

## ARCH 614: Practice Quiz 9

*Note: No aids are allowed for part 1. One side of a letter sized paper with notes is allowed during part 2, along with a silent, **non-programmable** calculator. There are reference charts on pages 2-5 for part 2.*

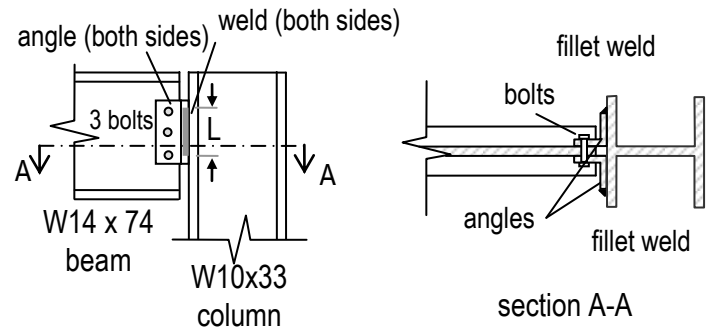
Clearly show your work and answer.

Part 1)    *Worth 5 points*  
               *(conceptual questions)*

Part 2)    *Worth 45 points*

*(NOTE: The member sizes, materials, and joint configuration can and will be changed for the quiz! The connector will remain a simple shear connector type.)*

A 18.5 ft tall W10 x 33 column supports a W14 x 74 beam with a simple shear connector of 2 angles as shown. Both W sections are A992 steel ( $F_y = 50$  ksi,  $F_u = 65$  ksi,  $E = 30 \times 10^3$  ksi). The angles are  $\frac{1}{2}$ " thick of A36 steel ( $F_y = 36$  ksi,  $F_u = 58$  ksi,  $E = 29 \times 10^3$  ksi).



- Find the safe factored load capacity of the column (theoretical) [*or recommended*] when the base is fixed and the top is pinned in the weak axis and pin-pinned in the strong axis.
- If there are 3 –  $\frac{3}{4}$  in  $\phi$  A490-N bolts connecting the angles to the beam with standard holes and 3" spacing, determine the capacity of that side of the connection.
- If the  $\frac{3}{8}$ " weld for the 8.5 in tall angles to the column is E60XX material, determine the minimum length,  $L$ , to transfer the load found in part b).

*Answers – Not provided on actual quiz!*

- $\phi P_n = 274$  k (other axis capacity = 355 k) [*or  $\phi P_n = 236$  k recommended*]
- $\phi R_n = 90.2$  k (by angle;  $\phi R_{n(p-web)} = 118.5$  k,  $\phi R_{n\ shear} = 135.3$  k)
- $L = 6.3$  in

**Disclaimer: Answers have NOT been painstakingly researched.**

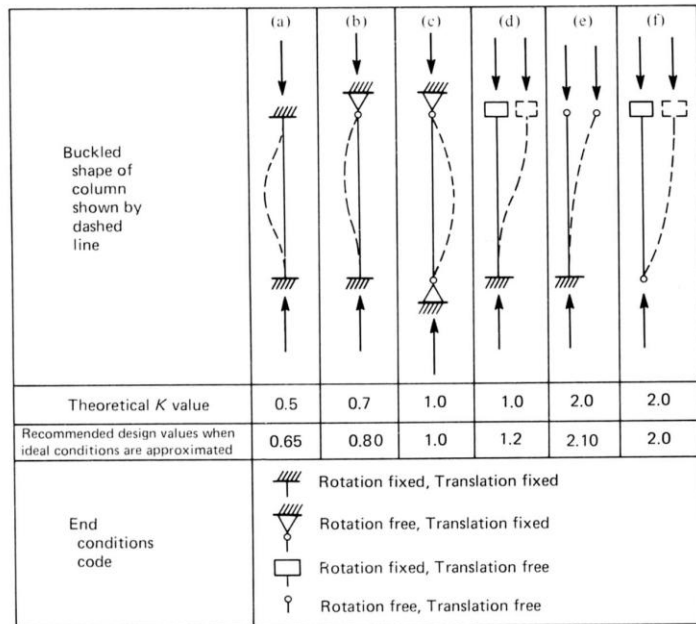
**REFERENCE CHARTS FOR QUIZ 9**

Table 6 W—Wide-Flange Shapes—U.S. Customary. (Continued)

