1) GIVEN: A 40-kN axial load is applied to a short wooden post that is supported
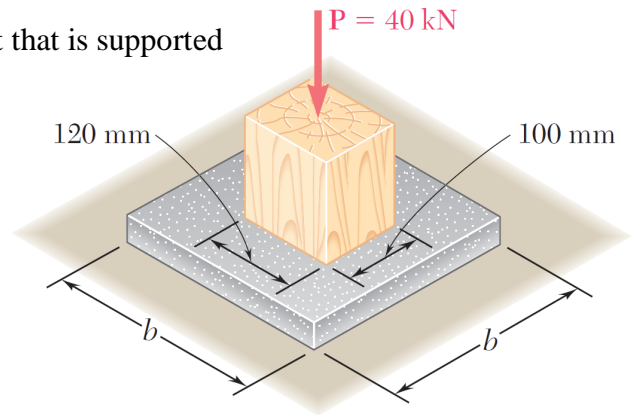by a concrete footing resting on undisturbed soil.

REQ'D: (a) Maximum bearing stress on concrete footing,
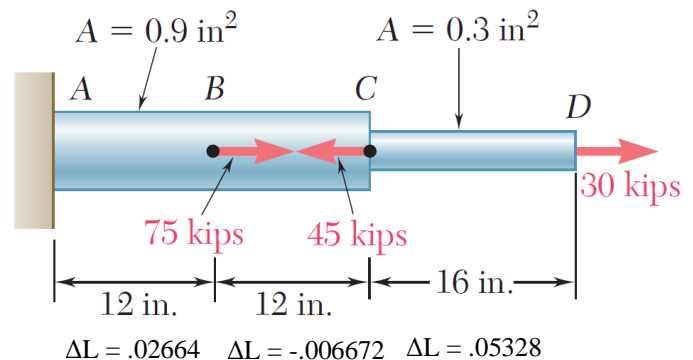(b) Size of footing for average bearing stress in
soil of 145 kPa.

P = 40 kN

120 mm

100 mm

b

b

2) GIVEN: Load P is applied to a steel rod supported by an aluminum
plate in which a $\varnothing 0.6"$ hole has been drilled. Shearing
stress must not exceed 18 ksi in the steel rod and 10 ksi
in the aluminum plate.

REQ'D: Largest load P that can be applied to the rod.

1.6 in.

0.4 in.

0.25 in.

0.6 in.

P
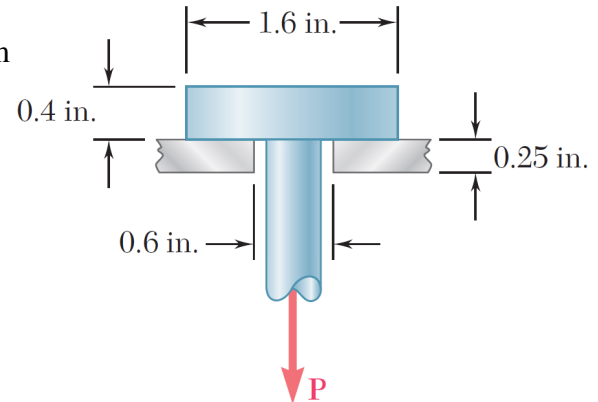
3) GIVEN: Steel bar caries a series of loads as shown.

REQ'D: Axial load, axial stress and axial strain in
each of the segments.

$A = 0.9$ in^2

$A = 0.3$ in^2

A   B   C

D

30 kips

75 kips   45 kips

12 in.   12 in.   16 in.

$\Delta L = .02664$ $\Delta L = -.006672$ $\Delta L = .05328$

4) GIVEN: 3" wide by .5" think steel plates are butt joined and bolted as shown with ⌀.5" bolts. There are six bolts total in the joint and F = 10 kips

REQ'D: Bearing stress, shear stress, and max normal stress in joint.
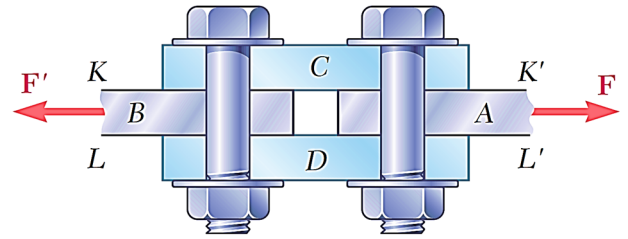
5) GIVEN: Stress strain plot.

Initial diameter	= 0.514 in
Gage length	= 2.00 in
Final diameter	= 0.378 in
Final length	= 2.36 in

REQ'D:

(a) Stress at proportional limit.

(b) 0.2 % offset yield stress.

(c) Modulus of elasticity.

(d) Modulus of Resilience.

(e) Modulus of Toughness.

(f) Ultimate Strength.

(g) Percent elongation and reduction in area.