.7	47.0	91.3	60.7	109	73.1	127	84.5	156	104	53.1	35.3	60.8	40.5
	26	63.0	41.9	65.4	43.5	84.4	56.1	101	67.6	117	78.1	145	96.5	49.1	32.6	56.2	37.4
	27	58.4	38.8	60.6	40.3	78.2	52.0	94.2	62.7	108	72.4	134	89.4	45.5	30.3	52.1	34.7
	28	54.3	36.1	56.3	37.5	72.7	48.4	87.6	58.3	101	67.3	125	83.2				
	29	50.6	33.7	52.5	34.9	67.8	45.1	81.6	54.3	94.4	62.8	116	77.5				
	30	47.3	31.5	49.1	32.6	63.4	42.1	76.3	50.7	88.2	58.6	108	72.4				
	31	44.3	29.5	46.0	30.6	59.3	39.5	71.4	47.5	82.6	54.9	102	67.8				
	32	41.6	27.6	43.1	28.7	55.7	37.0	67.0	44.6	77.5	51.5	95.7	63.7				
	33	39.1	26.0	40.5	27.0	52.4	34.8	63.0	41.9	72.9	48.5	90.0	59.9				
	34	36.8	24.5	38.2	25.4	49.3	32.8	59.4	39.5	68.6	45.6	84.8	56.4				
	35	34.7	23.1	36.0	24.0	46.5	30.9	56.0	37.3	64.8	43.1	80.0	53.2				
	36	32.8	21.8	34.1	22.6	44.0	29.2	53.0	35.2	61.2	40.7	75.6	50.3				
	37	31.1	20.7	32.2	21.4	41.6	27.7	50.1	33.3	57.9	38.5	71.6	47.6				
	38	29.5	19.6	30.6	20.3	39.5	26.2	47.5	31.6	54.9	36.5	67.9	45.1				
	39	28.0	18.6	29.0	19.3	37.5	24.9	45.1	30.0	52.1	34.7						
	40	26.6	17.7	27.6	18.3	35.6	23.7	42.9	28.5								

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(r) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		10 x 4		10 x 6										12 x 4	
T	Nominal	0.500		0.180		0.188		0.250		0.313		0.375		0.500		0.250	
	Design	0.465		0.167		0.174		0.233		0.291		0.349		0.465		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	478	318	176	117	187	124	281	187	361	240	428	285	556	370	252	168
	2	472	314	176	117	186	124	280	186	360	239	426	283	553	368	250	166
	3	463	308	175	116	185	123	278	185	357	237	422	281	548	365	246	164
	4	451	300	173	115	183	122	275	183	353	235	418	278	542	360	242	161
	5	436	290	171	114	181	120	271	180	348	231	412	274	534	355	236	157
	6	418	278	169	112	179	119	267	177	342	227	404	269	524	348	228	152
	7	398	264	166	110	176	117	262	174	335	223	396	263	512	341	220	146
	8	376	250	163	108	172	114	256	170	327	217	386	257	499	332	211	140
	9	352	234	159	106	169	112	250	166	318	211	376	250	485	323	201	134
	10	327	218	156	103	164	109	243	161	309	205	364	242	470	312	191	127
	11	302	201	151	101	160	106	235	156	298	198	352	234	453	301	180	119
	12	277	184	147	98.2	155	103	227	151	288	191	339	225	436	290	168	112
	13	251	167	143	95.1	150	100	219	145	276	184	326	216	418	278	157	104
	14	227	151	138	91.9	145	96.9	210	140	265	176	312	207	399	265	145	97.0
	15	203	135	133	88.6	140	93.4	201	134	253	168	297	198	380	253	134	89.4
	16	180	120	128	85.2	134	89.7	192	128	241	160	283	188	360	240	123	81.9
	17	159	106	122	81.8	129	86.0	183	121	228	152	268	178	341	226	112	74.6
	18	142	94.8	117	78.2	123	82.2	173	115	216	143	253	168	321	213	101	67.6
	19	127	85.1	112	74.7	117	78.4	164	109	204	135	238	158	301	200	91.4	60.8
	20	115	76.8	106	71.1	112	74.5	155	103	191	127	223	149	282	187	82.5	54.9
	21	104	69.6	101	67.5	106	70.7	145	97.0	179	119	209	139	263	175	74.8	49.8
	22	95.4	63.4	96.1	63.9	100	66.9	136	91.0	167	111	195	130	244	162	68.2	45.3
	23	87.3	58.0	90.8	60.4	94.9	63.1	127	85.0	156	103	181	120	226	150	62.4	41.5
	24	80.1	53.3	85.6	56.9	89.3	59.4	119	79.3	144	96.4	168	111	209	139	57.3	38.1
	25	73.8	49.1	80.4	53.5	83.8	55.8	110	73.6	133	88.9	155	103	192	128	52.8	35.1
	26	68.3	45.4	75.4	50.2	78.5	52.2	102	68.1	123	82.2	143	95.3	178	118	48.8	32.4
	27			70.6	46.9	73.3	48.8	94.9	63.1	114	76.2	132	88.4	165	109	45.2	30.1
	28			65.7	43.7	68.2	45.3	88.3	58.7	106	70.9	123	82.2	153	102	42.1	28.0
	29			61.2	40.7	63.5	42.3	82.3	54.7	99.4	66.1	115	76.6	143	95.3		
	30			57.2	38.0	59.4	39.5	76.9	51.1	92.8	61.8	107	71.6	133	89.0		
	31			53.6	35.6	55.6	37.0	72.0	47.9	86.9	57.8	100	67.0	125	83.4		
	32			50.3	33.4	52.2	34.7	67.6	44.9	81.6	54.3	94.6	62.9	117	78.2		
	33			47.3	31.4	49.1	32.6	63.5	42.2	76.7	51.0	88.9	59.2	110	73.5		
	34			44.5	29.6	46.2	30.7	59.8	39.8	72.3	48.1	83.8	55.7	104	69.3		
	35			42.0	27.9	43.6	29.0	56.5	37.6	68.2	45.4	79.1	52.6	98.3	65.4		
	36			39.7	26.4	41.2	27.4	53.4	35.5	64.5	42.9	74.7	49.7	92.9	61.8		
	37			37.6	25.0	39.0	25.9	50.5	33.6	61.0	40.6	70.7	47.0	87.9	58.5		
	38			35.6	23.7	37.0	24.6	47.9	31.8	57.8	38.5	67.1	44.6	83.4	55.5		
	39			33.8	22.5	35.1	23.3	45.5	30.2	54.9	36.5	63.7	42.3	79.1	52.6		
	40			32.2	21.4	33.4	22.2	43.2	28.7	52.2	34.7	60.5	40.2				

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(s) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		12 x 4						10 x 8				12 x 6				12 x 8	
T	Nominal	0.313		0.375		0.500		0.375		0.500		0.375		0.500		0.250	
	Design	0.291		0.349		0.465		0.349		0.465		0.349		0.465		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	351	233	427	284	555	369	486	323	633	421	486	323	633	421	330	219
	2	347	231	423	281	548	365	485	322	631	420	483	321	630	419	329	219
	3	342	227	415	276	538	358	482	321	628	418	480	319	624	415	328	218
	4	334	222	406	270	525	349	479	319	624	415	474	316	617	411	326	217
	5	324	216	393	261	508	337	475	316	618	411	468	311	608	405	324	215
	6	313	208	378	252	487	324	470	313	612	407	460	306	598	397	321	213
	7	300	199	362	240	464	309	464	309	604	402	451	300	585	389	318	211
	8	285	190	343	228	439	292	458	304	595	396	440	293	571	380	314	209
	9	270	179	323	215	413	274	450	300	585	389	429	285	555	369	310	206
	10	254	169	303	201	385	256	442	294	574	382	416	277	538	358	305	203
	11	237	157	281	187	356	237	434	288	563	374	403	268	520	346	300	200
	12	219	146	260	173	327	217	424	282	550	366	388	258	501	333	295	196
	13	202	134	238	158	298	198	414	275	537	357	373	248	481	320	289	192
	14	185	123	217	144	270	179	404	268	523	348	358	238	460	306	283	188
	15	168	112	196	130	242	161	393	261	508	338	342	227	439	292	277	184
	16	152	101	176	117	216	143	381	254	493	328	326	217	417	278	270	179
	17	136	90.9	157	104	191	127	370	246	477	317	310	206	396	263	263	175
	18	121	81.1	140	93.1	170	113	358	238	461	306	293	195	374	248	256	170
	19	109	72.8	125	83.6	153	102	345	229	444	295	277	184	352	234	249	165
	20	98.7	65.7	113	75.4	138	92.0	333	221	428	284	260	173	330	219	241	160
	21	89.5	59.6	102	68.4	125	83.5	320	213	411	273	244	162	309	205	234	155
	22	81.6	54.3	93.7	62.3	114	76.0	307	204	394	262	228	152	288	191	226	150
	23	74.6	49.6	85.7	57.0	104	69.6	294	196	377	250	213	141	267	178	218	145
	24	68.5	45.6	78.7	52.4	96.0	63.9	281	187	360	239	198	131	248	165	210	140
	25	63.2	42.0	72.5	48.3	88.5	58.9	269	179	343	228	183	121	228	152	202	134
	26	58.4	38.8	67.1	44.6	81.8	54.4	256	170	326	217	169	112	211	140	194	129
	27	54.1	36.0	62.2	41.4			243	162	309	206	156	104	195	130	186	124
	28	50.3	33.5					231	153	293	195	145	97.0	182	121	178	119
	29							219	145	277	184	136	90.5	169	113	171	113
	30							207	137	261	174	127	84.5	158	105	163	108
	31							195	130	246	164	119	79.2	148	98.9	155	103
	32							183	122	231	153	111	74.3	139	92.8	148	98.6
	33							172	115	217	144	105	69.8	131	87.2	140	93.7
	34							162	108	204	136	98.9	65.8	123	82.2	133	88.9
	35							153	102	193	128	93.3	62.1	116	77.5	126	84.1
	36							145	96.6	182	121	88.2	58.7	110	73.3	119	79.5
	37							137	91.5	173	115	83.5	55.6	104	69.4	113	75.3
	38							130	86.7	164	109	79.2	52.7	98.9	65.8	107	71.4
	39							123	82.3	155	103	75.2	50.0	93.9	62.4	101	67.7
	40							117	78.2	148	98.5	71.5	47.5	89.2	59.4	96.8	64.4

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(t) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		12 x 8						14 x 6						14 x 10			
T	Nominal	0.313		0.375		0.500		0.313		0.375		0.500		0.375		0.500	
	Design	0.291		0.349		0.465		0.291		0.349		0.465		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	448	298	544	362	710	472	413	275	537	357	710	472	653	434	864	575
	2	447	297	542	361	708	471	412	274	534	355	706	470	652	433	863	574
	3	445	296	540	359	705	469	409	272	530	353	701	466	650	432	860	572
	4	442	294	536	357	700	466	405	269	525	349	693	461	647	430	856	570
	5	439	292	532	354	694	462	400	266	518	344	683	454	644	428	852	567
	6	435	289	527	350	687	457	394	262	509	339	671	447	640	426	846	563
	7	430	286	521	346	679	451	387	258	500	332	658	437	635	422	840	559
	8	424	282	514	342	669	445	380	252	488	325	642	427	630	419	832	554
	9	418	278	506	336	659	438	371	247	476	317	625	416	624	415	824	548
	10	411	273	497	331	647	430	362	241	463	308	607	404	617	410	815	542
	11	403	268	488	324	634	422	352	234	448	298	587	390	609	405	805	535
	12	395	263	478	318	621	413	341	227	433	288	566	376	601	400	794	528
	13	387	257	467	310	606	403	330	219	417	277	544	362	593	394	782	520
	14	378	251	456	303	591	393	318	211	401	266	521	347	584	388	770	512
	15	368	245	444	295	575	383	306	203	384	255	498	331	574	382	756	503
	16	358	238	431	287	559	372	293	195	366	244	474	315	564	375	743	494
	17	348	232	419	278	542	360	281	187	349	232	450	299	553	368	728	484
	18	338	225	406	270	524	349	268	178	331	220	426	283	542	361	713	474
	19	327	217	392	261	506	337	255	169	313	208	402	267	531	353	698	464
	20	316	210	378	252	488	325	242	161	295	196	378	251	519	345	682	453
	21	305	203	365	242	470	312	229	152	278	184	354	235	507	337	665	442
	22	294	195	351	233	451	300	216	144	260	173	331	220	495	329	648	431
	23	282	188	337	224	433	288	203	135	243	162	308	205	482	321	631	420
	24	271	180	323	214	414	275	191	127	227	151	286	190	469	312	614	408
	25	260	173	308	205	395	263	179	119	211	140	264	175	456	303	596	397
	26	248	165	294	196	377	251	167	111	195	129	244	162	443	295	578	385
	27	237	157	281	187	359	238	155	103	180	120	226	150	430	286	560	373
	28	226	150	267	177	341	226	144	96.2	168	111	210	140	417	277	542	361
	29	215	143	253	168	323	215	134	89.7	156	104	196	130	403	268	524	349
	30	204	136	240	160	305	203	125	83.8	146	97.5	183	122	390	259	506	337
	31	193	128	227	151	288	192	117	78.4	137	91.3	171	114	376	250	488	325
	32	183	122	215	143	271	180	110	73.6	128	85.7	161	107	363	241	470	313
	33	173	115	202	134	255	170	104	69.2	121	80.5	151	100	350	232	452	301
	34	163	108	190	126	240	160	98.0	65.2	114	75.9	142	95.1	336	224	435	289
	35	153	102	179	119	227	151	92.5	61.5	107	71.6	134	89.7	323	215	417	277
	36	145	96.8	170	113	214	142	87.4	58.2	101	67.7	127	84.8	310	206	400	266
	37	137	91.6	160	107	203	135	82.8	55.1	96.3	64.1	120	80.3	298	198	383	255
	38	130	86.8	152	101	192	128	78.5	52.2	91.3	60.7	114	76.1	285	190	366	244
	39	123	82.4	144	96.3	183	121	74.5	49.5	86.7	57.7	108	72.2	273	181	350	233
	40	117	78.4	137	91.6	174	115	70.8	47.1	82.4	54.8	103	68.7	261	173	333	222

Table 10(u) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		14 x 10		16 x 8								16 x 12			
T	Nominal	0.625		0.250		0.313		0.375		0.500		0.625		0.375		0.500	
	Design	0.581		0.233		0.291		0.349		0.465		0.581		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1060	706	341	227	471	314	613	407	864	575	1060	706	728	484	1010	677
	2	1060	705	341	227	470	313	611	406	862	573	1050	704	728	484	1010	676
	3	1050	703	340	226	469	312	609	405	858	571	1050	701	726	483	1010	675
	4	1050	700	338	225	466	310	605	403	853	567	1040	696	724	482	1010	673
	5	1040	696	336	224	463	308	601	400	846	563	1030	691	722	480	1000	671
	6	1030	691	334	222	460	306	596	396	838	557	1020	684	719	478	1000	668
	7	1030	686	331	220	456	303	590	392	828	551	1010	676	715	476	998	664
	8	1020	679	328	218	451	300	583	388	817	544	1000	667	711	473	992	660
	9	1010	672	325	216	445	296	575	382	805	536	987	656	707	470	985	655
	10	999	665	321	213	439	292	566	377	792	527	970	645	702	467	978	650
	11	987	656	316	210	433	288	557	370	777	517	952	633	696	463	969	645
	12	973	647	312	207	426	283	547	364	762	507	932	620	690	459	960	639
	13	958	637	307	204	418	278	536	357	745	496	911	606	684	455	950	632
	14	942	627	302	201	410	273	525	349	728	484	889	591	677	450	940	625
	15	926	616	296	197	402	267	513	341	709	472	866	576	669	445	929	618
	16	908	604	291	193	393	261	500	333	690	459	842	560	661	440	917	610
	17	890	592	285	189	384	255	488	324	671	446	817	544	653	434	905	602
	18	871	580	278	185	374	249	474	315	650	433	792	527	645	429	892	593
	19	852	567	272	181	365	242	461	306	629	419	765	509	636	423	878	584
	20	832	553	265	176	355	236	447	297	608	405	739	491	626	417	864	575
	21	811	540	259	172	344	229	432	287	587	390	712	473	617	410	850	565
	22	790	526	252	167	334	222	418	278	565	376	685	455	607	404	835	555
	23	769	511	245	163	323	215	403	268	543	361	657	437	597	397	820	545
	24	747	497	237	158	313	208	388	258	521	346	630	419	586	390	804	535
	25	725	482	230	153	302	201	374	248	499	332	602	401	575	383	788	524
	26	703	467	223	148	291	193	359	239	477	317	575	383	564	375	772	513
	27	681	453	216	143	280	186	344	229	455	303	548	365	553	368	755	502
	28	658	438	208	138	269	179	329	219	434	289	521	347	542	360	738	491
	29	636	423	201	133	259	172	315	209	413	274	495	329	530	353	721	480
	30	613	408	193	129	248	165	300	200	392	261	469	312	519	345	704	468
	31	591	393	186	124	237	158	286	190	371	247	444	295	507	337	686	457
	32	568	378	179	119	227	151	272	181	351	234	419	279	495	329	669	445
	33	546	363	172	114	217	144	259	172	331	220	394	262	483	321	651	433
	34	524	349	165	109	206	137	245	163	312	207	372	247	471	313	634	421
	35	503	334	157	105	197	131	232	154	295	196	351	233	459	305	616	410
	36	481	320	151	100	187	124	219	146	278	185	331	220	447	297	598	398
	37	460	306	144	95.9	177	118	207	138	263	175	314	209	434	289	581	386
	38	440	292	137	91.5	168	111	197	131	250	166	297	198	422	281	563	374
	39	419	279	130	87.0	159	106	187	124	237	158	282	188	410	273	545	363
	40	399	265	124	82.7	151	101	177	118	225	150	268	178	398	265	528	351

