

Design Aids for Built-Up I-Shaped Beams with Slender Webs

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With the advent of the 13th Edition AISC *Steel Construction Manual* (AISC, 2005a), hereafter referred to as the AISC *Steel Manual*, available strength design aids have been prepared for use in the design of built-up I-shaped beams with slender webs, with or without stiffeners, for allowable strength design (ASD) and load and resistance factor design (LRFD) methodologies.

While the application of slender web built-up sections is not as common as rolled shapes, their use is warranted under conditions of economy, specialization or unusual constraints. Section F4 of the *Specification for Structural Steel Buildings* (AISC, 2005b), hereafter referred to as the AISC *Specification*, governs the flexural design of beams with noncompact webs for doubly or singly symmetric I-shaped members; however, Section F5 provides a simplified and conservative approach to the flexural design of beams with compact, noncompact, or slender webs by ignoring the torsional properties of the cross section. This approach greatly simplifies the design equations; however, the engineer is still confronted with determining the controlling limit state by applying the numerous equations in Section F5. This is compounded by the provisions in Sections G2 and G3 for the limit states pertaining to shear and the proportioning limits imposed by Section F13.2. Hence, the available strength tables appearing in this paper were created to aid in the design of built-up I-shaped slender web beams.

Tables originally prepared by Nasados (1997) served as design aids for plate girder design in accordance with the *Load and Resistance Factor Design Specification for Structural Steel Buildings* (AISC, 1993). The plate girder design aids included homogeneous sections for 36- and 50-ksi yield strengths, and hybrid sections consisting of 50-ksi flanges and 36-ksi webs. Those original design aids have been revised and updated to reflect the current specifications and industry practice of using homogeneous material and minimum yield strength of 50 ksi.

An example is presented to demonstrate the usage of the available strength tables. The example mimics the format of the design examples that appear on the companion CD that accompanies the AISC *Steel Manual* (AISC, 2005a).

GENERATION OF THE AVAILABLE STRENGTH TABLES

The provisions of Sections F5, G2, and G3 (AISC, 2005b) are largely based on the work of Basler and Thurlimann (1961) and Basler (1961a and 1961b) and essentially have remained unchanged since their adoption into the AISC specifications. Available strength tables were generated by employing the equations presented in the current *Specification* for each limit state with the following two simplifications: First, the effective radius of gyration of the compressed portion of the girder used for the calculation of the lateral torsional buckling limit state in Section F5.2 is approximated as the radius of gyration of the compression flange plus one-third of the web that is in compression; this approximation appears as a user note at the end of Section F4.2, specifically,

$$r_t \approx \frac{b_{fc}}{\sqrt{12 \left(1 + \frac{a_w}{6} \right)}} \quad (1)$$

where

$$a_w = \frac{h_c t_w}{b_{fc} t_{fc}} \leq 10 \quad (2)$$

Second, the following equations were used for the slenderness parameters in Section F5.3 for the compression flange local buckling limit state:

$$\lambda_{fc} = \lambda = \frac{b_{fc}}{2t_{fc}} \quad (3)$$

(AISC *Specification* Table B4.1, Case 2)

$$\lambda_{pf} = \lambda_p = 0.38 \sqrt{E/F_{yc}} \quad (4)$$

(AISC *Specification* Table B4.1, Case 2, Footnote b)

$$\lambda_{rf} = \lambda_r = 0.95 \sqrt{k_c E/F_L} \quad (5)$$

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where

$$F_L = 0.7F_y$$

(AISC Specification Table B4.1, Case 2, footnote b)

Equation 5 yields:

$$\lambda_{rf} = 0.95 \sqrt{\frac{k_c E}{0.7F_{yc}}} \quad (6)$$

where

$$k_c = \frac{4}{\sqrt{h/t_w}} \quad 0.35 \leq k_c \leq 0.76 \quad (7)$$

(AISC Specification Table B4.1, footnote a)

Since there was a tremendous amount of data and innumerable subsequent calculations used to generate the available strength tables, a spreadsheet was programmed (Microsoft Excel utilizing Visual Basic for Applications) to determine the pertinent values shown in the tables. Equations for each limit state were programmed into the spreadsheet according to the specification and as noted earlier. Dimensions and section properties were calculated by applying basic geometric and mechanics equations.

FLEXURAL AND SHEAR DESIGN LIMIT STATES

The programmed spreadsheet determined the nominal flexural strength by calculating and selecting the controlling limit state for compression flange yielding per Section F5.1; lateral torsional buckling per Section F5.2, utilizing an effective radius of gyration given in Equation 1; compression flange local buckling per Section F5.3 utilizing Equations 3 to 7; and tension flange yielding per Section F5.4. Vertical flange buckling is checked by the program per the requirements of Section F13.2. It should be noted that the sections shown in the tables are all doubly symmetric; therefore, Equation F13-2 of Section F13.2 is not applicable, and no further treatment of this requirement is given within the tables.

The nominal shear strength is determined in the same fashion as the flexural strength but for the limit states of shear yielding and shear buckling per Section G2.1 and the limit state of tension field yielding per Section G3.2 subjected to the limits imposed by Section G3.1. Two shear strength tables were generated: one for utilizing the post buckling strength of the web including tension field action and one for excluding tension field action. This is clearly stated on each table. The requirements for including tension field action per Section G3.1 are inherent in the tables by programmed checks in the spreadsheet.

The allowable strength (ASD) or design strength (LRFD) for flexure and shear were determined by applying the

appropriate safety or resistance factor. Consequently, the data shown in the available strength tables is the result of the generation process.

AVAILABLE STRENGTH TABLES

The available strength tables (Appendices B and C) provide the available flexural or shear strength in a tabular format based on either ASD or LRFD methodologies. The tables were generated for welded doubly symmetric I-shaped slender web beams. All tables display the available strength for ASD or LRFD in a side-by-side format similar to the aids presented in the AISC *Steel Manual* (AISC, 2005a). Each table displays the appropriate safety and resistance factors and material yield strength in the heading of the table. The flexural strength tables also indicate the beam bending coefficient, C_b , set to unity. Local effects due to concentrated loads are not accounted for in the tables.

DIMENSIONS

There are an infinite number of combinations that could be generated for design tables; however, that would preclude publishing in a journal. Thus, the tables have incorporated some practical minimum fabrication sizes and author-chosen increments of plate sizes that may compose a built-up slender web beam.

Web depths begin at 60 in. and increase to 120 in. at 12-in. intervals; very slender webs are not used. Plate thicknesses for the web increase at a constant 1/16-in. increment instead of the recommended 1/8-in. increment for thicknesses over 3/8 in. per AISC fabrication suggestions (AISC, 2005a).

Flange widths and thicknesses are given beginning with 12 in. wide by 3/4 in. thick and ending at 30 in. wide by 3 in. thick with increments of 6 in. and 1/4 in., respectively. The width-to-thickness ratio of the compression flange was kept at or below 24 for practical fabrication concerns.

Lateral brace points of the compression flange are given for a condition of full lateral support, intervals of 5 ft, from 10 to 30 ft, and at 50, 75, and 100 ft.

Basic section properties are given along with the raw dimensions. The tabulated weight per foot excludes any additional weight due to welds or other attachments.

AVAILABLE STRENGTH

Available flexural strength tables (Appendix B) present available flexural strength based on the laterally unbraced length for a predetermined cross section for ASD and LRFD. Sections not yielding adequate strength above that of supporting self-weight are shown dashed.

Available shear strength tables (Appendix C) correspond to the web depths and thicknesses in the available flexural strength tables. Available shear strength is presented as a function of transverse stiffener spacing for webs with and

without tension field action for ASD and LRFD. Additionally, it should be noted that Tables 3-16 and 3-17 of the AISC *Steel Manual* (AISC, 2005a) give curves for determining available shear stress using the ratio of stiffener spacing to web depth versus web slenderness. If Table C1 is used, the limits of AISC *Specification* Section G3.1 must be satisfied.

Available shear strength is given up to a maximum stiffener spacing, a_{max} , as indicated in the tables by a vertical solid line. This point may readily be determined by the limiting equations for the shear buckling coefficient given in Section G2.1 of the AISC *Specification* for stiffened webs:

$$k_v = 5 \text{ if } \frac{a}{h} > 3.0 \text{ or } \left[\frac{260}{h/t_w} \right]^2 \quad (8)$$

Rearranging and solving for a yields:

$$a_{max} = \text{minimum of } 3.0h \text{ and } \frac{67,600t_w^2}{h} \quad (9)$$

The maximum stiffener spacing designation is rounded to the nearest stiffener increment given in the table rather than its precise location. This line also indicates that the stiffeners have no effect on increasing the shear strength of the web, and also serves as a practical limit when considering fabrication and erection issues.

An example demonstrating the usage of the tables is presented in Appendix A. A full complement of the generated tables is provided in Appendices B and C.

CONCLUSION

Available strength tables for slender web I-shaped beams have been presented. The tables allow rapid determination of available strength in flexure and shear for both ASD and LRFD design methodologies. The tables may be used during the course of design for preliminary member sizing, design checking, final design, or design comparison. Many tedious calculations regarding detailing, geometric dimensions, and numerous limit state checks for the design of slender-web I-shaped beams are eliminated by using the tables. The tables have been formatted similarly to the current AISC *Steel Manual* design aids in spirit and usage. An example has been presented to illustrate the usage of the tables.

NOMENCLATURE

The following symbols are used in this paper:

A_w	=	Area of web plate ($h \times t_w$)
a	=	Clear distance between transverse stiffeners
a_w	=	Ratio of twice the web area in compression to the compression flange area

b_{fc}	=	Width of the compression flange
C_b	=	Beam bending coefficient
E	=	Modulus of elasticity for steel (29,000 ksi)
F_L	=	Calculated stress used to determine the nominal flexural strength
F_y	=	Minimum yield stress
F_{yfc}	=	Minimum yield stress of the compression flange
F_u	=	Minimum tensile stress
h	=	Clear distance between flanges
h_c	=	Twice the distance from the centroid to the inside face of the compression flange
I	=	Moment of inertia
k_c	=	Buckling parameter of the compression flange
k_v	=	Shear buckling coefficient
L	=	Span length
L_b	=	Laterally unbraced length
M_a	=	Required flexural strength (ASD)
M_D	=	Moment due to dead load
M_L	=	Moment due to live load
M_n	=	Nominal flexural strength
M_n/Ω_b	=	Allowable flexural strength (ASD)
M_u	=	Required flexural strength (LRFD)
P	=	Point load
r_t	=	Radius of gyration of the compression flange plus one-third of the compressed portion of the web
t_{fc}	=	Thickness of the compression flange
t_w	=	Thickness of the web
V_a	=	Required shear strength (ASD)
V_D	=	Shear due to dead load
V_L	=	Shear due to live load
V_n	=	Nominal shear strength
V_n/Ω_v	=	Allowable shear strength (ASD)
V_u	=	Required shear strength (LRFD)
Δ_L	=	Deflection due to live load
λ	=	Slenderness parameter (generalized)
λ_{fc}	=	Slenderness parameter for compression flange

λ_p	=	Limiting slenderness parameter for compact element
λ_{pf}	=	Limiting slenderness parameter for compact flange
λ_r	=	Limiting slenderness parameter for noncompact element
λ_{rf}	=	Limiting slenderness parameter for noncompact flange
ϕ_b	=	Resistance factor for flexure = 0.9 (LRFD)
$\phi_b M_n$	=	Design flexural strength (LRFD)
ϕ_v	=	Resistance factor for shear = 0.9 (LRFD)
$\phi_v V_n$	=	Design shear strength (LRFD)
Ω_b	=	Safety factor for flexure = 1.67 (ASD)
Ω_v	=	Safety factor for shear = 1.67 (ASD)

REFERENCES

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APPENDIX A

Example: Slender Web I-Shaped Flexural Member in Strong-Axis Bending

Given

A simply supported transfer girder with a span of 60 ft as shown in Figure A1. The nominal applied dead and live loads are 200 and 100 kips, respectively. The applied loads and lateral bracing are at the third points of the girder. The live load deflection is limited to $L/240$.

Determine

Using the available strength tables, select a suitable I-shaped flexural member section that satisfies the limit states of flexure and shear, and the limit state of deflection for serviceability. Use LRFD and ASD methodology.

Solution

The allowable maximum live load deflection is:

$$\Delta_{L(max)} = \frac{L}{240} = \frac{(60 \text{ ft} \times 12 \text{ in./ft})}{240} = 3.00 \text{ in.}$$

The maximum live load deflection will occur at the midspan, resulting in a required moment of inertia:

$$I_{req'd} = \frac{PL^3}{28E\Delta_L} = \frac{(100 \text{ kips})(60 \text{ ft} \times 12 \text{ in./ft})^3}{28(29,000 \text{ ksi})(3 \text{ in.})} = 15,300 \text{ in.}^4$$

(AISC *Steel Manual* Table 3-23, Diagram 9)

Assume an initial girder weight of 0.360 kip/ft.

The required moments and forces are determined as:

$$M_D = \frac{w_D L^2}{8} + P_D a = \frac{(0.360 \text{ kip/ft})(60 \text{ ft})^2}{8} + (200 \text{ kips})(20 \text{ ft}) = 4,160 \text{ kip-ft}$$

$$M_L = P_L a = (100 \text{ kips})(20 \text{ ft}) = 2,000 \text{ kip-ft}$$

$$V_D = \frac{w_D L}{2} + P_D = \frac{(0.360 \text{ kip/ft})(60 \text{ ft})}{2} + 200 \text{ kips} = 211 \text{ kips}$$

$$V_L = P_L = 100 \text{ kips}$$

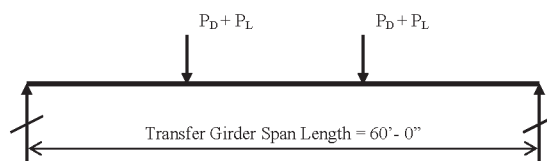


Fig. A1. Simply supported transfer girder.

For use of the available strength tables in Appendices B and C, the required strengths are determined per ASCE 7 (ASCE, 2002) Sections 2.3 and 2.4 (LRFD and ASD, respectively) for a typical load case:

LRFD	ASD
$M_u = 1.2(4,160 \text{ kip-ft})$ + $1.6(2,000 \text{ kip-ft})$ $M_u = 8,190 \text{ kip-ft}$	$M_a = 4,160 \text{ kip-ft}$ + $2,000 \text{ kip-ft}$ $M_a = 6,160 \text{ kip-ft}$
$V_u = 1.2(211 \text{ kips})$ + $1.6(100 \text{ kips})$ $V_u = 413 \text{ kips}$	$V_a = 211 \text{ kips} + 100 \text{ kips}$ $V_a = 311 \text{ kips}$

Material Properties:

ASTM A572 Gr. 50, $F_y = 50 \text{ ksi}$, $F_u = 65 \text{ ksi}$ (AISC *Steel Manual* Table 2-4)

For $L_b = 20 \text{ ft}$, $C_b = 1.0$ for middle span (AISC *Steel Manual* Table 3-1), and $F_y = 50 \text{ ksi}$

By inspection of the available flexural strength tables in Appendix B, narrow the options to a 60-in.-deep web.

LRFD	ASD
Web: 60 in. $\times$ $\frac{5}{16}$ in., Flanges: 24 $\times$ 1½ in.	Web: 60 in. $\times$ $\frac{5}{16}$ in., Flanges: 24 $\times$ 1¾ in.
From Appendix B, Table B1	From Appendix B, Table B1
$I = 73,700 \text{ in.}^4 > I_{req'd}$ o.k.	$I = 85,700 \text{ in.}^4 > I_{req'd}$ o.k.
$\phi_b M_n = 8,200 \text{ kip-ft}$ > 8,190 kip-ft o.k.	$M_n/\Omega_b = 6,320 \text{ kip-ft}$ > 6,160 kip-ft o.k.

By inspection of the available shear strength tables in Appendix C, it is clear that stiffeners must be used for a $\frac{5}{16}$ -in.-thick web. For end panels, tension field action is not permitted per AISC Section G3. Enter the available shear strength tables with tension field action EXCLUDED in Appendix C and find at an initial stiffener spacing:

LRFD	ASD
Stiffener spacing, $a = 20 \text{ in.}$	Stiffener spacing, $a = 20 \text{ in.}$
$\phi_v V_n = 494 \text{ kips} > 413 \text{ kips}$ o.k.	$V_n/\Omega_v = 329 \text{ kips} > 311 \text{ kips}$ o.k.

Tension field action may be used in the adjacent stiffened panels. As the shear reduces across the span, stiffeners may be detailed according to the distribution of shear and selected by using the available shear strength tables with tension field action INCLUDED in Appendix C.

The stiffener spacing may be optimized by using engineering judgment and interpolation of the available shear strength tables in Appendix C, or by using AISC *Steel Manual* Tables 3-17a and 3-17b for any given spacing and web size.

Finally, check the actual girder weight versus the assumed:

LRFD	ASD
Assumed: 0.360 kip/ft	Assumed: 0.360 kip/ft
Actual: 0.309 kip/ft o.k.	Actual: 0.350 kip/ft o.k.

Final Selection:

LRFD	ASD
Use: $F_y = 50 \text{ ksi}$	Use: $F_y = 50 \text{ ksi}$
Web: 60 in. $\times$ $\frac{5}{16}$ in., with $a_{initial} = 20 \text{ in.}$	Web: 60 in. $\times$ $\frac{5}{16}$ in., with $a_{initial} = 20 \text{ in.}$
Flanges: 24 in. $\times$ 1½ in.	Flanges: 24 in. $\times$ 1¾ in.

Other adequate sections that may be selected:

LRFD			
Web (in.)	Flanges (in.)	F_y (ksi)	$a_{initial}$ (in.)
72 $\times$ $\frac{3}{8}$	18 $\times$ 1¾	50	30
84 $\times$ $\frac{3}{8}$	18 $\times$ 1½	50	30
96 $\times$ $\frac{7}{16}$	18 $\times$ 1¼	50	90
—	—	—	—
—	—	—	—
ASD			
Web (in.)	Flanges (in.)	F_y (ksi)	$a_{initial}$ (in.)
72 $\times$ $\frac{3}{8}$	18 $\times$ 2	50	30
84 $\times$ $\frac{5}{16}$	18 $\times$ 1¾	50	20
84 $\times$ $\frac{9}{16}$	18 $\times$ 1½	50	90
96 $\times$ $\frac{3}{8}$	18 $\times$ 1½	50	30
96 $\times$ $\frac{9}{16}$	18 $\times$ 1¼	50	90

Choosing rolled sections for flexural strength from AISC *Steel Manual* Table 3-10 yields W40 $\times$ 593 or W36 $\times$ 529 for LRFD and W40 $\times$ 593 or W36 $\times$ 652 for ASD, which are also adequate for shear strength and serviceability. Special requirements may apply to these shapes per Section A3.1c of the AISC *Specification* and may be subject to availability through limited producers.

