ARCH 614. Assignment #7

Date: 3/5/13, *due 3/19/13* *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)*

Nominal Size (in.)	*Unbraced Length (ft)*	*Unbraced Length (m)*
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)*

Nominal Size (in.)	*Unbraced Length (ft)*	*Unbraced Length (m)*
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)*

Required Axial Load (kips)	*Required Axial Load (kN)*	*Unbraced Length (ft)*	*Unbraced Length (m)*
50	222	12	3.66

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

(20%) ***Problem 6.5.B.**** Ten-feet-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!)*

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(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 ½-in. plywood and 8d nails. Find the tension force limit for the bottom chord *having 12 nails each plywood side. (wood connection analysis)*

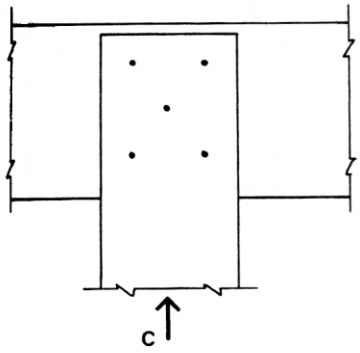
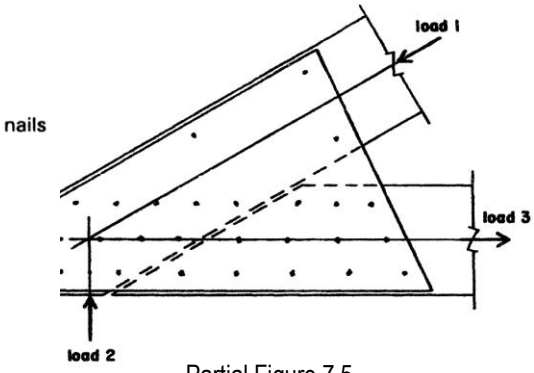


Figure 7.4 Reference for Example 1.



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				
		⅜	½	⅝	¾	⅞
1½	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
2½	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
3½	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