Table 10(v) Available Strength in Axial Compression, Kips

Fy = 46 ksi

Nominal Size		16 x 12				20 x 12						24 x 12					
T	Nominal	0.625		0.750		0.500		0.625		0.750		0.500		0.625		0.750	
	Design	0.581		0.698		0.465		0.581		0.698		0.465		0.581		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1250	834	1480	988	1120	749	1440	962	1710	1140	1320	882	1630	1090	1940	1290
	2	1250	833	1480	986	1120	748	1440	961	1710	1140	1320	881	1630	1080	1940	1290
	3	1250	831	1470	984	1120	747	1440	959	1710	1130	1320	880	1630	1080	1940	1290
	4	1240	829	1470	981	1120	745	1430	956	1700	1130	1310	877	1620	1080	1930	1280
	5	1240	826	1460	977	1110	742	1430	953	1690	1130	1310	874	1620	1080	1920	1280
	6	1230	822	1460	973	1110	739	1420	949	1690	1120	1300	871	1610	1070	1920	1270
	7	1220	818	1450	967	1100	736	1410	944	1680	1110	1300	866	1600	1070	1910	1270
	8	1220	812	1440	961	1100	731	1410	938	1670	1110	1290	862	1600	1060	1890	1260
	9	1210	807	1430	954	1090	727	1400	932	1660	1100	1280	856	1580	1050	1880	1250
	10	1200	800	1420	946	1080	722	1390	925	1640	1090	1270	850	1570	1050	1870	1240
	11	1190	793	1410	938	1070	716	1370	917	1630	1080	1260	843	1560	1040	1850	1230
	12	1180	786	1390	929	1060	710	1360	909	1610	1070	1250	836	1550	1030	1840	1220
	13	1160	777	1380	919	1050	703	1350	900	1600	1060	1240	828	1530	1020	1820	1210
	14	1150	769	1360	908	1040	696	1330	890	1580	1050	1230	820	1520	1010	1800	1200
	15	1140	759	1340	897	1030	689	1320	880	1560	1040	1210	811	1500	1000	1780	1180
	16	1120	749	1330	885	1020	681	1300	869	1540	1020	1200	802	1480	989	1760	1170
	17	1110	739	1310	873	1010	672	1290	858	1520	1010	1190	792	1460	976	1740	1150
	18	1090	728	1290	860	998	664	1270	846	1500	1000	1170	782	1440	963	1710	1140
	19	1070	717	1270	846	984	654	1250	834	1480	986	1150	771	1420	950	1690	1120
	20	1060	706	1250	832	970	645	1230	821	1450	970	1140	760	1400	936	1660	1100
	21	1040	693	1220	817	955	635	1210	808	1430	954	1120	748	1380	921	1630	1090
	22	1020	681	1200	803	940	625	1190	794	1410	938	1100	736	1360	906	1610	1070
	23	1000	668	1180	787	924	615	1170	780	1380	921	1080	724	1330	891	1580	1050
	24	985	655	1160	771	908	604	1150	765	1350	903	1060	711	1310	875	1550	1030
	25	965	642	1130	755	891	593	1120	751	1330	886	1050	698	1290	859	1520	1010
	26	945	628	1110	739	875	582	1100	735	1300	867	1030	685	1260	842	1490	995
	27	924	614	1080	722	857	570	1080	720	1270	849	1000	671	1240	825	1460	974
	28	903	600	1060	705	840	559	1050	705	1240	830	989	658	1210	808	1430	954
	29	881	586	1030	688	822	547	1030	689	1210	811	968	644	1180	790	1400	933
	30	860	572	1000	671	804	535	1010	673	1190	792	947	630	1160	773	1370	911
	31	838	557	983	654	786	523	987	657	1160	772	925	615	1130	755	1330	890
	32	816	543	957	636	768	511	963	640	1130	753	904	601	1100	737	1300	868
	33	794	528	930	619	749	498	938	624	1100	733	882	587	1080	719	1270	847
	34	772	514	904	601	731	486	913	608	1070	714	860	572	1050	701	1240	825
	35	750	499	878	584	712	474	889	591	1040	694	838	557	1020	682	1200	803
	36	728	484	851	566	693	461	864	575	1010	674	816	543	998	664	1170	781
	37	706	470	825	549	675	449	839	558	984	654	794	528	971	646	1140	759
	38	684	455	799	531	656	436	814	542	954	635	772	513	943	628	1100	737
	39	662	441	773	514	637	424	790	525	925	615	750	499	916	609	1070	715
	40	641	426	747	497	619	412	765	509	895	596	728	484	889	591	1040	693

Table 10(w) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		2 x 2						2.5 x 2.5						3 x 3			
T	Nominal	0.180		0.188		0.250		0.180		0.188		0.250		0.180		0.188	
	Design	0.167		0.174		0.233		0.167		0.174		0.233		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective Length KL (ft) with respect to least radius of gyration ry	1	50.8	33.8	52.6	35.0	66.3	44.1	66.1	43.9	68.5	45.5	87.6	58.3	81.2	54.0	84.3	56.0
	2	47.9	31.9	49.6	33.0	62.2	41.4	63.7	42.4	66.0	43.9	84.3	56.1	79.3	52.7	82.2	54.7
	3	43.5	28.9	44.9	29.9	55.9	37.2	60.0	39.9	62.2	41.4	79.1	52.6	76.2	50.7	79.0	52.5
	4	38.0	25.2	39.2	26.0	48.2	32.0	55.2	36.7	57.2	38.0	72.3	48.1	72.0	47.9	74.6	49.6
	5	31.9	21.2	32.8	21.8	39.8	26.4	49.6	33.0	51.3	34.1	64.5	42.9	67.0	44.5	69.4	46.2
	6	25.7	17.1	26.4	17.6	31.4	20.9	43.5	28.9	45.0	29.9	56.0	37.2	61.3	40.8	63.5	42.2
	7	19.9	13.2	20.4	13.6	23.8	15.8	37.3	24.8	38.5	25.6	47.4	31.5	55.2	36.7	57.2	38.0
	8	15.3	10.1	15.6	10.4	18.2	12.1	31.2	20.7	32.1	21.4	39.1	26.0	48.9	32.5	50.6	33.7
	9	12.0	8.04	12.3	8.24	14.4	9.59	25.4	16.9	26.1	17.4	31.4	20.9	42.7	28.4	44.1	29.3
	10	9.79	6.51	10.0	6.67	11.6	7.77	20.6	13.7	21.2	14.1	25.5	16.9	36.6	24.4	37.8	25.1
	11	8.09	5.38	8.29	5.52	9.65	6.42	17.0	11.3	17.5	11.6	21.0	14.0	30.9	20.5	31.8	21.2
	12	6.80	4.52	6.97	4.63			14.3	9.52	14.7	9.80	17.7	11.7	25.9	17.2	26.8	17.8
	13							12.2	8.11	12.5	8.35	15.0	10.0	22.1	14.7	22.8	15.1
	14							10.5	7.00	10.8	7.20	13.0	8.66	19.0	12.7	19.6	13.1
	15							9.16	6.09	9.43	6.27	11.3	7.54	16.6	11.0	17.1	11.4
	16													14.6	9.72	15.0	10.0
	17													12.9	8.61	13.3	8.88
	18													11.5	7.68	11.9	7.92
	19													10.3	6.89	10.6	7.11
	20																
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(x) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		3 x 3		3.5 x 3.5						4 x 4							
T	Nominal	0.250		0.180		0.188		0.250		0.180		0.188		0.250		0.313	
	Design	0.233		0.167		0.174		0.233		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	108	72.4	96.3	64.1	100	66.5	129	86.4	111	74.1	115	77.0	151	100	183	122
	2	106	70.5	94.7	63.0	98.3	65.4	127	84.8	110	73.2	114	76.0	148	99.1	181	120
	3	101	67.6	92.0	61.2	95.5	63.5	123	82.3	107	71.6	111	74.3	145	96.8	176	117
	4	95.7	63.7	88.3	58.8	91.7	61.0	118	78.9	104	69.4	108	72.1	141	93.8	171	113
	5	88.7	59.0	83.8	55.8	87.0	57.9	112	74.7	100	66.8	104	69.3	135	90.0	163	109
	6	80.7	53.7	78.7	52.3	81.6	54.3	105	69.9	95.7	63.6	99.3	66.0	128	85.6	155	103
	7	72.3	48.1	73.0	48.5	75.7	50.3	97.0	64.5	90.4	60.1	93.8	62.4	121	80.7	146	97.3
	8	63.6	42.3	66.9	44.5	69.3	46.1	88.6	58.9	84.6	56.3	87.8	58.4	113	75.4	136	90.7
	9	55.0	36.6	60.6	40.3	62.8	41.8	79.9	53.1	78.6	52.3	81.5	54.2	104	69.8	125	83.7
	10	46.8	31.1	54.3	36.1	56.2	37.4	71.2	47.3	72.3	48.1	75.0	49.9	96.2	64.0	115	76.5
	11	39.1	26.0	48.1	32.0	49.8	33.1	62.7	41.7	66.0	43.9	68.4	45.5	87.4	58.1	104	69.2
	12	32.8	21.8	42.1	28.0	43.5	28.9	54.5	36.2	59.7	39.7	61.8	41.1	78.7	52.4	93.4	62.1
	13	28.0	18.6	36.3	24.2	37.5	25.0	46.7	31.1	53.5	35.6	55.4	36.8	70.3	46.7	83.0	55.2
	14	24.1	16.0	31.3	20.8	32.4	21.5	40.3	26.8	47.6	31.6	49.2	32.7	62.1	41.3	73.0	48.6
	15	21.0	14.0	27.3	18.1	28.2	18.7	35.1	23.3	41.8	27.8	43.2	28.8	54.3	36.1	63.7	42.3
	16	18.4	12.3	24.0	15.9	24.8	16.5	30.8	20.5	36.7	24.4	38.0	25.3	47.8	31.8	55.9	37.2
	17	16.3	10.9	21.2	14.1	21.9	14.6	27.3	18.1	32.5	21.6	33.7	22.4	42.3	28.1	49.5	32.9
	18	14.6	9.72	18.9	12.6	19.6	13.0	24.3	16.2	29.0	19.3	30.0	20.0	37.7	25.1	44.2	29.4
	19			17.0	11.3	17.6	11.7	21.8	14.5	26.0	17.3	26.9	17.9	33.9	22.5	39.7	26.4
	20			15.3	10.2	15.8	10.5	19.7	13.1	23.5	15.6	24.3	16.2	30.5	20.3	35.8	23.8
	21			13.9	9.27	14.4	9.58	17.9	11.9	21.3	14.2	22.0	14.6	27.7	18.4	32.5	21.6
	22			12.7	8.45	13.1	8.73			19.4	12.9	20.1	13.3	25.2	16.8	29.6	19.7
	23									17.8	11.8	18.4	12.2	23.1	15.3	27.0	18.0
	24									16.3	10.8	16.9	11.2	21.2	14.1	24.8	16.5
	25									15.0	10.0	15.5	10.3	19.5	13.0		
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(y) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		4 x 4		4.5 x 4.5								5 x 5					
T	Nominal	0.375		0.180		0.188		0.250		0.313		0.180		0.188		0.250	
	Design	0.349		0.167		0.174		0.233		0.291		0.167		0.174		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	214	142	126	84.2	131	87.5	172	114	209	139	141	94.2	147	97.9	193	128
	2	211	140	125	83.3	130	86.6	170	113	207	138	140	93.4	146	97.1	191	127
	3	205	137	123	81.9	127	85.1	167	111	203	135	138	92.2	144	95.8	188	125
	4	198	132	120	80.0	124	83.1	163	108	198	132	135	90.4	141	94.0	185	123
	5	190	126	116	77.6	121	80.6	158	105	192	127	132	88.2	137	91.7	180	120
	6	180	120	112	74.7	116	77.6	152	101	184	122	128	85.6	133	88.9	174	116
	7	169	112	107	71.5	111	74.2	145	96.6	176	117	124	82.6	129	85.8	168	112
	8	157	104	102	67.9	106	70.5	137	91.6	166	110	119	79.3	123	82.4	161	107
	9	144	96.2	96.3	64.1	100	66.5	129	86.2	156	104	113	75.7	118	78.6	154	102
	10	131	87.6	90.3	60.0	93.7	62.3	121	80.6	146	97.2	108	71.8	112	74.6	145	97.1
	11	118	79.0	84.0	55.9	87.2	58.0	112	74.8	135	90.0	102	67.8	105	70.4	137	91.5
	12	106	70.6	77.7	51.7	80.6	53.6	103	69.0	124	82.8	95.7	63.7	99.4	66.1	128	85.7
	13	93.8	62.4	71.3	47.4	74.0	49.2	94.9	63.1	113	75.5	89.4	59.5	92.8	61.7	120	79.8
	14	82.0	54.6	65.1	43.3	67.4	44.8	86.3	57.4	102	68.4	83.0	55.2	86.1	57.3	111	74.0
	15	71.5	47.5	58.9	39.2	61.1	40.6	77.9	51.8	92.5	61.5	76.7	51.0	79.5	52.9	102	68.1
	16	62.8	41.8	53.0	35.3	54.9	36.5	69.8	46.4	82.6	54.9	70.5	46.9	73.1	48.6	93.8	62.4
	17	55.6	37.0	47.3	31.4	48.9	32.5	62.0	41.2	73.2	48.7	64.4	42.8	66.7	44.4	85.5	56.9
	18	49.6	33.0	42.2	28.0	43.6	29.0	55.3	36.8	65.2	43.4	58.5	38.9	60.6	40.3	77.4	51.5
	19	44.5	29.6	37.8	25.2	39.2	26.0	49.6	33.0	58.6	38.9	52.7	35.1	54.6	36.3	69.6	46.3
	20	40.2	26.7	34.1	22.7	35.3	23.5	44.8	29.8	52.8	35.1	47.6	31.6	49.3	32.8	62.8	41.8
	21	36.4	24.2	31.0	20.6	32.0	21.3	40.6	27.0	47.9	31.9	43.2	28.7	44.7	29.7	57.0	37.9
	22	33.2	22.1	28.2	18.7	29.2	19.4	37.0	24.6	43.7	29.0	39.3	26.1	40.7	27.1	51.9	34.5
	23	30.4	20.2	25.8	17.2	26.7	17.8	33.8	22.5	39.9	26.6	36.0	23.9	37.3	24.8	47.5	31.6
	24	27.9	18.5	23.7	15.7	24.5	16.3	31.1	20.7	36.7	24.4	33.0	22.0	34.2	22.7	43.6	29.0
	25			21.8	14.5	22.6	15.0	28.6	19.0	33.8	22.5	30.4	20.2	31.5	21.0	40.2	26.7
	26			20.2	13.4	20.9	13.9	26.5	17.6	31.2	20.8	28.1	18.7	29.1	19.4	37.1	24.7
	27			18.7	12.4	19.4	12.9	24.5	16.3	29.0	19.3	26.1	17.3	27.0	18.0	34.4	22.9
	28			17.4	11.6	18.0	12.0	22.8	15.2	26.9	17.9	24.3	16.1	25.1	16.7	32.0	21.3
	29			16.2	10.8	16.8	11.1					22.6	15.0	23.4	15.6	29.8	19.8
	30											21.1	14.0	21.9	14.5	27.9	18.5
	31											19.8	13.1	20.5	13.6	26.1	17.4
	32											18.6	12.3	19.2	12.8	24.5	16.3
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(z) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		5 x 5						6 x 6									
T	Nominal	0.313		0.375		0.500		0.180		0.188		0.250		0.313		0.375	
	Design	0.291		0.349		0.465		0.167		0.174		0.233		0.291		0.349	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	236	157	277	184	353	235	171	114	178	118	235	156	288	192	340	226
	2	234	155	274	182	350	232	170	113	177	118	233	155	286	190	338	224
	3	230	153	270	180	344	229	169	112	175	117	231	154	284	189	334	222
	4	226	150	265	176	336	224	167	111	173	115	228	151	280	186	330	219
	5	220	146	257	171	327	217	164	109	170	113	224	149	275	183	324	215
	6	213	141	249	166	316	210	160	107	167	111	219	146	269	179	316	210
	7	205	136	240	159	303	201	157	104	163	108	214	142	262	174	308	205
	8	196	130	229	152	289	192	152	101	158	105	208	138	254	169	299	199
	9	187	124	218	145	273	182	147	98.3	153	102	201	134	246	164	289	192
	10	177	117	205	137	257	171	142	94.9	148	98.6	194	129	237	157	278	185
	11	166	110	193	128	240	160	137	91.2	142	94.8	186	124	227	151	266	177
	12	155	103	180	120	223	148	131	87.4	136	90.8	178	118	217	144	254	169
	13	144	96.3	167	111	206	137	125	83.4	130	86.6	170	113	207	137	242	161
	14	133	89.0	154	102	189	126	119	79.2	123	82.3	161	107	196	130	229	152
	15	123	81.8	141	94.1	172	115	112	75.1	117	78.0	152	101	185	123	216	143
	16	112	74.7	128	85.8	156	104	106	70.8	110	73.5	143	95.7	174	116	203	135
	17	102	67.9	116	77.7	140	93.7	100	66.6	103	69.1	135	89.8	163	108	190	126
	18	92.1	61.3	105	69.8	125	83.7	93.7	62.3	97.3	64.7	126	83.9	152	101	177	117
	19	82.7	55.0	94.2	62.7	112	75.1	87.4	58.2	90.7	60.4	117	78.2	141	94.4	164	109
	20	74.6	49.6	85.0	56.5	101	67.8	81.3	54.0	84.3	56.1	109	72.5	131	87.4	151	101
	21	67.7	45.0	77.1	51.3	92.4	61.5	75.2	50.0	78.1	51.9	100	67.0	121	80.6	139	92.9
	22	61.6	41.0	70.2	46.7	84.2	56.0	69.4	46.2	72.0	47.9	92.7	61.7	111	73.9	127	85.0
	23	56.4	37.5	64.3	42.7	77.0	51.2	63.7	42.3	66.0	43.9	84.8	56.4	101	67.6	116	77.8
	24	51.8	34.4	59.0	39.2	70.7	47.0	58.5	38.9	60.6	40.3	77.9	51.8	93.4	62.1	107	71.4
	25	47.7	31.7	54.4	36.2	65.2	43.4	53.9	35.8	55.9	37.1	71.8	47.7	86.1	57.2	99.0	65.8
	26	44.1	29.3	50.3	33.4	60.3	40.1	49.8	33.1	51.6	34.3	66.4	44.1	79.6	52.9	91.5	60.9
	27	40.9	27.2	46.6	31.0	55.9	37.2	46.2	30.7	47.9	31.8	61.5	40.9	73.8	49.1	84.8	56.4
	28	38.0	25.3	43.3	28.8	52.0	34.5	42.9	28.5	44.5	29.6	57.2	38.1	68.6	45.6	78.9	52.5
	29	35.5	23.6	40.4	26.9	48.4	32.2	40.0	26.6	41.5	27.6	53.3	35.5	63.9	42.5	73.5	48.9
	30	33.1	22.0	37.8	25.1	45.2	30.1	37.4	24.9	38.8	25.8	49.8	33.1	59.7	39.7	68.7	45.7
	31	31.0	20.6	35.4	23.5			35.0	23.3	36.3	24.1	46.7	31.0	55.9	37.2	64.4	42.8
	32							32.9	21.8	34.1	22.7	43.8	29.1	52.5	34.9	60.4	40.2
	33							30.9	20.5	32.0	21.3	41.2	27.4	49.4	32.8	56.8	37.8
	34							29.1	19.3	30.2	20.1	38.8	25.8	46.5	30.9	53.5	35.6
	35							27.5	18.3	28.5	18.9	36.6	24.3	43.9	29.2	50.5	33.6
	36							26.0	17.3	26.9	17.9	34.6	23.0	41.5	27.6	47.7	31.7
	37							24.6	16.3	25.5	16.9	32.7	21.8	39.3	26.1	45.2	30.0
	38							23.3	15.5	24.1	16.1	31.0	20.6	37.2	24.7	42.8	28.5
	39							22.1	14.7	22.9	15.2						
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(aa) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		6 x 6		7 x 7										8 x 8	
T	Nominal	0.500		0.180		0.188		0.250		0.313		0.375		0.500		0.180	
	Design	0.465		0.167		0.174		0.233		0.291		0.349		0.465		0.167	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	437	290	187	125	201	133	277	184	341	226	403	268	521	346	195	130
	2	434	289	187	124	200	133	275	183	339	225	401	267	518	345	195	129
	3	429	286	186	123	199	132	274	182	337	224	398	265	514	342	194	129
	4	423	281	184	122	197	131	271	180	333	222	394	262	509	338	193	128
	5	415	276	182	121	194	129	268	178	329	219	389	259	502	334	191	127
	6	405	270	179	119	192	127	263	175	324	215	383	254	494	328	189	126
	7	394	262	176	117	188	125	259	172	318	211	375	250	484	322	187	124
	8	382	254	173	115	185	123	253	168	311	207	367	244	473	315	185	123
	9	368	245	169	112	181	120	247	164	304	202	358	238	461	307	182	121
	10	354	235	165	110	176	117	241	160	296	197	349	232	448	298	179	119
	11	338	225	161	107	171	114	234	155	287	191	338	225	434	289	176	117
	12	322	214	156	104	166	110	226	151	278	185	327	217	419	279	172	114
	13	305	203	151	101	161	107	219	145	268	178	315	210	403	268	168	112
	14	288	192	146	97.6	155	103	211	140	258	171	303	201	387	257	164	109
	15	271	180	141	94.1	150	99.8	202	134	247	164	291	193	370	246	160	107
	16	254	169	135	90.4	144	95.8	194	129	237	157	278	185	353	235	156	104
	17	237	157	130	86.7	137	91.7	185	123	226	150	265	176	336	223	152	101
	18	220	146	124	82.9	131	87.6	176	117	215	143	252	167	319	212	147	98.1
	19	203	135	118	79.1	125	83.5	167	111	204	135	238	158	301	200	142	95.0
	20	187	124	113	75.3	119	79.3	158	105	193	128	225	150	284	189	138	91.8
	21	171	114	107	71.5	113	75.2	149	99.7	182	121	212	141	267	177	133	88.6
	22	156	104	101	67.7	106	71.0	141	93.9	171	114	199	132	250	166	128	85.3
	23	143	95.1	96.1	63.9	100	67.0	132	88.2	160	106	187	124	233	155	123	82.0
	24	131	87.3	90.5	60.2	94.7	63.0	124	82.6	150	100	174	116	217	144	118	78.7
	25	121	80.5	85.1	56.6	88.8	59.1	115	77.1	140	93.3	162	108	202	134	113	75.4
	26	111	74.4	79.7	53.0	83.0	55.2	107	71.8	130	86.6	150	100	186	124	108	72.1
	27	103	69.0	74.5	49.6	77.4	51.5	100	66.6	120	80.3	139	92.9	173	115	103	68.8
	28	96.5	64.2	69.3	46.1	72.0	47.9	93.0	61.9	112	74.6	129	86.4	161	107	98.6	65.6
	29	89.9	59.8	64.6	43.0	67.1	44.6	86.7	57.7	104	69.6	121	80.6	150	99.8	93.8	62.4
	30	84.0	55.9	60.4	40.2	62.7	41.7	81.0	53.9	97.8	65.0	113	75.3	140	93.3	89.1	59.3
	31	78.7	52.3	56.6	37.6	58.7	39.0	75.9	50.5	91.5	60.9	106	70.5	131	87.4	84.5	56.2
	32	73.8	49.1	53.1	35.3	55.1	36.6	71.2	47.4	85.9	57.1	99.5	66.2	123	82.0	79.9	53.2
	33	69.4	46.2	49.9	33.2	51.8	34.4	67.0	44.5	80.8	53.7	93.5	62.2	115	77.1	75.4	50.2
	34	65.4	43.5	47.0	31.3	48.8	32.4	63.1	42.0	76.1	50.6	88.1	58.6	109	72.6	71.1	47.3
	35	61.7	41.0	44.4	29.5	46.0	30.6	59.5	39.6	71.8	47.8	83.1	55.3	103	68.5	67.1	44.6
	36	58.3	38.8	41.9	27.9	43.5	28.9	56.3	37.4	67.9	45.1	78.6	52.3	97.4	64.8	63.4	42.2
	37	55.2	36.7	39.7	26.4	41.2	27.4	53.3	35.4	64.2	42.7	74.4	49.5	92.2	61.3	60.0	39.9
	38			37.6	25.0	39.0	26.0	50.5	33.6	60.9	40.5	70.5	46.9	87.4	58.1	56.9	37.8
	39			35.7	23.7	37.1	24.6	47.9	31.9	57.8	38.5	66.9	44.5	83.0	55.2	54.0	35.9
	40			34.0	22.6	35.2	23.4	45.6	30.3	55.0	36.6	63.6	42.3	78.9	52.5	51.3	34.1

Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(ab) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		8 x 8										10 x 10					
T	Nominal	0.188		0.250		0.313		0.375		0.500		0.250		0.313		0.375	
	Design	0.174		0.233		0.291		0.349		0.465		0.233		0.291		0.349	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	209	139	319	212	393	261	466	310	604	402	367	244	498	331	591	393
	2	209	139	318	211	392	261	464	309	602	401	367	244	497	330	590	392
	3	208	138	316	210	390	259	461	307	599	398	366	243	495	329	588	391
	4	207	137	314	208	387	257	458	304	594	395	364	242	493	328	585	389
	5	205	136	311	206	383	255	453	302	588	391	362	241	490	326	582	387
	6	203	135	307	204	379	252	448	298	581	386	360	239	486	323	577	384
	7	201	133	303	201	373	248	442	294	572	381	357	237	482	321	572	380
	8	198	131	298	198	367	244	434	289	563	374	354	235	477	317	566	377
	9	195	129	293	195	361	240	426	284	552	367	350	233	472	314	560	372
	10	192	127	287	191	353	235	418	278	540	359	346	230	466	310	552	367
	11	188	125	281	187	345	230	408	271	527	351	341	227	459	305	544	362
	12	184	122	274	182	337	224	398	265	514	342	337	224	452	301	536	356
	13	180	120	267	177	328	218	387	257	499	332	332	220	444	295	527	350
	14	176	117	259	172	319	212	376	250	484	322	326	217	436	290	517	344
	15	171	114	251	167	309	205	364	242	468	311	320	213	428	284	507	337
	16	166	110	243	162	299	198	352	234	452	301	314	209	419	279	496	330
	17	161	107	235	156	288	192	339	226	435	290	308	205	410	272	485	323
	18	156	104	226	150	277	184	327	217	418	278	302	201	400	266	474	315
	19	151	100	218	145	267	177	314	208	401	267	295	196	390	259	462	307
	20	146	97.4	209	139	256	170	300	200	384	255	288	191	380	253	449	299
	21	141	93.8	200	133	245	163	287	191	366	244	281	187	370	246	437	291
	22	135	90.2	191	127	233	155	274	182	349	232	274	182	359	239	424	282
	23	130	86.6	182	121	222	148	261	173	331	220	266	177	348	231	411	273
	24	124	83.0	173	115	211	140	248	165	314	209	259	172	337	224	398	265
	25	119	79.4	164	109	201	133	235	156	297	197	251	167	326	217	385	256
	26	114	75.8	156	103	190	126	222	147	280	186	243	162	315	209	372	247
	27	108	72.3	147	98.2	179	119	209	139	264	175	236	157	304	202	358	238
	28	103	68.8	139	92.7	169	112	197	131	248	165	228	151	293	195	345	229
	29	98.2	65.3	131	87.3	159	105	185	123	232	154	220	146	282	187	332	221
	30	93.1	61.9	123	81.9	149	99.2	173	115	217	144	212	141	271	180	319	212
	31	88.1	58.6	115	76.7	139	92.9	162	108	203	135	204	136	260	173	306	203
	32	83.2	55.4	108	72.0	131	87.2	152	101	190	127	197	131	249	165	293	195
	33	78.3	52.1	101	67.7	123	82.0	143	95.4	179	119	189	126	238	158	280	186
	34	73.8	49.1	95.8	63.8	116	77.3	135	89.9	169	112	182	121	228	151	267	178
	35	69.6	46.3	90.4	60.2	109	72.9	127	84.8	159	106	174	116	217	144	255	169
	36	65.8	43.8	85.5	56.9	103	68.9	120	80.1	150	100	167	111	207	138	243	161
	37	62.3	41.4	80.9	53.8	98.1	65.2	114	75.9	142	95.0	159	106	197	131	231	153
	38	59.1	39.3	76.7	51.0	93.0	61.8	108	71.9	135	90.0	152	101	187	124	219	145
	39	56.1	37.3	72.8	48.4	88.3	58.7	102	68.3	128	85.5	145	96.9	177	118	208	138
	40	53.3	35.4	69.2	46.0	83.9	55.8	97.6	64.9	122	81.2	138	92.2	169	112	197	131

Table 10(ac) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		10 x 10				12 x 12											
T	Nominal	0.500		0.625		0.250		0.313		0.375		0.500		0.625		0.750	
	Design	0.465		0.581		0.233		0.291		0.349		0.465		0.581		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	772	513	945	628	387	257	566	377	717	477	939	625	1150	768	1360	906
	2	770	512	943	627	386	257	566	376	716	476	938	624	1150	767	1360	905
	3	768	511	939	625	386	256	564	375	714	475	936	622	1140	765	1350	903
	4	764	508	934	622	385	256	563	374	712	474	933	620	1140	762	1350	899
	5	759	505	928	618	383	255	560	373	709	471	929	618	1140	759	1340	895
	6	753	501	921	613	382	254	558	371	705	469	924	614	1130	754	1330	890
	7	746	496	912	607	380	253	555	369	701	466	918	611	1120	750	1330	885
	8	738	491	902	600	378	251	551	366	696	463	911	606	1110	744	1320	878
	9	730	485	891	593	376	250	547	364	690	459	904	601	1100	738	1300	870
	10	720	479	879	585	373	248	542	361	684	455	896	596	1090	731	1290	862
	11	709	472	866	576	370	246	537	357	678	451	887	590	1080	724	1280	853
	12	698	464	851	566	367	244	532	354	670	446	877	583	1070	715	1260	843
	13	686	456	836	556	364	242	526	350	662	441	866	576	1060	707	1250	832
	14	673	447	820	545	360	239	520	346	654	435	855	569	1040	697	1230	821
	15	659	438	803	534	356	237	513	341	645	429	843	561	1030	687	1210	809
	16	645	429	785	522	352	234	507	337	636	423	831	553	1010	677	1190	797
	17	630	419	766	509	348	231	499	332	626	416	818	544	1000	666	1170	783
	18	614	409	747	497	344	228	492	327	616	410	804	535	984	655	1150	770
	19	598	398	727	483	339	225	484	322	605	403	790	525	966	643	1130	755
	20	582	387	707	470	334	222	476	316	594	395	775	516	948	630	1110	741
	21	566	376	686	456	329	219	467	311	583	388	760	506	929	618	1090	725
	22	549	365	665	442	324	215	459	305	571	380	744	495	909	605	1060	710
	23	531	353	643	428	319	212	450	299	559	372	729	485	889	592	1040	694
	24	514	342	622	413	313	208	440	293	547	364	712	474	869	578	1010	678
	25	497	330	600	399	308	205	431	287	535	355	696	463	848	564	994	661
	26	479	318	578	384	302	201	422	280	522	347	679	451	827	550	968	644
	27	461	307	556	370	296	197	412	274	509	339	662	440	806	536	943	627
	28	444	295	534	355	290	193	402	267	496	330	644	429	784	522	917	610
	29	426	283	512	341	284	189	392	261	483	321	627	417	762	507	891	593
	30	409	272	491	326	278	185	382	254	470	312	609	405	741	493	865	575
	31	391	260	470	312	272	181	372	248	456	303	592	393	719	478	838	558
	32	374	249	448	298	266	177	362	241	443	295	574	382	697	463	812	540
	33	358	238	428	284	260	173	352	234	430	286	556	370	675	449	786	523
	34	341	227	407	271	253	168	342	227	416	277	539	358	653	434	760	505
	35	325	216	387	258	247	164	332	221	403	268	521	346	631	420	734	488
	36	309	205	368	244	241	160	322	214	390	259	503	335	609	405	708	471
	37	293	195	348	231	234	156	311	207	377	250	486	323	588	391	682	454
	38	278	185	330	219	228	152	301	200	364	242	469	312	566	377	657	437
	39	263	175	313	208	222	147	291	194	351	233	452	300	545	363	632	420
	40	250	166	298	198	215	143	282	187	338	225	435	289	524	349	607	404

Table 10(ad) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		14 x 14												16 x 16			
T	Nominal	0.313		0.375		0.500		0.625		0.750		0.875		0.375		0.500	
	Design	0.291		0.349		0.465		0.581		0.698		0.814		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	593	395	807	537	1100	736	1360	907	1610	1070	1850	1230	843	560	1270	848
	2	593	394	807	536	1100	736	1360	906	1610	1070	1850	1230	842	560	1270	847
	3	592	394	805	536	1100	734	1350	904	1600	1070	1840	1230	841	559	1270	846
	4	591	393	803	534	1100	732	1350	902	1600	1060	1840	1220	840	559	1260	844
	5	589	392	801	533	1090	730	1350	899	1600	1060	1830	1220	838	557	1260	842
	6	588	391	798	531	1090	727	1340	896	1590	1060	1830	1210	836	556	1260	840
	7	585	389	795	529	1080	724	1340	891	1580	1050	1820	1210	834	554	1250	837
	8	583	388	791	526	1080	720	1330	887	1570	1040	1810	1200	831	553	1250	834
	9	580	386	786	523	1070	716	1320	881	1560	1040	1800	1190	828	550	1240	830
	10	577	384	782	520	1060	711	1310	875	1550	1030	1780	1180	824	548	1240	826
	11	573	381	776	516	1060	706	1300	869	1540	1020	1770	1180	820	545	1230	821
	12	570	379	770	512	1050	700	1290	862	1530	1010	1750	1170	816	543	1220	816
	13	566	376	764	508	1040	694	1280	854	1510	1010	1740	1150	811	540	1210	811
	14	561	373	757	504	1030	688	1270	846	1500	1000	1720	1140	806	536	1210	805
	15	557	370	750	499	1020	681	1250	837	1480	989	1700	1130	801	533	1200	799
	16	552	367	743	494	1010	674	1240	828	1470	978	1680	1120	795	529	1190	792
	17	547	364	735	489	1000	666	1230	818	1450	967	1660	1100	790	525	1180	786
	18	541	360	726	483	989	658	1210	808	1430	954	1640	1090	783	521	1170	778
	19	536	356	718	477	976	649	1190	798	1410	942	1620	1070	777	517	1150	771
	20	530	352	708	471	963	641	1180	787	1390	928	1590	1060	770	512	1140	763
	21	524	348	699	465	949	631	1160	775	1370	915	1570	1040	763	507	1130	755
	22	517	344	689	458	935	622	1140	763	1350	901	1550	1030	755	502	1120	746
	23	511	340	679	452	921	612	1130	751	1330	886	1520	1010	748	497	1100	737
	24	504	335	669	445	906	602	1110	739	1300	871	1490	996	740	492	1090	728
	25	497	330	658	438	890	592	1090	726	1280	855	1470	978	732	487	1080	719
	26	490	326	647	430	875	582	1070	713	1260	840	1440	960	723	481	1060	709
	27	482	321	636	423	859	571	1050	700	1230	824	1410	941	715	475	1050	699
	28	475	316	625	415	842	560	1030	686	1210	807	1380	922	706	469	1030	689
	29	467	311	613	408	826	549	1010	672	1180	791	1350	903	697	463	1020	679
	30	460	306	601	400	809	538	990	658	1160	774	1320	883	688	457	1000	668
	31	452	300	589	392	792	527	968	644	1130	757	1290	863	678	451	989	658
	32	444	295	577	384	775	515	947	630	1110	740	1260	843	669	445	972	647
	33	436	290	565	376	757	504	925	615	1080	723	1230	823	659	438	956	636
	34	427	284	553	368	740	492	903	601	1060	705	1200	803	649	432	939	625
	35	419	279	541	359	722	480	881	586	1030	688	1170	783	639	425	922	613
	36	411	273	528	351	704	468	859	572	1000	670	1140	762	629	418	905	602
	37	402	267	516	343	687	457	837	557	981	653	1110	742	618	411	887	590
	38	394	262	503	335	669	445	815	542	955	635	1080	722	608	404	870	579
	39	385	256	491	326	651	433	793	528	928	617	1050	701	597	397	852	567
	40	377	250	478	318	633	421	771	513	902	600	1020	681	587	390	835	555

Table 10(ae) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		16 x 16						18 x 18								20 x 20	
T	Nominal	0.625		0.750		0.875		0.500		0.625		0.750		0.875		0.500	
	Design	0.581		0.698		0.814		0.465		0.581		0.698		0.814		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1570	1040	1860	1240	2140	1420	1440	959	1780	1180	2110	1400	2440	1620	1580	1050
	2	1570	1040	1860	1240	2140	1420	1440	959	1780	1180	2110	1400	2430	1620	1580	1050
	3	1560	1040	1860	1230	2140	1420	1430	958	1770	1180	2110	1400	2430	1620	1580	1050
	4	1560	1040	1850	1230	2130	1420	1430	956	1770	1180	2110	1400	2430	1610	1580	1050
	5	1560	1030	1850	1230	2130	1410	1430	954	1770	1170	2100	1400	2420	1610	1570	1040
	6	1550	1030	1840	1220	2120	1410	1430	952	1760	1170	2100	1390	2420	1610	1570	1040
	7	1550	1030	1840	1220	2110	1400	1420	950	1760	1170	2090	1390	2410	1600	1570	1040
	8	1540	1020	1830	1210	2110	1400	1420	947	1750	1170	2080	1380	2400	1600	1560	1040
	9	1530	1020	1820	1210	2100	1390	1410	943	1750	1160	2080	1380	2390	1590	1560	1040
	10	1530	1010	1810	1200	2080	1380	1410	940	1740	1160	2070	1370	2380	1580	1550	1030
	11	1520	1010	1800	1200	2070	1380	1400	936	1730	1150	2060	1370	2370	1580	1550	1030
	12	1510	1000	1790	1190	2060	1370	1400	931	1720	1150	2050	1360	2360	1570	1540	1020
	13	1500	1000	1780	1180	2040	1360	1390	926	1720	1140	2040	1350	2350	1560	1540	1020
	14	1490	993	1760	1170	2030	1350	1380	921	1710	1130	2030	1350	2330	1550	1530	1020
	15	1480	985	1750	1160	2010	1340	1370	916	1700	1130	2010	1340	2320	1540	1520	1010
	16	1460	977	1730	1150	2000	1330	1360	910	1680	1120	2000	1330	2300	1530	1510	1010
	17	1450	968	1720	1140	1980	1310	1350	904	1670	1110	1990	1320	2290	1520	1510	1000
	18	1440	959	1700	1130	1960	1300	1340	897	1660	1100	1970	1310	2270	1510	1500	999
	19	1420	949	1690	1120	1940	1290	1330	890	1650	1090	1950	1300	2250	1500	1490	993
	20	1410	939	1670	1110	1920	1270	1320	883	1630	1090	1940	1290	2230	1480	1480	987
	21	1390	929	1650	1100	1890	1260	1310	875	1620	1080	1920	1280	2210	1470	1470	980
	22	1380	918	1630	1080	1870	1240	1300	868	1600	1070	1900	1270	2190	1460	1460	973
	23	1360	907	1610	1070	1850	1230	1290	860	1590	1060	1890	1250	2170	1440	1450	966
	24	1340	896	1590	1060	1820	1210	1280	851	1570	1050	1870	1240	2150	1430	1440	958
	25	1320	884	1570	1040	1800	1200	1260	843	1560	1030	1850	1230	2130	1410	1420	951
	26	1310	872	1550	1030	1770	1180	1250	834	1540	1020	1830	1210	2100	1400	1410	943
	27	1290	860	1520	1010	1750	1160	1240	825	1520	1010	1810	1200	2080	1380	1400	935
	28	1270	847	1500	1000	1720	1140	1220	815	1510	1000	1790	1190	2050	1360	1390	926
	29	1250	834	1480	985	1690	1130	1210	806	1490	993	1760	1170	2030	1350	1370	918
	30	1230	821	1450	970	1670	1110	1190	796	1470	981	1740	1160	2000	1330	1360	909
	31	1210	808	1430	954	1640	1090	1180	786	1450	968	1720	1140	1980	1310	1350	900
	32	1190	794	1400	937	1610	1070	1160	776	1430	955	1700	1130	1950	1300	1330	890
	33	1170	780	1380	921	1580	1050	1150	765	1410	942	1670	1110	1920	1280	1320	881
	34	1150	766	1350	904	1550	1030	1130	755	1390	929	1650	1100	1890	1260	1310	871
	35	1130	752	1330	887	1520	1010	1110	744	1370	916	1620	1080	1870	1240	1290	862
	36	1110	738	1300	870	1490	995	1100	733	1350	902	1600	1060	1840	1220	1280	852
	37	1080	724	1280	853	1460	975	1080	722	1330	888	1570	1050	1810	1200	1260	841
	38	1060	709	1250	835	1430	955	1060	711	1310	875	1550	1030	1780	1180	1240	831
	39	1040	695	1220	818	1400	934	1050	700	1290	860	1520	1010	1750	1160	1230	821
	40	1020	680	1200	800	1370	914	1030	688	1270	846	1500	1000	1720	1140	1210	810

