

### ARCH 614. Assignment #3

Date: 2/5/13, due 2/12/13

Pass-fail work

**Problems:** all but 3A & 3B from Ambrose & Tripeny, Chapter 3, pgs 103, 108, 111 and 115.

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

- (16%) **Problem 3.3.C. USE METRIC UNITS.** Draw the shear and bending moment diagrams for the beam in Figure 3.5c, indicating all critical values for shear and moment and all significant dimensions [as the text illustrates].

Partial answers to check with:  $M_{max} = 5.71 \text{ kN-m}$  (at 1.8 m from  $R_2$ ).

- (10%) 3A) For the beam of problem 3.3.C, use Multiframe software to find the shear and bending moment values to verify your work from the text method. Use the standard steel section you have been assigned which is posted in My Grades on e-Learning. Submit the data file (.mfd) on E-learning (under Contents-Assignments) and provide a print of the shear (V) and bending moment (M) diagrams. Note: The "Find, Given, Solution" format is not required.

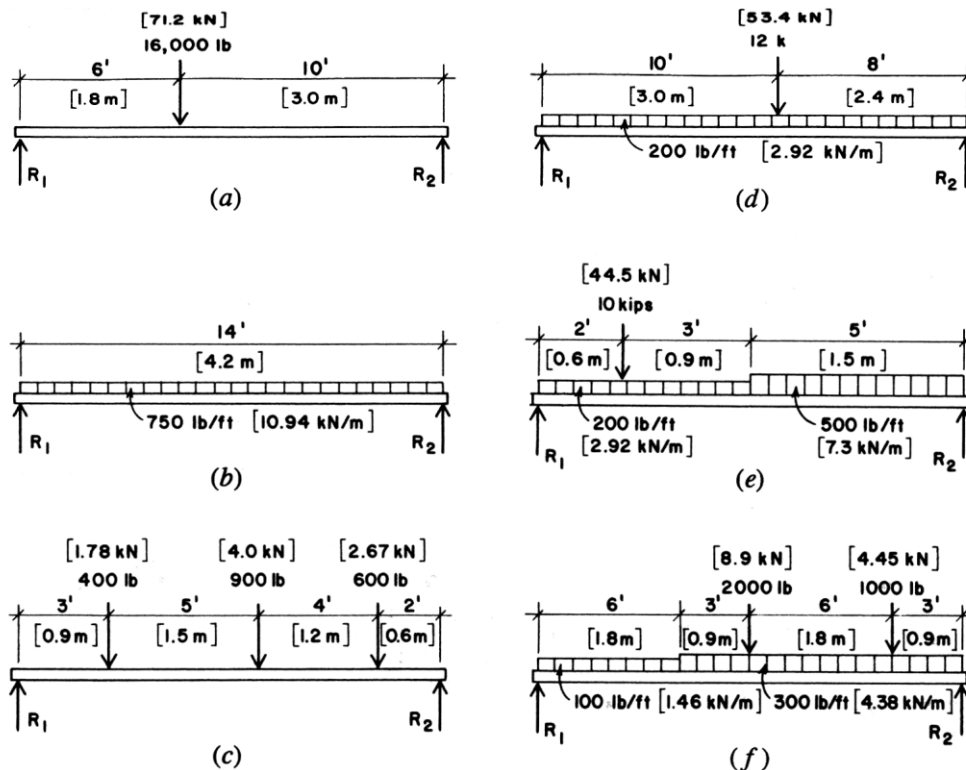


Figure 3.5 Reference for Problem 3.2

- (16%) **Problem 3.4.A.\* USE METRIC UNITS.** Draw the shear and bending moment diagrams for the beam in Figure 3.13a, indicating all critical values for shear and moment and all significant dimensions using the semi-graphical method.

- (18%) **Problem 3.4.B.\* USE US UNITS.** Draw the shear and bending moment diagrams for the beam in Figure 3.13b, indicating all critical values for shear and moment and all significant dimensions using the semi-graphical method.

Partial answers to check with:  $V_{max} = 7321 \text{ lb}$ ,  $M_{max} = 22,298 \text{ lb-ft}$  (at 6.68 ft from  $R_2$ ).