APPENDIX B **AVAILABLE FLEXURAL STRENGTH TABLES**

Table B1. Available Flexural Strength of Members with 60-in. Web Height

60-in. Web Height Dimensions										Available Flexural Strength, kip-ft													$F_y = 50 \text{ ksi}$		$C_b = 1.0$		
Nominal Shape	Wt/ft	Area	Depth	Flange		Web	Axis X-X			Allowable Flexural Strength = M_p/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_p$ (LRFD)													$\Omega_b = 1.67$		$\phi_b = 0.90$		
				width	thk.		height	t_f	t_w	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft										ASD		LRFD		
			d	in.	in.	in.	in.	in.	in.	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
60x12	125	36.8	61.5	12	3/4	60	5/8	22200	723	2.98	1690	2540	1580	2380	1420	2140	1260	1900	958	1440	665	1000	240	360	106	160	—
	138	40.5	61.5	12	3/4	60	3/4	23400	760	2.91	1840	2770	1710	2570	1530	2310	1360	2040	991	1490	688	1030	248	372	110	166	—
	145	42.8	62.0	12	1	60	5/8	28000	902	3.09	2130	3210	2010	3020	1820	2730	1620	2440	1290	1940	898	1350	323	486	144	216	—
	158	46.5	62.0	12	1	60	3/4	29100	938	3.02	2280	3430	2140	3220	1930	2900	1720	2580	1330	2000	922	1390	332	499	148	222	—
	166	48.8	62.5	12	1 1/4	60	5/8	33800	1080	3.15	2580	3880	2440	3670	2210	3320	1980	2970	1630	2450	1130	1700	407	612	181	272	—
	179	52.5	62.5	12	1 1/4	60	3/4	34900	1120	3.10	2730	4100	2570	3860	2320	3490	2080	3120	1670	2500	1160	1740	416	626	185	278	—
	186	54.8	63.0	12	1 1/2	60	5/8	39700	1260	3.20	3020	4540	2870	4310	2600	3910	2330	3510	1970	2960	1370	2050	492	739	219	328	—
	199	58.5	63.0	12	1 1/2	60	3/4	40800	1300	3.15	3170	4770	3000	4510	2720	4080	2430	3660	2000	3010	1390	2090	501	753	223	335	—
	207	60.8	63.5	12	1 3/4	60	5/8	45700	1440	3.23	3470	5210	3300	4950	2990	4500	2690	4050	2310	3460	1600	2410	576	866	256	385	—
	219	64.5	63.5	12	1 3/4	60	3/4	46800	1470	3.19	3620	5440	3430	5160	3110	4680	2790	4200	2340	3520	1630	2450	586	881	260	391	—
	227	66.8	64.0	12	2	60	5/8	51800	1620	3.26	3920	5890	3730	5600	3390	5090	3050	4580	2640	3970	1840	2760	661	994	294	442	—
	240	70.5	64.0	12	2	60	3/4	52900	1650	3.22	4060	6110	3860	5800	3500	5270	3150	4730	2680	4030	1860	2800	671	1010	298	448	—
	248	72.8	64.5	12	2 1/4	60	5/8	58000	1800	3.28	4360	6560	4160	6250	3780	5680	3410	5120	2980	4490	2070	3120	746	1120	332	498	—
	260	76.5	64.5	12	2 1/4	60	3/4	59100	1830	3.25	4510	6780	4290	6450	3900	5860	3510	5270	3020	4540	2100	3160	756	1140	336	505	—
	268	78.8	65.0	12	2 1/2	60	5/8	64300	1980	3.30	4810	7230	4590	6890	4180	6280	3770	5660	3330	5000	2310	3470	831	1250	369	555	—
	281	82.5	65.0	12	2 1/2	60	3/4	65400	2010	3.27	4960	7450	4720	7090	4290	6450	3870	5810	3360	5060	2340	3510	841	1260	374	562	—
	288	84.8	65.5	12	2 3/4	60	5/8	70600	2160	3.31	5260	7900	5020	7540	4570	6870	4120	6200	3670	5510	2550	3830	917	1380	407	612	—
	301	88.5	65.5	12	2 3/4	60	3/4	71800	2190	3.28	5410	8130	5150	7740	4690	7050	4220	6350	3710	5570	2570	3870	926	1390	412	619	—
309	90.8	66.0	12	3	60	5/8	77100	2340	3.32	5710	8580	5450	8190	4970	7470	4480	6740	4000	6010	2780	4180	1000	1510	445	669	—	
322	94.5	66.0	12	3	60	3/4	78200	2370	3.30	5860	8800	5580	8390	5080	7640	4580	6890	4050	6080	2810	4220	1010	1520	445	676	—	
60x18	156	45.8	61.5	18	3/4	60	5/8	30500	993	4.68	2070	3120	2070	3120	2070	3120	2070	3120	1940	2920	1800	2710	823	1240	366	550	206
	168	49.5	61.5	18	3/4	60	3/4	31700	1030	4.60	2210	3320	2210	3320	2210	3320	2050	3090	1900	2860	844	1270	844	1270	375	564	211
	186	54.8	62.0	18	1	60	5/8	39100	1260	4.80	3030	4550	3030	4550	2870	4320	2690	4050	2520	3780	2340	3520	1110	1670	493	740	277
	199	58.5	62.0	18	1	60	3/4	40200	1300	4.73	3180	4780	3180	4780	3010	4520	2820	4240	2630	3950	2440	3670	1130	1700	502	755	283
	217	63.8	62.5	18	1 1/4	60	5/8	47800	1530	4.87	3700	5560	3700	5560	3520	5290	3300	4970	3090	4640	2880	4320	1390	2100	625	931	349
	230	67.5	62.5	18	1 1/4	60	3/4	49000	1570	4.81	3850	5790	3850	5790	3650	5490	3430	5150	3200	4810	2980	4470	1420	2130	630	946	354
	248	72.8	63.0	18	1 1/2	60	5/8	56700	1800	4.92	4370	6570	4370	6570	4160	6260	3910	5880	3660	5500	3410	5130	1680	2530	747	1120	420
	260	76.5	63.0	18	1 1/2	60	3/4	57800	1840	4.87	4520	6790	4520	6790	4300	6460	4040	6070	3780	5670	3510	5280	1700	2560	757	1140	426
	278	81.8	63.5	18	1 3/4	60	5/8	65700	2070	4.96	5040	7580	5040	7580	4810	7230	4520	6800	4240	6370	3950	5940	1970	2960	875	1320	492
	291	85.5	63.5	18	1 3/4	60	3/4	66800	2100	4.91	5190	7800	5190	7800	4940	7430	4650	6980	4350	6540	4050	6090	1990	2990	885	1330	498
	309	90.8	64.0	18	2	60	5/8	74800	2340	4.98	5710	8590	5710	8590	5450	8200	5130	7710	4810	7230	4490	6740	2260	3390	1000	1510	564
	322	94.5	64.0	18	2	60	3/4	76000	2370	4.94	5860	8810	5860	8810	5590	8400	5260	7900	4920	7400	4590	6900	2280	3430	1010	1520	570
	339	99.8	64.5	18	2 1/4	60	5/8	84100	2610	5.01	6390	9600	6390	9600	6100	9170	5740	8630	5380	8090	5020	7550	2550	3830	1130	1700	636
	352	104	64.5	18	2 1/4	60	3/4	85300	2640	4.97	6530	9820	6530	9820	6240	9370	5870	8820	5500	8260	5130	7710	2570	3860	1140	1720	642
	370	109	65.0	18	2 1/2	60	5/8	93600	2880	5.02	7060	10600	7060	10600	6750	10100	6350	9550	5960	8960	5560	8360	2830	4260	1260	1890	708
	383	113	65.0	18	2 1/2	60	3/4	94700	2910	4.99	7210	10800	7210	10800	6880	10300	6480	9740	6070	9130	5670	8510	2860	4290	1270	1910	714
	401	118	65.5	18	2 3/4	60	5/8	103000	3150	5.04	7730	11600	7730	11600	7400	11100	6970	10500	6530	9820	6100	9170	3120	4690	1390	2090	781
	413	122	65.5	18	2 3/4	60	3/4	104000	3180	5.01	7880	11800	7880	11800	7530	11300	7090	10700	6650	9990	6200	9320	3150	4730	1400	2100	786
431	127	66.0	18	3	60	5/8	113000	3420	5.05	8410	12600	8410	12600	8050	12100	7580	11400	7110	10700	6640	9980	3410	5130	1520	2280	853	
444	131	66.0	18	3	60	3/4	114000	3450	5.02	8560	12900	8560	12900	8180	12300	7700	11600	7220	10900	6740	10100	3440	5160	1530	2290	859	

Table B1. Available Flexural Strength of Members with 60-in. Web Height

60-in. Web Height Dimensions										Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ ASD		$C_b = 1.0$ LRFD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Nominal Shape	Wt/ft	Area	Depth	Flange		Web	Axis X-X			Allowable Flexural Strength = M_p/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$		$\phi_b = 0.90$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
				width	thk.		height	t_f	thk.	t_w	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft										ASD	LRFD	ASD	LRFD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			d	in.	in.	in.	in.	in.	in.	in. ⁴	in. ³		0	10	15	20	25	30	50	75	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Table B2. Available Flexural Strength of Members with 72-in. Web Height																														
72-in. Web Height Dimensions										Available Flexural Strength, kip-ft										$F_y = 50 \text{ ksi}$ $C_b = 1.0$										
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_n/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										ASD		LRFD							
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft										$\Omega_b = 1.67$	$\phi_b = 0.90$								
	lb/ft	in. ²	d	in.	in.	in.	in.	in. ³	in.		0	10	15	20	25	30	50	75	100											
											ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD		
72x12	138	40.5	73.5	12	3/4	72	5/8	33500	913	2.91	2010	3010	1870	2810	1670	2510	1480	2220	1080	1620	750	1130	270	406	120	180	—	—	—	—
	153	45.0	73.5	12	3/4	72	3/4	35500	965	2.83	2220	3340	2050	3090	1830	2760	1610	2420	1130	1700	785	1180	282	425	126	189	—	—	—	—
	168	49.5	73.5	12	3/4	72	7/8	37400	1020	2.75	2430	3660	2240	3360	1990	2990	1740	2620	1170	1760	814	1220	293	441	130	196	—	—	—	—
	158	46.5	74.0	12	1	72	5/8	41700	1130	3.02	2530	3810	2380	3570	2140	3220	1900	2860	1470	2210	1020	1540	368	554	164	246	—	—	—	—
	174	51.0	74.0	12	1	72	3/4	43600	1180	2.95	2750	4130	2570	3860	2310	3460	2040	3070	1530	2290	1060	1590	382	573	170	255	—	—	—	—
	189	55.5	74.0	12	1	72	7/8	45600	1230	2.89	2960	4450	2750	4140	2470	3710	2180	3270	1570	2360	1090	1640	393	591	175	263	—	—	—	—
	179	52.5	74.5	12	1 1/4	72	5/8	50000	1340	3.10	3060	4600	2890	4340	2610	3920	2330	3500	1870	2810	1300	1950	468	703	208	312	—	—	—	—
	194	57.0	74.5	12	1 1/4	72	3/4	51900	1390	3.04	3280	4930	3080	4630	2780	4170	2470	3720	1930	2890	1340	2010	481	724	214	322	—	—	—	—
	209	61.5	74.5	12	1 1/4	72	7/8	53900	1450	2.98	3490	5250	3270	4910	2940	4420	2610	3920	1980	2970	1370	2060	494	742	219	330	—	—	—	—
	199	58.5	75.0	12	1 1/2	72	5/8	58300	1560	3.15	3600	5400	3400	5110	3080	4630	2760	4140	2270	3410	1580	2370	568	853	252	379	—	—	—	—
	214	63.0	75.0	12	1 1/2	72	3/4	60300	1610	3.10	3810	5730	3590	5400	3250	4880	2900	4360	2330	3500	1620	2430	582	875	259	389	—	—	—	—
	230	67.5	75.0	12	1 1/2	72	7/8	62200	1660	3.05	4030	6050	3780	5690	3410	5130	3040	4570	2380	3580	1650	2480	595	894	264	397	—	—	—	—
	219	64.5	75.5	12	1 3/4	72	5/8	66800	1770	3.19	4130	6200	3910	5880	3550	5330	3180	4790	2670	4020	1860	2790	668	1000	297	446	—	—	—	—
	235	69.0	75.5	12	1 3/4	72	3/4	68800	1820	3.14	4340	6530	4110	6170	3720	5590	3330	5000	2730	4100	1900	2850	683	1030	303	456	—	—	—	—
	250	73.5	75.5	12	1 3/4	72	7/8	70700	1870	3.10	4560	6850	4300	6460	3880	5840	3470	5210	2780	4180	1930	2910	696	1050	309	465	—	—	—	—
	240	70.5	76.0	12	2	72	5/8	75400	1990	3.22	4660	7010	4430	6650	4020	6040	3610	5430	3080	4630	2140	3210	769	1160	342	514	—	—	—	—
	255	75.0	76.0	12	2	72	3/4	77400	2040	3.18	4880	7330	4620	6940	4190	6300	3760	5650	3140	4710	2180	3270	784	1180	348	524	—	—	—	—
	271	79.5	76.0	12	2	72	7/8	79300	2090	3.14	5090	7650	4810	7230	4350	6540	3900	5860	3190	4790	2210	3330	797	1200	354	533	—	—	—	—
	260	76.5	76.5	12	2 1/4	72	5/8	84200	2200	3.25	5200	7810	4940	7430	4490	6750	4040	6070	3480	5230	2420	3630	871	1310	387	582	—	—	—	—
	276	81.0	76.5	12	2 1/4	72	3/4	86100	2250	3.21	5410	8130	5130	7720	4660	7000	4180	6290	3540	5320	2460	3700	885	1330	393	591	—	—	—	—
	291	85.5	76.5	12	2 1/4	72	7/8	88100	2300	3.17	5630	8460	5330	8000	4830	7250	4330	6500	3590	5400	2500	3750	899	1350	399	600	—	—	—	—
	281	82.5	77.0	12	2 1/2	72	5/8	93000	2420	3.27	5730	8610	5460	8200	4960	7460	4470	6720	3890	5840	2700	4060	972	1460	432	649	—	—	—	—
	296	87.0	77.0	12	2 1/2	72	3/4	94900	2470	3.23	5950	8940	5650	8490	5130	7710	4610	6930	3950	5930	2740	4120	987	1480	439	659	—	—	—	—
	311	91.5	77.0	12	2 1/2	72	7/8	96900	2520	3.20	6160	9260	5840	8780	5300	7960	4760	7150	4000	6010	2780	4180	1000	1500	445	668	—	—	—	—
	301	88.5	77.5	12	2 3/4	72	5/8	102000	2630	3.28	6270	9420	5970	8980	5430	8170	4900	7360	4300	6460	2980	4480	1070	1610	477	717	—	—	—	—
	316	93.0	77.5	12	2 3/4	72	3/4	104000	2680	3.25	6480	9740	6170	9270	5600	8420	5040	7580	4350	6540	3020	4540	1090	1640	484	727	—	—	—	—
	332	97.5	77.5	12	2 3/4	72	7/8	106000	2730	3.22	6700	10100	6360	9550	5770	8670	5180	7790	4410	6630	3060	4600	1100	1660	490	736	—	—	—	—
	322	94.5	78.0	12	3	72	5/8	111000	2850	3.30	6800	10200	6490	9750	5910	8880	5330	8010	4700	7070	3270	4910	1180	1770	523	786	—	—	—	—
	337	99.0	78.0	12	3	72	3/4	113000	2900	3.27	7020	10500	6680	10000	6080	9130	5470	8220	4760	7160	3310	4970	1190	1790	529	795	—	—	—	—
	352	104	78.0	12	3	72	7/8	115000	2950	3.24	7230	10900	6870	10300	6240	9380	5610	8440	4820	7240	3350	5030	1210	1810	535	804	—	—	—	—

Table B2. Available Flexural Strength of Members with 72-in. Web Height

72-in. Web Height Dimensions										Available Flexural Strength, kip-ft										$F_y = 50 \text{ ksi}$ $C_b = 1.0$		
Nominal Shape	Wt/ft	Area	Depth	width	Flange	Web	thk.	Axis X-X			Allowable Flexural Strength = M_x/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$ $\phi_b = 0.90$	
								I_x	S_x	r_t	Lateral Unbraced Length — L_{br} , ft										$\Omega_b = 1.67$ $\phi_b = 0.90$	
										0	10	15	20	25	30	50	75	100	ASD	LRFD	ASD	LRFD
72x24	lb/ft	in. ²	in.	in.	in.	in.	thk.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
	240	70.5	74.0	24	1	72	5/16	73700	1990	6.44	4110	6170	4110	6170	4110	6170	3090	4640	1370	2060	770	1160
	255	75.0	74.0	24	1	72	3/8	75600	2040	6.36	4300	6460	4300	6460	4300	6460	3150	4730	1400	2100	790	1180
	271	79.5	74.0	24	1	72	7/16	77600	2100	6.28	4490	6750	4490	6750	4490	6750	3200	4810	1420	2140	800	1200
	281	82.5	74.5	24	1 1/4	72	5/8	90200	2420	6.53	5640	8470	5640	8470	5640	8470	3900	5860	1730	2600	970	1460
	296	87.0	74.5	24	1 1/4	72	3/4	92200	2470	6.46	5850	8790	5850	8790	5850	8790	3960	5950	1760	2640	990	1490
	311	91.5	74.5	24	1 1/4	72	7/8	94100	2530	6.39	6070	9120	6070	9120	6070	9120	4020	6040	1790	2680	1000	1510
	322	94.5	75.0	24	1 1/2	72	5/8	107000	2850	6.59	6820	10200	6820	10200	6820	10200	4200	6200	1900	2770	1050	1570
	337	99.0	75.0	24	1 1/2	72	3/4	109000	2900	6.53	7040	10600	7040	10600	7040	10600	4270	6270	1910	2780	1060	1580
	352	104	75.0	24	1 1/2	72	7/8	111000	2960	6.47	7260	10900	7260	10900	7260	10900	4330	6330	1920	2790	1070	1590
	362	107	75.5	24	1 3/4	72	5/8	124000	3280	6.64	7890	11900	7890	11900	7890	11900	4530	6530	1970	2840	1090	1640
	378	111	75.5	24	1 3/4	72	3/4	126000	3340	6.58	8110	12200	8110	12200	8110	12200	4590	6590	1980	2850	1100	1650
	393	116	75.5	24	1 3/4	72	7/8	128000	3390	6.63	8330	12500	8330	12500	8330	12500	4650	6650	1990	2860	1110	1660
	403	119	76.0	24	2	72	5/8	141000	3720	6.67	8970	13500	8970	13500	8970	13500	4810	6810	2040	2910	1130	1690
	419	123	76.0	24	2	72	3/4	143000	3770	6.62	9190	13800	9190	13800	9190	13800	4870	6870	2050	2920	1140	1700
	434	128	76.0	24	2	72	7/8	145000	3820	6.58	9400	14100	9400	14100	9400	14100	4930	6930	2060	2930	1150	1710
	444	131	76.5	24	2 1/4	72	5/8	159000	4150	6.70	10000	15100	10000	15100	10000	15100	5090	7090	2110	2980	1170	1730
	459	135	76.5	24	2 1/4	72	3/4	161000	4200	6.66	10300	15400	10300	15400	10300	15400	5150	7150	2120	2990	1180	1740
	475	140	76.5	24	2 1/4	72	7/8	163000	4250	6.61	10500	15700	10500	15700	10500	15700	5210	7210	2130	3000	1190	1750
485	143	77.0	24	2 1/2	72	5/8	176000	4580	6.72	11100	16700	11100	16700	11100	16700	5410	7410	2180	3050	1200	1760	
500	147	77.0	24	2 1/2	72	3/4	178000	4630	6.68	11300	17000	11300	17000	11300	17000	5470	7470	2190	3060	1210	1770	
516	152	77.0	24	2 1/2	72	7/8	180000	4680	6.64	11600	17400	11600	17400	11600	17400	5530	7530	2200	3070	1220	1780	
526	155	77.5	24	2 3/4	72	5/8	194000	5010	6.74	12200	18300	12200	18300	12200	18300	5730	7730	2250	3120	1230	1790	
541	159	77.5	24	2 3/4	72	3/4	196000	5060	6.70	12400	18700	12400	18700	12400	18700	5790	7790	2260	3130	1240	1800	
556	164	77.5	24	2 3/4	72	7/8	198000	5110	6.67	12600	19000	12600	19000	12600	19000	5850	7850	2270	3140	1250	1810	
567	167	78.0	24	3	72	5/8	212000	5440	6.75	13300	20000	13300	20000	13300	20000	6050	8050	2320	3190	1260	1820	
582	171	78.0	24	3	72	3/4	214000	5490	6.72	13500	20300	13500	20300	13500	20300	6110	8110	2330	3200	1270	1830	
597	176	78.0	24	3	72	7/8	216000	5540	6.69	13700	20600	13700	20600	13700	20600	6170	8170	2340	3210	1280	1840	
72x30	332	97.5	74.5	30	1 1/4	72	5/8	110000	2960	8.26	6230	9360	6230	9360	6230	9360	3630	5360	1630	2360	830	1230
	347	102	74.5	30	1 1/4	72	3/8	112000	3010	8.18	6420	9650	6420	9650	6420	9650	3690	5420	1640	2370	840	1240
	362	107	74.5	30	1 1/4	72	7/16	114000	3070	8.11	6610	9940	6610	9940	6610	9940	3750	5480	1650	2380	850	1250
	383	113	75.0	30	1 1/2	72	5/8	131000	3500	8.32	8130	12200	8130	12200	8130	12200	4250	6250	1950	2750	930	1330
	398	117	75.0	30	1 1/2	72	3/4	133000	3550	8.26	8340	12500	8340	12500	8340	12500	4310	6310	1960	2760	940	1340
	413	122	75.0	30	1 1/2	72	7/8	135000	3600	8.20	8550	12900	8550	12900	8550	12900	4370	6370	1970	2770	950	1350
	434	128	75.5	30	1 3/4	72	5/8	153000	4040	8.37	9780	14700	9780	14700	9780	14700	4770	6770	2070	2870	990	1390
	449	132	75.5	30	1 3/4	72	3/4	154000	4090	8.31	9990	15000	9990	15000	9990	15000	4830	6830	2080	2880	1000	1400
	465	137	75.5	30	1 3/4	72	7/8	156000	4140	8.26	10200	15400	10200	15400	10200	15400	4890	6890	2090	2890	1010	1410
	485	143	76.0	30	2	72	5/8	174000	4580	8.40	11100	16700	11100	16700	11100	16700	5090	7090	2140	2940	1020	1420
	500	147	76.0	30	2	72	3/4	176000	4630	8.35	11300	17000	11300	17000	11300	17000	5150	7150	2150	2950	1030	1430
	516	152	76.0	30	2	72	7/8	178000	4680	8.30	11500	17300	11500	17300	11500	17300	5210	7210	2160	2960	1040	1440
	536	158	76.5	30	2 1/4	72	5/8	196000	5120	8.43	12500	18700	12500	18700	12500	18700	5410	7410	2210	3010	1050	1450
	551	162	76.5	30	2 1/4	72	3/4	198000	5170	8.39	12700	19100	12700	19100	12700	19100	5470	7470	2220	3020	1060	1460
	567	167	76.5	30	2 1/4	72	7/8	200000	5220	8.34	12900	19400	12900	19400	12900	19400	5530	7530	2230	3030	1070	1470
	587	173	77.0	30	2 1/2	72	5/8	218000	5660	8.45	13800	20800	13800	20800	13800	20800	5730	7730	2280	3080	1080	1480
	602	177	77.0	30	2 1/2	72	3/4	220000	5710	8.41	14000	21100	14000	21100	14000	21100	5790	7790	2290	3090	1090	1490
	618	182	77.0	30	2 1/2	72	7/8	222000	5760	8.37	14200	21400	14200	21400	14200	21400	5850	7850	2300	3100	1100	1500
	638	188	77.5	30	2 3/4	72	5/8	240000	6200	8.47	15200	22800	15200	22800	15200	22800	6050	8050	2350	3150	1110	1510
653	192	77.5	30	2 3/4	72	3/4	242000	6250	8.43	15400	23100	15400	23100	15400	23100	6110	8110	2360	3160	1120	1520	
669	197	77.5	30	2 3/4	72	7/8	244000	6300	8.40	15600	23400	15600	23400	15600	23400	6170	8170	2370	3170	1130	1530	
689	203	78.0	30	3	72	5/8	263000	6740	8.49	16500	24800	16500	24800	16500	24800	6370	8370	2420	3220	1140	1540	
704	207	78.0	30	3	72	3/4	265000	6790	8.45	16700	25100	16700	25100	16700	25100	6430	8430	2430	3230	1150	1550	
720	212	78.0	30	3	72	7/8	267000	6840	8.42	16900	25500	16900	25500	16900	25500	6490	8490	2440	3240	1160	1560	