Table 10(af) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		20 x 20						22 x 22	
T	Nominal	0.625		0.750		0.875		0.750	
	Design	0.581		0.698		0.814		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1990	1320	2360	1570	2730	1810	2610	1740
	2	1990	1320	2360	1570	2730	1810	2610	1740
	3	1980	1320	2360	1570	2730	1810	2610	1740
	4	1980	1320	2360	1570	2720	1810	2610	1730
	5	1980	1310	2350	1560	2720	1810	2610	1730
	6	1970	1310	2350	1560	2710	1800	2600	1730
	7	1970	1310	2340	1560	2710	1800	2600	1730
	8	1970	1310	2340	1550	2700	1790	2590	1720
	9	1960	1300	2330	1550	2690	1790	2590	1720
	10	1950	1300	2320	1540	2680	1780	2580	1710
	11	1950	1290	2310	1540	2670	1780	2570	1710
	12	1940	1290	2310	1530	2660	1770	2560	1700
	13	1930	1280	2300	1530	2650	1760	2550	1700
	14	1920	1280	2290	1520	2640	1750	2540	1690
	15	1910	1270	2270	1510	2620	1740	2530	1680
	16	1900	1260	2260	1500	2610	1730	2520	1680
	17	1890	1260	2250	1490	2600	1720	2510	1670
	18	1880	1250	2240	1490	2580	1710	2500	1660
	19	1870	1240	2220	1480	2560	1700	2490	1650
	20	1860	1230	2210	1470	2550	1690	2470	1640
	21	1840	1220	2190	1460	2530	1680	2460	1630
	22	1830	1220	2170	1450	2510	1670	2440	1620
	23	1820	1210	2160	1430	2490	1650	2430	1610
	24	1800	1200	2140	1420	2470	1640	2410	1600
	25	1790	1190	2120	1410	2450	1630	2390	1590
	26	1770	1180	2100	1400	2430	1610	2380	1580
	27	1760	1170	2090	1390	2400	1600	2360	1570
	28	1740	1160	2070	1370	2380	1580	2340	1560
	29	1720	1140	2050	1360	2360	1570	2320	1540
	30	1710	1130	2020	1350	2330	1550	2300	1530
	31	1690	1120	2000	1330	2310	1530	2280	1520
	32	1670	1110	1980	1320	2280	1520	2260	1500
	33	1650	1100	1960	1300	2260	1500	2240	1490
	34	1630	1080	1940	1290	2230	1480	2220	1480
	35	1610	1070	1910	1270	2200	1460	2200	1460
	36	1590	1060	1890	1260	2180	1450	2180	1450
	37	1570	1050	1870	1240	2150	1430	2160	1430
	38	1550	1030	1840	1220	2120	1410	2130	1420
	39	1530	1020	1820	1210	2090	1390	2110	1400
	40	1510	1010	1790	1190	2060	1370	2090	1390

Table 10(ag) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		3 x 2						4 x 2						4 x 3			
T	Nominal	0.180		0.188		0.250		0.180		0.188		0.250		0.180		0.188	
	Design	0.167		0.174		0.233		0.167		0.174		0.233		0.167		0.174	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	65.7	43.7	68.1	45.3	87.1	57.9	80.6	53.6	83.6	55.6	107	71.7	96.2	64.0	99.9	66.4
	2	62.4	41.5	64.6	43.0	82.3	54.8	76.8	51.0	79.6	52.9	102	68.1	94.1	62.6	97.7	65.0
	3	57.2	38.0	59.2	39.4	75.0	49.9	70.8	47.1	73.4	48.8	93.8	62.4	90.6	60.3	94.1	62.6
	4	50.7	33.7	52.4	34.9	65.8	43.7	63.2	42.0	65.5	43.5	83.0	55.2	86.1	57.2	89.3	59.4
	5	43.4	28.8	44.8	29.8	55.6	37.0	54.7	36.4	56.5	37.6	71.0	47.2	80.5	53.5	83.5	55.5
	6	35.9	23.8	37.0	24.6	45.2	30.1	45.8	30.4	47.3	31.4	58.6	39.0	74.2	49.3	76.9	51.1
	7	28.6	19.0	29.5	19.6	35.5	23.6	37.1	24.7	38.2	25.4	46.8	31.1	67.3	44.8	69.8	46.4
	8	22.1	14.7	22.8	15.1	27.2	18.1	29.0	19.3	29.9	19.9	36.1	24.0	60.2	40.1	62.4	41.5
	9	17.5	11.6	18.0	11.9	21.5	14.3	22.9	15.2	23.6	15.7	28.5	19.0	53.1	35.3	54.9	36.5
	10	14.2	9.45	14.6	9.71	17.4	11.5	18.6	12.3	19.1	12.7	23.1	15.4	46.1	30.7	47.7	31.7
	11	11.7	7.81	12.0	8.03	14.3	9.58	15.3	10.2	15.8	10.5	19.1	12.7	39.4	26.2	40.8	27.1
	12	9.86	6.56	10.1	6.74	12.0	8.05	12.9	8.60	13.3	8.85	16.0	10.7	33.2	22.1	34.3	22.8
	13	8.40	5.59					11.0	7.33	11.3	7.54			28.3	18.8	29.2	19.4
	14													24.4	16.2	25.2	16.8
	15													21.3	14.1	22.0	14.6
	16													18.7	12.4	19.3	12.8
	17													16.5	11.0	17.1	11.3
	18													14.7	9.84	15.2	10.1
	19													13.2	8.83	13.7	9.12
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Table 10(ah) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		4 x 3		5 x 2						5 x 3							
T	Nominal	0.250		0.180		0.188		0.250		0.180		0.188		0.250		0.313	
	Design	0.233		0.167		0.174		0.233		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	129	86.2	95.4	63.5	99.1	65.9	128	85.5	111	73.9	115	76.8	150	100	183	121
	2	126	84.2	91.1	60.6	94.5	62.9	122	81.3	108	72.4	113	75.2	147	97.9	178	118
	3	121	81.0	84.3	56.1	87.5	58.2	112	74.9	105	69.9	109	72.6	141	94.4	172	114
	4	115	76.7	75.7	50.3	78.4	52.2	100	66.6	100	66.5	103	69.1	134	89.6	163	108
	5	107	71.5	65.8	43.8	68.2	45.3	86.3	57.4	93.9	62.5	97.4	64.8	126	83.9	152	101
	6	98.6	65.6	55.5	36.9	57.4	38.2	71.9	47.8	86.9	57.8	90.1	60.0	116	77.3	139	92.9
	7	89.1	59.2	45.4	30.2	46.9	31.2	57.9	38.5	79.3	52.7	82.2	54.7	105	70.2	126	84.0
	8	79.2	52.7	35.9	23.9	37.0	24.6	45.1	30.0	71.4	47.5	74.0	49.2	94.5	62.9	112	74.8
	9	69.3	46.1	28.4	18.9	29.3	19.4	35.6	23.7	63.3	42.1	65.6	43.6	83.4	55.4	98.7	65.6
	10	59.8	39.7	23.0	15.3	23.7	15.7	28.9	19.2	55.4	36.8	57.3	38.1	72.4	48.2	85.2	56.7
	11	50.7	33.7	19.0	12.6	19.6	13.0	23.8	15.8	47.8	31.8	49.4	32.9	62.0	41.3	72.4	48.2
	12	42.6	28.3	15.9	10.6	16.4	10.9	20.0	13.3	40.6	27.0	41.9	27.9	52.3	34.8	60.9	40.5
	13	36.3	24.1	13.6	9.06	14.0	9.34	17.1	11.3	34.6	23.0	35.7	23.7	44.6	29.6	51.9	34.5
	14	31.3	20.8							29.8	19.8	30.8	20.5	38.4	25.5	44.7	29.7
	15	27.2	18.1							25.9	17.2	26.8	17.8	33.5	22.2	38.9	25.9
	16	23.9	15.9							22.8	15.1	23.6	15.7	29.4	19.5	34.2	22.7
	17	21.2	14.1							20.2	13.4	20.9	13.9	26.0	17.3	30.3	20.1
	18	18.9	12.6							18.0	12.0	18.6	12.4	23.2	15.4	27.0	18.0
	19	17.0	11.3							16.1	10.7	16.7	11.1	20.8	13.8	24.2	16.1
	20									14.6	9.72	15.1	10.0				
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(ai) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		5 x 3		6 x 2						6 x 3							
T	Nominal	0.375		0.180		0.188		0.250		0.180		0.188		0.250		0.313	
	Design	0.349		0.167		0.174		0.233		0.167		0.174		0.233		0.291	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	213	142	110	73.4	114	76.2	149	99.3	126	83.9	131	87.2	171	114	209	139
	2	208	138	105	70.1	109	72.8	142	94.6	123	82.2	128	85.4	167	111	204	136
	3	200	133	97.8	65.1	101	67.5	131	87.3	119	79.5	124	82.6	161	107	197	131
	4	189	125	88.1	58.6	91.3	60.7	117	78.0	114	75.8	118	78.7	154	102	187	124
	5	175	117	77.0	51.2	79.7	53.0	101	67.5	107	71.3	111	74.1	144	96.2	175	116
	6	160	107	65.3	43.4	67.5	44.9	85.0	56.5	99.5	66.2	103	68.7	133	89.0	161	107
	7	144	96.3	53.7	35.7	55.5	36.9	69.0	45.9	91.2	60.6	94.6	62.9	122	81.1	146	97.5
	8	128	85.3	42.8	28.5	44.2	29.4	54.1	36.0	82.4	54.8	85.4	56.8	109	72.9	131	87.2
	9	111	74.4	33.8	22.5	34.9	23.2	42.7	28.4	73.4	48.8	76.1	50.6	97.2	64.7	115	76.9
	10	95.9	63.8	27.4	18.2	28.2	18.8	34.6	23.0	64.6	42.9	66.9	44.5	85.0	56.5	100	66.8
	11	80.8	53.7	22.6	15.0	23.3	15.5	28.6	19.0	56.0	37.3	58.0	38.6	73.2	48.7	86.0	57.2
	12	67.9	45.1	19.0	12.6	19.6	13.0	24.0	16.0	47.9	31.8	49.5	32.9	62.1	41.3	72.5	48.2
	13	57.8	38.5	16.2	10.8	16.7	11.1	20.4	13.6	40.8	27.1	42.2	28.0	52.9	35.2	61.8	41.1
	14	49.9	33.2							35.2	23.4	36.3	24.2	45.6	30.3	53.3	35.4
	15	43.4	28.9							30.6	20.4	31.7	21.0	39.7	26.4	46.4	30.9
	16	38.2	25.4							26.9	17.9	27.8	18.5	34.9	23.2	40.8	27.1
	17	33.8	22.5							23.8	15.8	24.6	16.4	30.9	20.5	36.1	24.0
	18	30.1	20.0							21.2	14.1	22.0	14.6	27.6	18.3	32.2	21.4
	19	27.0	18.0							19.1	12.7	19.7	13.1	24.7	16.4	28.9	19.2
	20									17.2	11.4	17.8	11.8	22.3	14.8		
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Note)
Heavy line indicates KL/r equal to or greater than 200.

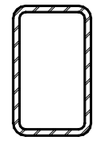

Table 10(aj) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		6 x 3		6 x 4								7 x 5			
T	Nominal	0.375		0.180		0.188		0.250		0.313		0.375		0.313		0.375	
	Design	0.349		0.167		0.174		0.233		0.291		0.349		0.291		0.349	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	244	162	141	94.1	147	97.8	192	128	235	156	276	184	288	191	339	226
	2	239	159	139	93.0	145	96.6	190	126	232	154	273	181	286	190	337	224
	3	230	153	137	91.2	142	94.8	186	124	228	151	267	177	282	187	332	221
	4	217	145	133	88.7	138	92.2	181	120	221	147	259	172	277	184	326	217
	5	203	135	128	85.6	133	89.0	174	116	213	141	249	165	270	180	318	211
	6	186	124	123	82.0	128	85.2	167	111	203	135	237	158	262	174	309	205
	7	168	112	117	77.9	121	80.9	158	105	192	128	224	149	253	168	298	198
	8	150	100	110	73.4	114	76.3	149	99.2	180	120	210	139	244	162	286	190
	9	131	87.7	103	68.7	107	71.3	139	92.5	168	112	195	129	233	155	273	181
	10	113	75.7	95.8	63.8	99.5	66.2	128	85.6	155	103	179	119	221	147	259	172
	11	96.8	64.4	88.2	58.7	91.6	60.9	118	78.6	142	94.6	164	109	209	139	245	163
	12	81.3	54.1	80.6	53.6	83.6	55.6	107	71.6	129	85.8	148	98.7	197	131	230	153
	13	69.3	46.1	73.1	48.6	75.8	50.4	97.2	64.6	116	77.2	133	88.5	184	122	215	143
	14	59.7	39.7	65.7	43.7	68.1	45.3	87.0	57.9	103	68.9	118	78.7	171	114	199	132
	15	52.0	34.6	58.6	39.0	60.7	40.4	77.3	51.4	91.6	60.9	104	69.2	159	105	184	122
	16	45.7	30.4	51.8	34.4	53.6	35.7	68.0	45.3	80.5	53.6	91.4	60.8	146	97.5	169	112
	17	40.5	26.9	45.9	30.5	47.5	31.6	60.3	40.1	71.3	47.4	81.0	53.8	134	89.3	155	103
	18	36.1	24.0	40.9	27.2	42.4	28.2	53.8	35.7	63.6	42.3	72.2	48.0	122	81.4	140	94
	19	32.4	21.5	36.7	24.4	38.0	25.3	48.2	32.1	57.1	38.0	64.8	43.1	110	73.7	127	85
	20			33.1	22.0	34.3	22.8	43.5	28.9	51.5	34.3	58.5	38.9	99.9	66.5	114	76.3
	21			30.0	20.0	31.1	20.7	39.5	26.2	46.7	31.1	53.0	35.3	90.6	60.3	104	69.2
	22			27.4	18.2	28.3	18.8	36.0	23.9	42.6	28.3	48.3	32.1	82.6	54.9	95	63.0
	23			25.0	16.6	25.9	17.2	32.9	21.9	38.9	25.9	44.2	29.4	75.6	50.3	87	57.7
	24			23.0	15.3	23.8	15.8	30.2	20.1	35.8	23.8	40.6	27.0	69.4	46.1	79.6	53.0
	25			21.2	14.1	21.9	14.6	27.8	18.5	33.0	21.9	37.4	24.9	63.9	42.5	73.4	48.8
	26			19.6	13.0	20.3	13.5	25.7	17.1	30.5	20.3			59.1	39.3	67.8	45.1
	27			18.2	12.1	18.8	12.5							54.8	36.5	62.9	41.8
	28													51.0	33.9	58.5	38.9
	29													47.5	31.6	54.5	36.3
	30													44.4	29.5	50.9	33.9
	31													41.6	27.6	47.7	31.7
	32													39.0	25.9	44.8	29.8
	33													36.7	24.4		
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Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(ak) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		8 x 4										8 x 6					
T	Nominal	0.180		0.188		0.250		0.313		0.375		0.180		0.188		0.250	
	Design	0.167		0.174		0.233		0.291		0.349		0.167		0.174		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	153	102	162	108	234	156	288	191	339	225	183	122	194	129	277	184
	2	151	101	161	107	232	154	284	189	335	223	182	121	193	128	275	183
	3	149	99.4	158	105	227	151	279	185	328	218	181	120	191	127	273	181
	4	145	97.1	154	102	221	147	271	180	319	212	179	119	189	126	269	179
	5	141	94.2	150	99.8	214	142	262	174	307	204	176	117	186	124	265	176
	6	136	90.9	144	96.1	205	136	250	166	294	195	173	115	183	122	260	173
	7	130	87.1	138	92.0	195	129	238	158	279	185	170	113	179	119	254	169
	8	124	82.9	131	87.4	184	122	224	149	262	174	166	110	175	116	247	164
	9	117	78.3	124	82.6	172	115	210	139	245	163	161	107	170	113	240	159
	10	110	73.6	116	77.4	160	106	194	129	226	150	157	104	165	110	232	154
	11	103	68.6	108	72.1	148	98.7	179	119	208	138	151	101	160	106	223	148
	12	95.7	63.6	100	66.7	135	90.3	163	109	189	126	146	97.4	154	102	214	142
	13	88.1	58.6	92.2	61.3	123	82.1	148	98.8	171	113	140	93.6	148	98.5	205	136
	14	80.6	53.6	84.1	56.0	111	74.1	133	88.8	153	102	134	89.7	141	94.3	195	130
	15	73.2	48.7	76.3	50.7	99.6	66.3	119	79.2	136	90.7	128	85.6	135	90.0	185	123
	16	66.1	44.0	68.7	45.7	88.3	58.8	105	69.9	120	79.8	122	81.5	128	85.6	175	116
	17	59.2	39.4	61.3	40.8	78.2	52.0	93.1	61.9	106	70.7	116	77.4	121	81.1	165	110
	18	52.8	35.1	54.7	36.4	69.8	46.4	83.0	55.2	94.8	63.1	110	73.2	115	76.7	155	103
	19	47.4	31.5	49.1	32.6	62.6	41.6	74.5	49.6	85.1	56.6	103	69.0	108	72.2	145	96.9
	20	42.8	28.4	44.3	29.5	56.5	37.6	67.2	44.7	76.8	51.1	97.6	64.9	101	67.8	135	90.4
	21	38.8	25.8	40.2	26.7	51.3	34.1	61.0	40.6	69.6	46.3	91.4	60.8	95.4	63.4	126	84.0
	22	35.3	23.5	36.6	24.3	46.7	31.1	55.6	37.0	63.4	42.2	85.4	56.8	89.0	59.2	116	77.8
	23	32.3	21.5	33.5	22.3	42.7	28.4	50.8	33.8	58.0	38.6	79.5	52.9	82.7	55.0	107	71.7
	24	29.7	19.7	30.7	20.4	39.2	26.1	46.7	31.0	53.3	35.4	73.8	49.1	76.7	51.0	99.0	65.9
	25	27.3	18.2	28.3	18.8	36.2	24.0	43.0	28.6	49.1	32.7	68.1	45.3	70.7	47.0	91.3	60.7
	26	25.3	16.8	26.2	17.4	33.4	22.2	39.8	26.4	45.4	30.2	63.0	41.9	65.4	43.5	84.4	56.1
	27	23.4	15.6	24.3	16.1	31.0	20.6	36.9	24.5			58.4	38.8	60.6	40.3	78.2	52.0
	28	21.8	14.5	22.6	15.0							54.3	36.1	56.3	37.5	72.7	48.4
	29											50.6	33.7	52.5	34.9	67.8	45.1
	30											47.3	31.5	49.1	32.6	63.4	42.1
	31											44.3	29.5	46.0	30.6	59.3	39.5
	32											41.6	27.6	43.1	28.7	55.7	37.0
	33											39.1	26.0	40.5	27.0	52.4	34.8
	34											36.8	24.5	38.2	25.4	49.3	32.8
	35											34.7	23.1	36.0	24.0	46.5	30.9
	36											32.8	21.8	34.1	22.6	44.0	29.2
	37											31.1	20.7	32.2	21.4	41.6	27.7
	38											29.5	19.6	30.6	20.3	39.5	26.2
	39											28.0	18.6	29.0	19.3	37.5	24.9
	40											26.6	17.7	27.6	18.3	35.6	23.7

