Foundations Math Worksheet

1. **Compare the *actual* bearing pressure that the shallow foundation produces and the *allowable* bearing pressure of the soil. Does the foundation fail? Why is σzD equal to 0? Show all your work and calculations.**
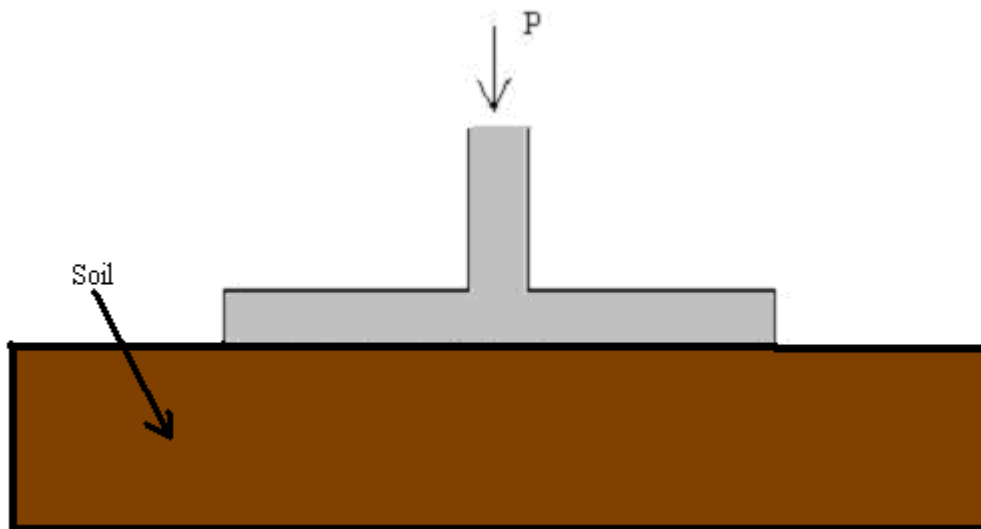
Actual bearing pressure is q = force / area

The force, P, on the foundation is 100,000 lbs

The area of the bottom of the foundation is square with 10-foot sides

Allowable bearing pressure of the soil is $q_{ult} = 6.28$ x $s_u + \sigma_{zD}$

From soil investigations, $s_u = 500$ lbs/ft^2 and σ_{zD} is 0.

2. **Compare the *actual* bearing pressure that the shallow foundation produces and the *allowable* bearing pressure of the soil. Does the foundation fail? Show all your work and calculations.**
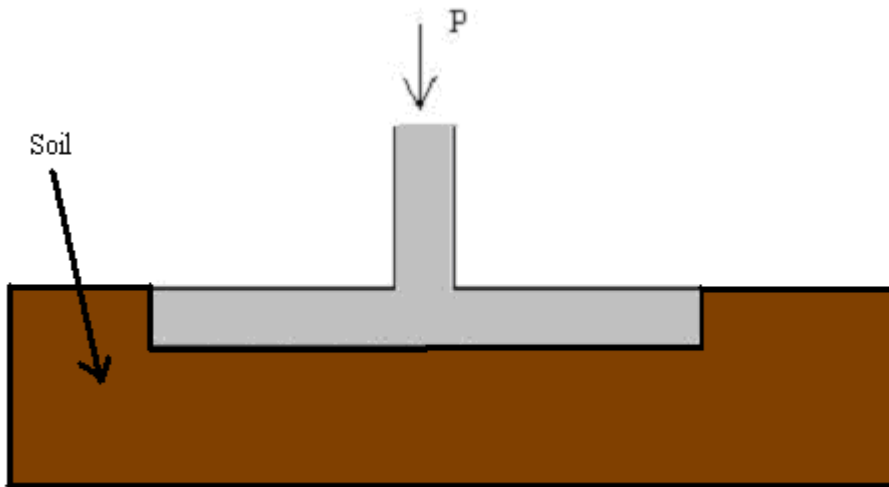
   Actual bearing pressure is q = force / area

   The force, P, on the foundation is 200,000 lbs

   The area of the bottom of the foundation is square with 7-foot sides

   Allowable bearing pressure of the soil is $q_{ult} = 6.28 \times s_u + \sigma_{zD}$

   From soil investigations, $s_u = 500$ lbs/ft^2 and σ_{zD} is 110 lbs/ft^2

3. **Compare the *actual* load given for the deep foundation and the *allowable* ultimate load calculated. Does the foundation fail? Show all your work and calculations.**

The **actual load**, P, on the foundation is 100,000 lbs

The **allowable load** $P_a = q_t' \times A_t + f_s \times A_s$.

The area of the bottom of the foundation is circular with a 1-foot radius

Area of a circle $= \pi *$ radius * radius

The area of the side of the foundation is the surface area of the foundation in contact with the soil. The area is the foundation circumference of the multiplied by the foundation length.

Circumference $= 2 \times \pi \times$ radius $\pi = 3.14$

Length of the foundation $= 40$ feet

From soil investigations, $q_t' = 3000$ lbs/ft^2 and $f_s = 600$ lbs/ft^2

Soil   P