Table B3. Available Flexural Strength of Members with 84-in. Web Height

84-in. Web Height Dimensions										Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ $C_b = 1.0$				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_u/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_u$ (LRFD)										$\Omega_b = 1.67$ $\phi_b = 0.90$							
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft					ASD		LRFD										
		in.^2	d	b_f	t_f	h	t_w	in.^4	in.^3	in.	0		10		15		20		25		30		50		75		100	
in.	lb/ft			in.	$\frac{3}{4}$	in.	$\frac{5}{16}$			in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
84x12	151	44.3	85.5	12	$\frac{3}{4}$	84	$\frac{5}{16}$	47800	1120	2.91	2270	3410	2100	3160	1880	2820	1650	2490	1170	1750	810	1220	292	438	130	195	—	—
	168	49.5	85.5	12	$\frac{3}{4}$	84	$\frac{3}{8}$	50800	1190	2.75	2570	3860	2360	3550	2100	3150	1840	2760	1240	1860	859	1290	309	465	137	207	—	—
	186	54.8	85.5	12	$\frac{3}{4}$	84	$\frac{7}{16}$	53900	1260	2.67	2860	4290	2610	3920	2310	3470	2010	3020	1300	1950	901	1350	324	488	144	217	—	—
	204	60.0	85.5	12	$\frac{3}{4}$	84	$\frac{1}{2}$	57000	1330	2.60	3140	4730	2850	4290	2510	3780	2110	3170	1350	2030	937	1410	337	507	150	225	—	—
	222	65.3	85.5	12	$\frac{3}{4}$	84	$\frac{9}{16}$	60100	1410	2.53	3430	5150	3090	4650	2710	4070	2180	3280	1400	2100	969	1460	349	524	155	233	—	—
	171	50.3	86.0	12	1	84	$\frac{5}{8}$	58800	1370	2.97	2880	4330	2690	4050	2420	3640	2150	3230	1610	2420	1120	1680	403	606	179	269	—	—
	189	55.5	86.0	12	1	84	$\frac{3}{8}$	61900	1440	2.89	3180	4780	2950	4440	2640	3980	2340	3510	1690	2540	1170	1760	422	634	188	282	—	—
	207	60.8	86.0	12	1	84	$\frac{7}{16}$	65000	1510	2.82	3470	5220	3210	4820	2860	4300	2520	3780	1750	2640	1220	1830	439	659	195	293	—	—
	225	66.0	86.0	12	1	84	$\frac{1}{2}$	68000	1580	2.75	3760	5650	3460	5200	3070	4620	2690	4040	1810	2720	1260	1890	453	681	201	303	—	—
	242	71.3	86.0	12	1	84	$\frac{9}{16}$	71100	1650	2.69	4050	6080	3700	5560	3280	4930	2860	4290	1860	2800	1290	1950	466	700	207	311	—	—
	191	56.3	86.5	12	1 $\frac{1}{4}$	84	$\frac{5}{8}$	69900	1620	3.05	3500	5260	3290	4940	2960	4450	2640	3970	2070	3110	1430	2160	517	776	230	345	—	—
	209	61.5	86.5	12	1 $\frac{1}{4}$	84	$\frac{3}{4}$	73000	1690	2.98	3790	5700	3550	5330	3190	4800	2830	4260	2140	3220	1490	2240	536	806	238	358	—	—
	227	66.8	86.5	12	1 $\frac{1}{4}$	84	$\frac{7}{8}$	76100	1760	2.92	4090	6140	3810	5720	3410	5130	3020	4540	2210	3330	1540	2310	554	832	246	370	—	—
	245	72.0	86.5	12	1 $\frac{1}{4}$	84	$\frac{1}{2}$	79200	1830	2.86	4380	6580	4060	6100	3630	5450	3200	4810	2280	3420	1580	2380	569	856	253	380	—	—
	263	77.3	86.5	12	1 $\frac{1}{4}$	84	$\frac{9}{8}$	82300	1900	2.81	4660	7010	4310	6470	3840	5770	3370	5070	2330	3510	1620	2440	583	877	259	390	—	—
	212	62.3	87.0	12	1 $\frac{1}{2}$	84	$\frac{5}{8}$	81200	1870	3.11	4110	6180	3880	5830	3510	5270	3130	4710	2530	3800	1750	2640	631	949	281	422	—	—
	230	67.5	87.0	12	1 $\frac{1}{2}$	84	$\frac{3}{4}$	84300	1940	3.05	4410	6630	4140	6230	3740	5620	3330	5000	2610	3920	1810	2720	652	979	290	435	—	—
	248	72.8	87.0	12	1 $\frac{1}{2}$	84	$\frac{7}{8}$	87400	2010	2.99	4700	7070	4400	6620	3960	5950	3520	5290	2680	4030	1860	2800	670	1010	298	447	—	—
	265	78.0	87.0	12	1 $\frac{1}{2}$	84	$\frac{1}{2}$	90500	2080	2.94	4990	7510	4660	7000	4180	6280	3700	5560	2740	4130	1910	2860	686	1030	305	458	—	—
	283	83.3	87.0	12	1 $\frac{1}{2}$	84	$\frac{9}{8}$	93600	2150	2.89	5280	7940	4910	7380	4390	6610	3880	5830	2800	4220	1950	2930	701	1050	312	468	—	—
	232	68.3	87.5	12	1 $\frac{3}{4}$	84	$\frac{5}{8}$	92700	2120	3.15	4730	7110	4480	6730	4050	6090	3630	5460	2990	4490	2080	3120	747	1120	332	499	—	—
	250	73.5	87.5	12	1 $\frac{3}{4}$	84	$\frac{3}{4}$	95700	2190	3.10	5030	7560	4740	7130	4280	6440	3830	5750	3070	4620	2130	3210	768	1150	341	513	—	—
	268	78.8	87.5	12	1 $\frac{3}{4}$	84	$\frac{7}{8}$	98800	2260	3.05	5320	8000	5000	7520	4510	6780	4020	6040	3150	4730	2180	3280	786	1180	349	525	—	—
	286	84.0	87.5	12	1 $\frac{3}{4}$	84	$\frac{1}{2}$	102000	2330	3.00	5610	8440	5260	7900	4730	7110	4200	6320	3210	4830	2230	3350	803	1210	357	537	—	—
	304	89.3	87.5	12	1 $\frac{3}{4}$	84	$\frac{9}{8}$	105000	2400	2.95	5900	8870	5510	8280	4950	7440	4390	6590	3280	4920	2270	3420	819	1230	364	547	—	—
	253	74.3	88.0	12	2	84	$\frac{5}{8}$	104000	2370	3.19	5350	8040	5070	7620	4600	6910	4130	6200	3460	5190	2400	3610	864	1300	384	577	—	—
	271	79.5	88.0	12	2	84	$\frac{3}{4}$	107000	2440	3.14	5650	8490	5340	8020	4830	7260	4320	6500	3540	5320	2460	3690	884	1330	393	591	—	—
	288	84.8	88.0	12	2	84	$\frac{7}{8}$	110000	2510	3.09	5940	8930	5600	8420	5060	7600	4520	6790	3610	5430	2510	3770	903	1360	402	603	—	—
	306	90.0	88.0	12	2	84	$\frac{1}{2}$	113000	2580	3.05	6230	9370	5860	8800	5280	7940	4710	7070	3680	5540	2560	3840	921	1380	409	615	—	—
	324	95.3	88.0	12	2	84	$\frac{9}{8}$	117000	2650	3.01	6520	9800	6110	9180	5500	8270	4890	7350	3750	5630	2600	3910	937	1410	416	626	—	—
	273	80.3	88.5	12	2 $\frac{1}{4}$	84	$\frac{5}{8}$	116000	2620	3.21	5970	8980	5670	8520	5150	7740	4620	6950	3920	5900	2720	4100	981	1470	436	655	—	—
	291	85.5	88.5	12	2 $\frac{1}{4}$	84	$\frac{3}{4}$	119000	2690	3.17	6270	9420	5940	8920	5380	8080	4820	7250	4010	6020	2780	4180	1000	1510	445	669	—	—
	309	90.8	88.5	12	2 $\frac{1}{4}$	84	$\frac{7}{8}$	122000	2760	3.13	6560	9860	6200	9320	5610	8430	5020	7540	4080	6140	2840	4260	1020	1530	454	682	—	—
	327	96.0	88.5	12	2 $\frac{1}{4}$	84	$\frac{1}{2}$	125000	2830	3.09	6850	10300	6460	9700	5830	8760	5210	7820	4150	6240	2880	4340	1040	1560	462	694	—	—
	345	101	88.5	12	2 $\frac{1}{4}$	84	$\frac{9}{8}$	128000	2900	3.05	7140	10700	6710	10100	6050	9090	5390	8100	4220	6340	2930	4400	1060	1590	469	705	—	—
	294	86.3	89.0	12	2 $\frac{1}{2}$	84	$\frac{5}{8}$	128000	2870	3.24	6600	9910	6270	9420	5690	8560	5120	7700	4390	6600	3050	4590	1100	1650	488	734	—	—
	311	91.5	89.0	12	2 $\frac{1}{2}$	84	$\frac{3}{4}$	131000	2940	3.20	6890	10400	6530	9820	5930	8910	5320	8000	4480	6730	3110	4670	1120	1680	497	748	—	—
	329	96.8	89.0	12	2 $\frac{1}{2}$	84	$\frac{7}{8}$	134000	3010	3.16	7180	10800	6800	10200	6160	9250	5520	8290	4550	6840	3160	4750	1140	1700	506	761	—	—
	347	102	89.0	12	2 $\frac{1}{2}$	84	$\frac{1}{2}$	137000	3080	3.12	7480																	

Table B3. Available Flexural Strength of Members with 84-in. Web Height

84-in. Web Height Dimensions										Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ $C_b = 1.0$						
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_x/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$ $\phi_b = 0.90$									
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft					ASD		LRFD												
			d	b_f	t_f	h	t_w	in.	in. ⁴	in. ³	in.	I_x	S_x	r_t	0	10	15	20	25	30	50	75	100							
in.	lb/ft	in. ²	in.	in.	%	in.	in.	in.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD							
84x18	181	53.3	85.5	18	¾	84	⅝	63900	1500	4.52	2810	4220	2810	4220	2810	4220	2810	4220	2800	4200	2600	3900	2400	3600	1040	1560	461	692	260	389
	199	58.5	85.5	18	¾	84	¾	67000	1570	4.41	3070	4610	3070	4610	3070	4610	3070	4610	3040	4560	2810	4230	2590	3890	1080	1620	480	722	270	406
	217	63.8	85.5	18	¾	84	⅞	70100	1640	4.31	3330	5000	3330	5000	3330	5000	3330	5000	3270	4910	3020	4540	2770	4170	1120	1680	497	747	280	420
	235	69.0	85.5	18	¾	84	⅞	73200	1710	4.22	3580	5390	3580	5390	3580	5390	3580	5390	3500	5260	3220	4850	2950	4440	1150	1730	513	770	290	433
	253	74.3	85.5	18	¾	84	⅞	76300	1780	4.13	3840	5770	3840	5770	3840	5770	3840	5770	3720	5590	3420	5140	3120	4700	1180	1780	526	791	300	445
	212	62.3	86.0	18	1	84	⅝	80500	1870	4.66	4120	6200	4120	6200	4120	6200	3890	5840	3640	5470	3390	5090	3140	4720	1420	2140	633	951	360	535
	230	67.5	86.0	18	1	84	¾	83600	1940	4.57	4420	6650	4420	6650	4420	6650	4150	6240	3880	5830	3610	5430	3340	5020	1470	2210	653	982	370	552
	248	72.8	86.0	18	1	84	¾	86600	2010	4.49	4720	7090	4720	7090	4720	7090	4240	6640	4120	6190	3820	5750	3530	5300	1510	2270	672	1010	380	568
	265	78.0	86.0	18	1	84	⅞	89700	2090	4.41	5010	7530	4990	7530	5050	7590	4670	7020	4350	6540	4030	6060	3710	5580	1550	2330	688	1030	390	582
	283	83.3	86.0	18	1	84	⅞	92800	2160	4.33	5300	7970	5270	7920	4930	7400	4580	6890	4240	6370	3890	5850	1580	2380	703	1060	400	595		
	242	71.3	86.5	18	1 ¼	84	¾	97200	2250	4.75	5050	7590	5050	7590	4780	7190	4480	6740	4180	6290	3890	5840	1820	2730	807	1210	450	682		
	260	76.5	86.5	18	1 ¼	84	¾	100000	2320	4.68	5350	8040	5350	8040	5050	7590	4730	7110	4420	6620	4080	6140	1860	2800	828	1240	470	700		
	278	81.8	86.5	18	1 ¼	84	¾	103000	2390	4.61	5650	8490	5650	8490	5310	7990	4970	7470	4620	6950	4280	6430	1910	2860	847	1270	480	716		
	296	87.0	86.5	18	1 ¼	84	¾	106000	2460	4.54	5940	8930	5940	8930	5570	8380	5210	7820	4840	7270	4470	6720	1950	2920	865	1300	490	731		
	314	92.3	86.5	18	1 ¼	84	¾	110000	2530	4.47	6230	9370	6220	9350	5830	8760	5440	8170	5050	7580	4650	6990	1980	2980	881	1320	500	745		
	273	80.3	87.0	18	1 ½	84	¾	114000	2620	4.82	5990	9000	5990	9000	5680	8540	5330	8010	4980	7490	4630	6960	2210	3320	983	1480	550	831		
	291	85.5	87.0	18	1 ½	84	¾	117000	2690	4.75	6280	9450	6280	9450	5950	8940	5580	8350	5210	7820	4830	7260	2260	3400	1000	1510	560	849		
	309	90.8	87.0	18	1 ½	84	¾	120000	2770	4.69	6580	9890	6580	9890	6210	9340	5820	8750	5420	8150	5030	7560	2300	3460	1020	1540	580	865		
	327	96.0	87.0	18	1 ½	84	¾	123000	2840	4.63	6870	10300	6870	10300	6490	9730	6060	9100	5640	8480	5220	7850	2340	3520	1040	1570	590	881		
	345	101	87.0	18	1 ½	84	¾	126000	2910	4.57	7170	10800	7170	10800	6730	10100	6290	9460	5850	8790	5410	8130	2380	3580	1060	1590	600	895		
	304	89.3	87.5	18	1 ¾	84	⅞	131000	3000	4.87	6920	10400	6920	10400	6580	9890	6180	9290	5780	8690	5380	8090	2610	3920	1160	1740	650	980		
	322	94.5	87.5	18	1 ¾	84	⅞	134000	3070	4.81	7220	10800	7220	10800	6850	10300	6430	9660	6000	9020	5580	8390	2660	3990	1180	1770	660	998		
	339	99.8	87.5	18	1 ¾	84	⅞	137000	3140	4.75	7510	11300	7510	11300	7110	10700	6670	10000	6220	9350	5780	8690	2700	4060	1200	1800	680	1010		
	357	105	87.5	18	1 ¾	84	⅞	141000	3210	4.70	7810	11700	7810	11700	7380	11100	6910	10400	6440	9680	5970	8980	2740	4120	1220	1830	690	1030		
	375	110	87.5	18	1 ¾	84	⅞	144000	3280	4.65	8100	12200	8100	12200	7630	11500	7140	10700	6650	10000	6160	9260	2780	4180	1240	1860	696	1050		
	334	98.3	88.0	18	2	84	¾	149000	3380	4.91	7860	11800	7860	11800	7480	11200	7030	10600	6890	9810	3010	4520	1340	2010	752	1130	752	1130		
	352	104	88.0	18	2	84	¾	152000	3450	4.85	8150	12300	8150	12300	7750	11600	7280	10900	6800	10200	6330	9510	3060	4590	1360	2040	764	1150		
	370	109	88.0	18	2	84	¾	155000	3520	4.80	8450	12700	8450	12700	8010	12000	7520	11300	7020	10600	6530	9810	3100	4660	1380	2070	775	1160		
	388	114	88.0	18	2	84	¾	158000	3590	4.75	8740	13100	8740	13100	8280	12400	7760	11700	7260	10900	6720	10100	3140	4720	1400	2100	786	1180		
	406	119	88.0	18	2	84	¾	161000	3660	4.71	9040	13600	9040	13600	8540	12800	8000	12000	7460	11200	6920	10400	3180	4780	1410	2130	796	1200		
	365	107	88.5	18	2 ¼	84	⅞	166000	3750	4.94	8790	13200	8790	13200	8380	12600	7880	11800	7380	11100	6880	10300	3410	5120	1510	2280	852	1280		
	383	113	88.5	18	2 ¼	84	⅞	169000	3820	4.89	9090	13700	9090	13700	8650	13000	8130	12200	7600	11400	7080	10600	3460	5190	1540	2310	864	1300		
	401	118	88.5	18	2 ¼	84	⅞	172000	3890	4.84	9390	14100	9390	14100	8920	13400	8370	12600	7820	11800	7280	10900	3500	5260	1560	2340	875	1320		
	419	123	88.5	18	2 ¼	84	⅞	175000	3960	4.80	9680	14500	9680	14500	9180	13800	8610	12900	8040	12100	7480	11200	3540	5330	1570	2370	886	1330		
	436	128	88.5	18	2 ¼	84	⅞	178000	4030	4.75	9970	15000	9970	15000	9440	14200	8850	13300	8260	12400	7670	11500	3580	5390	1590	2390	896	1350		
	396	116	89.0	18	2 ½	84	⅞	184000	4130	4.96	9730	14600	9730	14600	9280	14000	8730	13100	8180	12300	7630	11500	3810	5720	1690	2540	952	1430		
	413	122	89.0	18	2 ½	84	⅞	187000	4200	4.92	10000	15100	10000	15100	9550	14400	8980	13500	8400	12600	7830	11800	3860	5800	1710	2580	964	1450		
	431	127	89.0	18	2 ½	84	⅞	190000	4270	4.87	10300	15500	10300	15500	9820	14800	9220	13900	8630	13000	8030	12100	3900	5860	1730	2610	975	1470		
	449	132	89.0	18	2 ½	84	⅞	193000	4340	4.83	10600	16000	10600	16000	10100	15														