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(al) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		8 x 6						10 x 4				10 x 6					
T	Nominal	0.313		0.375		0.500		0.313		0.375		0.180		0.188		0.250	
	Design	0.291		0.349		0.465		0.291		0.349		0.167		0.174		0.233	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	340	226	402	268	520	346	340	226	402	267	188	125	200	133	301	200
	2	339	225	400	266	517	344	336	223	397	264	188	125	199	132	299	199
	3	336	223	396	264	512	341	330	219	389	259	186	124	197	131	297	197
	4	331	220	391	260	505	336	321	213	379	252	185	123	196	130	294	195
	5	326	217	385	256	497	330	310	206	366	243	182	121	193	128	290	192
	6	319	212	377	251	486	323	298	198	350	233	180	119	190	126	284	189
	7	312	207	368	245	474	315	283	188	333	221	177	117	187	124	279	185
	8	303	202	358	238	460	306	268	178	314	209	173	115	183	122	272	181
	9	294	196	347	230	445	296	251	167	294	195	169	112	179	119	265	176
	10	284	189	334	222	429	285	234	155	273	181	165	109	174	116	257	171
	11	273	182	322	214	412	274	216	143	252	167	160	106	169	112	248	165
	12	262	174	308	205	393	262	198	131	230	153	155	103	164	109	239	159
	13	250	166	294	195	375	249	180	120	209	139	150	100	158	105	230	153
	14	238	158	280	186	355	236	162	108	188	125	145	96.6	153	101	220	146
	15	226	150	265	176	336	223	146	97.1	168	111	139	92.9	147	97.8	210	140
	16	214	142	250	166	316	210	129	86.3	148	98.8	133	89.1	140	93.7	200	133
	17	201	134	235	156	296	197	114	76.4	131	87.6	128	85.2	134	89.6	190	126
	18	189	125	220	146	277	184	102	68.2	117	78.1	122	81.3	128	85.3	179	119
	19	176	117	205	136	257	171	92.0	61.2	105	70.1	116	77.3	121	81.1	169	112
	20	164	109	191	127	238	158	83.0	55.2	95.1	63.2	110	73.4	115	76.9	159	105
	21	152	101	177	117	220	146	75.3	50.1	86.2	57.4	104	69.4	109	72.6	149	99.1
	22	141	93.9	163	108	202	134	68.6	45.6	78.6	52.3	98.5	65.5	102	68.5	139	92.5
	23	129	86.4	150	99.8	185	123	62.7	41.7	71.9	47.8	92.7	61.7	96.8	64.4	129	86.1
	24	119	79.3	137	91.7	170	113	57.6	38.3	66.0	43.9	87.0	57.9	90.7	60.3	120	79.8
	25	109	73.1	127	84.5	156	104	53.1	35.3	60.8	40.5	81.4	54.2	84.8	56.4	110	73.6
	26	101	67.6	117	78.1	145	96.5	49.1	32.6	56.2	37.4	76.0	50.6	79.0	52.6	102	68.1
	27	94.2	62.7	108	72.4	134	89.4	45.5	30.3	52.1	34.7	70.6	47.0	73.3	48.8	94.9	63.1
	28	87.6	58.3	101	67.3	125	83.2					65.7	43.7	68.2	45.3	88.3	58.7
	29	81.6	54.3	94.4	62.8	116	77.5					61.2	40.7	63.5	42.3	82.3	54.7
	30	76.3	50.7	88.2	58.6	108	72.4					57.2	38.0	59.4	39.5	76.9	51.1
	31	71.4	47.5	82.6	54.9	102	67.8					53.6	35.6	55.6	37.0	72.0	47.9
	32	67.0	44.6	77.5	51.5	95.7	63.7					50.3	33.4	52.2	34.7	67.6	44.9
	33	63.0	41.9	72.9	48.5	90.0	59.9					47.3	31.4	49.1	32.6	63.5	42.2
	34	59.4	39.5	68.6	45.6	84.8	56.4					44.5	29.6	46.2	30.7	59.8	39.8
	35	56.0	37.3	64.8	43.1	80.0	53.2					42.0	27.9	43.6	29.0	56.5	37.6
	36	53.0	35.2	61.2	40.7	75.6	50.3					39.7	26.4	41.2	27.4	53.4	35.5
	37	50.1	33.3	57.9	38.5	71.6	47.6					37.6	25.0	39.0	25.9	50.5	33.6
	38	47.5	31.6	54.9	36.5	67.9	45.1					35.6	23.7	37.0	24.6	47.9	31.8
	39	45.1	30.0	52.1	34.7							33.8	22.5	35.1	23.3	45.5	30.2
	40	42.9	28.5									32.2	21.4	33.4	22.2	43.2	28.7

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(am) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		10 x 6						12 x 4						10 x 8			
T	Nominal	0.313		0.375		0.500		0.250		0.313		0.375		0.375		0.500	
	Design	0.291		0.349		0.465		0.233		0.291		0.349		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	393	261	465	309	604	402	268	178	374	249	464	309	528	351	688	458
	2	391	260	463	308	601	399	266	177	370	246	459	305	527	350	686	456
	3	387	258	459	305	595	396	262	174	364	242	450	300	524	348	682	454
	4	383	254	453	301	588	391	256	170	355	236	439	292	520	346	677	450
	5	377	251	446	296	578	384	250	166	344	229	424	282	515	343	671	446
	6	370	246	437	291	566	377	241	160	331	220	407	270	510	339	663	441
	7	361	240	427	284	553	368	232	154	316	210	387	257	503	334	654	435
	8	352	234	416	277	538	358	222	148	300	199	366	243	495	329	643	428
	9	342	227	404	268	521	346	211	140	283	188	343	228	486	323	632	420
	10	331	220	390	260	503	335	199	132	265	176	319	212	477	317	619	412
	11	319	212	376	250	484	322	187	124	246	163	295	196	467	310	605	403
	12	307	204	361	240	464	308	175	116	227	151	270	180	456	303	591	393
	13	294	195	346	230	443	294	162	108	208	138	246	164	444	295	575	382
	14	280	186	329	219	421	280	149	100	189	126	222	148	432	287	559	372
	15	266	177	313	208	399	266	137	91.3	171	113	199	132	419	279	542	360
	16	253	168	296	197	377	251	125	83.2	153	102	177	117	406	270	524	348
	17	238	158	279	186	355	236	113	75.4	136	90.9	157	104	392	261	506	336
	18	224	149	263	175	333	221	101	67.7	121	81.1	140	93.1	378	252	487	324
	19	210	140	246	164	311	206	91.4	60.8	109	72.8	125	83.6	364	242	468	311
	20	197	131	230	153	289	192	82.5	54.9	98.7	65.7	113	75.4	350	233	449	299
	21	183	122	213	142	268	178	74.8	49.8	89.5	59.6	102	68.4	335	223	430	286
	22	170	113	198	131	247	164	68.2	45.3	81.6	54.3	93.7	62.3	321	213	411	273
	23	157	104	183	121	227	151	62.4	41.5	74.6	49.6	85.7	57.0	306	204	391	260
	24	145	96.5	168	111	209	139	57.3	38.1	68.5	45.6	78.7	52.4	292	194	372	247
	25	133	88.9	155	103	192	128	52.8	35.1	63.2	42.0	72.5	48.3	277	184	353	235
	26	123	82.2	143	95.3	178	118	48.8	32.4	58.4	38.8	67.1	44.6	263	175	334	222
	27	114	76.2	132	88.4	165	109	45.2	30.1	54.1	36.0	62.2	41.4	249	165	316	210
	28	106	70.9	123	82.2	153	102	42.1	28.0	50.3	33.5			235	156	298	198
	29	99.4	66.1	115	76.6	143	95.3							222	147	280	186
	30	92.8	61.8	107	71.6	133	89.0							209	139	263	175
	31	86.9	57.8	100	67.0	125	83.4							195	130	246	164
	32	81.6	54.3	94.6	62.9	117	78.2							183	122	231	153
	33	76.7	51.0	88.9	59.2	110	73.5							172	115	217	144
	34	72.3	48.1	83.8	55.7	104	69.3							162	108	204	136
	35	68.2	45.4	79.1	52.6	98.3	65.4							153	102	193	128
	36	64.5	42.9	74.7	49.7	92.9	61.8							145	96.6	182	121
	37	61.0	40.6	70.7	47.0	87.9	58.5							137	91.5	173	115
	38	57.8	38.5	67.1	44.6	83.4	55.5							130	86.7	164	109
	39	54.9	36.5	63.7	42.3	79.1	52.6							123	82.3	155	103
	40	52.2	34.7	60.5	40.2									117	78.2	148	98.5

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(an) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		12 x 6				12 x 8								14 x 6			
T	Nominal	0.375		0.500		0.250		0.313		0.375		0.500		0.313		0.375	
	Design	0.349		0.465		0.233		0.291		0.349		0.465		0.291		0.349	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	528	351	688	457	353	234	480	319	591	393	772	513	441	293	573	381
	2	525	349	684	455	352	234	478	318	589	392	769	512	439	292	570	379
	3	521	346	678	451	350	233	476	317	586	390	765	509	435	290	566	376
	4	515	342	670	445	348	232	473	314	582	387	760	506	431	287	560	372
	5	507	337	659	438	346	230	469	312	577	384	753	501	426	283	552	367
	6	497	331	646	430	342	228	464	309	571	380	745	495	419	279	542	360
	7	487	324	632	420	339	225	458	305	564	375	735	489	411	273	531	353
	8	474	315	615	409	334	222	452	301	555	369	724	481	403	268	518	345
	9	461	306	597	397	330	219	445	296	546	363	711	473	393	261	504	335
	10	446	297	577	384	325	216	437	291	536	356	698	464	382	254	489	325
	11	431	286	556	370	319	212	429	285	525	349	683	454	371	247	473	315
	12	414	275	534	355	313	208	419	279	513	341	667	444	359	239	456	303
	13	397	264	511	339	306	204	410	272	501	333	650	432	346	230	438	291
	14	379	252	487	324	299	199	400	266	488	324	633	421	333	222	419	279
	15	361	240	462	307	292	194	389	259	474	315	614	408	320	213	400	266
	16	342	228	438	291	285	189	378	251	460	306	595	396	306	203	381	253
	17	324	215	413	274	277	184	366	243	445	296	575	383	292	194	361	240
	18	305	203	388	258	269	179	354	236	430	286	555	369	277	184	342	227
	19	286	190	363	241	261	173	342	228	414	275	535	356	263	175	322	214
	20	268	178	339	225	252	168	330	219	399	265	514	342	249	165	303	201
	21	250	166	315	210	244	162	318	211	383	255	493	328	235	156	283	188
	22	232	154	292	194	235	156	305	203	367	244	472	314	221	147	265	176
	23	215	143	270	179	226	151	292	194	351	233	450	299	207	137	246	164
	24	198	132	248	165	218	145	280	186	335	223	429	285	193	128	228	152
	25	183	121	228	152	209	139	267	178	319	212	408	272	180	120	211	140
	26	169	112	211	140	200	133	255	169	303	202	388	258	167	111	195	129
	27	156	104	195	130	191	127	243	161	288	191	367	244	155	103	180	120
	28	145	97.0	182	121	183	121	230	153	273	181	347	231	144	96.2	168	111
	29	136	90.5	169	113	174	116	218	145	258	171	328	218	134	89.7	156	104
	30	127	84.5	158	105	166	110	207	137	243	162	308	205	125	83.8	146	97.5
	31	119	79.2	148	98.9	158	105	195	130	229	152	289	192	117	78.4	137	91.3
	32	111	74.3	139	92.8	149	100	184	122	215	143	271	180	110	73.6	128	85.7
	33	105	69.8	131	87.2	142	94.4	173	115	202	134	255	170	104	69.2	121	80.5
	34	98.9	65.8	123	82.2	134	89.1	163	108	190	126	240	160	98.0	65.2	114	75.9
	35	93.3	62.1	116	77.5	126	84.1	153	102	179	119	227	151	92.5	61.5	107	71.6
	36	88.2	58.7	110	73.3	119	79.5	145	96.8	170	113	214	142	87.4	58.2	101	67.7
	37	83.5	55.6	104	69.4	113	75.3	137	91.6	160	107	203	135	82.8	55.1	96.3	64.1
	38	79.2	52.7	98.9	65.8	107	71.4	130	86.8	152	101	192	128	78.5	52.2	91.3	60.7
	39	75.2	50.0	93.9	62.4	101	67.7	123	82.4	144	96.3	183	121	74.5	49.5	86.7	57.7
	40	71.5	47.5	89.2	59.4	96.8	64.4	117	78.4	137	91.6	174	115	70.8	47.1	82.4	54.8

Note)
Heavy line indicates KL/r equal to or greater than 200.

Table 10(ao) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		14 x 6		14 x 10						16 x 8							
T	Nominal	0.500		0.375		0.500		0.625		0.250		0.313		0.375		0.500	
	Design	0.465		0.349		0.465		0.581		0.233		0.291		0.349		0.465	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	771	513	699	465	939	625	1150	768	364	242	503	335	654	435	939	625
	2	767	510	698	464	937	624	1150	766	364	242	502	334	652	434	936	623
	3	761	506	696	463	934	622	1140	763	362	241	500	332	649	432	932	620
	4	752	500	693	461	930	619	1140	760	361	240	497	331	646	429	926	616
	5	740	492	689	458	925	615	1130	755	358	238	494	328	641	426	918	610
	6	726	483	684	455	918	611	1120	750	356	237	490	326	635	422	908	604
	7	710	472	679	452	911	606	1110	743	353	235	485	322	628	418	897	597
	8	692	460	673	447	902	600	1100	736	349	232	479	319	620	412	884	588
	9	672	447	666	443	892	593	1090	728	345	230	473	315	611	406	870	579
	10	651	433	658	438	881	586	1080	719	341	227	466	310	601	400	854	568
	11	628	417	650	432	869	578	1060	709	336	223	459	305	591	393	837	557
	12	603	401	640	426	856	570	1040	698	331	220	451	300	579	385	819	545
	13	578	384	631	419	843	560	1030	687	325	216	443	294	567	377	800	532
	14	552	367	620	413	828	551	1010	674	319	212	434	288	554	369	779	518
	15	525	349	609	405	813	541	994	661	313	208	424	282	541	360	758	504
	16	498	331	598	398	797	530	974	648	307	204	414	275	527	350	736	489
	17	470	313	586	390	780	519	953	634	300	199	404	269	513	341	713	474
	18	443	294	573	381	762	507	931	619	293	195	393	261	498	331	690	459
	19	415	276	560	373	744	495	909	604	286	190	382	254	482	321	666	443
	20	388	258	547	364	726	483	885	589	278	185	371	247	467	310	641	426
	21	362	241	534	355	707	470	862	573	271	180	360	239	451	300	617	410
	22	336	224	520	346	687	457	837	557	263	175	348	231	435	289	592	394
	23	311	207	505	336	668	444	813	541	255	170	336	224	418	278	567	377
	24	286	190	491	327	648	431	788	524	247	164	324	216	402	267	542	360
	25	264	175	477	317	627	417	763	507	239	159	313	208	386	256	517	344
	26	244	162	462	307	607	404	737	490	231	154	301	200	369	246	493	328
	27	226	150	447	297	587	390	712	473	223	148	289	192	353	235	468	311
	28	210	140	432	287	566	377	686	456	215	143	277	184	337	224	444	295
	29	196	130	417	277	546	363	661	439	207	137	265	176	321	214	421	280
	30	183	122	402	268	525	349	635	422	199	132	253	168	306	203	398	264
	31	171	114	388	258	505	336	610	406	191	127	242	161	290	193	375	249
	32	161	107	373	248	485	322	585	389	183	121	231	153	275	183	352	234
	33	151	100	358	238	465	309	560	373	175	116	219	146	260	173	331	220
	34	142	95.1	344	229	445	296	536	356	167	111	208	139	246	163	312	207
	35	134	89.7	330	219	426	283	512	340	160	106	198	131	232	154	295	196
	36	127	84.8	315	210	407	270	488	325	152	101	187	124	219	146	278	185
	37	120	80.3	302	201	388	258	465	309	145	96.6	177	118	207	138	263	175
	38	114	76.1	288	191	369	246	442	294	137	91.7	168	111	197	131	250	166
	39	108	72.2	275	183	351	233	420	279	130	87.0	159	106	187	124	237	158
	40	103	68.7	261	174	333	222	399	265	124	82.7	151	101	177	118	225	150

Note)

Heavy line indicates KL/r equal to or greater than 200.

Table 10(ap) Available Strength in Axial Compression, Kips

Fy = 50 ksi

Nominal Size		20 x 12						24 x 12					
T	Nominal	0.500		0.625		0.750		0.500		0.625		0.750	
	Design	0.465		0.581		0.698		0.465		0.581		0.698	
		LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD	LRDF	ASD
Effective length KL (ft) with respect to least radius of gyration ry	1	1200	801	1570	1040	1860	1240	1440	959	1780	1180	2110	1400
	2	1200	800	1570	1040	1860	1230	1440	958	1770	1180	2110	1400
	3	1200	798	1560	1040	1850	1230	1430	956	1770	1180	2100	1400
	4	1190	796	1560	1030	1850	1230	1430	953	1770	1170	2100	1390
	5	1190	793	1550	1030	1840	1220	1420	950	1760	1170	2090	1390
	6	1180	790	1540	1030	1830	1220	1420	945	1750	1160	2080	1380
	7	1180	786	1540	1020	1820	1210	1410	940	1740	1160	2070	1370
	8	1170	781	1530	1010	1810	1200	1400	935	1730	1150	2060	1370
	9	1160	776	1510	1010	1800	1190	1390	928	1720	1140	2040	1360
	10	1150	770	1500	1000	1780	1180	1380	921	1700	1130	2020	1350
	11	1140	763	1490	993	1760	1170	1370	913	1690	1120	2010	1330
	12	1130	756	1470	983	1750	1160	1360	905	1670	1110	1990	1320
	13	1120	749	1460	973	1730	1150	1340	895	1660	1100	1970	1310
	14	1110	741	1440	961	1710	1130	1330	886	1640	1090	1940	1290
	15	1100	732	1420	949	1680	1120	1310	875	1620	1080	1920	1280
	16	1080	723	1400	937	1660	1100	1290	864	1600	1060	1890	1260
	17	1070	714	1380	923	1640	1090	1280	853	1580	1050	1870	1240
	18	1050	704	1360	909	1610	1070	1260	841	1550	1030	1840	1220
	19	1040	693	1340	895	1590	1050	1240	828	1530	1020	1810	1200
	20	1020	683	1320	880	1560	1040	1220	815	1500	1000	1780	1180
	21	1000	671	1300	865	1530	1020	1200	801	1480	987	1750	1160
	22	992	660	1270	849	1500	1000	1180	788	1450	969	1720	1140
	23	975	648	1250	832	1470	982	1160	773	1430	951	1690	1120
	24	956	636	1220	816	1440	962	1140	759	1400	933	1650	1100
	25	938	624	1200	798	1410	942	1110	744	1370	914	1620	1080
	26	919	611	1170	781	1380	921	1090	728	1340	895	1580	1050
	27	900	598	1140	763	1350	899	1070	713	1310	875	1550	1030
	28	880	585	1120	745	1310	878	1040	697	1280	856	1510	1000
	29	860	572	1090	727	1280	856	1020	681	1250	836	1480	985
	30	840	559	1060	709	1250	834	999	665	1220	815	1440	961
	31	820	545	1030	690	1220	812	975	648	1190	795	1400	936
	32	799	532	1010	672	1180	789	950	632	1160	774	1370	912
	33	779	518	982	653	1150	767	925	615	1130	754	1330	887
	34	758	504	954	635	1110	745	900	599	1100	733	1290	862
	35	738	491	926	616	1080	722	875	582	1070	712	1250	837
	36	717	477	898	597	1050	700	850	566	1030	691	1220	812
	37	696	463	870	579	1010	678	825	549	1000	671	1180	787
	38	676	449	842	560	985	656	801	532	977	650	1140	763
	39	655	436	815	542	953	634	776	516	947	630	1110	738
	40	635	422	787	524	920	612	751	500	916	609	1070	714

Sect.5 Beam

Beam subjected to flexural loads shall be proportioned to meet the requirements of allowable bebding stresses given in Sect. 3-3 and the requirements of deflection.
Formulas to calculate the moments and deflections of simple beams and cantilevers with various loading conditions are tabulated in Table 11(a) to Table 11(c).

Sect3-3, the available strength in flexural for square and rectangular HSS are calculated and given in Table12(a) and Table12(d). For non-compact and slender cross-sections, the tabulated values of $\Phi_b M_n$ and M_n/Ω_b have been adjusted to account for the non-compactness or slenderness.