Section-Shape	Weight per Foot	Area	Depth of Section	Flange		Web Thickness	Axis x-x			Axis y-y		
				$b_f$	$t_f$		$I_x$	$S_x$	$r_x$	$I_y$	$S_y$	$r_y$
	$\omega$	$A$	$d$	in.	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
W14 x	132	38.8	14.66	14.725	1.030	0.645	1530	209	6.28	548	74.5	3.76
	74	21.8	14.17	10.070	0.785	0.450	796	112	6.04	134	26.6	2.48
W10 x	112	32.9	11.36	10.415	1.250	0.755	716	126	4.66	236	45.3	2.68
	33	9.71	9.73	7.960	0.435	0.290	170	35.0	4.19	36.6	9.20	1.94

Available Strength of Fillet Welds per inch of weld ( $\phi$ S)		
Weld Size (in.)	E60XX (k/in.)	E70XX (k/in.)
3/16	3.58	4.18
1/4	4.77	5.57
5/16	5.97	6.96
3/8	7.16	8.35
7/16	8.35	9.74
1/2	9.55	11.14
5/8	11.93	13.92
3/4	14.32	16.70

(not considering increase in throat with submerged arc weld process)



**Table 7-1 Available Shear Strength of Bolts, kips**

ASTM Desig.	Thread Cond.	Nominal Bolt Diameter, $d$ , in.		5/8		3/4		7/8		1	
		Nominal Bolt Area, in. <sup>2</sup>		0.307		0.442		0.601		0.785	
		$F_n/\Omega$ (ksi)	$\phi F_n$ (ksi)	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Group A	N	27.0	40.5	8.29	12.4	11.9	17.9	16.2	24.3	21.2	31.8
	D	16.6	24.9	23.9	35.8	32.5	48.7	42.4	63.6	55.6	83.6
Group B	N	34.0	51.0	10.4	15.7	15.0	22.5	20.4	30.7	26.7	40.0
	D	20.9	31.3	30.1	45.1	40.9	61.3	53.4	80.1	70.0	104.0
A307	N	34.0	51.0	10.4	15.7	15.0	22.5	20.4	30.7	26.7	40.0
	D	20.9	31.3	30.1	45.1	40.9	61.3	53.4	80.1	70.0	104.0
A307	N	42.0	63.0	12.9	19.3	18.6	27.8	25.2	37.9	33.0	49.5
	D	25.8	38.7	37.1	55.7	50.5	75.7	65.9	98.9	86.9	128.9
A307	N	13.5	20.3	4.14	6.23	5.97	8.97	8.11	12.2	10.6	15.9
	D	8.29	12.5	11.9	17.9	16.2	24.4	21.2	31.9	28.1	41.9
		Nominal Bolt Diameter, $d$ , in.		1 1/8		1 1/4		1 3/8		1 1/2	
		Nominal Bolt Area, in. <sup>2</sup>		0.994		1.23		1.48		1.77	
ASTM Desig.	Thread Cond.	$F_n/\Omega$ (ksi)	$\phi F_n$ (ksi)	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Group A	N	27.0	40.5	26.8	40.3	33.2	49.8	40.0	59.9	47.8	71.7
	D	53.7	80.5	66.4	99.6	79.9	120	95.6	143	112	167
Group B	N	34.0	51.0	33.8	50.7	41.8	62.7	50.3	75.5	60.2	90.3
	D	67.6	101	83.6	125	101	151	120	181	143	214
A307	N	34.0	51.0	33.8	50.7	41.8	62.7	50.3	75.5	60.2	90.3
	D	67.6	101	83.6	125	101	151	120	181	143	214
A307	N	42.0	63.0	41.7	62.6	51.7	77.5	62.2	93.2	74.3	112
	D	83.5	125	103	155	124	186	149	223	174	257
A307	N	13.5	20.3	13.4	20.2	16.6	25.0	20.0	30.0	23.9	35.9
	D	26.8	40.4	33.2	49.9	40.0	60.1	47.8	71.7	55.6	83.6