Table B3. Available Flexural Strength of Members with 84-in. Web Height																			
84-in. Web Height Dimensions										Available Flexural Strength, kip-ft									
Nominal Shape	Wt/ft	Area	Depth	Flange	Web	Axis X-X			Allowable Flexural Strength = M_x/Ω_x (ASD) or Design Flexural Strength = $\phi_b M_x$ (LRFD)										$F_y = 50 \text{ ksi}$ $C_b = 1.0$
in.	lb/ft	in. ²	d	thk.	height	I_x	S_x	r_x	Lateral Unbraced Length — L_{br} , ft										$\Omega_b = 1.67$ $\phi_b = 0.90$
				thk.	in.	in. ⁴	in. ³	in.	0	10	15	20	25	30	50	75	100		
				in.	in.	in.	in.	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
84x24	253	74.3	86.0	1	84	102000	2380	6.37	4720	7090	4720	7090	4720	7090	4720	7090	4720	7090	1300
	271	79.5	86.0	1	84	105000	2450	6.28	4980	7480	4980	7480	4980	7480	4980	7480	4980	7480	1330
	288	84.8	86.0	1	84	108000	2520	6.18	5240	7880	5240	7880	5240	7880	5240	7880	5240	7880	1360
	306	90.0	86.0	1	84	111000	2590	6.10	5500	8270	5500	8270	5500	8270	5500	8270	5500	8270	1390
	324	95.3	86.0	1	84	114000	2660	6.01	5760	8650	5760	8650	5760	8650	5760	8650	5760	8650	1420
	294	86.3	86.5	2	1 1/4	124000	2880	6.47	6490	9750	6490	9750	6490	9750	6490	9750	6490	9750	1660
	311	91.5	86.5	2	1 1/4	128000	2950	6.39	6780	10200	6780	10200	6780	10200	6780	10200	6780	10200	1690
	329	96.8	86.5	2	1 1/4	131000	3020	6.31	7080	10600	7080	10600	7080	10600	7080	10600	7080	10600	1720
	347	102	86.5	2	1 1/4	134000	3090	6.24	7370	11100	7370	11100	7370	11100	7370	11100	7370	11100	1750
	365	107	86.5	2	1 1/4	137000	3160	6.17	7650	11500	7650	11500	7650	11500	7650	11500	7650	11500	1770
	334	98	87.0	2	1 1/2	147000	3380	6.54	7860	11800	7860	11800	7860	11800	7860	11800	7860	11800	2010
	352	104	87.0	2	1 1/2	150000	3450	6.47	8160	12300	8160	12300	8160	12300	8160	12300	8160	12300	2040
	370	109	87.0	2	1 1/2	153000	3520	6.40	8460	12700	8460	12700	8460	12700	8460	12700	8460	12700	2070
	388	114	87.0	2	1 1/2	156000	3590	6.34	8760	13200	8760	13200	8760	13200	8760	13200	8760	13200	2100
	406	119	87.0	2	1 1/2	159000	3660	6.28	9050	13600	9050	13600	9050	13600	9050	13600	9050	13600	2130
	375	110	87.5	2	1 1/4	170000	3880	6.59	9110	13700	9080	13600	8890	13100	8300	12500	7910	11900	2370
	393	116	87.5	2	1 1/4	173000	3950	6.53	9410	14100	9370	14100	8960	13500	8550	12900	8150	12200	2400
	411	121	87.5	2	1 1/4	176000	4020	6.47	9710	14600	9650	14500	9230	13900	8810	13200	8380	12600	2430
	429	126	87.5	2	1 1/4	179000	4090	6.41	10000	15000	9930	14900	9490	14300	9050	13600	8620	12900	2460
	447	131	87.5	2	1 1/4	182000	4170	6.36	10300	15500	10200	15300	9760	14700	9300	14000	8840	13300	2490
	416	122	88.0	2	2	193000	4390	6.63	10400	15600	10300	15500	9890	14900	9450	14200	9010	13500	2720
	434	128	88.0	2	2	196000	4460	6.58	10700	16000	10700	16000	10200	15300	9710	14600	9250	13900	2760
	452	133	88.0	2	2	199000	4530	6.52	11000	16500	11000	16500	10400	15700	9960	15000	9490	14300	2790
	470	138	88.0	2	2	202000	4600	6.47	11300	16900	11300	16900	10700	16100	10200	15300	9720	14600	2820
	487	143	88.0	2	2	205000	4670	6.42	11600	17400	11600	17400	11000	16500	10500	15700	9950	15000	2850
	457	134	88.5	2	2 1/4	216000	4890	6.66	11600	17500	11600	17500	11100	16700	10600	15900	10100	15200	3080
	475	140	88.5	2	2 1/4	219000	4960	6.61	11900	17900	11900	17900	11400	17100	10900	16300	10400	15600	3110
	493	145	88.5	2	2 1/4	223000	5030	6.57	12200	18400	12200	18400	11600	17500	11100	16700	10600	15900	3150
	510	150	88.5	2	2 1/4	226000	5100	6.52	12500	18800	12500	18800	11900	17900	11400	17100	10800	16300	3180
	528	155	88.5	2	2 1/4	229000	5170	6.47	12800	19200	12800	19200	12200	18300	11600	17400	11100	16600	3200
	498	146	89.0	2	2 1/2	240000	5390	6.69	12900	19300	12900	19300	12300	18500	11800	17700	11200	16900	3440
	516	152	89.0	2	2 1/2	243000	5460	6.64	13200	19800	13100	19700	12600	18900	12000	18100	11500	17200	3470
	533	157	89.0	2	2 1/2	246000	5530	6.60	13500	20200	13400	20200	12800	19300	12300	18400	11700	17600	3500
	551	162	89.0	2	2 1/2	249000	5600	6.56	13800	20700	13700	20600	13100	19700	12500	18800	11900	17900	3530
	569	167	89.0	2	2 1/2	252000	5670	6.51	14100	21100	14000	21000	13400	20100	12800	19200	12200	18300	3560
	539	158	89.5	2	2 1/2	264000	5900	6.71	14100	21200	14100	21200	13500	20300	12900	19400	12300	18500	3800
	556	164	89.5	2	2 1/2	267000	5970	6.67	14400	21700	14400	21600	13800	20700	13200	19800	12600	18900	3830
	574	169	89.5	2	2 1/2	270000	6030	6.63	14700	22100	14700	22100	14000	21100	13400	20200	12800	19200	3860
	592	174	89.5	2	2 1/2	273000	6100	6.59	15000	22600	15000	22500	14300	21500	13700	20500	13000	19600	3890
	610	179	89.5	2	2 1/2	276000	6170	6.55	15300	23000	15300	22900	14600	21900	13900	20900	13300	19900	3920
	579	170	90.0	2	3	288000	6400	6.73	15400	23100	15400	23100	14700	22100	14100	21200	13400	20200	4160
	597	176	90.0	2	3	291000	6470	6.69	15700	23600	15700	23600	15000	22500	14300	21500	13700	20500	4190
	615	181	90.0	2	3	294000	6540	6.65	16000	24000	16000	24000	15300	22900	14600	21900	13900	20900	4220
	633	186	90.0	2	3	297000	6610	6.61	16300	24500	16300	24500	15500	23300	14800	22300	14100	21200	4250
	651	191	90.0	2	3	300000	6680	6.58	16600	24900	16600	24900	15800	23700	15100	22700	14400	21600	4280

Table B3. Available Flexural Strength of Members with 84-in. Web Height																										
84-in. Web Height Dimensions										Available Flexural Strength, kip-ft																
Nominal Shape	Wt/ft	Area	Depth	Flange width	Flange thk.	Web height	Web thk.	I_x	S_x	r_t	Allowable Flexural Strength = M_x/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)															
in.	lb/ft	in. ²	in.	in.	thk.	in.	in.	in. ⁴	in. ³	in.	Lateral Unbraced Length— L_b , ft															
											0	10	15	20	25	30	50	75	100							
											ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
84x30	345	101	86.5	30	1 1/4	84	5/8	152000	3510	8.20	7190	10800	7190	10800	7190	10800	6390	9600	3880	5840	2180	3280	3880	5840	2180	3280
	362	107	86.5	30	1 1/4	84	3/4	155000	3580	8.11	7450	11200	7450	11200	7450	11200	6590	9910	3940	5930	2220	3330	3940	5930	2220	3330
	380	112	86.5	30	1 1/4	84	3/4	158000	3650	8.03	7710	11600	7710	11600	7710	11600	6790	10200	4000	6010	2250	3380	4000	6010	2250	3380
	398	117	86.5	30	1 1/4	84	1/2	161000	3720	7.95	7970	12000	7970	12000	7970	12000	6990	10500	4050	6090	2280	3430	4050	6090	2280	3430
	416	122	86.5	30	1 1/4	84	3/4	164000	3790	7.87	8230	12400	8230	12400	8230	12400	7190	10800	4110	6170	2310	3470	7190	10800	4110	6170
	396	116	87.0	30	1 1/2	84	5/8	180000	4140	8.27	9390	14100	9390	14100	9390	14100	8960	13500	7640	11500	4710	7070	8960	13500	7640	11500
	413	122	87.0	30	1 1/2	84	3/4	183000	4210	8.20	9680	14600	9680	14600	9680	14600	9220	13900	7840	11800	4770	7170	9220	13900	7840	11800
	431	127	87.0	30	1 1/2	84	3/4	186000	4280	8.12	9970	15000	9970	15000	9970	15000	9480	14200	8050	12100	4830	7250	9480	14200	8050	12100
	449	132	87.0	30	1 1/2	84	1/2	189000	4350	8.06	10300	15400	10300	15400	10300	15400	9730	14600	8250	12400	4880	7340	9730	14600	8250	12400
	467	137	87.0	30	1 1/2	84	3/4	192000	4420	7.99	10500	15800	10500	15800	10500	15800	9980	15000	8440	12700	4930	7410	9980	15000	8440	12700
	447	131	87.5	30	1 3/4	84	5/8	208000	4770	8.32	11300	17000	11300	17000	11300	17000	10400	15700	8890	13400	5530	8320	10400	15700	8890	13400
	465	137	87.5	30	1 3/4	84	3/4	212000	4840	8.26	11600	17500	11600	17500	11600	17500	11100	16600	9100	13700	5590	8410	11100	16600	9100	13700
	482	142	87.5	30	1 3/4	84	3/4	215000	4910	8.20	11900	17900	11900	17900	11900	17900	11300	17000	9300	14000	5650	8500	11300	17000	9300	14000
	500	147	87.5	30	1 3/4	84	1/2	218000	4980	8.13	12200	18300	12200	18300	12200	18300	11600	17500	9500	14300	5710	8580	11600	17500	9500	14300
	518	152	87.5	30	2	84	3/4	221000	5050	8.08	12500	18800	12500	18800	12500	18800	11900	17800	9700	14600	5760	8660	11900	17800	9700	14600
	498	146	88.0	30	2	84	5/8	237000	5390	8.36	12900	19400	12900	19400	12900	19400	12300	18500	10100	15200	6360	9560	12300	18500	10100	15200
	516	152	88.0	30	2	84	3/4	240000	5460	8.30	13200	19800	13200	19800	13200	19800	12600	18900	10300	15600	6420	9650	12600	18900	10300	15600
	533	157	88.0	30	2	84	3/4	244000	5530	8.25	13500	20300	13500	20300	13500	20300	12900	19300	10600	15900	6480	9740	12900	19300	10600	15900
	551	162	88.0	30	2	84	1/2	247000	5600	8.20	13800	20700	13800	20700	13800	20700	13300	20000	10800	16200	6540	9820	13300	20000	10800	16200
	569	167	88.0	30	2	84	3/4	250000	5680	8.14	14100	21100	14100	21100	14100	21100	13600	20400	11000	16500	6590	9910	13600	20400	11000	16500
	549	161	88.5	30	2 1/4	84	5/8	267000	6020	8.39	14400	21700	14400	21700	14400	21700	13900	20800	11400	17100	7190	10800	13900	20800	11400	17100
	567	167	88.5	30	2 1/4	84	3/4	270000	6090	8.34	14700	22200	14700	22200	14700	22200	14300	21500	11600	17400	7250	10900	14300	21500	11600	17400
	584	172	88.5	30	2 1/4	84	1/2	273000	6160	8.29	15000	22600	15000	22600	15000	22600	14600	21900	11800	17700	7310	11000	14600	21900	11800	17700
	602	177	88.5	30	2 1/4	84	3/4	276000	6230	8.24	15300	23100	15300	23100	15300	23100	14900	22300	12000	18000	7370	11100	14900	22300	12000	18000
	620	182	88.5	30	2 1/4	84	1/2	279000	6300	8.20	15600	23500	15600	23500	15600	23500	15100	22600	12200	18300	7420	11200	15100	22600	12200	18300
	600	176	89.0	30	2 1/2	84	5/8	296000	6650	8.42	16000	24100	16000	24100	16000	24100	15900	23800	12500	19000	8020	12100	15900	23800	12500	19000
	618	182	89.0	30	2 1/2	84	3/4	299000	6720	8.37	16300	24500	16300	24500	16300	24500	16100	24300	12700	19300	8080	12100	16100	24300	12700	19300
	636	187	89.0	30	2 1/2	84	1/2	302000	6790	8.33	16600	25000	16600	25000	16600	25000	16400	24700	12900	19600	8140	12200	16400	24700	12900	19600
	653	192	89.0	30	2 1/2	84	3/4	305000	6860	8.28	16900	25400	16900	25400	16900	25400	16700	25100	13100	19900	8200	12300	16700	25100	13100	19900
	671	197	89.0	30	2 1/2	84	1/2	308000	6930	8.24	17200	25900	17200	25900	17200	25900	17000	25500	13300	20200	8250	12400	17000	25500	13300	20200
	651	191	89.5	30	2 3/4	84	5/8	326000	7280	8.44	17600	26400	17600	26400	17600	26400	17400	26200	13500	20500	8300	12500	17400	26200	13500	20500
	669	197	89.5	30	2 3/4	84	3/4	329000	7350	8.40	17900	26900	17900	26900	17900	26900	17700	26600	13700	20800	8350	12600	17700	26600	13700	20800
	687	202	89.5	30	2 3/4	84	1/2	332000	7420	8.36	18200	27300	18200	27300	18200	27300	18000	27000	13900	21100	8400	12700	18000	27000	13900	21100
	704	207	89.5	30	2 3/4	84	3/4	335000	7490	8.31	18500	27800	18500	27800	18500	27800	18300	27500	14100	21400	8450	12800	18300	27500	14100	21400
	722	212	89.5	30	2 3/4	84	1/2	338000	7560	8.27	18800	28200	18800	28200	18800	28200	18600	28000	14300	21700	8500	12900	18600	28000	14300	21700
	702	206	90.0	30	3	84	5/8	356000	7920	8.46	19200	28800	19200	28800	19200	28800	19000	28500	14500	22000	8550	13000	19000	28500	14500	22000
	720	212	90.0	30	3	84	3/4	359000	7980	8.42	19500	29200	19500	29200	19500	29200	19300	28800	14700	22300	8600	13100	19300	28800	14700	22300
	738	217	90.0	30	3	84	1/2	362000	8050	8.38	19800	29700	19800	29700	19800	29700	19600	29400	14900	22600	8650	13200	19600	29400	14900	22600
	755	222	90.0	30	3	84	3/4	365000	8120	8.34	20000	30100	20000	30100	20000	30100	19800	29800	15100	22900	8700	13300	19800	29800	15100	22900
	773	227	90.0	30	3	84	1/2	369000	8190	8.30	20300	30600	20300	30600	20300	30600	20100	30200	15300	23200	8750	13400	20100	30200	15300	23200

Table B4. Available Flexural Strength of Members with 96-in. Web Height

96-in. Web Height Dimensions										Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ $C_b = 1.0$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$		$\phi_b = 0.90$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
				width	thk.	height	thk.	I_x	S_x	r_x	Lateral Unbraced Length— L_{br} , ft										ASD	LRFD	ASD	LRFD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
				b_f	t_f	h	t_w	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.</

