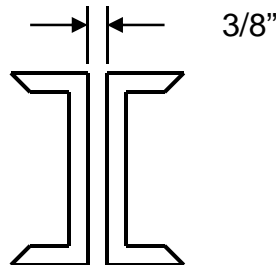




**Problem 1 (60 points)**

**GIVEN:** Create an “Available Load in Axial Compression Table” (similar to AISC Table 4-1) for back-to-back \_\_\_\_\_ channels. Use A572 ( $F_y = 50$  KSI) steel, and assume the space between the channels is  $3/8$ ” as shown below: (See AISC p. 1-110 for properties.)



**REQUIRED:**

1. Create an “Available Load in Axial Compression Table” (similar to AISC Table 4-1) for your back-to-back channels using a computer **Excel spreadsheet**. Your spreadsheet must make use of the formulas given in the AISC manual as indicated in your Lecture notes.
2. Using **hand calculations**, determine ONE of the values in your table. Show ALL calculations, including units for each. Circle & highlight answer.

Available Load in Axial Compression, Kips ( $F_y = 50$ ksi)			
Shape		C????x???	
Wt/Ft		???	
Design		$\frac{P_n}{\Omega_c}$	$\phi_c P_n$
		ASD	LRFD
Eff. Length KL (ft.) w/ respect to $r_y$	3'		
	5'		
	7'		
	9'		
	11'		
	13'		
	15'		
	17'		

← Fill-in ALL of the blanks – If beyond  $kL/r_{min} = 200$ , then specify “N.A.”

## Problem 2 (ASD) (40 points)

GIVEN: The symmetric 5-story building below has \_\_\_\_\_ for each of the 4 corner columns. Use A992 steel. Use the following SERVICE loads:

- Roof Loads:
  - Service Dead Load = 59 PSF (NOT including steel framing)
  - Service Flat-Roof Snow Load = 37 PSF
- 5<sup>th</sup>, 4<sup>th</sup>, 3<sup>rd</sup>, 2<sup>nd</sup> floor loads
  - Service Dead Load = 86 PSF (NOT including steel framing)
  - Service Live Load = 100 PSF

### REQUIRED:

- 1) Determine the **TOTAL service axial load** at the bottom of each of the columns (in units of Kips) Don't forget steel weight!.
- 2) Determine the **applied service moment about the strong axis, " $M_{rx}$ " from the 2<sup>nd</sup> floor W21x50 girder acting on the column**. Assume the girder is framed to the **flange** of the column using L4x4 x 1/4 angles (gage = 2 1/2").
- 3) Determine the **applied service moment about the weak axis, " $M_{ry}$ " from the 2<sup>nd</sup> floor W18x35 beam acting on the column**. Assume the girder is framed to the **web** of the column using L4x4 x 1/4 angles (gage = 2 1/2").
- 4) Determine if the **column is adequate based upon axial load + moment**.

