

ARCH 614. Assignment #7

Date: 3/4/14, due 3/18/14

Pass-fail work

Problems: all but 7A from Ambrose & Tripeny, Chapter 8, pgs 242, 254, 263, 264.

*Note: Problems marked with a * have been altered with respect to the problem stated in the text.*

- (20%) **Problem 6.2.A.** Using the ASD method, find the allowable axial compression load for the following wood column. Use Douglas fir-larch, No. 2 grade. *Note: This is dimensioned lumber < 4 inches thick. (wood column analysis)*

<i>Nominal Size (in.)</i>	<i>Unbraced Length (ft)</i>	<i>Unbraced Length (m)</i>
4 x 4	8	2.44

Partial answers to check with: $P_{allowed} = 6.8$ kip.

- (20%) **Problem 6.2.D.*** Using the ASD method, find the allowable axial compression load from a seven day construction load for the following glu-lam wood column of Douglas fir-larch, No. 2 Southern Pine grade. $F_c = 1500$ psi, $E = 1,400,000$ psi (Actual size of 10 x 10 is 9.25"x9.25") (wood column analysis)

<i>Nominal Size (in.)</i>	<i>Unbraced Length (ft)</i>	<i>Unbraced Length (m)</i>
10 x 10	14	4.27

Partial answers to check with: $F_c' = 1387.5$ psi.

- (10%) **Problem 6.2.F. USE US UNITS.** Select square column section of Douglas fir-larch, No. 1 grade from Table 6.1, for the following data. (wood column design)

<i>Required Axial Load (kips)</i>	<i>Required Axial Load (kN)</i>	<i>Unbraced Length (ft)</i>	<i>Unbraced Length (m)</i>
50	222	12	3.66

Partial answers to check with: $P_{adequate} = 79.0$ k.

- (20%) **Problem 6.5.B.*** Ten-foot-high 2 x 4 studs of Douglas fir-larch, No. 1 grade, are used in an exterior wall. Wind load is 25 psf on the wall surface; studs are 16 in. on center; the gravity load on the wall is 500 lb/ft of wall length. ~~Investigate the studs for combined action of compression plus bending using the ASD method.~~ Determine the working compression stress and bending stress that would be used to investigate the studs for combined stresses. (beam-column analysis)

*Partial answers to check with: $f_c = 127$ psi, $f_b = 1632$ psi ($>F_b * C_D!$)*

(10%) **Problem 7.2.A.** A joint similar to that in Figure 7.4 is formed with outer members of 1- inch nominal thickness (3/4-in. actual thickness) and 10d common wire nails. Find the compression force that can be transferred to the two side members *having 5 nails each board side.* (wood connection analysis)

(10%) **Problem 7.3.A.** A truss heel joint similar to that in Figure 7.5 is made with gusset plates of 1/2-in. plywood and 8d nails. Find the tension force limit for the bottom chord *having 12 nails each plywood side.* (wood connection analysis)

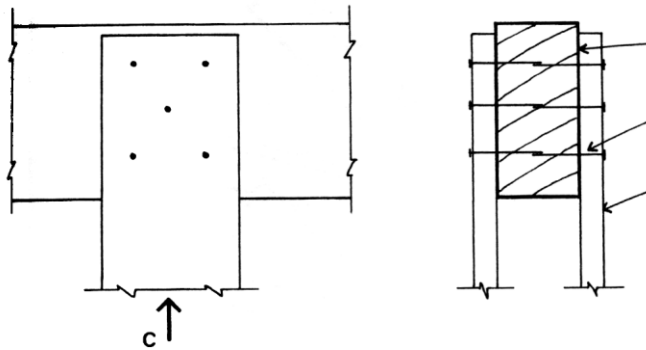
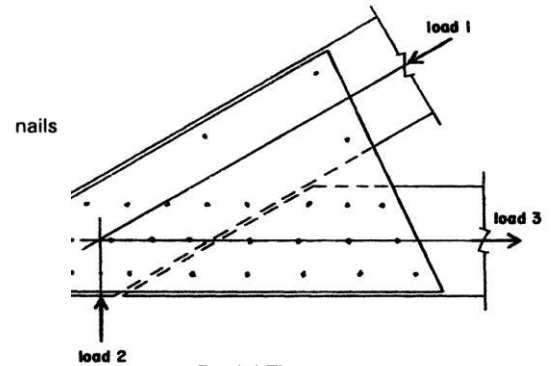


Figure 7.4 Reference for Example 1.



Partial Figure 7.5

(10%) 7A) A nominal 3 x 8 in redwood beam is to be supported by two 2 x 8 in. members acting as a spaced column. The minimum spacing and edge distances for the 5/8 inch bolts are shown. How many 5/8 in. bolts will be required to safely carry a load of 3200 lb? Use the chart provided. (wood connection design)

Partial answer to check with: $min\ n = 3.95$.

Table 7.1
Holding Power of Bolts

p = Safe loads parallel to grain in pounds q = Safe loads perpendicular to grain in pounds						
Length of Bolt in Main Wood Member ³ (in inches)	DIAMETER OF BOLT (IN)					
	3/8	1/2	5/8	3/4	7/8	
1 1/2	Single p	325	470	590	710	830
	Shear q	185	215	245	270	300
	Double p	650	940	1180	1420	1660
	Shear q	370	430	490	540	600
2 1/2	Single p		630	910	1155	1370
	Shear q		360	405	450	495
	Double p	710	1260	1820	2310	2740
	Shear q	620	720	810	900	990
3 1/2	Single p			990	1400	1790
	Shear q			565	630	695
	Double p	710	1270	1980	2800	3580
	Shear q	640	980	1130	1260	1390
Single p					1950	

