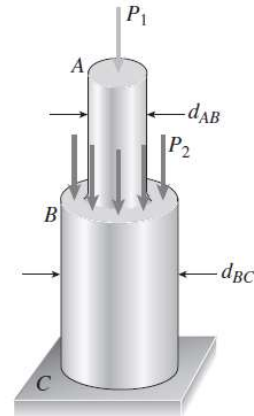


HW1

Normal Stress and Strain

Problem 1.2-1 A solid circular post ABC (see figure) supports a load $P_1 = 2500$ lb acting at the top. A second load P_2 is uniformly distributed around the shelf at B . The diameters of the upper and lower parts of the post are $d_{AB} = 1.25$ in. and $d_{BC} = 2.25$ in., respectively.

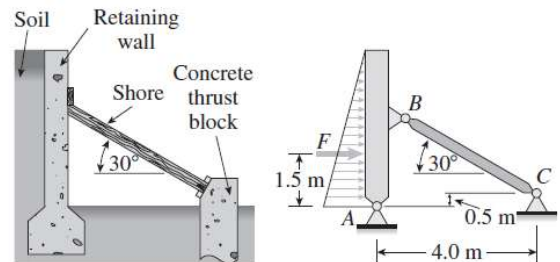
- Calculate the normal stress σ_{AB} in the upper part of the post.
- If it is desired that the lower part of the post have the same compressive stress as the upper part, what should be the magnitude of the load P_2 ?



Problem 1.2-8 A long retaining wall is braced by wood shores set at an angle of 30° and supported by concrete thrust blocks, as shown in the first part of the figure. The shores are evenly spaced, 3 m apart.

For analysis purposes, the wall and shores are idealized as shown in the second part of the figure. Note that the base of the wall and both ends of the shores are assumed to be pinned. The pressure of the soil against the wall is assumed to be triangularly distributed, and the resultant force acting on a 3-meter length of the wall is $F = 190$ kN.

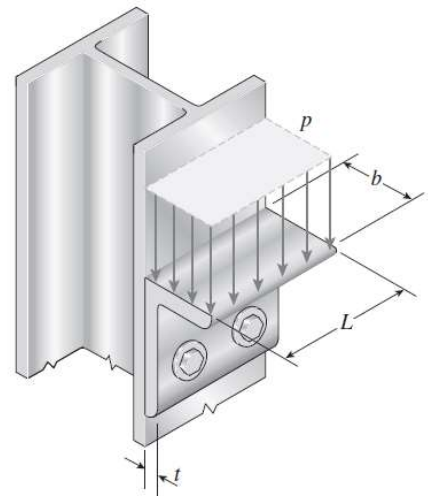
If each shore has a $150 \text{ mm} \times 150 \text{ mm}$ square cross section, what is the compressive stress σ_c in the shores?



Shear Stress and Strain

Problem 1.6-1 An angle bracket having thickness $t = 0.5$ in. is attached to the flange of a column by two $\frac{3}{8}$ -inch diameter bolts (see figure). A uniformly distributed load acts on the top face of the bracket with a pressure $p = 300$ psi. The top face of the bracket has length $L = 6$ in. and width $b = 2.5$ in.

Determine the average bearing pressure σ_b between the angle bracket and the bolts and the average shear stress τ_{aver} in the bolts. (Disregard friction between the bracket and the column.)



Problem 1.6-5 The connection shown in the figure consists of five steel plates, each $\frac{3}{8}$ in. thick, joined by a single $\frac{1}{4}$ -in. diameter bolt. The total load transferred between the plates is 1200 lb, distributed among the plates as shown.

- (a) Calculate the largest shear stress in the bolt, disregarding friction between the plates.
 - (b) Calculate the largest bearing stress acting against the bolt.
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