Table B4. Available Flexural Strength of Members with 96-in. Web Height

96-in. Web Height Dimensions										Available Flexural Strength, kip-ft										$F_y = 50 \text{ ksi}$ ASD		$C_b = 1.0$ LRFD									
Nominal Shape	Wt/ft	Area	Depth	Flange width	Flange thk.	Web height	Web thk.	I_x	S_x	r_t	Allowable Flexural Strength = M_n/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$ ASD		$\phi_b = 0.90$ LRFD								
											Lateral Unbraced Length — L_b , ft										75		100								
											0	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
in.	lb/ft	in. ²	in.	in.	thk.	in.	in.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
96x18	194	57.0	97.5	18	3/4	96	5/16	86200	1770	4.44	3090	4650	3090	4650	3060	4610	2840	4270	2620	3940	1100	1660	490	737	280	414					
	214	63.0	97.5	18	3/4	96	5/16	90800	1860	4.32	3440	5170	3440	5170	3380	5080	3130	4700	2870	4310	1160	1750	517	777	290	437					
	235	69.0	97.5	18	3/4	96	7/16	95400	1960	4.22	3780	5680	3780	5680	3690	5540	3400	5110	3110	4680	1220	1830	540	812	300	457					
	255	75.0	97.5	18	3/4	96	1/2	100000	2050	4.12	4110	6180	4110	6180	3980	5990	3660	5500	3340	5020	1260	1900	561	843	320	474					
	276	81.0	97.5	18	3/4	96	5/8	105000	2150	4.02	4440	6680	4440	6680	4270	6420	3920	5890	3560	5360	1300	1960	579	870	330	490					
	225	66.0	98.0	18	1	96	5/16	108000	2200	4.60	4570	6870	4570	6870	4300	6460	4020	6340	3720	5590	1600	2400	711	1070	400	601					
	245	72.0	98.0	18	1	96	3/8	112000	2290	4.50	4970	7460	4970	7460	4650	6990	4340	6520	4030	6060	1600	2400	711	1070	400	601					
	265	78.0	98.0	18	1	96	7/16	117000	2390	4.41	5350	8050	5350	8050	4990	7510	4650	6990	4310	6480	1650	2490	736	1110	410	622					
	286	84.0	98.0	18	1	96	1/2	122000	2480	4.32	5740	8620	5740	8620	5330	8010	4960	7450	4580	6890	1710	2560	758	1140	430	641					
	306	90.0	98.0	18	1	96	5/8	126000	2570	4.24	6120	9190	6120	9190	5670	8510	5250	7900	4440	6680	1750	2630	778	1170	440	658					
	255	75.0	98.5	18	1 1/4	96	5/16	129000	2630	4.70	5630	8460	5630	8460	5320	7990	4980	7490	4640	6980	1980	2970	879	1320	490	743					
	276	81.0	98.5	18	1 1/4	96	3/8	134000	2720	4.62	6020	9050	6020	9050	5670	8520	5300	7970	4940	7420	2040	3070	907	1360	510	767					
	296	87.0	98.5	18	1 1/4	96	7/16	139000	2820	4.54	6410	9640	6410	9640	6020	9040	5620	8440	5220	7850	2100	3160	933	1400	520	789					
	316	93.0	98.5	18	1 1/4	96	1/2	143000	2910	4.46	6800	10200	6780	10200	6360	9550	5930	8910	5500	8260	2150	3240	957	1440	540	809					
	337	99.0	98.5	18	1 1/2	96	5/16	148000	3000	4.39	7180	10800	7180	10800	6690	10100	6230	9360	5770	8670	2200	3310	978	1470	550	827					
	286	84.0	99.0	18	1 1/2	96	3/8	151000	3060	4.77	6690	10100	6690	10100	6340	9530	5940	8930	5550	8340	2420	3640	1080	1620	610	911					
	306	90.0	99.0	18	1 1/2	96	5/8	156000	3150	4.70	7080	10600	7080	10600	6690	10100	6270	9420	5840	8780	2490	3740	1110	1660	620	935					
	327	96.0	99.0	18	1 1/2	96	1	161000	3240	4.63	7470	11200	7470	11200	7040	10600	6590	9900	6130	9220	2550	3830	1130	1700	640	958					
	347	102	99.0	18	1 1/2	96	1 1/4	165000	3340	4.56	7860	11800	7860	11800	7380	11100	6900	10400	6410	9640	2600	3910	1160	1740	650	978					
	368	108	99.0	18	1 1/2	96	5/16	170000	3430	4.50	8240	12400	8240	12400	7720	11600	7200	10800	6690	10100	2650	3990	1180	1770	660	997					
	316	93.0	99.5	18	1 3/4	96	3/8	174000	3490	4.83	7760	11700	7760	11700	7360	11100	6910	10400	6460	9710	2870	4320	1280	1920	720	1080					
	337	99.0	99.5	18	1 3/4	96	1/2	178000	3580	4.76	8150	12200	8150	12200	7720	11600	7230	10900	6750	10200	2940	4420	1310	1960	730	1100					
	357	105	99.5	18	1 3/4	96	5/8	183000	3670	4.70	8540	12800	8540	12800	8070	12100	7550	11400	7040	10600	3000	4510	1330	2000	750	1130					
	378	111	99.5	18	1 3/4	96	1	187000	3770	4.64	8920	13400	8920	13400	8410	12600	7870	11800	7330	11000	3060	4590	1360	2040	760	1150					
	398	117	99.5	18	1 3/4	96	5/16	192000	3860	4.58	9310	14000	9310	14000	8750	13100	8180	12300	7600	11400	3110	4670	1380	2080	777	1170					
	347	102	100	18	2	96	5/16	196000	3920	4.87	8820	13300	8820	13300	8390	12600	7880	11800	7370	11100	3330	5000	1480	2220	831	1250					
	368	108	100	18	2	96	3/8	201000	4010	4.81	9220	13900	9220	13900	8740	13100	8200	12300	7660	11500	3390	5100	1510	2270	848	1270					
	388	114	100	18	2	96	7/16	205000	4100	4.75	9600	14400	9600	14400	9090	13700	8520	12800	7950	12000	3450	5190	1530	2310	863	1300					
	408	120	100	18	2	96	1/2	210000	4200	4.70	9990	15000	9990	15000	9440	14200	8840	13300	8240	12400	3510	5270	1560	2340	877	1320					
	429	126	100	18	2	96	5/8	214000	4290	4.65	10400	15600	10400	15600	9780	14700	9150	13800	8580	12900	3560	5350	1580	2380	891	1340					
	378	111	101	18	2 1/4	96	5/16	219000	4350	4.90	9890	14900	9890	14900	9420	14200	8850	13300	8280	12400	3780	5680	1680	2520	945	1420					
	398	117	101	18	2 1/4	96	3/8	223000	4440	4.85	10300	15500	10300	15500	9770	14700	9170	13800	8580	12900	3780	5680	1680	2520	945	1420					
	419	123	101	18	2 1/4	96	7/16	228000	4530	4.80	10700	16000	10700	16000	10100	15200	9490	14300	8870	13300	3910	5870	1740	2610	977	1470					
	439	129	101	18	2 1/4	96	1/2	232000	4620	4.75	11100	16600	11100	16600	10500	15700	9810	14700	9150	13800	3960	5960	1760	2650	991	1490					
	459	135	101	18	2 1/4	96	5/8	237000	4720	4.70	11400	17200	11400	17200	10800	16200	10100	15200	9440	14200	4020	6040	1790	2680	1000	1510					
	408	120	101	18	2 1/2	96	5/16	241000	4780	4.93	11000	16500	11000	16500	10400	15700	9820	14800	9190	13800	4240	6370	1880	2830	1060	1590					
	429	126	101	18	2 1/2	96	3/8	246000	4870	4.88	11400	17100	11400	17100	10800	16200	10100	15200	9490	14300	4300	646									

Table B4. Available Flexural Strength of Members with 96-in. Web Height

96-in. Web Height Dimensions							Available Flexural Strength, kip-ft										$F_y = 50 \text{ ksi}$ $C_b = 1.0$					
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)										$\Omega_b = 1.67$	
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft										ASD	LRFD
				b_f	t_f	h	t_w	$in.^4$	$in.^3$	$in.$	0	10	15	20	25	30	50	75	100			
in.	lb/ft	$in.^2$	in.	in.	in.	in.	in.	$in.^4$	$in.^3$	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD		
96x24	265	78.0	98.0	24	1	96	5/8	136000	2770	6.30	5260	7910	5260	7910	5260	7910	3780	5690	1680	2530	946	1420
	286	84.0	98.0	24	1	96	3/4	141000	2870	6.20	5610	8430	5610	8430	5610	8430	4170	5980	1730	2600	975	1460
	306	90.0	98.0	24	1	96	7/8	145000	2960	6.10	5950	8950	5950	8950	5950	8950	4000	6020	1780	2670	1000	1500
	327	96.0	98.0	24	1	96	1/2	150000	3060	6.00	6290	9460	6290	9460	6290	9460	4100	6160	1820	2740	1030	1540
	347	102	98.0	24	1	96	5/8	154000	3150	5.91	6630	9960	6630	9960	6630	9960	4190	6300	1860	2800	1050	1570
	306	90.0	98.5	24	1 1/4	96	5/8	165000	3350	6.41	7270	10900	7270	10900	7030	10600	4850	7280	2150	3240	1210	1820
	327	96.0	98.5	24	1 1/4	96	3/4	170000	3440	6.32	7650	11500	7650	11500	7380	11100	4960	7460	2210	3320	1240	1860
	347	102	98.5	24	1 1/4	96	7/8	174000	3540	6.24	8040	12100	8040	12100	7730	11600	5070	7620	2250	3390	1270	1910
	368	108	98.5	24	1 1/4	96	1/2	179000	3630	6.16	8420	12700	8420	12700	8080	12100	5170	7770	2300	3450	1290	1940
	388	114	98.5	24	1 1/4	96	5/8	183000	3720	6.08	8800	13200	8800	13200	8420	12700	5260	7910	2340	3520	1320	1980
	347	102	99.0	24	1 1/2	96	5/8	194000	3920	6.49	8830	13300	8830	13300	8400	12600	5320	8000	2630	3950	1480	2220
	368	108	99.0	24	1 1/2	96	3/4	199000	4020	6.41	9230	13900	9230	13900	8750	13200	5400	8070	2680	4030	1510	2270
	388	114	99.0	24	1 1/2	96	7/8	203000	4110	6.34	9620	14500	9530	14300	9100	13700	5520	8240	2730	4110	1540	2310
	408	120	99.0	24	1 1/2	96	1/2	208000	4200	6.27	10000	15000	10000	14900	9450	14200	5650	8350	2780	4170	1560	2350
	429	126	99.0	24	1 1/2	96	5/8	213000	4290	6.20	10400	15600	10400	15300	9790	14700	5850	8550	2820	4240	1590	2380
	388	114	99.5	24	1 3/4	96	5/8	224000	4500	6.55	10300	15400	10300	15400	9770	14700	8890	13400	3110	4670	1750	2630
	408	120	99.5	24	1 3/4	96	3/4	228000	4590	6.48	10700	16000	10700	16000	10100	15200	9200	13800	3160	4750	1780	2670
	429	126	99.5	24	1 3/4	96	7/8	233000	4680	6.41	11000	16600	11000	16500	10500	15700	9990	15000	3210	4830	1810	2710
	449	132	99.5	24	1 3/4	96	1/2	238000	4770	6.35	11400	17200	11400	17200	11300	17000	10300	15500	3260	4900	1830	2750
	470	138	99.5	24	1 3/4	96	5/8	242000	4870	6.29	11800	17800	11800	17800	11700	17600	10600	16000	3300	4960	1860	2790
	429	126	100	24	2	96	5/8	254000	5070	6.59	11700	17600	11700	17500	11100	16700	10800	16000	3590	5400	2020	3030
	449	132	100	24	2	96	3/4	258000	5160	6.53	12100	18200	12100	18200	11500	17300	11000	16500	3640	5470	2050	3080
	470	138	100	24	2	96	7/8	263000	5260	6.47	12500	18700	12400	18600	11800	17800	11300	17000	3690	5550	2080	3120
	490	144	100	24	2	96	1/2	267000	5350	6.41	12900	19300	12900	19300	13300	19200	12200	18300	3740	5620	2100	3160
	510	150	100	24	2	96	5/8	272000	5440	6.36	13200	19900	13200	19900	13100	19700	12500	18900	3780	5690	2130	3200
	470	138	101	24	2 1/4	96	5/8	284000	5650	6.63	13100	19700	13100	19600	12500	18800	12000	18000	4070	6120	2290	3440
	490	144	101	24	2 1/4	96	3/4	288000	5740	6.57	13500	20300	13400	20300	13400	20200	12900	19300	4120	6200	2320	3490
	510	150	101	24	2 1/4	96	7/8	293000	5830	6.52	13900	20900	13900	20900	13800	20800	13200	19900	4170	6270	2350	3530
	531	156	101	24	2 1/4	96	1/2	298000	5920	6.47	14300	21500	14300	21500	14200	21300	13600	20400	4220	6340	2370	3570
	551	162	101	24	2 1/4	96	5/8	302000	6010	6.41	14700	22000	14700	22000	14600	21900	13900	20900	4260	6410	2400	3610
	510	150	101	24	2 1/2	96	5/8	314000	6220	6.66	14500	21900	14500	21800	14500	21800	13900	20900	4550	6850	2560	3850
	531	156	101	24	2 1/2	96	3/4	319000	6310	6.61	14900	22400	14900	22400	14900	22400	14200	21400	4610	6920	2590	3890
	551	162	101	24	2 1/2	96	7/8	323000	6400	6.56	15300	23000	15300	22900	14600	21900	13900	21000	4660	7000	2620	3940
	572	168	101	24	2 1/2	96	1/2	328000	6490	6.51	15700	23600	15600	23500	14900	22500	14300	21400	4700	7070	2650	3980
	592	174	101	24	2 1/2	96	5/8	333000	6590	6.46	16100	24200	16000	24000	15300	23000	14600	21900	4750	7140	2670	4010
	551	162	102	24	2 3/4	96	5/8	345000	6800	6.68	16000	24000	16000	24000	15900	23000	14600	21900	5040	7570	2830	4260
	572	168	102	24	2 3/4	96	3/4	350000	6890	6.63	16400	24600	16400	24600	16300	24500	15600	23500	5090	7650	2860	4300
	592	174	102	24	2 3/4	96	7/8	354000	6980	6.59	16800	25200	16800	25200	16700	25100	16000	24000	5140	7720	2890	4340
	613	180	102	24	2 3/4	96	1/2	359000	7070	6.54	17100	25800	17100	25600	17000	25600	16300	24500	5190	7800	2920	4380
	633	186	102	24	2 3/4	96	5/8	363000	7160	6.50	17500	26300	17500	26300	17400	26200	16700	25100	5230	7860	2940	4420
	592	174	102	24	3	96	5/8	376000	7370	6.70	17400	26200	17400	26200	17400	26100	16600	25000	5520	8300	3110	4670
	613	180	102	24	3	96	3/4	381000	7460	6.66	17800	26800	17800	26800	17800	26700	17000	25600	5570	8380	3140	4710
	633	186	102	24	3	96	7/8	385000	7550	6.61	18200	27300	18200	27300	18100	27200	17400	26100	5620	8450	3160	4750
	653	192	102	24	3	96	1/2	390000	7640	6.57	18600	27900	18600	27900	18500	27800	17700	26600	5670	8520	3190	4790
	674	198	102	24	3	96	5/8	394000	7730	6.53	19000	28500	19000	28500	18900	28300	18000	27100	5720	8590	3220	4830

Table B4. Available Flexural Strength of Members with 96-in. Web Height

96-in. Web Height Dimensions										Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ $C_b = 1.0$				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_u/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)												ASD	LRFD				
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft												$\Omega_b = 1.67$	$\phi_b = 0.90$				
				b_f	t_f	h	t_w	in. ⁴	in. ³	in.	0		10		15		20		25		30		50		75		100	
in.	lb/ft	in. ²	in.	in.	in.	in.	in.	in.	in.	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
96x30	357	105	98.5	30	1 1/4	96	5/8	200000	4070	8.13	8070	12100	8070	12100	8070	12100	8070	12100	8070	12100	8070	12100	7150	10800	4300	6460	2420	3630
	378	111	98.5	30	1 1/4	96	3/4	205000	4160	8.04	8420	12700	8420	12700	8420	12700	8420	12700	8420	12700	8420	12700	7420	11200	4380	6590	2460	3700
	398	117	98.5	30	1 1/4	96	7/8	210000	4260	7.95	8770	13200	8770	13200	8770	13200	8770	13200	8770	13200	8770	13200	7690	11600	4460	6700	2510	3770
	419	123	98.5	30	1 1/4	96	1/2	214000	4350	7.86	9110	13700	9110	13700	9110	13700	9110	13700	9110	13700	9110	13700	7950	11900	4530	6810	2550	3830
	439	129	98.5	30	1 1/4	96	5/8	219000	4440	7.78	9450	14200	9450	14200	9450	14200	9450	14200	9450	14200	9450	14200	8200	12300	4600	6910	2590	3890
	408	120	99.0	30	1 1/2	96	5/8	237000	4790	8.22	10600	15900	10600	15900	10600	15900	10600	15900	10600	15900	10600	15900	8580	12900	5240	7870	2950	4430
	429	126	99.0	30	1 1/2	96	3/4	242000	4880	8.13	11000	16500	11000	16500	11000	16500	11000	16500	11000	16500	11000	16500	8850	13300	5320	7990	2990	4500
	449	132	99.0	30	1 1/2	96	7/8	246000	4970	8.06	11300	17000	11300	17000	11300	17000	11300	17000	11300	17000	11300	17000	9120	13700	5400	8110	3040	4560
	470	138	99.0	30	1 1/2	96	1	251000	5070	7.98	11700	17600	11700	17600	11700	17600	11700	17600	11700	17600	11700	17600	9380	14100	5470	8220	3080	4620
	490	144	99.0	30	1 1/2	96	5/8	255000	5160	7.91	12100	18200	12100	18200	12100	18200	12100	18200	12100	18200	12100	18200	9630	14500	5540	8330	3120	4680
	459	135	99.5	30	1 3/4	96	5/8	274000	5510	8.28	12800	19200	12800	19200	12800	19200	12800	19200	12800	19200	12800	19200	10000	15000	5780	8580	3200	4760
	480	141	99.5	30	1 3/4	96	3/4	278000	5600	8.20	13200	19800	13200	19800	13200	19800	13200	19800	13200	19800	13200	19800	10300	15400	5860	8680	3240	4800
	500	147	99.5	30	1 3/4	96	7/8	283000	5690	8.13	13500	20400	13500	20400	13400	20400	13400	20400	13400	20400	13400	20400	10500	15800	5920	8780	3280	4840
	521	153	99.5	30	1 3/4	96	1	288000	5780	8.07	13900	21000	13900	21000	13700	20600	13700	20600	13700	20600	13700	20600	10800	16200	6000	8880	3320	4880
	541	159	99.5	30	1 3/4	96	5/8	292000	5880	8.00	14300	21500	14300	21500	14100	21200	14100	21200	14100	21200	14100	21200	11100	16600	6080	8980	3360	4920
	510	150	100	30	2	96	5/8	311000	6220	8.32	14600	22100	14600	22100	14400	21600	14400	21600	14400	21600	14400	21600	11400	17200	6120	9080	3400	4960
	531	156	100	30	2	96	3/4	316000	6320	8.26	14900	22500	14900	22500	14800	22200	14800	22200	14800	22200	14800	22200	11700	17600	6200	9180	3440	5000
	551	162	100	30	2	96	7/8	320000	6410	8.20	15300	23100	15300	23100	15100	22700	15100	22700	15100	22700	15100	22700	12000	18000	6280	9280	3480	5040
	572	168	100	30	2	96	1/2	325000	6500	8.13	15700	23600	15700	23600	15500	23300	15500	23300	15500	23300	15500	23300	12300	18400	6360	9380	3520	5080
	592	174	100	30	2	96	5/8	330000	6590	8.08	16100	24200	16100	24200	15900	23900	15900	23900	15900	23900	15900	23900	12600	18800	6440	9480	3560	5120
	561	165	101	30	2 1/4	96	5/8	349000	6940	8.36	16300	24600	16300	24600	16200	24300	16200	24300	16200	24300	16200	24300	12900	19300	6520	9580	3600	5160
	582	171	101	30	2 1/4	96	3/4	353000	7030	8.30	16700	25200	16700	25200	16500	24900	16500	24900	16500	24900	16500	24900	13100	19700	6600	9680	3640	5200
	602	177	101	30	2 1/4	96	7/8	358000	7130	8.24	17100	25700	17100	25700	16900	25400	16900	25400	16900	25400	16900	25400	13400	20100	6680	9780	3680	5240
	623	183	101	30	2 1/4	96	1/2	363000	7220	8.19	17500	26300	17500	26300	17300	26000	17300	26000	17300	26000	17300	26000	13700	20500	6760	9880	3720	5280
	643	189	101	30	2 1/4	96	5/8	367000	7310	8.13	17900	26900	17900	26900	17900	26900	17900	26900	17900	26900	17900	26900	14000	20900	6840	9980	3760	5320
	613	180	101	30	2 1/2	96	5/8	387000	7660	8.39	18100	27300	18100	27300	18000	27000	18000	27000	18000	27000	18000	27000	14300	21300	6920	10080	3800	5360
	633	186	101	30	2 1/2	96	3/4	392000	7750	8.33	18500	27800	18500	27800	18300	27500	18300	27500	18300	27500	18300	27500	14600	21700	7000	10180	3840	5400
	653	192	101	30	2 1/2	96	7/8	396000	7840	8.28	18900	28400	18900	28400	18900	28400	18900	28400	18900	28400	18900	28400	14900	22100	7080	10280	3880	5440
	674	198	101	30	2 1/2	96	1/2	401000	7940	8.23	19300	29000	19300	29000	19300	29000	19300	29000	19300	29000	19300	29000	15200	22500	7160	10380	3920	5480
	694	204	101	30	2 1/2	96	5/8	405000	8030	8.18	19700	29600	19700	29600	19700	29600	19700	29600	19700	29600	19700	29600	15500	22900	7240	10480	3960	5520
	664	195	102	30	2 3/4	96	5/8	425000	8380	8.41	19900	29900	19900	29900	19900	29900	19900	29900	19900	29900	19900	29900	15800	23300	7320	10580	4000	5560
	684	201	102	30	2 3/4	96	3/4	430000	8470	8.36	20300	30500	20300	30500	20100	30200	20100	30200	20100	30200	20100	30200	16100	23700	7400	10680	4040	5600
	704	207	102	30	2 3/4	96	7/8	435000	8560	8.31	20700	31100	20700	31100	20700	31100	20700	31100	20700	31100	20700	31100	16400	24100	7480	10780	4080	5640
	725	213	102	30	2 3/4	96	1/2	439000	8650	8.27	21100	31700	21100	31700	21100	31700	21100	31700	21100	31700	21100	31700	16700	24500	7560	10880	4120	5680
	745	219	102	30	2 3/4	96	5/8	444000	8750	8.22	21500	32300	21500	32300	21500	32300	21500	32300	21500	32300	21500	32300	17000	24900	7640	10980	4160	5720
	715	210	102	30	3	96	5/8	464000	9100	8.43	21700	32600	21700	32600	21700	32600	21700	32600	21700	32600	21700	32600	17300	25300	7720	11080	4200	5760
	735	216	102	30	3	96	3/4	469000	9190	8.39	22100	33200	22100	33200	21900	32900	21900	32900	21900	32900	21900	32900	17600	25700	7800	11180	4240	5800
	755	222	102	30	3	96	7/8	473000	9280	8.34	22500	33800	22500	33800	22300	33500	22300	33500	22300	33500	22300	33500	17900	26100	7880	11280	4280	5840
	776	228	102	30	3	96	1/2	478000	9370	8.30	22900	34400	22900	34400	22900	34400	22900	34400	22900	34400	22900	34400	18200	26500	7960	11380		