Table 11(a) Moments, Shears, and Deflections

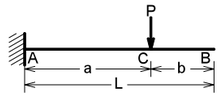
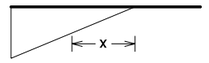
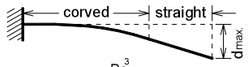
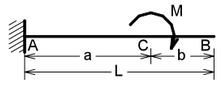
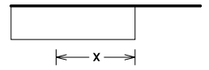
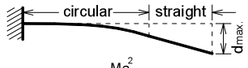
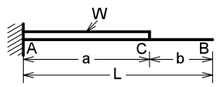
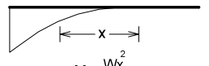
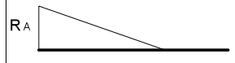
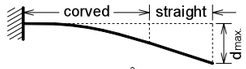
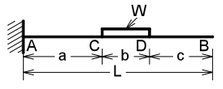
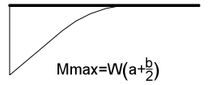
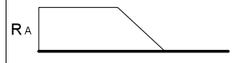
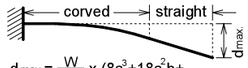
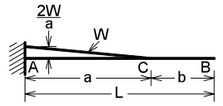
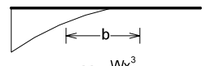
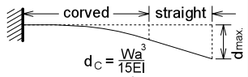
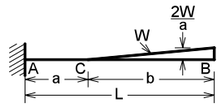
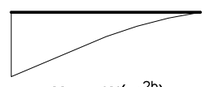
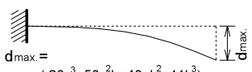
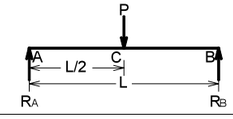
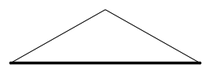
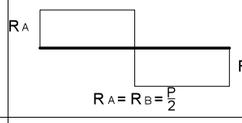
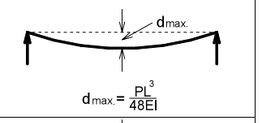
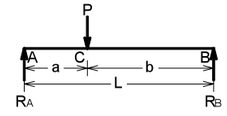
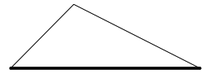
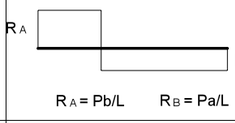
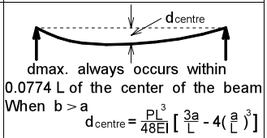
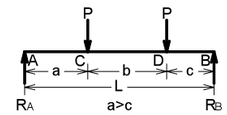
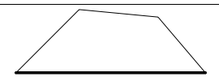
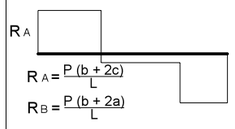
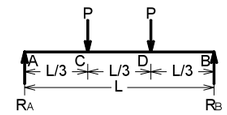
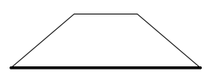
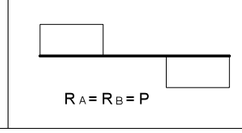
No.	Loading	Moment Diagram	Shear Diagram	Deflection
01		 Mx=P.x Mmax=P.a	 RA = P	 $d_C = \frac{Pa^3}{3EI}$ $d_{max.} = \frac{Pa^3}{3EI}(1+\frac{3b}{2a})$
02		 Mmax=Mx=Mc	No shears	 $d_C = \frac{Ma^2}{2EI}$ $d_{max.} = \frac{Ma^2}{2EI}(1+\frac{2b}{a})$
03		 $M_x = \frac{Wx^2}{2a}$ $M_{max} = \frac{Wa}{2}$	 RA = W	 $d_C = \frac{Wa^3}{8EI}$ $d_{max.} = \frac{Wa^3}{8EI}(1+\frac{4b}{3a})$
04		 $M_{max} = W(a+\frac{b}{2})$	 RA = W	 $d_{max.} = \frac{W}{24EI} \times (8a^3+18a^2b+12ab^2+3b^3+12a^2c+12abc+4b^2c)$
05		 $M_x = \frac{Wx^3}{3a^2}$ $M_A = \frac{Wa}{3}$	 RA = W	 $d_C = \frac{Wa^3}{15EI}$ $d_{max.} = \frac{Wa^3}{15EI}(1+\frac{5b}{4a})$
06		 $M_{max.} = W(a+\frac{2b}{3})$	 RA = W	 $d_{max.} = \frac{W(20a^3+50a^2b+40ab^2+11b^3)}{60EI}$
07		 $M_{max.} = \frac{PL}{4}$	 $R_A = R_B = \frac{P}{2}$	 $d_{max.} = \frac{PL^3}{48EI}$
08		 $M_{max.} = \frac{Pab}{L}$	 $R_A = Pb/L$ $R_B = Pa/L$	 dmax. always occurs within 0.0774 L of the center of the beam When b > a $d_{centre} = \frac{PL^3}{48EI}[\frac{3a}{L} - 4(\frac{a}{L})^3]$
09		 $M_C = \frac{Pa(b+2c)}{L}$ $M_D = \frac{Pc(b+2a)}{L}$	 $R_A = \frac{P(b+2c)}{L}$ $R_B = \frac{P(b+2a)}{L}$	For central deflection add the values for each P derived from the formula in the No.8 diagram.
10		 $M_{max.} = \frac{PL}{3}$	 $R_A = R_B = P$	 $d_{max.} = \frac{23PL^3}{648EI}$

Table 11(b) Moments, Shears, and Deflections

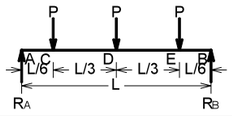
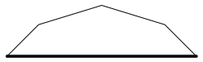
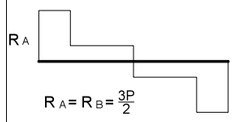
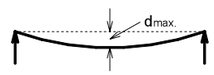
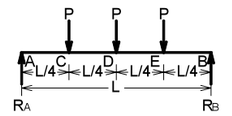
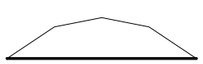
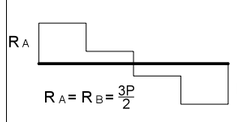
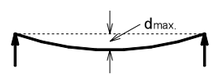
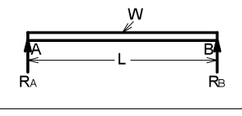
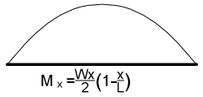
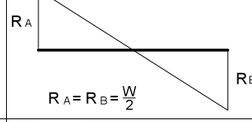
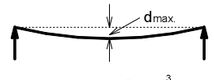
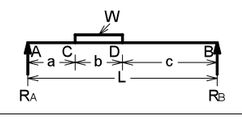
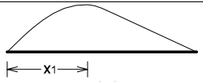
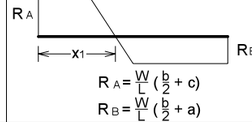
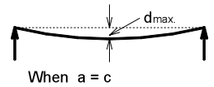
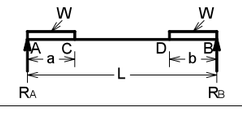
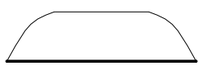
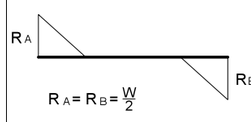
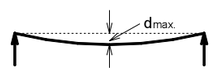
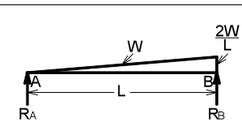
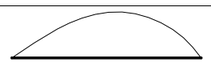
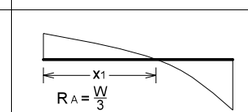
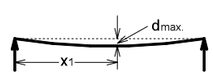
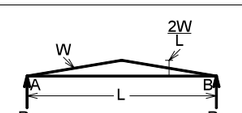
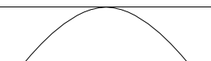
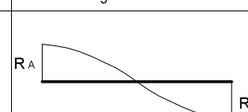
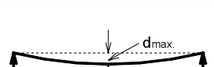
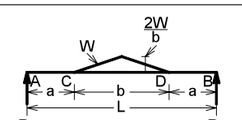
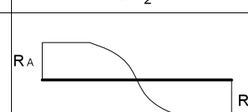
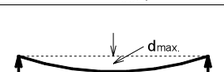
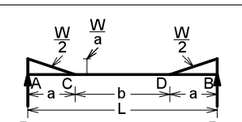
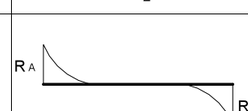
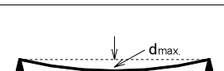
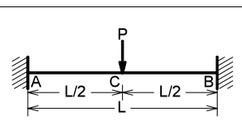
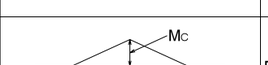
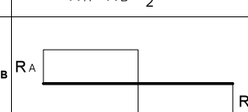
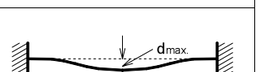
No.	Loading	Moment Diagram	Shear Diagram	Deflection
11		 $M_C = M_E = \frac{PL}{4}$ $M_D = \frac{5PL}{12}$	 $R_A = R_B = \frac{3P}{2}$	 $d_{max.} = \frac{53PL^3}{1296EI}$
12		 $M_C = M_E = \frac{3PL}{8}$ $M_D = \frac{PL}{2}$	 $R_A = R_B = \frac{3P}{2}$	 $d_{max.} = \frac{19PL^3}{384EI}$
13		 $M_x = \frac{Wx}{2}(1-\frac{x}{L})$ $M_{max.} = \frac{WL}{8}$	 $R_A = R_B = \frac{W}{2}$	 $d_{max.} = \frac{5}{384} \cdot \frac{WL^3}{EI}$
14		 $M_{max.} = \frac{W}{b}(\frac{x_1^2}{2} - a^2)$ when $x_1 = a + \frac{Pab}{W}$	 $R_A = \frac{W}{L}(\frac{b}{2} + c)$ $R_B = \frac{W}{L}(\frac{b}{2} + a)$	 When a = c $d_{max.} = \frac{W}{384EI}(8L^3 - 4Lb^2 - b^3)$
15		 $M_{max.} = \frac{Wa}{4}$	 $R_A = R_B = \frac{W}{2}$	 $d_{max.} = \frac{Wa(3L^2 - 2a^2)}{96EI}$
16		 $M_x = \frac{Wx}{3}(1-\frac{x^2}{L^2})$ M max.=0.128WL when $x_1 = 0.5774WL$	 $R_A = \frac{W}{3}$ $R_B = \frac{2W}{3}$	 $d_{max.} = \frac{0.01304WL^3}{EI}$ when x = 0.5193L
17		 $M_x = Wx(\frac{1}{2} - \frac{2x^2}{3L^2})$ M max.=WL/6	 $R_A = R_B = \frac{W}{2}$	 $d_{max.} = \frac{WL^3}{60EI}$
18		 $M^{max.} = \frac{W}{4}(L - \frac{b}{3})$	 $R_A = R_B = \frac{W}{2}$	 $d_{max.} = \frac{W}{480EI}(8L^3 + 7aL^2 - 4a^2L - 4a^3)$
19		 $M_{max.} = \frac{Wa}{6}$	 $R_A = R_B = \frac{W}{2}$	 $d_{max.} = \frac{Wa}{240EI}(18a^2 + 20ab + 5b^2)$
20		 $-M_A = -M_B = M_C = \frac{PL}{8}$	 $R_A = R_B = \frac{P}{2}$	 $_{max.} = \frac{PL^3}{192EI}$

Table 11(c) Moments, Shears, and Deflections

No.	Loading	Moment Diagram	Shear Diagram	Deflection
21		$M_A = -\frac{Pab^2}{L^2}$ $M_B = -\frac{Pba^2}{L^2}$ $M_C = -\frac{2Pa^2b^2}{L^3}$	$R_A = P(\frac{b}{L})^2(1 + 2\frac{a}{L})$ $R_B = P(\frac{a}{L})^2(1 + 2\frac{b}{L})$	$d_c = \frac{Pa^3b^3}{3EIL^3}$ $d_{max.} = \frac{2Pa^3b^3}{3EI(3L - 2a)^2}$ when $x = \frac{L^2}{3L - 2a}$
22		$M_A = M_B = -2PL/9$ $M_C = M_D = PL/9$	$R_A = R_B = P$	$d_{max.} = \frac{5PL^3}{648EI}$
23		$M_A = M_B = -19PL/72$ $M_D = 11PL/72$	$R_A = R_B = 3P/2$	$d_{max.} = \frac{41PL^3}{5184EI}$
24		$M_A = M_B = -5PL/16$ $M_D = 3PL/16$	$R_A = R_B = 3P/2$	$d_{max.} = \frac{PL^3}{96EI}$
25		$M_A = M_B = -\frac{WL}{12}$ $M_C = \frac{WL}{24}$	$R_A = R_B = W/2$	$d_{max.} = \frac{PL^3}{384EI}$
26		$M_A = \frac{-W}{12L^2b}[e^3(4L - 3e) - c^3(4L - 3c)]$ $M_B = \frac{-W}{12L^2b}[d^3(4L - 3d) - a^3(4L - 3a)]$	$R_A = r_A + \frac{M_A - M_B}{L}$, $R_B = r_B + \frac{M_B - M_A}{L}$ where r is the simple support reaction.	when a = c, $d_{max.} = \frac{W}{384EI}(L^3 + 2L^2a + 4La^2 - 8a^3)$
27		$M_x = -\frac{WL}{30}(\frac{10x^3}{L^3} - \frac{9x}{L} + 2)$ $+ M_{max} = WL/23.3$ when x = 0.55L $M_A = -WL/15$ $M_B = -WL/10$	$R_A = 0.3W$, $R_B = 0.7W$	$d_{max.} = \frac{WL^3}{382EI}$ when $x^1 = 0.525L$
28		$M_A = M_B = -\frac{5WL}{48}$ $M_C = WL/16$	$R_A = R_B = W/2$	$d_{max.} = \frac{1.4WL^3}{384EI}$
29		$M_A = M_B = \frac{-W}{48L}(5L^2 + 4aL - 4a^2)$	$R_A = R_B = W/2$	$d_{max.} = \frac{W}{1920EI}(7L^3 + 8aL^2 + 4a^2L - 16a^3)$
30		$M_A = M_B = -\frac{Wa}{12L}(2L - a)$	$R_A = R_B = W/2$	$d_{max.} = \frac{Wa^2}{480EI}(5L - 4a)$

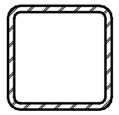


Table 12(a) Available Flexural Strength, (kip-ft)

Fy = 46 ksi				
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	Mn/Ω LRDF	ϕMn ASD
2 x 2	0.180	0.167	2.67	1.77
	0.188	0.174	2.75	1.83
	0.250	0.233	3.32	2.21
2.5 x 2.5	0.180	0.167	4.40	2.93
	0.188	0.174	4.55	3.02
	0.250	0.233	5.63	3.75
3 x 3	0.180	0.167	6.58	4.37
	0.188	0.174	6.80	4.52
	0.250	0.233	8.55	5.68
	0.313	0.291	10.0	6.65
	0.375	0.349	11.2	7.46
3.5 x 3.5	0.180	0.167	9.18	6.10
	0.188	0.174	9.50	6.32
	0.250	0.233	12.0	8.02
4 x 4	0.180	0.167	12.2	8.12
	0.188	0.174	12.6	8.42
	0.250	0.233	16.1	10.7
	0.313	0.291	19.2	12.8
	0.375	0.349	22.0	14.6
	0.500	0.465	26.5	17.6
4.5 x 4.5	0.180	0.167	15.6	10.4
	0.188	0.174	16.2	10.8
	0.250	0.233	20.9	13.9
	0.313	0.291	25.0	16.6
5 x 5	0.180	0.167	19.5	13.0
	0.188	0.174	20.3	13.5
	0.250	0.233	26.2	17.4
	0.313	0.291	31.5	21.0
	0.375	0.349	36.5	24.2
	0.500	0.465	45.0	29.9
6 x 6	0.180	0.167	26.5	17.6
	0.188	0.174	28.4	18.9
	0.250	0.233	38.6	25.7
	0.313	0.291	46.9	31.2
	0.375	0.349	54.5	36.3
	0.500	0.465	68.3	45.4
7 x 7	0.180	0.167	33.3	22.1
	0.188	0.174	35.1	23.3
	0.250	0.233	53.5	35.6
	0.313	0.291	65.2	43.4
	0.375	0.349	76.2	50.7
	0.500	0.465	96.3	64.1

Fy = 46 ksi				
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	Mn/Ω LRDF	ϕMn ASD
8 x 8	0.180	0.167	41.5	27.6
	0.188	0.174	43.9	29.2
	0.250	0.233	67.6	45.0
	0.313	0.291	86.5	57.5
	0.375	0.349	101	67.5
	0.500	0.465	129	86.0
	0.625	0.581	154	102
10 x 10	0.250	0.233	93.5	62.2
	0.313	0.291	132	87.8
	0.375	0.349	162	108
	0.500	0.465	209	139
	0.625	0.581	252	167
	0.750	0.698	292	194
12 x 12	0.250	0.233	126	84.0
	0.313	0.291	170	113
	0.375	0.349	228	151
	0.500	0.465	308	205
	0.625	0.581	374	249
	0.750	0.698	436	290
14 x 14	0.313	0.291	220	146
	0.375	0.349	281	187
	0.500	0.465	427	284
	0.625	0.581	521	346
	0.750	0.698	609	405
	0.875	0.814	693	461
16 x 16	0.313	0.291	274	182
	0.375	0.349	351	233
	0.500	0.465	540	359
	0.625	0.581	691	460
	0.750	0.698	812	540
	0.875	0.814	926	616
18 x 18	0.500	0.465	630	419
	0.625	0.581	885	589
	0.750	0.698	1040	694
	0.875	0.814	1190	793
20 x 20	0.500	0.465	748	497
	0.625	0.581	1050	701
	0.750	0.698	1300	867
	0.875	0.814	1490	993
22 x 22	0.750	0.698	1590	1060
	0.875	0.814	1820	1210

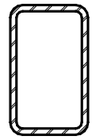


Table 12(b) Available Flexural Strength, (kip-ft)

Fy = 46 ksi						
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	X-Axis Mn/Ω LRDF	X-Axis ϕMn ASD	Y-Axis Mn/Ω LRDF	Y-Axis ϕMn ASD
3 x 2	0.180	0.167	4.94	3.29	3.72	2.48
	0.188	0.174	5.10	3.39	3.84	2.55
	0.250	0.233	6.32	4.20	4.74	3.15
4 x 2	0.180	0.167	7.80	5.19	4.78	3.18
	0.188	0.174	8.06	5.36	4.94	3.28
	0.250	0.233	10.1	6.74	6.16	4.10
4 x 3	0.180	0.167	10.0	6.65	8.21	5.46
	0.188	0.174	10.3	6.89	8.50	5.65
	0.250	0.233	13.1	8.75	10.7	7.16
5 x 2	0.180	0.167	11.2	7.47	5.83	3.88
	0.188	0.174	11.6	7.73	6.03	4.01
	0.250	0.233	14.7	9.80	7.58	5.04
5 x 3	0.180	0.167	14.0	9.32	9.84	6.55
	0.188	0.174	14.5	9.66	10.1	6.78
	0.250	0.233	18.5	12.3	12.9	8.64
	0.313	0.291	22.1	14.7	15.4	10.2
	0.375	0.349	25.3	16.8	17.5	11.7
6 x 2	0.180	0.167	15.2	10.1	6.44	4.28
	0.188	0.174	15.7	10.5	6.84	4.55
	0.250	0.233	20.1	13.4	9.00	5.99
6 x 3	0.180	0.167	18.5	12.3	10.7	7.15
	0.188	0.174	19.2	12.8	11.4	7.60
	0.250	0.233	24.7	16.4	15.2	10.1
	0.313	0.291	29.7	19.7	18.1	12.0
	0.375	0.349	34.1	22.7	20.7	13.8
6 x 4	0.180	0.167	21.9	14.6	15.5	10.3
	0.188	0.174	22.7	15.1	16.5	11.0
	0.250	0.233	29.4	19.5	22.2	14.8
	0.313	0.291	35.4	23.5	26.7	17.7
	0.375	0.349	40.9	27.2	30.8	20.5
	0.500	0.465	50.5	33.6	37.9	25.2
7 x 5	0.313	0.291	51.7	34.4	41.0	27.3
	0.375	0.349	60.2	40.0	47.7	31.7
	0.500	0.465	75.4	50.1	59.5	39.6
8 x 4	0.180	0.167	33.9	22.6	16.9	11.2
	0.188	0.174	35.2	23.4	17.9	11.9
	0.250	0.233	45.8	30.5	27.1	18.0
	0.313	0.291	55.6	37.0	34.1	22.7
	0.375	0.349	64.6	43.0	39.6	26.3
	0.500	0.465	80.9	53.8	49.2	32.7
8 x 6	0.180	0.167	39.5	26.2	28.4	18.9
	0.188	0.174	42.4	28.2	30.1	20.0
	0.250	0.233	58.3	38.8	45.9	30.5
	0.313	0.291	71.0	47.2	58.3	38.8
	0.375	0.349	83.1	55.2	68.1	45.3
	0.500	0.465	105	69.9	86.0	57.2