For end loaded connections greater than 38 in., see AISC Specification Table J3.2 footnote b.

$\Omega = 2.00$   
 $\phi = 0.75$

**REFERENCE CHARTS FOR QUIZ 9**

**Table 7-4**  
**Available Bearing Strength at Bolt Holes**  
**Based on Bolt Spacing**  
kips/in. thickness

Hole Type	Bolt Spacing, s, in.	F <sub>b</sub> , ksi	Nominal Bolt Diameter, d, in.																				
			5/8		3/4		7/8		1		1 1/8		1 1/4										
			r <sub>n</sub> /Ω	ASD	r <sub>n</sub> /Ω	ASD	r <sub>n</sub> /Ω	ASD	r <sub>n</sub> /Ω	ASD	r <sub>n</sub> /Ω	ASD	r <sub>n</sub> /Ω	ASD									
STD	2 2/3 d <sub>b</sub>	58	34.1	51.1	41.3	62.0	48.6	72.9	55.8	83.7	61.1	90.2	70.7	101	79.2	113	87.0	121	95.3	110	144	110	144
			38.2	57.3	46.3	69.5	54.4	81.7	62.6	93.8	70.7	101	79.2	113	87.0	121	95.3	110	144	110	144	110	144
SSLT	3 in.	65	43.5	65.3	52.2	78.3	60.9	91.4	67.4	101	79.2	113	87.0	121	95.3	110	144	110	144	110	144	110	144
			48.8	73.1	58.5	87.8	68.3	102	75.6	113	87.0	121	95.3	110	144	110	144	110	144	110	144	110	144
SSLP	2 2/3 d <sub>b</sub>	58	27.6	41.3	34.8	52.2	42.1	63.1	47.1	70.7	52.8	79.2	61.1	90.2	70.7	101	79.2	113	87.0	121	95.3	110	144
			30.9	46.3	39.0	58.5	47.1	70.7	52.8	79.2	61.1	90.2	70.7	101	79.2	113	87.0	121	95.3	110	144	110	144
OVS	3 in.	65	43.5	65.3	52.2	78.3	60.9	91.4	67.4	101	79.2	113	87.0	121	95.3	110	144	110	144	110	144	110	144
			48.8	73.1	58.5	87.8	68.3	102	75.6	113	87.0	121	95.3	110	144	110	144	110	144	110	144	110	144
LSLP	2 2/3 d <sub>b</sub>	58	29.7	44.6	37.0	55.5	44.2	66.3	49.3	74.0	58.1	88.1	67.4	101	79.2	113	87.0	121	95.3	110	144	110	144
			33.3	50.0	41.4	62.2	49.6	74.3	55.3	82.9	61.1	90.2	70.7	101	79.2	113	87.0	121	95.3	110	144	110	144
LSLT	3 in.	65	43.5	65.3	52.2	78.3	60.9	91.4	67.4	101	79.2	113	87.0	121	95.3	110	144	110	144	110	144	110	144
			48.8	73.1	58.5	87.8	68.3	102	75.6	113	87.0	121	95.3	110	144	110	144	110	144	110	144	110	144
STD, SSLT, LSLT	s ≥ s <sub>full</sub>	58	3.62	5.44	4.35	6.53	5.08	7.61	5.80	8.70	6.50	9.75	7.40	10.9	8.20	12.3	9.50	14.2	11.0	16.1	12.5	18.8	
			4.06	6.09	4.88	7.31	5.69	8.53	6.50	9.75	7.40	10.9	8.20	12.3	9.50	14.2	11.0	16.1	12.5	18.8	14.4	21.4	16.1
SSLP	3 in.	65	43.5	65.3	52.2	78.3	60.9	91.4	67.4	101	79.2	113	87.0	121	95.3	110	144	110	144	110	144	110	144
			48.8	73.1	58.5	87.8	68.3	102	75.6	113	87.0	121	95.3	110	144	110	144	110	144	110	144	110	144
LSLT	3 in.	65	31.8	47.7	38.6	57.9	45.4	68.0	52.1	78.2	61.1	90.2	70.7	101	79.2	113	87.0	121	95.3	110	144	110	144
			36.3	54.4	43.5	65.3	50.8	76.1	56.2	84.3	65.3	96.6	74.0	109	84.3	123	95.3	134	103	155	117	176	134
LSLT	s ≥ s <sub>full</sub>	58	36.3	54.4	43.5	65.3	50.8	76.1	56.2	84.3	65.3	96.6	74.0	109	84.3	123	95.3	134	103	155	117	176	
			40.6	60.9	48.8	73.1	56.9	85.3	63.0	94.5	74.0	109	84.3	123	95.3	134	103	155	117	176	134	195	144
SSLP	s ≥ s <sub>full</sub>	65	11.5/16	11.5/16	2 5/16	2 5/16	2 11/16	2 11/16	3 1/16	3 1/16	3 1/2	3 1/2	3 7/8	3 7/8	4 1/8	4 1/8	4 1/2	4 1/2	4 7/8	4 7/8	5 1/8	5 1/8	
			2 1/16	2 1/16	2 7/16	2 7/16	2 13/16	2 13/16	2 3/4	2 3/4	2 7/8	2 7/8	3 1/8	3 1/8	3 3/8	3 3/8	3 7/8	3 7/8	4 1/4	4 1/4	4 3/4	4 3/4	5 1/4