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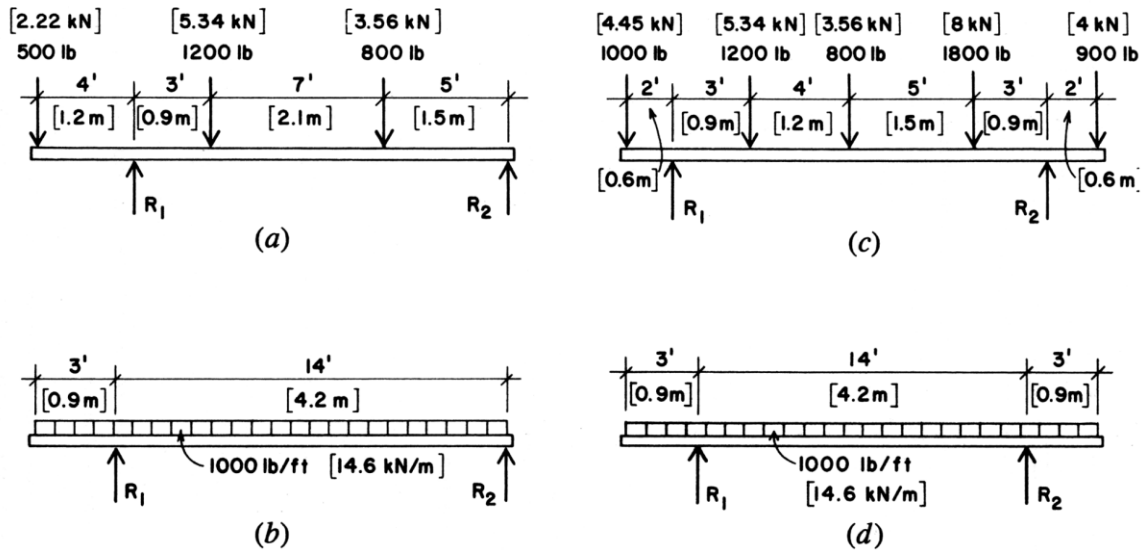


Figure 3.13 Reference for Problem 3.4, part 1.

(16%) **Problem 3.4.F.\* USE US UNITS.** Draw the shear and bending moment diagrams for the beam in Figure 3.16f, indicating all critical values for shear and moment and all significant dimensions using the semi-graphical method.

Partial answers to check with:  $M_{max} = -9500 \text{ lb-ft}$  (at  $R_2$ ).

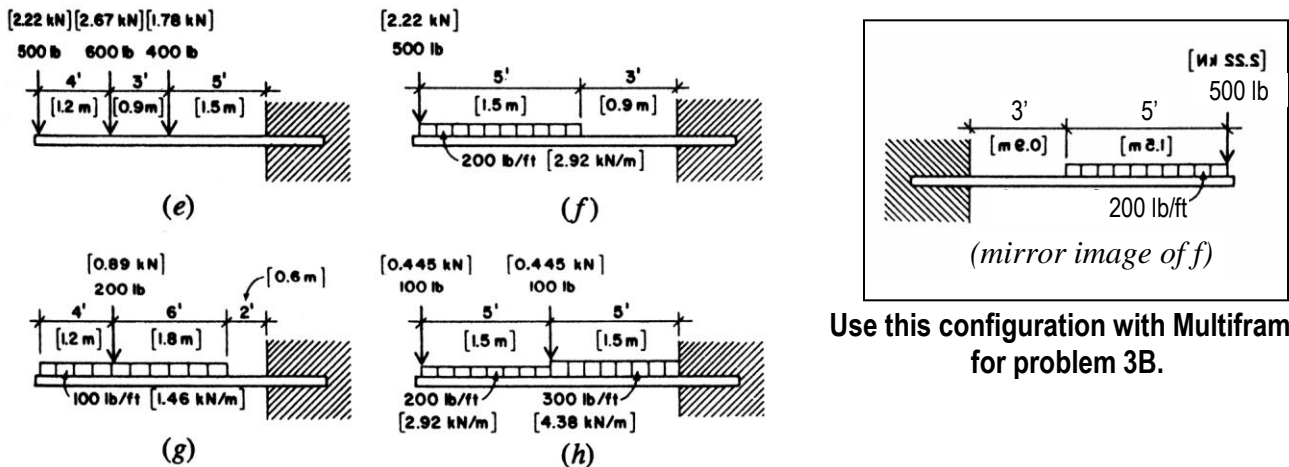


Figure 3.16 Reference for Problem 3.4, part 2.

Use this configuration with Multifram for problem 3B.

(10%) 3B) For the mirror image of the beam of problem 3.4.F, use Multifram software to find the shear and bending moment values to verify your work from the semi-graphical method. Use the standard steel section you have been assigned which is posted in My Grades on e-Learning. Submit the data file (.mfd) on E-learning (under Contents-Assignments) and provide a print of the shear (V) and bending moment (M) diagrams. Note: The "Find, Given, Solution" format is not required.

(7%) **Problem 3.5.A. USE METRIC UNITS.** A simple span beam has two concentrated loads of 4 kips [17.8 kN], each placed at the third points of the 24-ft [7.32-m] span. Find the value for the maximum bending moment in the beam. (using beam diagrams and formulas)

(7%) **Problem 3.5.B. USE US UNITS.** A simple span beam has a uniformly distributed load of 2.5 kips/ft [36.5 kN/m] on a span of 18 ft [5.49 m]. Find the value for the maximum bending moment in the beam. (using beam diagrams and formulas)

Partial answers to check with:  $M_{max} = 101.25 \text{ k-ft}$  (at midspan).