Table B5. Available Flexural Strength of Members with 108-in. Web Height

108-in. Web Height Dimensions								Available Flexural Strength, kip-ft														$F_y = 50 \text{ ksi}$ $C_b = 1.0$				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_p$ (LRFD)										$\Omega_b = 1.67$ $\phi_b = 0.90$					
				width	thk.	height	thk.	I_x	S_x	r_x	Lateral Unbraced Length— L_b , ft										ASD	LRFD				
in.	lb/ft	in. ²	d	in.	thk.	in.	in.	in. ⁴	in. ³	in.	0	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
108x12	199	58.5	110	12	3/4	108	3/8	92600	1690	2.62	3100	4650	2820	4230	2480	3730	2110	3170	1350	2030	938	1410	338	508	150	226
	222	65.3	110	12	3/4	108	7/8	99100	1810	2.53	3580	5380	3230	4850	2830	4260	2280	3420	1480	2190	1010	1520	364	548	162	243
	245	72.0	110	12	3/4	108	1/2	106000	1930	2.45	4060	6100	3630	5460	3160	4760	2420	3640	1550	2330	1080	1620	387	582	172	259
	268	78.8	110	12	3/4	108	9/8	112000	2050	2.38	4530	6810	4020	6040	3480	5240	2540	3820	1630	2450	1130	1700	407	611	181	272
	219	64.5	110	12	1	108	3/8	111000	2010	2.77	3870	5810	3560	5350	3170	4760	2780	4170	1890	2840	1310	1970	472	710	210	315
	242	71.3	110	12	1	108	7/8	117000	2130	2.69	4350	6540	3980	5990	3530	5300	3070	4620	2010	3020	1390	2090	502	754	223	335
	265	78.0	110	12	1	108	1/2	124000	2250	2.62	4830	7270	4400	6610	3880	5830	3290	4950	2110	3170	1460	2200	527	792	234	352
	288	84.8	110	12	1	108	9/8	130000	2370	2.55	5310	7980	4800	7210	4210	6330	3430	5160	2200	3300	1530	2290	550	826	244	367
	240	70.5	111	12	1 1/4	108	3/8	129000	2330	2.88	4640	6980	4310	6480	3860	5800	3400	5110	2440	3670	1700	2550	611	918	271	408
	263	77.3	111	12	1 1/4	108	7/8	135000	2450	2.81	5130	7710	4740	7120	4230	6350	3710	5580	2570	3860	1780	2680	642	965	285	429
	286	84.0	111	12	1 1/4	108	1/2	142000	2570	2.74	5620	8440	5160	7750	4580	6890	4000	6020	2680	4030	1860	2800	670	1010	298	447
	309	90.8	111	12	1 1/4	108	9/8	149000	2690	2.68	6090	9160	5570	8370	4930	7410	4290	6440	2780	4170	1930	2900	694	1040	309	464
	260	76.5	111	12	1 1/2	108	3/8	147000	2650	2.95	5420	8150	5060	7610	4550	6830	4030	6060	3010	4520	2090	3140	753	1130	335	503
	283	83.3	111	12	1 1/2	108	7/8	154000	2770	2.89	5920	8890	5500	8260	4920	7400	4350	6530	3140	4720	2180	3280	785	1180	349	524
	306	90.0	111	12	1 1/2	108	1/2	160000	2890	2.83	6400	9620	5920	8900	5280	7940	4650	6990	3260	4890	2260	3400	814	1220	362	544
	329	96.8	111	12	1 1/2	108	9/8	167000	3010	2.77	6880	10300	6340	9520	5640	8470	4940	7420	3360	5050	2330	3510	840	1260	373	561
	281	82.5	112	12	1 3/4	108	3/8	166000	2970	3.01	6210	9330	5820	8750	5240	7880	4660	7010	3590	5390	2490	3740	897	1350	398	599
	304	89.3	112	12	1 3/4	108	7/8	172000	3090	2.95	6700	10100	6260	9400	5620	8440	4980	7480	3720	5590	2580	3880	930	1400	413	621
	327	96.0	112	12	1 3/4	108	1/2	179000	3210	2.90	7190	10800	6680	10000	5990	9000	5290	7950	3840	5770	2670	4010	960	1440	427	641
	350	103	112	12	1 3/4	108	9/8	186000	3330	2.85	7670	11500	7100	10700	6340	9540	5590	8400	3950	5930	2740	4120	987	1480	439	659
	301	88.5	112	12	2	108	3/8	185000	3300	3.06	7000	10500	6580	9890	5940	8920	5290	7960	4170	6270	2890	4350	1040	1570	463	696
	324	95.3	112	12	2	108	7/8	191000	3410	3.01	7490	11300	7020	10500	6320	9490	5620	8440	4300	6470	2990	4490	1080	1620	478	719
	347	102	112	12	2	108	1/2	198000	3530	2.95	7980	12000	7450	11200	6690	10100	5930	8910	4430	6650	3070	4620	1110	1660	492	739
	370	109	112	12	2	108	9/8	204000	3650	2.91	8460	12700	7870	11800	7050	10600	6230	9360	4540	6820	3150	4740	1130	1710	504	758
	322	94.5	113	12	2 1/4	108	3/8	203000	3620	3.10	7790	11700	7340	11000	6630	9970	5930	8910	4760	7150	3300	4960	1190	1790	528	794
	345	101	113	12	2 1/4	108	7/8	210000	3730	3.05	8280	12400	7780	11700	7020	10500	6250	9390	4890	7350	3400	5110	1220	1840	544	817
	368	108	113	12	2 1/4	108	1/2	217000	3850	3.00	8770	13200	8210	12300	7390	11100	6570	9870	5020	7540	3490	5240	1250	1890	558	838
	390	115	113	12	2 1/4	108	9/8	223000	3970	2.95	9250	13900	8640	13000	7750	11700	6870	10300	5130	7720	3570	5360	1280	1930	570	857
	342	101	113	12	2 1/2	108	3/8	223000	3940	3.13	8580	12900	8100	12200	7330	11000	6560	9860	5350	8040	3710	5580	1340	2010	594	893
	365	107	113	12	2 1/2	108	7/8	229000	4060	3.08	9070	13600	8540	12800	7720	11600	6890	10400	5490	8240	3810	5730	1370	2060	609	916
	388	114	113	12	2 1/2	108	1/2	236000	4170	3.04	9560	14400	8980	13500	8090	12200	7200	10800	5610	8440	3900	5860	1400	2110	624	937
	411	121	113	12	2 1/2	108	9/8	242000	4290	3.00	10000	15100	9400	14100	8460	12700	7510	11300	5730	8610	3980	5980	1430	2150	637	957
	362	107	114	12	2 3/4	108	3/8	242000	4260	3.16	9380	14100	8870	13300	8030	12100	7200	10800	5940	8930	4130	6200	1490	2230	660	992
	385	113	114	12	2 3/4	108	7/8	248000	4380	3.11	9870	14800	9310	14000	8420	12600	7520	11300	6080	9140	4220	6350	1520	2280	676	1020
	408	120	114	12	2 3/4	108	1/2	255000	4490	3.07	10400	15600	9740	14600	8790	13200	7840	11800	6210	9330	4310	6480	1550	2330	690	1040
	431	127	114	12	2 3/4	108	9/8	261000	4610	3.03	10800	16300	10200	15300	9160	13800	8160	12300	6330	9510	4390	6600	1580	2380	703	1060
	383	113	114	12	3	108	3/8	261000	4580	3.18	10200	15300	9630	14500	8730	13100	7830	11800	6540	9830	4540	6820	1630	2460	726	1090
	406	119	114	12	3	108	7/8	268000	4700	3.14	10700	16000	10100	15100	9120	13700	8160	12300	6680	10000	4640	6970	1670	2510	742	1120
	429	126	114	12	3	108	1/2	274000	4810	3.10	11100	16800	10500	15800	9500	14300	8480	12700	6810	10200	4730	7100	1700	2560	756	1140
	452	133	114	12	3	108	9/8	281000	4930	3.06	11600	17500	10900	16400	9870	14800	8800	13200	6930	10400	4810	7230	1730	2600	770	1160

Table B5. Available Flexural Strength of Members with 108-in. Web Height																																										
108-in. Web Height Dimensions										Available Flexural Strength, kip-ft																																
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_p$ (LRFD)																															
				width	thk.	height	thk.	I_x	S_x	r_t	0				10				15				20				25				30				50				75			
in.	lb/ft	in. ²	in.	in.	in.	in.	in.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD				
108x18	230	67.5	110	18	3/4	108	3/8	119000	2180	4.24	3740	5630	3740	5630	3660	5500	3380	5080	3100	4650	1220	1830	542	815	305	458																
	253	74.3	110	18	3/4	108	7/8	126000	2300	4.13	4180	6280	4180	6280	4050	6080	3720	5600	3400	5110	1290	1940	573	861	322	484																
	276	81.0	110	18	3/4	108	1/2	132000	2420	4.02	4600	6920	4600	6920	4420	6650	4060	6100	3690	5550	1350	2030	600	901	337	507																
	299	87.8	110	18	3/4	108	3/8	139000	2540	3.93	5020	7550	5020	7550	4790	7200	4380	6580	3900	5860	1400	2110	623	937	351	527																
	260	76.5	110	18	1	108	3/8	146000	2660	4.43	5440	8170	5420	8150	5080	7630	4730	7110	4390	6590	4040	6070	1700	2550	754	1130	420	638														
	283	83.3	110	18	1	108	7/8	153000	2780	4.33	5930	8910	5900	8860	5510	8280	5130	7710	4740	7130	4360	6550	1770	2660	787	1180	440	666														
	306	90.0	110	18	1	108	1/2	159000	2900	4.24	6420	9650	6360	9570	5940	8930	5510	8290	5090	7650	4660	7010	1840	2760	816	1230	460	690														
	329	96.8	110	18	1	108	3/8	166000	3020	4.16	6900	10400	6820	10300	6360	9550	5890	8850	5420	8150	4950	7450	1900	2850	843	1270	470	712														
	291	85.5	111	18	1 1/4	108	3/8	174000	3140	4.56	6620	9950	6620	9950	6220	9340	5810	8730	5400	8110	4990	7500	2190	3290	972	1460	550	821														
	314	92.3	111	18	1 1/4	108	7/8	180000	3260	4.47	7110	10700	7100	10700	6660	10000	6210	9330	5760	8660	5310	7980	2260	3400	1010	1510	570	850														
337	99.0	111	18	1 1/4	108	1/2	187000	3380	4.39	7600	11400	7570	11400	7090	10700	6600	9920	6110	9190	5620	8450	2330	3500	1040	1560	580	876															
360	106	111	18	1 1/4	108	3/8	193000	3500	4.32	8090	12200	8040	12100	7510	11300	6980	10500	6460	9700	5930	8910	2390	3600	1060	1600	600	900															
322	94.5	111	18	1 1/2	108	3/8	201000	3630	4.65	7810	11700	7810	11700	7360	11100	6890	10300	6410	9640	5940	8930	2680	4030	1190	1790	670	1010															
345	101	111	18	1 1/2	108	7/8	208000	3740	4.57	8300	12500	8300	12500	7800	11700	7290	11000	6780	10200	6270	9420	2760	4150	1230	1840	690	1040															
368	108	111	18	1 1/2	108	1/2	214000	3860	4.50	8790	13200	8790	13200	8240	12400	7690	11600	7140	10700	6590	9900	2830	4260	1260	1890	710	1060															
390	115	111	18	1 1/2	108	3/8	221000	3980	4.43	9280	13900	9250	13900	8660	13000	8070	12100	7490	11300	6900	10400	2900	4350	1290	1940	720	1090															
352	104	112	18	1 3/4	108	3/8	229000	4110	4.72	9000	13500	9000	13500	8510	12800	7970	12000	7430	11200	6890	10400	3180	4780	1410	2130	800	1200															
375	110	112	18	1 3/4	108	7/8	236000	4230	4.65	9500	14300	9500	14300	8950	13500	8380	12600	7800	11700	7220	10900	3260	4900	1450	2180	820	1230															
398	117	112	18	1 3/4	108	1/2	242000	4340	4.58	9990	15000	9990	15000	9390	14100	8770	13200	8160	12300	7550	11300	3330	5010	1480	2230	830	1250															
421	124	112	18	2	108	3/8	249000	4460	4.52	10500	15700	10500	15700	9820	14800	9170	13800	8510	12800	7860	11800	3400	5110	1510	2270	850	1280															
383	113	112	18	2	108	7/8	257000	4590	4.77	10200	16300	10200	16300	10300	15000	9050	13600	8450	12700	7850	11800	3690	5540	1640	2460	920	1380															
406	119	112	18	2	108	1/2	264000	4710	4.71	10700	16900	10700	16900	10100	15200	9460	14200	8820	13300	8180	12300	3770	5660	1670	2520	940	1420															
429	126	112	18	2	108	3/8	270000	4830	4.65	11200	17500	11200	17500	10500	15800	9860	14800	9180	13800	8510	12800	3840	5770	1710	2570	960	1440															
452	133	112	18	2	108	7/8	277000	4940	4.59	11700	18100	11700	18100	10800	16200	10300	15400	9540	14300	8830	13300	3910	5880	1740	2610	980	1470															
413	122	113	18	2 1/4	108	3/8	286000	5080	4.81	11400	17100	11400	17100	10800	16200	10100	15200	9480	14200	8810	13200	4190	6300	1860	2800	1050	1580															
436	128	113	18	2 1/4	108	7/8	292000	5190	4.75	11900	17900	11900	17900	11300	16900	10500	15900	9850	14800	9140	13700	4270	6420	1900	2850	1070	1610															
459	135	113	18	2 1/4	108	1/2	299000	5310	4.70	12400	18600	12400	18600	11700	17600	11000	16500	10200	15300	9470	14200	4350	6540	1930	2900	1090	1630															
482	142	113	18	2 1/4	108	3/8	305000	5430	4.65	12900	19300	12900	19300	12100	18200	11300	17100	10600	15900	9790	14700	4420	6640	1960	2950	1100	1660															
444	131	113	18	2 1/2	108	7/8	314000	5560	4.85	12600	18900	12600	18900	12000	18000	11200	16900	10500	15800	9770	14700	4700	7070	2090	3140	1180	1770															
467	137	113	18	2 1/2	108	1/2	321000	5680	4.79	13100	19700	13100	19700	12400	18600	11600	17500	10900	16300	10100	15200	4780	7190	2130	3190	1200	1800															
490	144	113	18	2 1/2	108	3/8	327000	5790	4.74	13600	20400	13600	20400	12800	19300	12000	18100	11200	16900	10400	15700	4860	7300	2160	3240	1210	1830															
513	151	113	18	2 1/2	108	7/8	334000	5910	4.69	14100	21100	14100	21100	13300	20000	12400	18700	11600	17400	10800	16200	4930	7410	2190	3290	1230	1850															
475	140	114	18	2 3/4	108	3/8	343000	6040	4.87	13800	20700	13800	20700	13100	19700	12300	18500	11500	17300	10700	16100	5210	7830	2320	3480	1300	1960															
498	146	114	18	2 3/4	108	7/8	350000	6160	4.83	14300	21500	14300	21500	13600	20400	1																										

Table B5. Available Flexural Strength of Members with 108-in. Web Height																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
108-in. Web Height Dimensions										Available Flexural Strength, kip-ft										$F_y = 50 \text{ ksi}$ $C_b = 1.0$ $\Omega_b = 1.67$ $\phi_b = 0.90$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Nominal Shape	Wt/ft	Area	Depth	width	Flange	height	Web	Axis X-X			Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
								I_x	S_x	r_x	0					10					15					20					25					30					50					75					100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	lb/ft	in. ²	in.	in.	in.	in.	thk.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
108x24	301	88.5	110	24	1	108	in.	182000	3310	6.12	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6170	9270	6