STD = standard hole  
 SSLT = short-slotted hole oriented transverse to the line of force  
 SSLP = short-slotted hole oriented parallel to the line of force  
 OVS = oversized hole  
 LSLP = long-slotted hole oriented parallel to the line of force  
 LSLT = long-slotted hole oriented transverse to the line of force

Note: Spacing indicated is from the center of the hole or slot to the center of the adjacent hole or slot in the line of force. Hole deformation is considered. When hole deformation is not considered, see AISC Specification Section J3.10.

<sup>a</sup> Decimal value has been rounded to the nearest sixteenth of an inch.

**Table 10-1 (continued)**  
**All-Bolted Double-Angle Connections**  
3/4-in. Bolts

Bolt Group	Hole Type	Thread Contd.	Bolt and Angle Available Strength, kips											
			1/4		5/16		3/8		1/2		5/8		3/4	
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Group A	STD	N	32.6	48.9	40.8	61.2	47.7	71.6	47.7	71.6	47.7	71.6	47.7	71.6
			32.6	48.9	40.8	61.2	48.9	73.4	60.1	90.2				
	SSLT	X	25.3	38.0	25.3	38.0	25.3	38.0	25.3	38.0	25.3	38.0	25.3	38.0
			21.6	32.3	21.6	32.3	21.6	32.3	21.6	32.3	21.6	32.3	21.6	32.3
Group B	STD	N	32.6	48.9	40.8	61.2	42.2	63.3	42.2	63.3	42.2	63.3	42.2	63.3
			30.5	45.7	36.0	53.8	36.0	53.8	36.0	53.8	36.0	53.8	36.0	53.8
	SSLT	X	32.6	48.9	40.8	61.2	42.2	63.3	42.2	63.3	42.2	63.3	42.2	63.3
			32.6	48.9	40.8	61.2	48.9	73.4	60.1	90.2				
Group C	STD	N	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5
			27.0	40.3	27.0	40.3	27.0	40.3	27.0	40.3	27.0	40.3	27.0	40.3
	SSLT	X	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5	31.6	47.5
			32.6	48.9	40.8	61.2	48.9	73.4	52.7	79.1				
Group D	STD	N	30.5	45.7	38.1	57.1	44.9	67.2	44.9	67.2	44.9	67.2	44.9	67.2
			32.6	48.9	40.8	61.2	48.9	73.4	52.7	79.1				
	SSLT	X	30.5	45.7	38.1	57.1	44.9	67.2	44.9	67.2	44.9	67.2	44.9	67.2
			32.6	48.9	40.8	61.2	48.9	73.4	52.7	79.1				

