

ENDS 231. Assignment #6

Date: 6/15/06, due 6/21/06

Worth 25 pts.

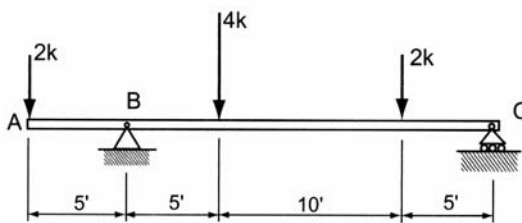
Problems: from Onouye, Chapters 8 & 6.

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

Construct the load, shear, and moment diagrams for the following beam conditions using the semi-graphical method.

***Identify maximum quantities and locations of shear and bending moment. Multiframe2D may be used *only* to verify calculations.**

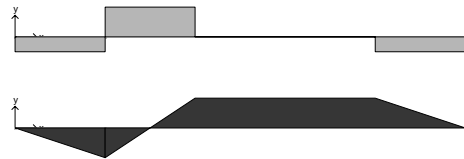
8.4.1



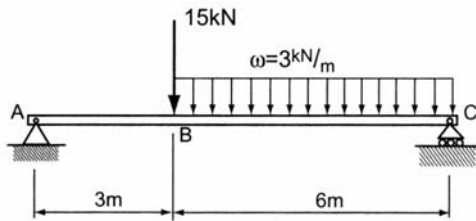
Problem 8.4.1

Partial answers to check with:

$$V_{max} = +4 \text{ k}, M_{max} = +10 \text{ k-ft}$$



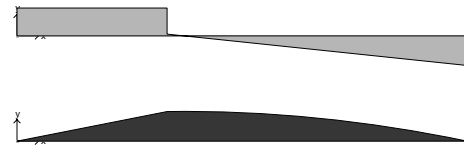
8.4.4



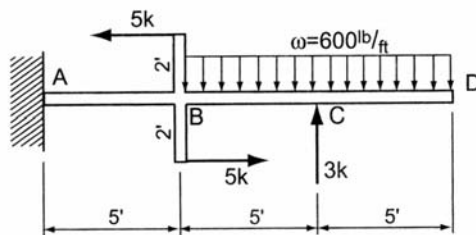
Problem 8.4.4

Partial answers to check with:

$$V_{max} = -17 \text{ kN}, M_{max} = 48.2 \text{ kN-m}$$



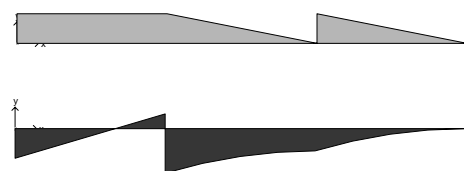
8.4.7



Problem 8.4.7

Partial answers to check with:

$$V_{max} = +3 \text{ k}, M_{max} = -15 \text{ k-ft}$$



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***Use metric units.**

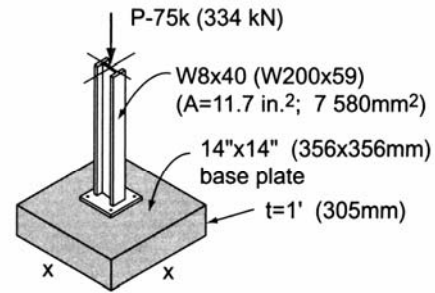
6.1.3 A steel column carries a building load of 75 k (334 kN) to a 14" × 14" (356 mm × 356 mm) base plate that is bolted to a concrete footing pad that measures 1 foot (305 mm) in thickness. The column has a cross-sectional area $A = 11.7 \text{ in.}^2$ ($A = 7580 \text{ mm}^2 = 7.58 \times 10^{-3} \text{ m}^2$). Determine the following:

- the average compressive stress developed in the W8 × 40 (W200 × 59) column
- the bearing stress between the steel base plate and the concrete footing
- the footing size, assuming that the allowable soil bearing pressure is $q = 4 \text{ ksf}$ (191 kPa) and the density of concrete is 150 pcf ($2400 \text{ kg/m}^3 = 23.6 \text{ kN/m}^3$)

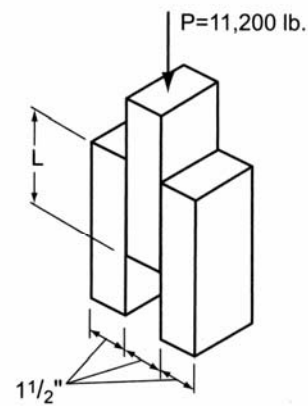
Partial answers to check with: a) 44.1 MPa,
b) 2.64 MPa, c) $x = 1.35 \text{ m}$

6.1.7 Three 2×4 S4S blocks are glued together as shown. Assuming the glue has a shear capacity of 80 psi, determine the minimum length L required.

Partial answers to check with: $L = 20 \text{ in.}$



Problem 6.1.3



Problem 6.1.7