Fy = 46 ksi						
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	X-Axis Mn/Ω LRDF	X-Axis ϕMn ASD	Y-Axis Mn/Ω LRDF	Y-Axis ϕMn ASD
10 x 4	0.313	0.291	79.7	53.0	39.9	26.6
	0.375	0.349	93.2	62.0	48.4	32.2
	0.500	0.465	117	78.3	60.5	40.3
10 x 6	0.180	0.167	54.3	36.1	30.3	20.2
	0.188	0.174	58.5	38.9	32.2	21.4
	0.250	0.233	81.2	54.0	48.3	32.1
	0.313	0.291	99.2	66.0	67.0	44.6
	0.375	0.349	116	77.4	81.7	54.4
	0.500	0.465	148	98.6	103	69.0
12 x 4	0.250	0.233	88.4	58.8	30.8	20.5
	0.313	0.291	107	71.8	42.1	28.0
	0.375	0.349	126	84.2	54.8	36.4
	0.500	0.465	160	107	71.9	47.8
10 x 8	0.375	0.349	139	92.9	119	79.8
	0.500	0.465	178	119	153	102
12 x 6	0.375	0.349	154	102	91.6	60.9
	0.500	0.465	197	131	121	80.8
12 x 8	0.250	0.233	119	79.5	74.1	49.3
	0.313	0.291	155	103	100	67.1
	0.375	0.349	182	121	132	88.3
	0.500	0.465	234	156	177	118
14 x 6	0.313	0.291	167	111	74.1	49.3
	0.375	0.349	197	131	95.3	63.4
	0.500	0.465	254	169	139	92.7
14 x 10	0.375	0.349	263	175	181	120
	0.500	0.465	340	226	270	180
	0.625	0.581	413	275	327	218
16 x 8	0.250	0.233	183	121	79.8	53.1
	0.313	0.291	239	159	110	73.7
	0.375	0.349	283	188	143	95.7
	0.500	0.465	366	243	217	144
	0.625	0.581	444	295	273	181
16 x 12	0.375	0.349	340	226	241	160
	0.500	0.465	466	310	367	244
	0.625	0.581	567	377	466	310
	0.750	0.698	664	442	545	362
20 x 12	0.500	0.465	648	431	386	257
	0.625	0.581	793	527	535	356
	0.750	0.698	931	619	654	435
24 x 12	0.500	0.465	857	570	410	273
	0.625	0.581	1050	698	561	373
	0.750	0.698	1230	823	733	487

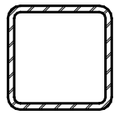


Table 12(c) Available Flexural Strength, (kip-ft)

Fy = 50 ksi				
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	Mn/Ω LRDF	ϕMn ASD
2 x 2	0.180	0.167	2.90	1.93
	0.188	0.174	2.99	1.98
	0.250	0.233	3.61	2.40
2.5 x 2.5	0.180	0.167	4.79	3.18
	0.188	0.174	4.94	3.29
	0.250	0.233	6.12	4.07
3 x 3	0.180	0.167	7.15	4.75
	0.188	0.174	7.39	4.92
	0.250	0.233	9.29	6.18
3.5 x 3.5	0.180	0.167	9.98	6.64
	0.188	0.174	10.3	6.87
	0.250	0.233	13.1	8.72
4 x 4	0.180	0.167	13.2	8.83
	0.188	0.174	13.7	9.15
	0.250	0.233	17.5	11.7
	0.313	0.291	20.9	13.9
	0.375	0.349	23.9	15.9
4.5 x 4.5	0.180	0.167	17.0	11.3
	0.188	0.174	17.6	11.7
	0.250	0.233	22.7	15.1
	0.313	0.291	27.2	18.1
5 x 5	0.180	0.167	21.2	14.1
	0.188	0.174	22.0	14.6
	0.250	0.233	28.5	18.9
	0.313	0.291	34.3	22.8
	0.375	0.349	39.6	26.4
	0.500	0.465	48.9	32.5
6 x 6	0.180	0.167	28.0	18.6
	0.188	0.174	30.0	20.0
	0.250	0.233	42.0	27.9
	0.313	0.291	50.9	33.9
	0.375	0.349	59.3	39.4
	0.500	0.465	74.2	49.3
7 x 7	0.180	0.167	35.6	23.7
	0.188	0.174	37.6	25.0
	0.250	0.233	58.2	38.7
	0.313	0.291	70.9	47.1
	0.375	0.349	82.8	55.1
	0.500	0.465	104	69.7

Fy = 50 ksi				
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	Mn/Ω LRDF	ϕMn ASD
8 x 8	0.180	0.167	44.4	29.5
	0.188	0.174	46.9	31.2
	0.250	0.233	71.5	47.6
	0.313	0.291	94.0	62.6
	0.375	0.349	110	73.4
	0.500	0.465	140	93.4
10 x 10	0.250	0.233	100	66.5
	0.313	0.291	139	92.9
	0.375	0.349	177	117
	0.500	0.465	227	151
	0.625	0.581	274	182
12 x 12	0.250	0.233	135	89.8
	0.313	0.291	182	121
	0.375	0.349	241	160
	0.500	0.465	335	223
	0.625	0.581	407	270
	0.750	0.698	474	315
14 x 14	0.313	0.291	235	156
	0.375	0.349	300	200
	0.500	0.465	464	309
	0.625	0.581	566	376
	0.750	0.698	663	441
	0.875	0.814	753	501
16 x 16	0.375	0.349	375	249
	0.500	0.465	571	380
	0.625	0.581	751	500
	0.750	0.698	882	587
	0.875	0.814	1000	669
18 x 18	0.500	0.465	670	446
	0.625	0.581	963	640
	0.750	0.698	1130	754
	0.875	0.814	1290	862
20 x 20	0.500	0.465	800	532
	0.625	0.581	1110	742
	0.750	0.698	1410	942
	0.875	0.814	1620	1080
22 x 22	0.750	0.698	1730	1150

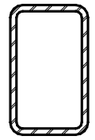


Table 12(d) Available Flexural Strength, (kip-ft)

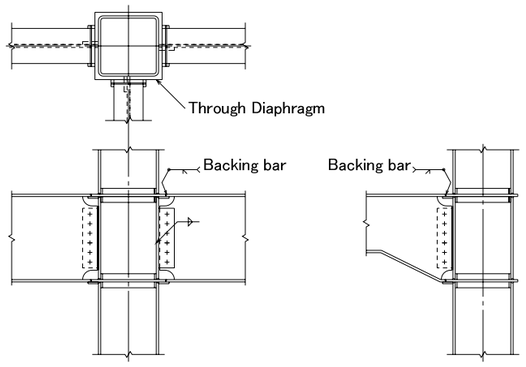
Fy = 50 ksi						
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	X-Axis Mn/Ω LRDF	X-Axis ϕMn ASD	Y-Axis Mn/Ω LRDF	Y-Axis ϕMn ASD
3 x 2	0.180	0.167	5.37	3.57	3.72	2.48
	0.188	0.174	5.55	3.69	3.84	2.55
	0.250	0.233	6.87	4.57	4.74	3.15
4 x 2	0.180	0.167	8.47	5.64	4.78	3.18
	0.188	0.174	8.76	5.83	4.94	3.28
	0.250	0.233	11.0	7.32	6.16	4.10
4 x 3	0.180	0.167	10.8	7.23	8.21	5.46
	0.188	0.174	11.2	7.49	8.50	5.65
	0.250	0.233	14.3	9.51	10.7	7.16
5 x 2	0.180	0.167	12.2	8.12	5.83	3.88
	0.188	0.174	12.6	8.40	6.03	4.01
	0.250	0.233	16.0	10.6	7.58	5.04
5 x 3	0.180	0.167	15.2	10.1	9.84	6.55
	0.188	0.174	15.7	10.5	10.1	6.78
	0.250	0.233	20.1	13.4	12.9	8.64
	0.313	0.291	24.0	16.0	15.4	10.2
	0.375	0.349	27.5	18.3	17.5	11.7
6 x 2	0.180	0.167	16.5	11.0	6.44	4.28
	0.188	0.174	17.1	11.4	6.84	4.55
	0.250	0.233	21.9	14.5	9.00	5.99
6 x 3	0.180	0.167	20.2	13.4	10.7	7.15
	0.188	0.174	20.9	13.9	11.4	7.60
	0.250	0.233	26.9	17.9	15.2	10.1
	0.313	0.291	32.2	21.4	18.1	12.0
	0.375	0.349	37.1	24.7	20.7	13.8
6 x 4	0.180	0.167	23.8	15.8	15.5	10.3
	0.188	0.174	24.7	16.4	16.5	11.0
	0.250	0.233	31.9	21.2	22.2	14.8
	0.313	0.291	38.5	25.6	26.7	17.7
	0.375	0.349	44.5	29.6	30.8	20.5
7 x 5	0.313	0.291	56.2	37.4	41.0	27.3
	0.375	0.349	65.4	43.5	47.7	31.7
8 x 4	0.180	0.167	36.9	24.5	16.9	11.2
	0.188	0.174	38.3	25.5	17.9	11.9
	0.250	0.233	49.8	33.1	27.1	18.0
	0.313	0.291	60.4	40.2	34.1	22.7
	0.375	0.349	70.3	46.7	39.6	26.3
8 x 6	0.180	0.167	41.5	27.6	28.4	18.9
	0.188	0.174	44.7	29.7	30.1	20.0
	0.250	0.233	63.4	42.2	45.9	30.5
	0.313	0.291	77.2	51.4	58.3	38.8
	0.375	0.349	90.3	60.1	68.1	45.3
	0.500	0.465	114	76.0	86.0	57.2

Fy = 50 ksi						
Nominal Size in.	Wall Thickness Nominal in.	Wall Thickness Design in.	X-Axis Mn/Ω LRDF	X-Axis ϕMn ASD	Y-Axis Mn/Ω LRDF	Y-Axis ϕMn ASD
10 x 4	0.313	0.291	86.7	57.7	39.9	26.6
	0.375	0.349	101	67.4	48.4	32.2
10 x 6	0.180	0.167	56.9	37.8	30.3	20.2
	0.188	0.174	61.5	40.9	32.2	21.4
	0.250	0.233	88.3	58.7	48.3	32.1
	0.313	0.291	107	71.8	67.0	44.6
	0.375	0.349	126	84.2	81.7	54.4
	0.500	0.465	161	107	103	69.0
12 x 4	0.250	0.233	96.1	63.9	30.8	20.5
	0.313	0.291	117	78.0	42.1	28.0
	0.375	0.349	137	91.5	54.8	36.4
10 x 8	0.375	0.349	151	101	119	79.8
	0.500	0.465	194	129	153	102
12 x 6	0.375	0.349	168	111	91.6	60.9
	0.500	0.465	215	143	121	80.8
12 x 8	0.250	0.233	125	83.7	74.1	49.3
	0.313	0.291	168	112	100	67.1
	0.375	0.349	198	132	132	88.3
	0.500	0.465	255	169	177	118
14 x 6	0.313	0.291	182	121	74.1	49.3
	0.375	0.349	214	142	95.3	63.4
	0.500	0.465	276	183	139	92.7
14 x 10	0.375	0.349	286	190	181	120
	0.500	0.465	370	246	270	180
	0.625	0.581	449	299	327	218
16 x 8	0.250	0.233	191	127	79.8	53.1
	0.313	0.291	260	173	110	73.7
	0.375	0.349	307	204	143	95.7
	0.500	0.465	398	264	217	144
20 x 12	0.500	0.465	705	469	386	257
	0.625	0.581	862	573	535	356
	0.750	0.698	1010	673	654	435
24 x 12	0.500	0.465	931	619	410	273
	0.625	0.581	1140	759	561	373
	0.750	0.698	1340	894	733	487

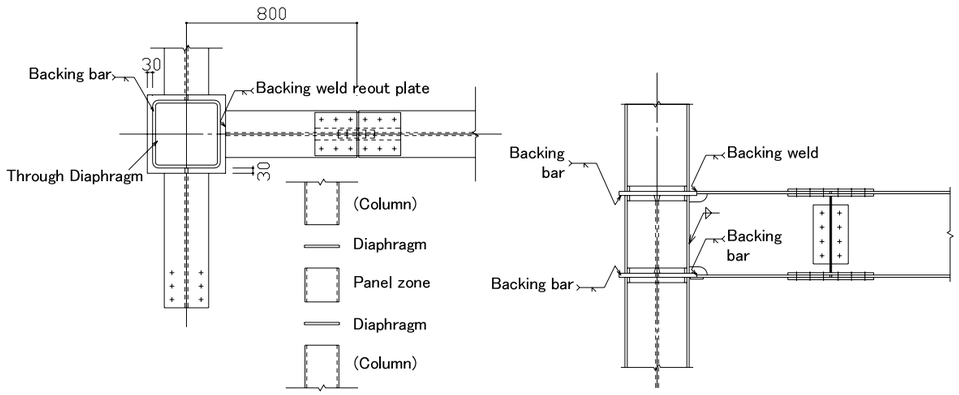
Sect.⑥ Details

The following drawings are typical details designed and used in Japan. The arabic numbers without any unit show the dimensions or distances in metric unit (mm).