**Beam Web Available Strength per Inch Thickness, kips/in.**

Hole Type	L <sub>wp</sub> , in.	STD						OVS						SSLT							
		1 1/2		1 3/4		1 1/2		1 3/4		1 1/2		1 3/4		1 1/2		1 3/4		1 1/2		1 3/4	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Coped at Top Flange Only	1 1/4	83.7	126	91.4	137	78.0	117	86.1	129	80.6	121	88.8	133								
	1 3/8	86.1	129	94.3	141	80.4	121	86.6	133	83.1	125	91.2	137								
	1 1/2	88.6	133	96.7	145	82.9	124	91.0	137	85.5	128	93.6	140								
Coped at Both Flanges	1 1/4	91.0	137	99.1	149	85.3	128	93.4	140	88.0	132	96.1	144								
	1 3/8	96.3	147	106	160	92.6	139	101	151	95.3	143	103	155								
	1 1/2	116	175	117	176	112	168	117	176	113	170	117	176								
Uncoped	1 1/4	73.1	110	73.1	110	66.3	102	66.3	102	73.1	110	73.1	110								
	1 3/8	78.0	117	78.0	117	73.1	110	73.1	110	78.0	117	78.0	117								
	1 1/2	82.9	124	82.9	124	78.0	117	78.0	117	82.9	124	82.9	124								
Support Available Strength per Inch Thickness, kips/in.	1 1/4	87.8	132	87.8	132	82.9	124	82.9	124	87.8	132	87.8	132								
	1 3/8	98.3	147	102	154	92.6	139	97.5	146	95.3	143	102	154								
	1 1/2	116	175	117	176	112	168	117	176	113	170	117	176								

Notes:  
 STD = Standard holes  
 OVS = Oversized holes  
 SSLT = Short-slotted holes transverse to direction of load

\* Tabulated values include 1/4-in. reduction in end distance, L<sub>eh</sub>, to account for possible unbalanced in beam length.

Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers.

**REFERENCE CHARTS FOR QUIZ 9**

Group A Bolts		Group A Bolts											
		Nominal Bolt Diameter, <i>d</i> , in.											
Hole Type		Minimum Group A Bolt Pretension, kips											
		5/8			3/4			7/8			1		
Loading		19											
		$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD
STD/SSLT	S	4.29	6.44	6.33	9.49	8.81	13.2	11.5	17.3	11.5	17.3	11.5	17.3
	D	8.59	12.9	12.7	19.0	17.6	26.4	23.1	34.6	23.1	34.6	23.1	34.6
OVS/SSLP	S	3.66	5.47	5.39	8.07	7.51	11.2	9.82	14.7	9.82	14.7	9.82	14.7
	D	7.32	10.9	10.8	16.1	15.0	22.5	19.6	29.4	19.6	29.4	19.6	29.4
LSL	S	3.01	4.51	4.44	6.64	6.18	9.25	8.08	12.1	8.08	12.1	8.08	12.1
	D	6.02	9.02	8.87	13.3	12.4	18.5	16.2	24.2	16.2	24.2	16.2	24.2
Hole Type		Nominal Bolt Diameter, <i>d</i> , in.											
		1 1/8			1 1/4			1 3/8			1 1/2		
Loading		56											
		$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD
STD/SSLT	S	12.7	19.0	16.0	24.1	19.2	28.8	23.3	34.9	23.3	34.9	23.3	34.9
	D	25.3	38.0	32.1	48.1	38.4	57.6	46.6	69.8	46.6	69.8	46.6	69.8
OVS/SSLP	S	10.8	16.1	13.7	20.5	16.4	24.5	19.8	29.7	19.8	29.7	19.8	29.7
	D	21.6	32.3	27.4	40.9	32.7	49.0	39.7	59.4	39.7	59.4	39.7	59.4
LSL	S	8.87	13.3	11.2	16.8	13.5	20.2	16.3	24.4	16.3	24.4	16.3	24.4
	D	17.7	26.6	22.5	33.7	26.9	40.3	32.6	48.9	32.6	48.9	32.6	48.9