Table B5. Available Flexural Strength of Members with 108-in. Web Height																														
108-in. Web Height Dimensions										Available Flexural Strength, kip-ft																				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web		Axis X-X			Allowable Flexural Strength = M_n/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)																$F_y = 50 \text{ ksi}$ ASD $\Omega_b = 1.67$		$C_b = 1.0$ LRFD $\phi_b = 0.90$	
				width	thk.	height	thk.	I_x	S_x	r_t	Lateral Unbraced Length— L_{br} , ft																			
			d	b_f	t_f	h	t_w	I_x	S_x	r_t																				
in.	lb/ft	in. ²	in.	in.	in.	in.	in.	in. ⁴	in. ³	in.	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	100			
											ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD				
108x30	393	116	111	30	1¼	108	¾	2630000	4760	7.97	9320	14000	9320	14000	9320	14000	9320	14000	9320	14000	8190	12300	4770	7170	2680	4030				
	416	122	111	30	1¼	108	7/8	2700000	4880	7.87	9760	14700	9760	14700	9760	14700	9760	14700	9760	14700	8520	12800	4870	7320	2740	4120				
	439	129	111	30	1¼	108	½	2760000	5000	7.78	10200	15300	10200	15300	10200	15300	10200	15300	10200	15300	8850	13300	4960	7460	2790	4200				
	462	136	111	30	1¼	108	9/8	2830000	5120	7.68	10600	16000	10600	16000	10600	16000	10600	16000	10600	16000	9170	13800	5050	7590	2840	4270				
	444	131	111	30	1½	108	¾	3090000	5570	8.08	12200	18300	12200	18300	12200	18300	12200	18300	12200	18300	11500	17400	5810	8740	3270	4920				
	467	137	111	30	1½	108	7/8	3160000	5690	7.99	12600	19000	12600	19000	12600	19000	12600	19000	12600	19000	10100	15200	5920	8890	3330	5000				
	490	144	111	30	1½	108	½	3220000	5810	7.91	13100	19700	13100	19700	13100	19700	13100	19700	13100	19700	10500	15700	6010	9040	3380	5080				
	513	151	111	30	1½	108	9/8	3290000	5930	7.82	13600	20400	13600	20400	13600	20400	13600	20400	13600	20400	10800	16200	6100	9170	3430	5160				
	495	146	112	30	1¼	108	¾	3560000	6380	8.15	14600	22000	14600	22000	14600	22000	14600	22000	14600	22000	11400	17100	6870	10300	3860	5810				
	518	152	112	30	1¼	108	7/8	3620000	6500	8.08	15100	22700	15100	22700	14900	22400	14400	21600	13800	20800	11700	17600	6970	10500	3920	5890				
	541	159	112	30	1¼	108	½	3690000	6610	8.00	15600	23500	15600	23500	15400	23100	14800	22300	14300	21400	12100	18100	7070	10600	3970	5970				
	564	166	112	30	1¼	108	9/8	3750000	6730	7.93	16100	24200	16100	24200	15800	23800	15200	22900	14700	22100	12400	18600	7160	10800	4030	6050				
	546	161	112	30	2	108	¾	4020000	7190	8.21	16600	25000	16600	25000	16400	24700	15800	23800	15300	23000	13000	19500	7920	11900	4460	6700				
	569	167	112	30	2	108	7/8	4090000	7300	8.14	17100	25700	17100	25700	16900	25400	16300	24500	15700	23600	13300	20000	8020	12100	4510	6780				
	592	174	112	30	2	108	½	4160000	7420	8.08	17600	26500	17600	26500	17400	26100	16700	25200	16100	24200	13700	20500	8120	12200	4570	6870				
	615	181	112	30	2	108	9/8	4220000	7540	8.01	18100	27200	18100	27200	17800	26800	17200	25800	16500	24900	14000	21000	8210	12300	4620	6940				
	597	176	113	30	2¼	108	¾	4500000	7990	8.26	18600	28000	18600	28000	18400	27700	17800	26700	17100	25800	14600	21900	8980	13500	5050	7590				
	620	182	113	30	2¼	108	7/8	4560000	8110	8.20	19100	28800	19100	28800	18900	28400	18200	27400	17600	26400	14900	22500	9080	13700	5110	7680				
	643	189	113	30	2¼	108	½	4630000	8230	8.13	19600	29500	19600	29500	19400	29100	18700	28100	18000	27000	15300	23000	9180	13800	5160	7760				
	666	196	113	30	2¼	108	9/8	4690000	8340	8.08	20100	30200	20100	30200	19800	29800	19100	28700	18400	27700	15600	23500	9270	13900	5220	7840				
	648	191	113	30	2½	108	¾	4970000	8800	8.30	20600	31000	20600	31000	20400	30700	19700	29600	19000	28600	16200	24400	10000	15100	5650	8490				
	671	197	113	30	2½	108	7/8	5040000	8920	8.24	21100	31800	21100	31800	20900	31400	20200	30300	19300	29200	16500	24900	10100	15200	5710	8580				
	694	204	113	30	2½	108	½	5100000	9030	8.18	21600	32500	21600	32500	21400	32100	20600	31000	19900	29900	16900	25400	10200	15400	5760	8660				
	717	211	113	30	2½	108	9/8	5170000	9150	8.13	22100	33300	22100	33300	21800	32800	21000	31600	20300	30500	17200	25900	10300	15500	5810	8740				
	699	206	114	30	2¼	108	¾	5450000	9610	8.33	22700	34100	22700	34100	22400	33700	21600	32500	20900	31400	17800	26800	11100	16700	6250	9390				
	722	212	114	30	2¼	108	7/8	5520000	9730	8.27	23200	34800	23200	34800	23000	34400	22100	33200	21300	32700	18200	27300	11200	16800	6300	9470				
	745	219	114	30	2¼	108	½	5590000	9840	8.22	23700	35500	23700	35500	23400	35100	22500	33900	21700	32700	18500	27800	11300	17000	6360	9560				
	768	226	114	30	2¼	108	9/8	5650000	9960	8.17	24100	36300	24100	36300	23800	35800	23000	34500	22200	33300	18800	28300	11400	17100	6410	9640				
	750	221	114	30	3	108	¾	5940000	10400	8.35	24700	37100	24700	37100	24400	36700	23600	35400	22800	34200	19400	29200	12200	18300	6840	10300				
	773	227	114	30	3	108	7/8	6010000	10500	8.30	25200	37800	25200	37800	24900	37400	24500	36100	23200	34800	19800	29700	12300	18400	6900	10400				
	796	234	114	30	3	108	½	6070000	10700	8.26	25700	38600	25700	38600	25400	38100	24600	36800	23600	35500	20100	30200	12400	18600	6960	10500				
	819	241	114	30	3	108	9/8	6140000	10800	8.21	26200	39300	26200	39300	25800	38800	24900	37500	24000	36100	20400	30700	12500	18700	7010	10500				

Table B6. Available Flexural Strength of Members with 120-in. Web Height																												
120-in. Web Height Dimensions								Available Flexural Strength, kip-ft										F _y = 50 ksi C _b = 1.0										
Nominal Shape	Wt/ft	Area	Depth	Flange width	Flange	Web height	Web thk.	Axis X-X			Allowable Flexural Strength = M _n /Ω _b (ASD) or Design Flexural Strength = φ _b M _n (LRFD)										ASD		LRFD					
								I _x	S _x	r _t	Lateral Unbraced Length—L _b , ft										Ω _b = 1.67	φ _b = 0.90						
			d	b _f	t _f	h	t _w	in. ⁴	in. ³	in.	0		10		15		20		25		30		50		75		100	
in.	lb/ft	in. ²	in.	in.	in.	in.	in.				ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
120x12	214	63.0	122	12	12	120	3/4	120000	1970	2.56	3250	4890	2940	4420	2580	3880	2110	3180	1350	2030	940	1410	338	508	150	226	—	—
	240	70.5	122	12	12	120	7/8	129000	2120	2.47	3850	5790	3450	5190	3010	4530	2330	3500	1490	2240	1030	1560	373	560	166	249	—	—
	265	78.0	122	12	12	120	1/2	138000	2270	2.38	4440	6680	3950	5930	3420	5140	2510	3770	1610	2410	1120	1680	402	603	178	268	—	—
	291	85.5	122	12	12	120	3/4	147000	2410	2.31	5030	7550	4430	6650	3810	5730	2860	4000	1700	2560	1180	1780	426	641	189	285	—	—
	235	69.0	122	12	1	120	3/4	142000	2330	2.72	4090	6150	3750	5640	3330	5000	2900	4370	1920	2890	1330	2010	480	722	214	321	—	—
	260	76.5	122	12	1	120	7/8	151000	2470	2.63	4700	7060	4280	6430	3780	5670	3240	4870	2070	3120	1440	2160	518	779	230	346	—	—
	286	84.0	122	12	1	120	1/2	160000	2620	2.56	5290	7960	4790	7200	4200	6320	3440	5180	2200	3310	1530	2300	551	828	245	368	—	—
	311	91.5	122	12	1	120	3/4	169000	2770	2.49	5880	8840	5280	7940	4620	6940	3620	5440	2320	3480	1610	2420	579	871	257	387	—	—
	255	75.0	123	12	1 1/4	120	3/4	164000	2680	2.83	4940	7430	4570	6880	4080	6140	3590	5400	2520	3780	1750	2630	629	945	280	420	—	—
	281	82.5	123	12	1 1/4	120	7/8	173000	2830	2.75	5550	8350	5110	7680	4540	6820	3970	5970	2680	4020	1860	2790	669	1010	297	447	—	—
	306	90.0	123	12	1 1/4	120	1/2	182000	2980	2.68	6150	9250	5630	8460	4980	7490	4340	6520	2820	4240	1960	2940	704	1060	313	471	—	—
	332	97.5	123	12	1 1/4	120	3/4	191000	3120	2.62	6750	10100	6130	9220	5410	8130	4600	6910	2940	4420	2040	3070	735	1110	327	491	—	—
	276	81.0	123	12	1 1/2	120	3/4	187000	3040	2.91	5810	8730	5400	8120	4840	7280	4280	6430	3130	4700	2170	3260	782	1180	348	522	—	—
	301	88.5	123	12	1 1/2	120	7/8	196000	3180	2.84	6420	9640	5940	8930	5310	7980	4670	7020	3300	4950	2290	3440	824	1240	366	550	—	—
	327	96.0	123	12	1 1/2	120	1/2	205000	3330	2.78	7020	10500	6470	9720	5760	8650	5040	7580	3440	5180	2390	3590	861	1290	383	575	—	—
	352	104	123	12	1 1/2	120	3/4	214000	3480	2.72	7610	11400	6980	10500	6190	9310	5400	8120	3580	5370	2480	3730	894	1340	397	597	—	—
	296	87.0	124	12	1 3/4	120	3/4	210000	3400	2.97	6670	10000	6240	9370	5610	8430	4970	7480	3750	5640	2610	3920	938	1410	417	627	—	—
	322	94.5	124	12	1 3/4	120	7/8	219000	3540	2.91	7280	10900	6780	10200	6070	9130	5370	8070	3920	5900	2720	4100	981	1470	436	655	—	—
	347	102	124	12	1 3/4	120	1/2	228000	3690	2.85	7890	11900	7310	11000	6530	9810	5750	8640	4080	6130	2830	4260	1020	1530	453	681	—	—
	373	110	124	12	1 3/4	120	3/4	237000	3830	2.80	8480	12700	7830	11800	6970	10500	6120	9200	4220	6340	2930	4400	1050	1580	468	704	—	—
	316	93.0	124	12	2	120	3/4	233000	3750	3.02	7540	11300	7070	10600	6370	9580	5670	8520	4390	6590	3050	4580	1100	1650	487	732	—	—
	342	101	124	12	2	120	7/8	242000	3900	2.97	8150	12300	7620	11500	6840	10300	6070	9120	4560	6850	3170	4760	1140	1710	507	762	—	—
	368	108	124	12	2	120	1/2	251000	4040	2.91	8760	13200	8150	12300	7300	11000	6460	9710	4720	7090	3280	4920	1180	1770	524	788	—	—
	393	115.5	124	12	2	120	3/4	260000	4190	2.86	9350	14100	8670	13000	7750	11700	6830	10300	4860	7310	3380	5070	1220	1830	540	812	—	—
	337	99.0	125	12	2 1/4	120	3/4	256000	4110	3.06	8420	12600	7920	11900	7140	10700	6370	9570	5030	7560	3490	5250	1260	1890	559	839	—	—
	362	107	125	12	2 1/4	120	7/8	265000	4250	3.01	9030	13600	8460	12700	7620	11400	6770	10200	5200	7820	3610	5430	1300	1960	578	869	—	—
	388	114	125	12	2 1/4	120	1/2	274000	4400	2.96	9630	14500	9000	13500	8080	12100	7160	10800	5360	8060	3730	5600	1340	2020	596	896	—	—
	413	122	125	12	2 1/4	120	3/4	283000	4540	2.91	10200	15400	9520	14300	8530	12800	7540	11300	5510	8280	3830	5750	1380	2070	612	920	—	—
	357	105	125	12	2 1/2	120	3/4	279000	4470	3.10	9290	14000	8760	13200	7910	11900	7070	10600	5670	8530	3940	5920	1420	2130	630	947	—	—
	383	113	125	12	2 1/2	120	7/8	288000	4610	3.05	9900	14900	9300	14000	8390	12600	7480	11200	5850	8800	4060	6110	1460	2200	650	977	—	—
	408	120	125	12	2 1/2	120	1/2	297000	4750	3.00	10500	15800	9840	14800	8860	13300	7870	11800	6010	9040	4180	6280	1500	2260	668	1000	—	—
	434	128	125	12	2 1/2	120	3/4	306000	4900	2.95	11100	16700	10400	15600	9310	14000	8250	12400	6160	9270	4280	6430	1540	2320	685	1030	—	—
	378	111	126	12	2 3/4	120	3/4	303000	4820	3.13	10200	15300	9600	14400	8690	13100	7770	11700	6330	9510	4390	6600	1580	2380	703	1060	—	—
	403	119	126	12	2 3/4	120	7/8	312000	4970	3.08	10800	16200	10200	15300	9160	13800	8180	12300	6500	9780	4520	6790	1630	2440	723	1090	—	—
	429	126	126	12	2 3/4	120	1/2	321000	5110	3.03	11400	17100	10700	16100	9630	14500	8580	12900	6670	10000	4630	6960	1670	2510	741	1110	—	—
	454	134	126	12	2 3/4	120	3/4	330000	5250	2.99	12000	18000	11200	16900	10100	15200	8960	13500	6820	10300	4740	7120	1710	2560	758	1140	—	—
	398	117	126	12	3	120	3/4	326000	5180	3.15	11100	16600	10500	15700	9460	14200	8480	12700	6980	10500	4850	7290	1750	2620	776	1170	—	—
	424	125	126	12	3	120	7/8	335000	5320	3.11	11700	17500	11000	16500	9940	14900	8880	13400	7160	10800	4970	7470	1790	2690	796	1200	—	—
	449	132	126	12	3	120	1/2	344000	5470	3.06	12300	18400	11500	17300	10400	15600	9280	14000	7330	11000	5090	7650	1830	2750	814	1220	—	—
	475	140	126	12	3	120	3/4	353000	5610	3.02	12900	19300	12100	18100	10900	16300	9670	14500	7480	11200	5190	7810	1870	2810	831	1250	—	—

Table B6. Available Flexural Strength of Members with 120-in. Web Height

120-in. Web Height Dimensions								Available Flexural Strength, kip-ft																$F_y = 50 \text{ ksi}$ $C_b = 1.0$				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web	Axis X-X		Allowable Flexural Strength = M_p/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_n$ (LRFD)																ASD			
				width	thk.		I_x	S_x	r_t	Lateral Unbraced Length— L_b , ft																$\Omega_b = 1.67$	LRFD	
				b_f	t_f	height	thk.	t_w	0		10		15		20		25		30		50		75		100			
in.	lb/ft	in. ²	in.	in.	in.	in.	in.	in.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD			
120x18	245	72.0	122	18	3/4	120	3/8	152000	2510	4.17	3980	5980	3980	5980	3980	5980	3870	5810	3560	5350	3250	4890	1250	1880	555	835	312	469
	271	79.5	122	18	3/4	120	7/8	161000	2660	4.05	4510	6780	4510	6780	4510	6780	4350	6530	3990	6000	3630	5460	1340	2010	595	894	335	503
	296	87.0	122	18	3/4	120	1/2	170000	2810	3.94	5040	7580	5040	7580	5040	7580	4810	7230	4400	6610	3930	5910	1420	2130	629	945	354	532
	322	94.5	122	18	3/4	120	3/8	179000	2950	3.84	5560	8360	5560	8360	5560	8360	5260	7910	4800	7210	4120	6190	1480	2230	659	990	371	557
	276	81.0	122	18	1	120	3/8	186000	3050	4.37	5820	8750	5790	8700	5420	8140	5040	7580	4670	7010	4290	6450	1760	2650	784	1180	440	663
	301	88.5	122	18	1	120	7/8	195000	3190	4.26	6430	9670	6380	9590	5960	8950	5530	8320	5110	7680	4680	7040	1860	2790	826	1240	460	698
	327	96.0	122	18	1	120	1/2	204000	3340	4.17	7040	10600	6960	10500	6490	9750	6010	9030	5530	8320	5060	7600	1940	2920	863	1300	490	730
	352	104	122	18	1	120	3/8	213000	3490	4.08	7640	11500	7530	11300	7000	10500	6470	9730	5950	8940	5420	8150	2020	3030	897	1350	500	758
	306	90.0	123	18	1 1/4	120	3/8	219000	3580	4.50	7120	10700	7120	10700	6670	10000	6230	9360	5780	8690	5330	8020	2290	3450	1020	1530	570	862
	332	97.5	123	18	1 1/4	120	7/8	228000	3730	4.41	7740	11600	7710	11600	7220	10800	6720	10100	6230	9360	5740	8620	2390	3600	1060	1600	600	899
	357	105	123	18	1 1/4	120	1/2	237000	3880	4.32	8350	12500	8300	12500	7750	11700	7210	10800	6670	10000	6120	9200	2480	3730	1100	1660	620	932
	383	113	123	18	1 1/4	120	3/8	246000	4020	4.24	8950	13400	8870	13300	8280	12400	7680	11500	7090	10700	6500	9760	2560	3850	1140	1710	640	962
	337	99.0	123	18	1 1/2	120	3/8	253000	4120	4.60	8440	12700	8440	12700	7930	11900	7420	11100	6900	10400	6380	9600	2830	4260	1260	1890	710	1060
	362	107	123	18	1 1/2	120	7/8	262000	4270	4.52	9050	13600	9050	13600	8480	12800	7920	11900	7360	11100	6790	10200	2930	4410	1300	1960	730	1100
	388	114	123	18	1 1/2	120	1/2	271000	4410	4.44	9660	14500	9640	14500	9020	13600	8410	12600	7800	11700	7190	10800	3030	4550	1350	2020	760	1140
	413	122	123	18	1 1/2	120	3/8	280000	4560	4.37	10300	15400	10200	15400	9550	14400	8890	13400	8230	12400	7570	11400	3110	4670	1380	2080	780	1170
	368	108	124	18	1 3/4	120	3/8	287000	4660	4.67	9750	14700	9750	14700	9200	13800	8610	12900	8030	12100	7440	11200	3380	5080	1500	2260	850	1270
	393	116	124	18	1 3/4	120	7/8	296000	4800	4.60	10400	15600	10400	15600	9750	14700	9120	13700	8480	12800	7850	11800	3480	5240	1550	2330	870	1310
	419	123	124	18	1 3/4	120	1/2	305000	4950	4.53	11000	16500	11000	16500	10300	15500	9610	14400	8930	13400	8250	12400	3580	5380	1590	2390	890	1340
	444	131	124	18	1 3/4	120	3/8	314000	5090	4.46	11600	17400	11600	17400	10800	16300	10100	15200	9370	14100	8640	13000	3660	5510	1630	2450	920	1380
	398	117	124	18	2	120	3/8	322000	5190	4.73	11100	16600	11100	16600	10500	15700	9810	14800	9160	13800	8500	12800	3940	5920	1750	2630	980	1480
	424	125	124	18	2	120	7/8	331000	5340	4.66	11700	17600	11700	17600	11000	16600	10300	15500	9610	14500	8910	13400	4040	6070	1790	2700	1010	1520
	449	132	124	18	2	120	1/2	340000	5480	4.60	12300	18500	12300	18500	11600	17400	10800	16300	10100	15100	9310	14000	4130	6210	1840	2760	1030	1550
	475	140	124	18	2	120	3/8	349000	5630	4.54	12900	19400	12900	19400	12100	18200	11300	17000	10500	15800	9700	14600	4220	6340	1880	2820	1060	1590
	429	126	125	18	2 1/4	120	3/8	357000	5730	4.77	12400	18600	12400	18600	11700	17700	11000	16600	10300	15500	9560	14400	4490	6750	2000	3000	1120	1690
	454	134	125	18	2 1/4	120	7/8	366000	5870	4.71	13000	19600	13000	19600	12300	18500	11500	17300	10700	16200	9970	15000	4600	6910	2040	3070	1150	1730
	480	141	125	18	2 1/4	120	1/2	375000	6020	4.65	13600	20500	13600	20500	12800	19300	12000	18100	11200	16800	10400	15600	4690	7050	2090	3130	1170	1760
	505	149	125	18	2 1/4	120	3/8	384000	6160	4.60	14200	21400	14200	21400	13400	20100	12500	18800	11600	17500	10800	16200	4780	7190	2130	3190	1200	1800
	459	135	125	18	2 1/2	120	3/8	392000	6270	4.81	13700	20600	13700	20600	13000	19600	12200	18400	11400	17200	10600	16000	5050	7590	2250	3380	1260	1900
	485	143	125	18	2 1/2	120	7/8	401000	6410	4.75	14300	21600	14300	21600	13600	20400	12700	19100	11900	17900	11000	16600	5160	7750	2290	3440	1290	1940
	510	150	125	18	2 1/2	120	1/2	410000	6560	4.70	15000	22500	15000	22500	14100	21200	13200	19900	12300	18500	11400	17200	5250	7900	2330	3510	1310	1970
	536	158	125	18	2 1/2	120	3/8	419000	6700	4.65	15600	23400	15600	23400	14700	22200	13700	20600	12800	19200	11800	17800	5340	8030	2370	3570	1340	2010
	490	144	126	18	2 3/4	120	3/8	427000	6800	4.84	15100	22600	15100	22600	14300	21500	13400	20200	12600	18900	11700	17600	5620	8440	2500	3750	1400	2110
	516	152	126	18	2 3/4	120	7/8	436000	6950	4.79	15700	23600	15700	23600	14900	22300	13900	21000	13000	19600	12100	18200	5720	8600	2540	3820	1430	2150
	541	159	126	18	2 3/4	120	1/2	445000	7090	4.74	16300	24500	16300	24500	15400	23200	14400	21700	13500	20200	12500	18800	5820	8740	2580	3890	1450	2190
	567	167	126	18	2 3/4	120	3/8	454000	7230	4.69	16900	25400	16900	25400	15900	24000	14900	22400	13900	20900	12900	19400	5910	8880	2630	3950	1480	2220
	521	153	126	18	3	120	3/8	463000	7340	4.87	16400	24600	16400	24600	15600	23400	14600	22000	13700	20600	12700	19200	6180	9290	2730	4130	1550	2320
	546	161	126	18	3	120	7/8	472000	7490	4.82	17000	25600	17000	25600	16100	24300	15100	22800	14200	21300	13200	19800	6280	9440	2790	4200	1570	2360
	572	168	126	18	3	120	1/2	481000	7630	4.77	17600	26500	17600	26500	16700	25100	15800	23500	14600	22000	13600	20400	6380	9590	2840	4260	1600	2400
	597	176	126	18	3	120	3/8	490000	7770	4.73	18200	27400	18200	27400	17200	25900	16100	24300	15100	22600	14000	21000	6470	9730	2880	4320	1620	2430