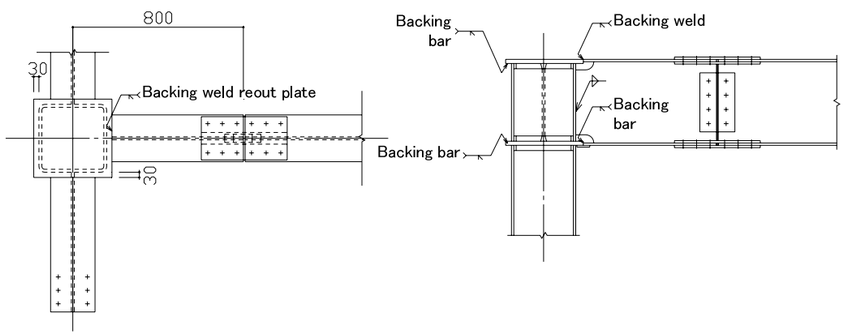
01 Through Diaphragm Basic Type A



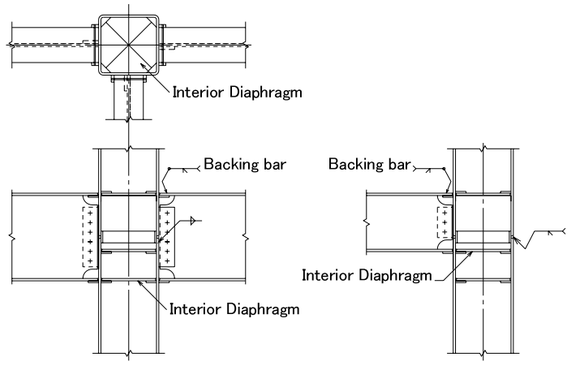
02 Through Diaphragm Basic Type B



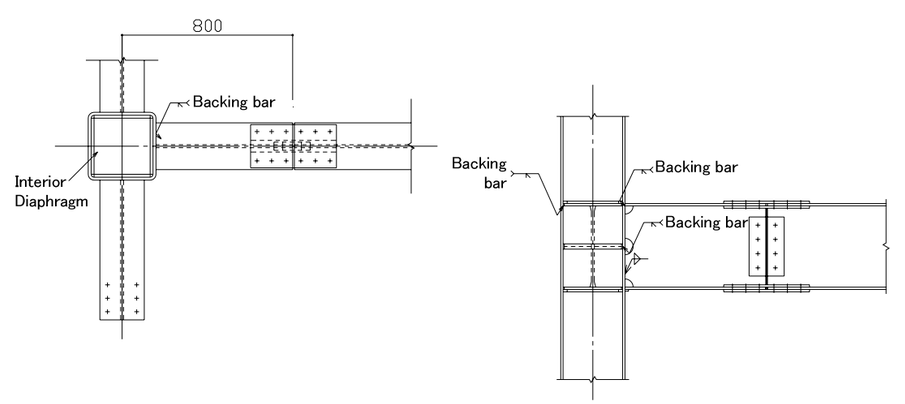
03 Top of Column for Through Diaphragm



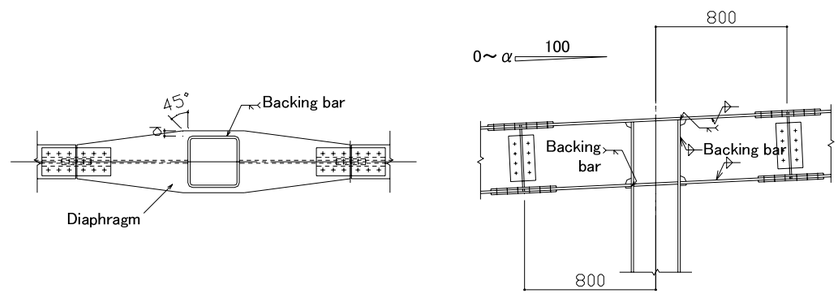
04 Interior Diaphragm Basic Type A



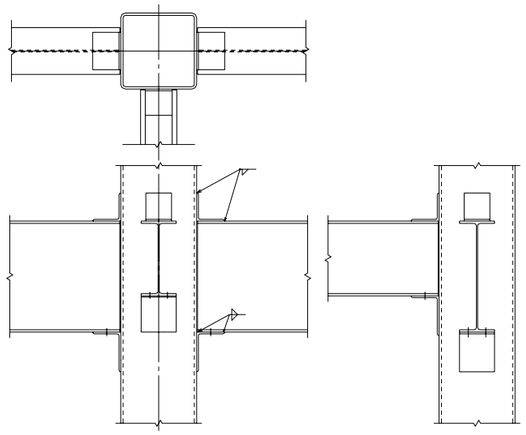
05 Interior Diaphragm



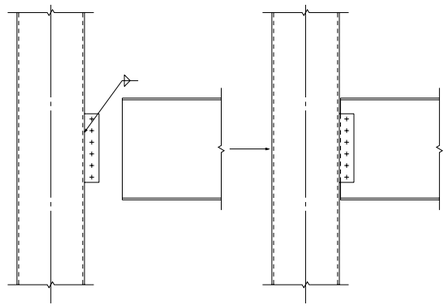
06 Top of Column with Sloped Beam



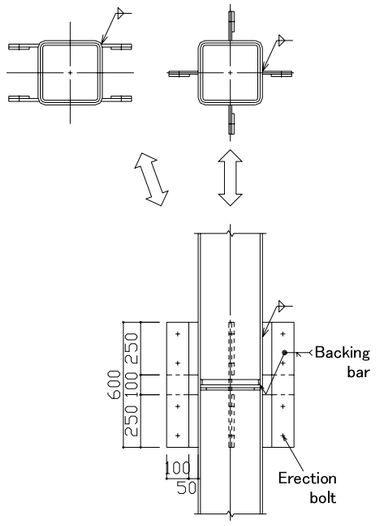
07 Interior Beam to Column Connection



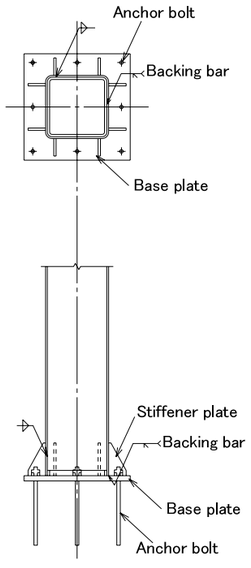
08 Pin Connection



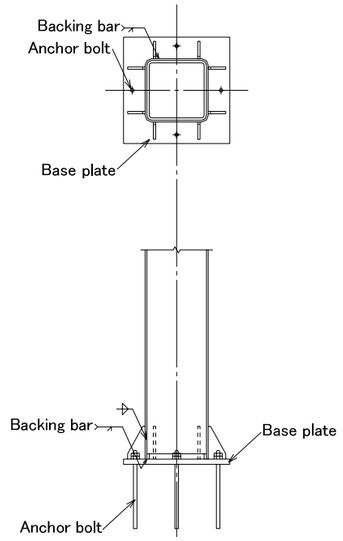
09 Column Splice



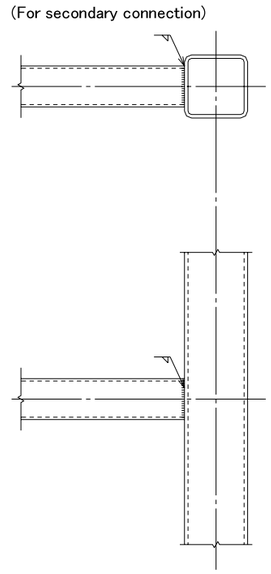
10 Fixed Column Footing



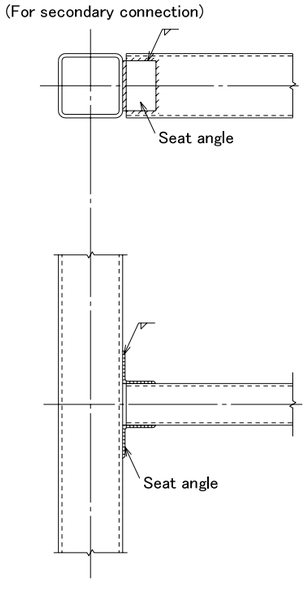
11 Pinned Column Footing A



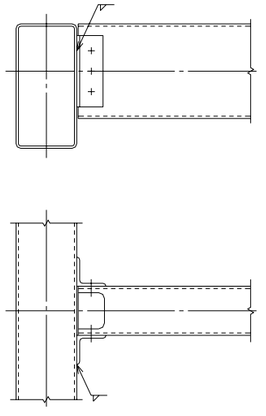
12 Right Angle Connection A



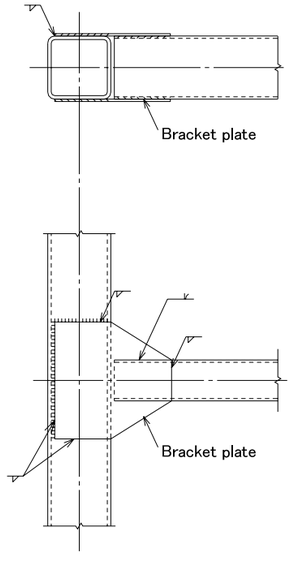
13 Right Angle Connection B



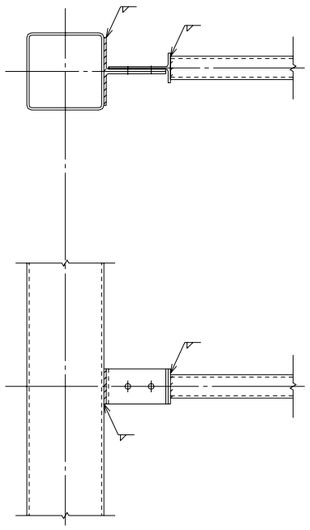
14 Right Angle Connection C



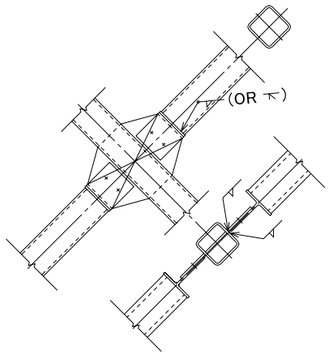
15 Right Angle Connection D



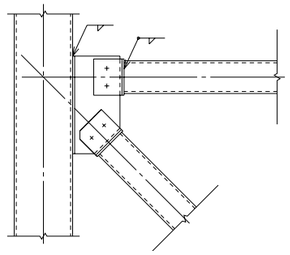
16 Connection of Bracing Member A



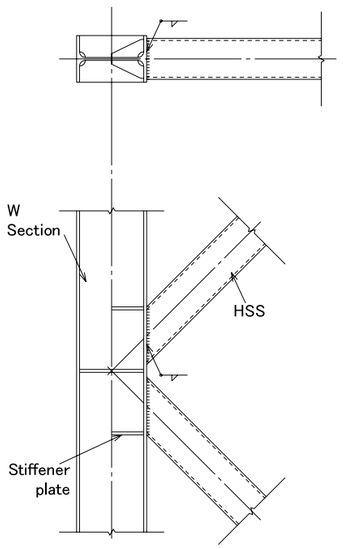
17 Connection of Bracing Member B



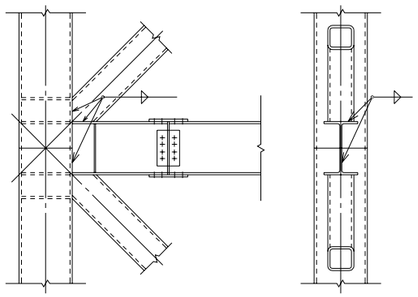
18 Connection of Bracing Member C



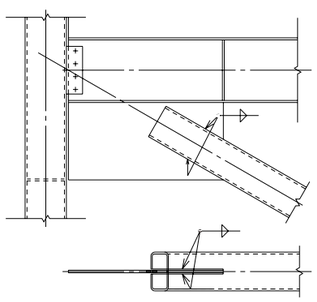
19 Connection of W = Chord and HSS Web



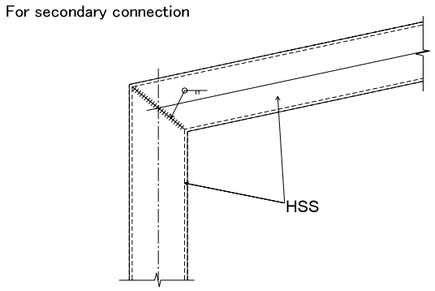
20 Connection of Truss Structure



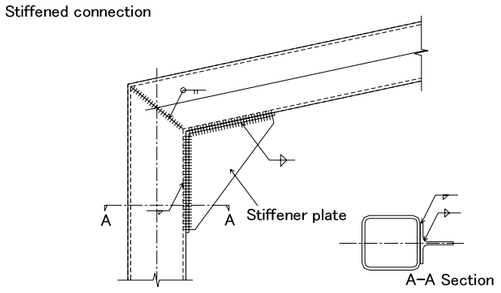
21 Connection of Bracing Member



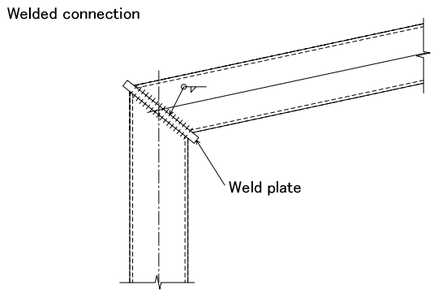
22 Angular Connection A



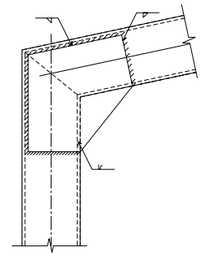
23 Angular Connection B



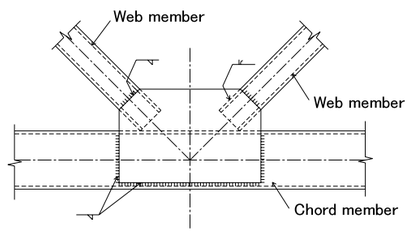
24 Angular Connection C



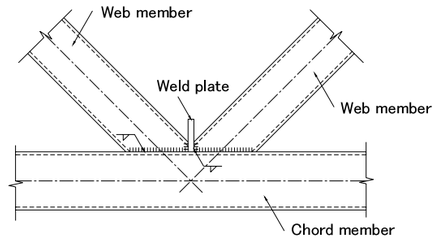
25 Angular Connection D



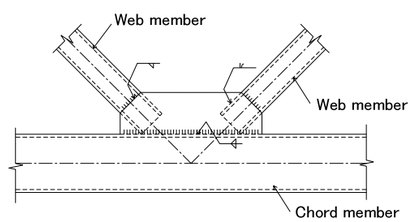
26 Connection of Truss Structure A



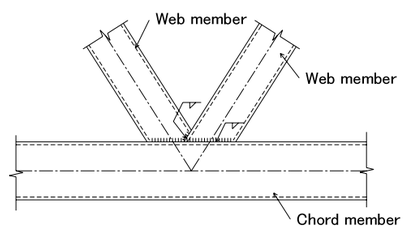
27 Connection of Truss Structure B



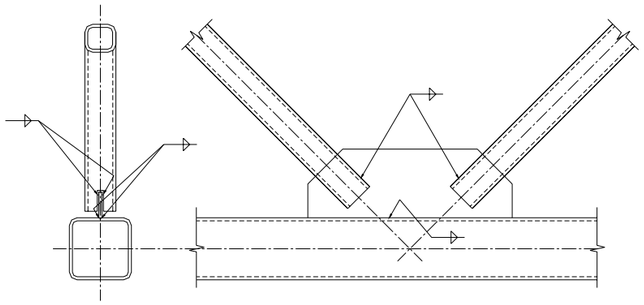
28 Connection of Truss Structure C



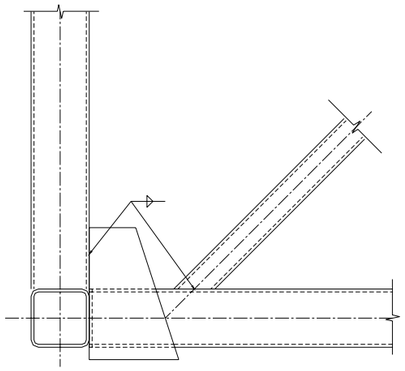
29 Connection of Truss Structure D



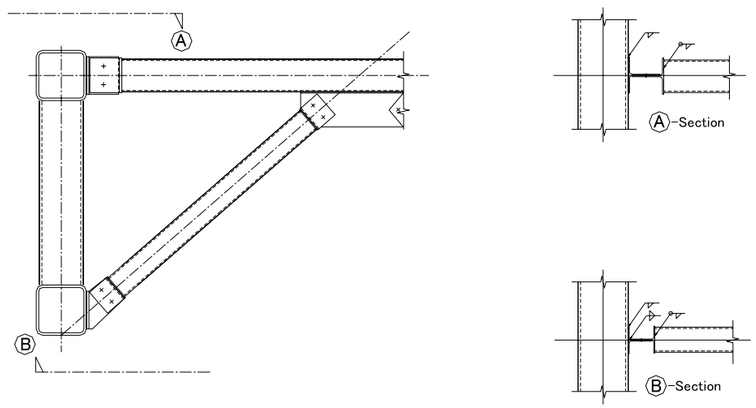
30 Connection of Truss Structure E



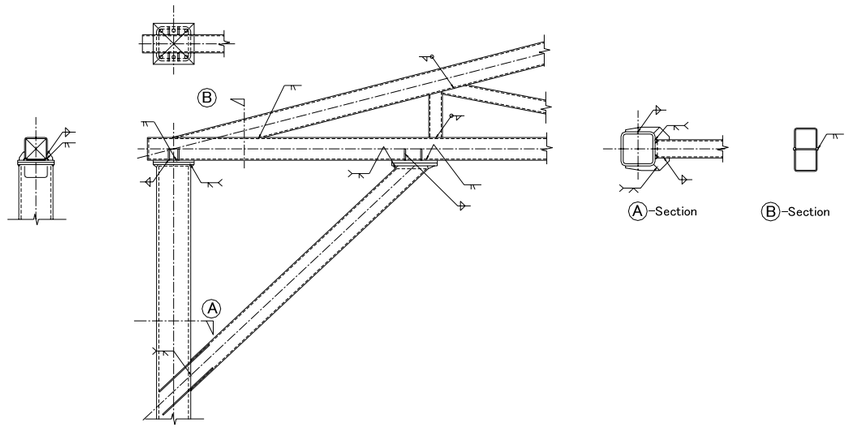
31 Connection of Truss to Truss Structure F



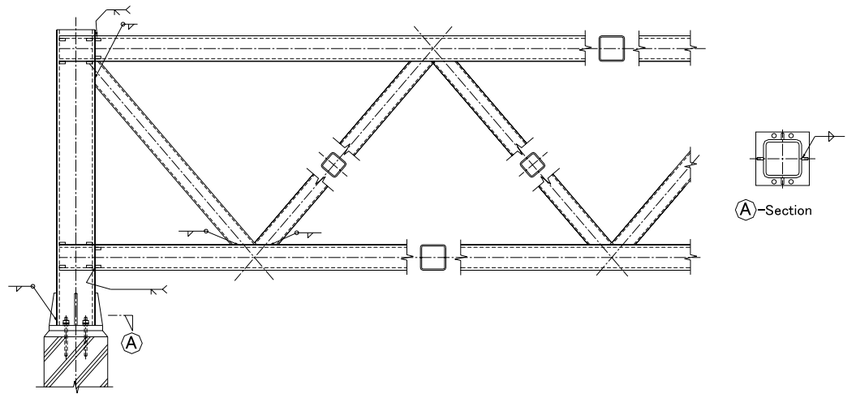
32 Connection of Girder to Truss Structure G



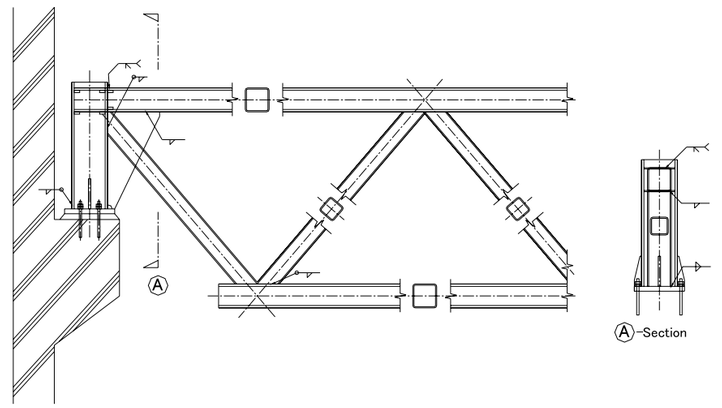
33 Connection of Truss Structure H



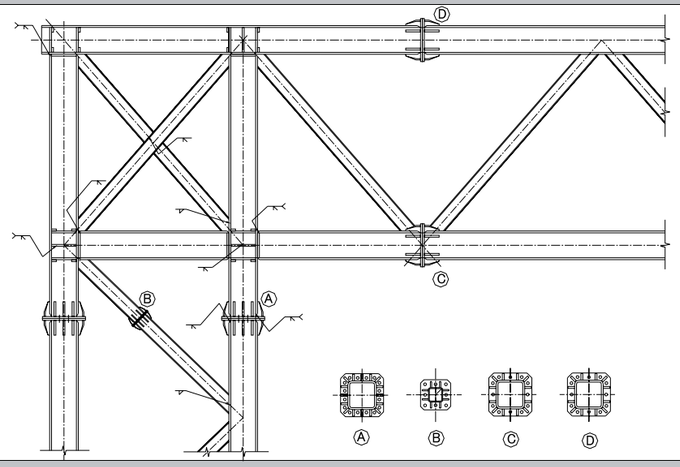
34 Connection of Truss Structure I



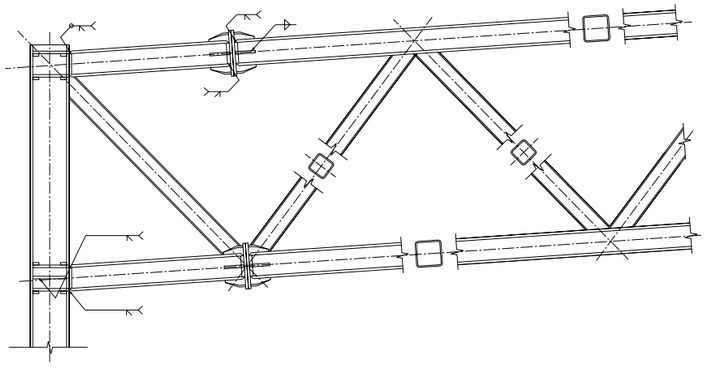
35 Connection of Truss Structure J



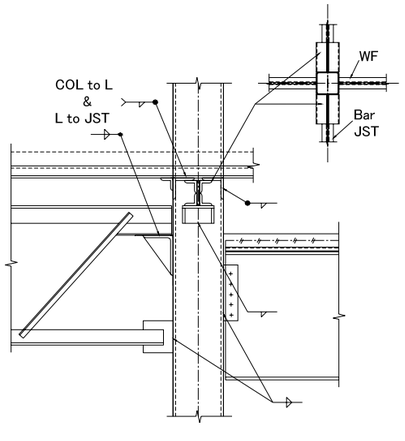
36 Connection of Truss Structure K



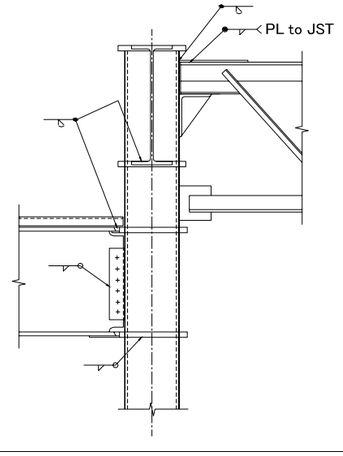
37 Connection of Truss Structure L



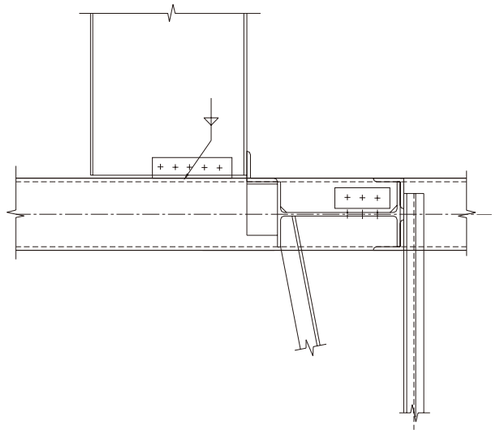
38 Example of Connection Applied to Building A



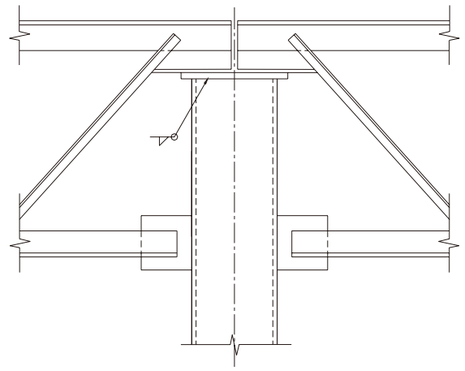
39 Example of Connection Applied to Building B



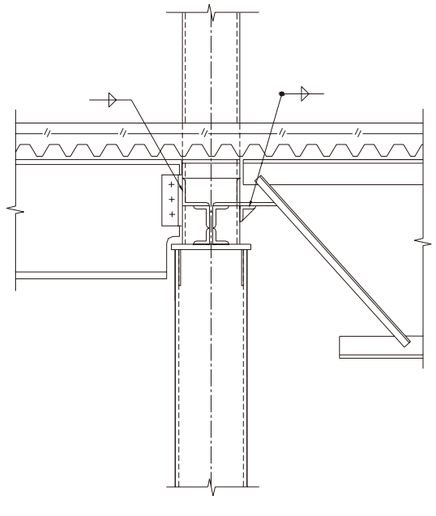
40 Example of Connection Applied to Building C



41 Example of Connection Applied to Building D



42 Example of Connection Applied to Building E



43 Example of Connection Applied to Building F