STD = standard hole  
 OVS = oversized hole  
 SSLT = short-slotted hole transverse to the line of force  
 SSLP = short-slotted hole parallel to the line of force  
 LSL = long-slotted hole transverse or parallel to the line of force

S = single shear  
 D = double shear

Hole Type		ASD	LRFD
STD and SSLT	$\Omega = 1.50$	$\phi = 1.00$	
OVS and SSLP	$\Omega = 1.76$	$\phi = 0.85$	
LSL	$\Omega = 2.14$	$\phi = 0.70$	

Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers. See AISC Specification Sections J3.8 and J5 for provisions when fillers are present. For Class B faying surfaces, multiply the tabulated available strength by 1.67.

Group B Bolts		Group B Bolts											
		Nominal Bolt Diameter, <i>d</i> , in.											
Hole Type		Minimum Group B Bolt Pretension, kips											
		5/8			3/4			7/8			1		
Loading		24											
		$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD
STD/SSLT	S	5.42	8.14	7.91	11.9	11.1	16.6	14.5	21.7	14.5	21.7	14.5	21.7
	D	10.8	16.3	15.8	23.7	22.1	33.2	28.9	43.4	28.9	43.4	28.9	43.4
OVS/SSLP	S	4.62	6.92	6.74	10.1	9.44	14.1	12.3	18.4	12.3	18.4	12.3	18.4
	D	9.25	13.8	13.5	20.2	18.9	28.2	24.7	36.9	24.7	36.9	24.7	36.9
LSL	S	3.80	5.70	5.54	8.31	7.76	11.6	10.1	15.2	10.1	15.2	10.1	15.2
	D	7.60	11.4	11.1	16.6	15.5	23.3	20.3	30.4	20.3	30.4	20.3	30.4
Hole Type		Nominal Bolt Diameter, <i>d</i> , in.											
		1 1/8			1 1/4			1 3/8			1 1/2		
Loading		80											
		$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD	$r_n/\Omega$	$\phi r_n$	ASD	LRFD
STD/SSLT	S	18.1	27.1	23.1	34.6	27.3	41.0	33.4	50.2	33.4	50.2	33.4	50.2
	D	36.2	54.2	46.1	69.2	54.7	82.0	66.9	100	66.9	100	66.9	100
OVS/SSLP	S	15.4	23.1	19.6	29.4	23.3	34.9	28.5	42.6	28.5	42.6	28.5	42.6
	D	30.8	46.1	39.3	58.8	46.6	69.7	57.0	85.3	46.6	69.7	57.0	85.3
LSL	S	12.7	19.0	16.2	24.2	19.2	28.2	23.4	35.1	23.4	35.1	23.4	35.1
	D	25.3	38.0	32.3	48.4	38.3	57.4	46.9	70.2	46.9	70.2	46.9	70.2

STD = standard hole  
 OVS = oversized hole  
 SSLT = short-slotted hole transverse to the line of force  
 SSLP = short-slotted hole parallel to the line of force  
 LSL = long-slotted hole transverse or parallel to the line of force

S = single shear  
 D = double shear

Hole Type		ASD	LRFD
STD and SSLT	$\Omega = 1.50$	$\phi = 1.00$	
OVS and SSLP	$\Omega = 1.76$	$\phi = 0.85$	
LSL	$\Omega = 2.14$	$\phi = 0.70$	

Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers. See AISC Specification Sections J3.8 and J5 for provisions when fillers are present. For Class B faying surfaces, multiply the tabulated available strength by 1.67.