Table B6. Available Flexural Strength of Members with 120-in. Web Height

120-in. Web Height Dimensions								Available Flexural Strength, kip-ft																$F_y = 50 \text{ ksi}$ $C_b = 1.0$				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web height	Web thk.	Axis X-X			Allowable Flexural Strength = M_x/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_x$ (LRFD)																ASD	
				width	thk.			I_x	S_x	r_x	Lateral Unbraced Length— L_b , ft																$\Omega_b = 1.67$	
				d	b_f	t_f	t_w				0	10	15	20	25	30	50	75	100									
in.	lb/ft	in. ²	in.	in.	in.	in.	in.	in. ⁴	in. ³	in.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD						
120x24	316	93.0	122	24	1	120	3/8	230000	3770	6.05	6650	9990	6650	9990	6650	9990	6650	9990	6650	9990	1960	2940						
	342	101	122	24	1	120	7/8	239000	3910	5.93	7190	10800	7190	10800	7190	10800	7190	10800	7190	10800	2040	3060						
	368	108	122	24	1	120	1/2	248000	4060	5.82	7730	11600	7730	11600	7730	11600	7730	11600	7730	11600	2110	3170						
	393	116	122	24	1	120	3/8	257000	4210	5.72	8260	12400	8260	12400	8260	12400	8260	12400	8260	12400	2170	3260						
	357	105	123	24	1 1/4	120	3/8	275000	4480	6.20	9150	13700	9150	13700	8790	13200	8370	12600	7940	11900	2530	3800						
	383	113	123	24	1 1/4	120	7/8	284000	4630	6.10	9750	14700	9750	14700	9340	14000	8880	13400	8420	12700	2610	3930						
	408	120	123	24	1 1/4	120	1/2	293000	4780	6.00	10400	15600	10400	15600	9890	14900	9390	14100	8900	13400	2690	4040						
	434	128	123	24	1 1/4	120	3/8	302000	4920	5.91	10900	16500	10900	16500	10400	15700	9890	14900	9360	14100	2750	4140						
	398	117	123	24	1 1/2	120	3/8	320000	5200	6.30	11100	16700	11100	16700	11000	16500	10500	15800	9990	15000	3110	4680						
	424	125	123	24	1 1/2	120	7/8	329000	5350	6.21	11700	17600	11700	17600	11600	17400	11000	16600	10500	15800	3200	4800						
	449	132	123	24	1 1/2	120	1/2	338000	5490	6.13	12300	18500	12300	18500	12200	18300	11600	17400	11000	16600	3270	4920						
	475	140	123	24	1 1/2	120	3/8	347000	5640	6.05	12900	19400	12900	19400	12700	19100	12100	18200	11500	17300	3340	5020						
	439	129	124	24	1 3/4	120	3/8	365000	5920	6.38	12900	19300	12900	19300	12800	19200	12200	18300	11600	17500	3560	5560						
	465	137	124	24	1 3/4	120	7/8	374000	6060	6.30	13500	20300	13500	20300	13300	20100	12700	19200	12100	18300	3780	5690						
	490	144	124	24	1 3/4	120	1/2	383000	6210	6.23	14100	21200	14100	21200	13900	20900	13300	20000	12700	19000	3860	5800						
	516	152	124	24	1 3/4	120	3/8	392000	6350	6.15	14700	22100	14700	22100	14500	21800	13800	20800	13200	19800	3930	5910						
	480	141	124	24	2	120	3/8	411000	6630	6.44	14600	22000	14600	22000	14500	21800	13900	20900	13300	19900	4290	6450						
	505	149	124	24	2	120	7/8	420000	6780	6.37	15300	22900	15300	22900	15100	22700	14500	21700	13800	20700	4380	6580						
	531	156	124	24	2	120	1/2	429000	6920	6.30	15900	23800	15900	23800	15700	23600	15000	22500	14300	21500	4450	6690						
	556	164	124	24	2	120	3/8	438000	7070	6.24	16500	24800	16500	24800	16300	24500	15500	23400	14800	22200	4530	6800						
	521	153	125	24	2 1/4	120	3/8	458000	7350	6.49	16400	24700	16400	24700	16300	24500	15600	23500	14900	22400	4890	7350						
	546	161	125	24	2 1/4	120	7/8	467000	7490	6.43	17000	25600	17000	25600	16900	25400	16200	24300	15400	23200	4970	7470						
	572	168	125	24	2 1/4	120	1/2	476000	7640	6.36	17600	26500	17600	26500	17500	26300	16700	25100	15900	23900	5050	7590						
	597	176	125	24	2 1/4	120	3/8	485000	7780	6.30	18200	27400	18200	27400	18100	27200	17300	25900	16400	24700	5120	7700						
	561	165	125	24	2 1/2	120	3/8	504000	8070	6.53	18200	27300	18200	27300	18100	27200	17300	26000	16500	24900	5490	8250						
	587	173	125	24	2 1/2	120	7/8	513000	8210	6.47	18800	28300	18800	28300	18700	28100	17900	26900	17100	25600	5570	8370						
	613	180	125	24	2 1/2	120	1/2	522000	8360	6.41	19400	29200	19400	29200	19300	29000	18400	27700	17600	26400	5650	8490						
	638	188	125	24	2 1/2	120	3/8	531000	8500	6.36	20000	30100	20000	30100	19900	29800	19000	28500	18100	27200	5720	8600						
	602	177	126	24	2 3/4	120	3/8	551000	8790	6.57	20000	30000	20000	30000	19900	29900	19000	28600	18200	27300	6080	9150						
	628	185	126	24	2 3/4	120	7/8	560000	8930	6.51	20600	30900	20600	30900	20500	30800	19600	29400	18700	28100	6170	9270						
	653	192	126	24	2 3/4	120	1/2	569000	9070	6.46	21200	31900	21200	31900	21100	31700	20100	30300	19200	28900	6250	9390						
	679	200	126	24	2 3/4	120	3/8	578000	9220	6.40	21800	32800	21800	32800	21600	32500	20700	31100	19700	29600	6320	9500						
	643	189	126	24	3	120	3/8	599000	9500	6.59	21800	32700	21800	32700	21700	32600	20700	31200	19800	29800	6690	10000						
	669	197	126	24	3	120	7/8	608000	9650	6.54	22400	33600	22400	33600	22300	33500	21300	32000	20300	30600	6770	10200						
	694	204	126	24	3	120	1/2	617000	9790	6.49	23000	34500	23000	34500	22900	34300	21900	32800	20900	31300	6850	10300						
	720	212	126	24	3	120	3/8	626000	9930	6.44	23600	35500	23600	35500	23400	35200	22400	33700	21400	32100	6920	10400						

Table B6. Available Flexural Strength of Members with 120-in. Web Height																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
120-in. Web Height Dimensions										Available Flexural Strength, kip-ft																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Nominal Shape	Wt/ft	Area	Depth	Flange		Web	Axis X-X			Allowable Flexural Strength = M_x/Ω_b (ASD) or Design Flexural Strength = $\phi_b M_x$ (LRFD)												$F_y = 50$ ksi $C_b = 1.0$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				width b_f	thk. t_f		height h	thk. t_w	I_x	S_x	r_x	Lateral Unbraced Length— L_{br} , ft												ASD	LRFD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

AVAILABLE SHEAR STRENGTH TABLES

Table C1. Available Shear Strength with Tension Field Action Included

Web			Available Shear Strength, kips																													
			$F_y = 50 \text{ ksi}$																													
			ASD												LRFD																	
height	thk.	area	Allowable Shear Strength = V_p/Ω_v (ASD) or Design Shear Strength = $\phi_v V_n$ (LRFD)																													
h	t_w	A_w	Transverse Stiffener Spacing (a , in.)																													
in.	in.	in. ²	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230							
60	60	18.8	ASD	337	335	306	280	257	238	221	206	192	181	171																		
			LRFD	506	504	461	420	387	358	332	309	289	272	256																		
60	60	22.5	ASD	404	404	389	355	326	302	281	263	247	233	221	210	201	192	185														
			LRFD	608	608	584	533	490	454	422	395	371	350	332	316	301	289	278														
72	72	22.5	ASD	404	402	369	341	318	297	278	260	245																				
			LRFD	608	604	554	513	478	446	418	391	368																				
72	72	27.0	ASD	485	485	466	427	397	371	347	326	307	289	274	260	248																
			LRFD	729	729	701	642	597	557	522	490	461	435	412	391	373																
72	72	31.5	ASD	566	566	559	523	485	452	424	398	376	356	338	322	308	295	283	273	263												
			LRFD	851	851	840	786	728	680	637	599	565	535	508	484	462	443	426	410	396												
84	84	26.3	ASD	472	468	432	403	380	358	338																						
			LRFD	709	703	649	606	571	539	508																						
84	84	31.5	ASD	566	566	542	502	471	443	418	395	373	354	336																		
			LRFD	851	851	815	754	707	666	628	593	561	531	504																		
84	84	36.8	ASD	660	660	650	609	569	535	505	477	451	428	407	388	370	354	340														
			LRFD	992	992	977	916	855	804	758	717	678	644	612	583	556	533	511														
84	84	42.0	ASD	754	754	754	725	677	635	599	566	537	510	486	464	444	426	409	394	380	368	356	345									
			LRFD	1130	1130	1130	1090	1020	955	900	851	807	766	730	697	667	640	615	592	571	552	535	519									
84	84	47.3	ASD	849	849	849	835	795	745	702	664	630	600	573	548	525	505	487	470	454	440	428	416	405	395	386						
			LRFD	1280	1280	1280	1250	1200	1120	1060	998	948	902	861	823	790	759	731	706	683	662	643	625	609	594	580						
96	96	30.0	ASD	539	535	495	466	442	421																							
			LRFD	810	803	744	700	665	632																							
96	96	36.0	ASD	647	647	619	577	545	517	491	467	444																				
			LRFD	972	972	931	867	819	777	739	702	667																				
96	96	42.0	ASD	754	754	742	697	655	621	589	560	532	507	483	461	441																
			LRFD	1130	1130	1120	1050	985	933	885	841	800	762	726	693	663																
96	96	48.0	ASD	862	862	862	829	775	732	694	659	627	598	570	545	522	501	481	463	446												
			LRFD	1300	1300	1300	1250	1160	1100	1040	990	942	898	857	819	784	752	723	696	670												
96	96	54.0	ASD	970	970	970	951	904	852	807	766	729	696	665	636	610	586	564	544	525	508	492	477	463	451							
			LRFD	1460	1460	1460	1430	1360	1280	1210	1150	1100	1050	999	956	917	881	848	817	789	763	739	717	696	677							
108	108	40.5	ASD	728	728	697	652	620	592	566	541																					
			LRFD	1090	1090	1050	980	932	890	851	813																					
108	108	47.3	ASD	849	849	835	785	743	707	675	645	616	589	564																		
			LRFD	1280	1280	1250	1180	1120	1060	1010	969	926	886	848																		
108	108	54.0	ASD	970	970	970	930	874	830	791	755	722	690	661	633	607	583	561														
			LRFD	1460	1460	1460	1400	1310	1250	1190	1140	1080	1040	993	952	913	877	843														
108	108	60.8	ASD	1090	1090	1090	1070	1020	961	915	873	834	798	764	733	704	677	651	628	606	586	567										
			LRFD	1640	1640	1640	1640	1610	1530	1440	1370	1310	1250	1200	1150	1100	1060	1020	979	944	911	880	852									
120	120	45.0	ASD	808	808	774	727	695	667	641																						
			LRFD	1220	1220	1160	1090	1040	1000	964																						
120	120	52.5	ASD	943	943	927	874	830	795	762	732	702	674																			
			LRFD	1420	1420	1390	1310	1250	1190	1150	1100	1060	1010																			
120	120	60.0	ASD	1080	1080	1080	1030	974	929	890	853	819	786	755	726	698	672															
			LRFD	1620	1620	1620	1550	1460	1400	1340	1280	1230	1180	1140	1090	1050	1010															
120	120	67.5	ASD	1210	1210	1210	1190	1130	1070	1030	982	942	905	869	835	804	774	746	720	695												
			LRFD	1820	1820	1820	1780	1700	1610	1540	1480	1420	1360	1310	1260	1210	1160	1120	1080	1040												

Notes: 1) Solid vertical line indicates maximum stiffener spacing; 2) A_w is conservatively taken as h_{tw}^2 ; 3) Limits of Specification Section G3.1 must be satisfied.

Notes: 1) Solid vertical line indicates maximum stiffener spacing; 2) A_w is conservatively taken as ht_w ; 3) Limits of Specification Section G3.1 must be satisfied.

Table C2. Available Shear Strength with Tension Field Action EXCLUDED

Available Shear Strength, kips																									F _y = 50 ksi									
																									ASD	LRFD								
																									Ω _v = 1.67	ϕ _v = 0.90								
Web			Allowable Shear Strength = V _n /Ω _v (ASD) or Design Shear Strength = ϕ _v V _n (LRFD)																															
height	thk.	area	Transverse Stiffener Spacing (α, in.)																															
h	t _w	A _w	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230									
60	5/16	18.8	ASD	337	329	200	130	98	80	69	63	58	54	52																				
			LRFD	506	494	301	195	147	120	104	94	87	82	78																				
60	3/8	22.5	ASD	404	404	335	225	169	138	120	108	100	94	90	86	84	82	80																
			LRFD	608	608	503	338	254	208	180	162	150	141	135	130	126	123	121																
72	5/16	22.5	ASD	404	388	225	141	102	81	69	60	55																						
			LRFD	608	584	339	212	154	122	103	91	82																						
72	3/8	27.0	ASD	485	485	389	244	177	141	119	104	94	87	82	78	75																		
			LRFD	729	729	585	367	266	211	178	157	142	131	124	118	113																		
72	7/16	31.5	ASD	566	566	530	388	281	223	188	166	150	139	131	124	120	116	113	110	108														
			LRFD	851	851	796	583	423	336	283	249	226	209	196	187	180	174	169	165	162														
84	5/16	26.3	ASD	472	449	253	155	109	85	70																								
			LRFD	709	674	380	232	164	127	105																								
84	3/8	31.5	ASD	566	566	437	267	189	146	120	104	92	84	78																				
			LRFD	851	851	656	402	284	220	181	156	139	127	118																				
84	7/16	36.8	ASD	660	660	606	424	300	232	191	165	147	134	124	117	111	107	103																
			LRFD	992	992	910	638	451	349	288	248	221	201	187	176	167	160	155																
84	1/2	42.0	ASD	754	754	754	619	447	346	286	246	219	200	185	174	166	159	154	149	146	143	140	138											
			LRFD	1130	1130	1130	930	673	521	429	370	329	300	279	262	249	239	231	224	219	214	210	207											
84	9/16	47.3	ASD	849	849	849	783	637	493	407	350	312	284	264	248	236	227	219	213	207	203	199	196	193	191	189								
			LRFD	1280	1280	1280	1180	958	742	611	527	469	427	397	373	355	341	329	320	312	305	299	295	291	287	284								
96	5/16	30.0	ASD	539	510	281	169	117	89																									
			LRFD	810	766	422	254	176	134																									
96	3/8	36.0	ASD	647	647	486	292	203	154	124	105	92																						
			LRFD	972	972	730	439	304	231	187	158	139																						
96	7/16	42.0	ASD	754	754	683	464	322	244	198	167	147	132	121	113	106																		
			LRFD	1130	1130	1030	697	483	367	297	252	220	198	182	169	159																		
96	1/2	48.0	ASD	862	862	862	692	480	365	295	250	219	197	180	168	158	151	144	139	135														
			LRFD	1300	1300	1300	1040	721	548	443	376	329	296	271	252	238	226	217	209	203														
96	9/16	54.0	ASD	970	970	970	875	683	519	420	356	312	280	257	239	225	214	206	198	192	187	183	179	176	174									
			LRFD	1460	1460	1460	1320	1030	780	631	535	469	421	386	359	339	322	309	298	289	282	275	270	265	261									
108	3/8	40.5	ASD	728	728	536	318	218	163	130	108																							
			LRFD	1090	1090	806	479	327	245	195	163																							
108	7/16	47.3	ASD	849	849	761	506	346	259	206	172	149	132	120																				
			LRFD	1280	1280	1140	760	519	389	310	259	224	199	180																				
108	1/2	54.0	ASD	970	970	970	755	516	386	308	257	222	197	179	165	154	145	138																
			LRFD	1460	1460	1460	1130	775	580	463	386	334	296	269	248	231	218	208																
108	9/16	60.8	ASD	1090	1090	1090	969	734	550	438	366	316	281	255	235	219	207	197	189	182	176	172												
			LRFD	1640	1640	1640	1460	1100	826	659	550	475	422	383	353	329	311	296	284	273	265	258												
120	3/8	45.0	ASD	808	808	588	346	234	173	136																								
			LRFD	1220	1220	883	520	351	260	205																								
120	7/16	52.5	ASD	943	943	840	549	371	274	216	178	152	134																					
			LRFD	1420	1420	1260	825	558	413	325	268	229	201																					
120	1/2	60.0	ASD	1080	1080	1080	819	554	410	323	266	228	200	179	164	152	142																	
			LRFD	1620	1620	1620	1230	833	616	485	400	342	301	270	246	228	214																	
120	9/16	67.5	ASD	1210	1210	1210	1060	789	583	460	379	324	285	256	233	216	202	191	182	175														
			LRFD	1820	1820	1820	1600	1190	877	691	570	487	428	384	351	325	304	288	274	263														

Notes: 1) Solid vertical line indicates maximum stiffener spacing; 2) A_w is conservatively taken as h_tw_t.

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