**REFERENCE CHARTS FOR QUIZ 9**Available Critical Stress,  $\phi_c F_{cr}$ , for Compression Members, ksi ( $F_y = 50$  ksi and  $\phi_c = 0.90$ )

$KL/r$	$\phi_c F_{cr}$	$KL/r$	$\phi_c F_{cr}$	$KL/r$	$\phi_c F_{cr}$	$KL/r$	$\phi_c F_{cr}$	$KL/r$	$\phi_c F_{cr}$
1	45.0	41	39.8	81	27.9	121	15.4	161	8.72
2	45.0	42	39.6	82	27.5	122	15.2	162	8.61
3	45.0	43	39.3	83	27.2	123	14.9	163	8.50
4	44.9	44	39.1	84	26.9	124	14.7	164	8.40
5	44.9	45	38.8	85	26.5	125	14.5	165	8.30
6	44.9	46	38.5	86	26.2	126	14.2	166	8.20
7	44.8	47	38.3	87	25.9	127	14.0	167	8.10
8	44.8	48	38.0	88	25.5	128	13.8	168	8.00
9	44.7	49	37.8	89	25.2	129	13.6	169	7.91
10	44.7	50	37.5	90	24.9	130	13.4	170	7.82
11	44.6	51	37.2	91	24.6	131	13.2	171	7.73
12	44.5	52	36.9	92	24.2	132	13.0	172	7.64
13	44.4	53	36.6	93	23.9	133	12.8	173	7.55
14	44.4	54	36.4	94	23.6	134	12.6	174	7.46
15	44.3	55	36.1	95	23.3	135	12.4	175	7.38
16	44.2	56	35.8	96	22.9	136	12.2	176	7.29
17	44.1	57	35.5	97	22.6	137	12.0	177	7.21
18	43.9	58	35.2	98	22.3	138	11.9	178	7.13
19	43.8	59	34.9	99	22.0	139	11.7	179	7.05
20	43.7	60	34.6	100	21.7	140	11.5	180	6.97
21	43.6	61	34.3	101	21.3	141	11.4	181	6.90
22	43.4	62	34.0	102	21.0	142	11.2	182	6.82
23	43.3	63	33.7	103	20.7	143	11.0	183	6.75
24	43.1	64	33.4	104	20.4	144	10.9	184	6.67
25	43.0	65	33.0	105	20.1	145	10.7	185	6.60
26	42.8	66	32.7	106	19.8	146	10.6	186	6.53
27	42.7	67	32.4	107	19.5	147	10.5	187	6.46
28	42.5	68	32.1	108	19.2	148	10.3	188	6.39
29	42.3	69	31.8	109	18.9	149	10.2	189	6.32
30	42.1	70	31.4	110	18.6	150	10.0	190	6.26
31	41.9	71	31.1	111	18.3	151	9.91	191	6.19
32	41.8	72	30.8	112	18.0	152	9.78	192	6.13
33	41.6	73	30.5	113	17.7	153	9.65	193	6.06
34	41.4	74	30.2	114	17.4	154	9.53	194	6.00
35	41.1	75	29.8	115	17.1	155	9.40	195	5.94
36	40.9	76	29.5	116	16.8	156	9.28	196	5.88
37	40.7	77	29.2	117	16.5	157	9.17	197	5.82
38	40.5	78	28.8	118	16.2	158	9.05	198	5.76
39	40.3	79	28.5	119	16.0	159	8.94	199	5.70
40	40.0	80	28.2	120	15.7	160	8.82	200	5.65