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Upward Soil Pressure

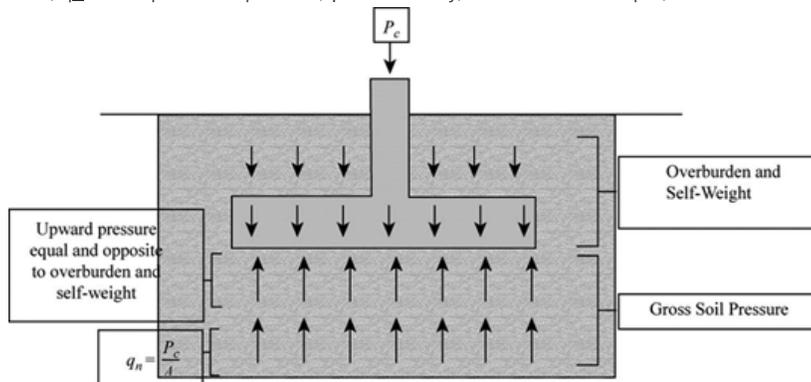
Upward soil pressure is defined as the sum of the overburden pressure from soil weight present above the footing and self-weight of structure. It is also known as the allowable bearing capacity for soil.

Overburden pressure in footing represents the pressure due to weight of soil present above the footing. It is calculated by multiplying the soil density and the depth of the foundation.

The expression for the upward soil pressure is as given below.

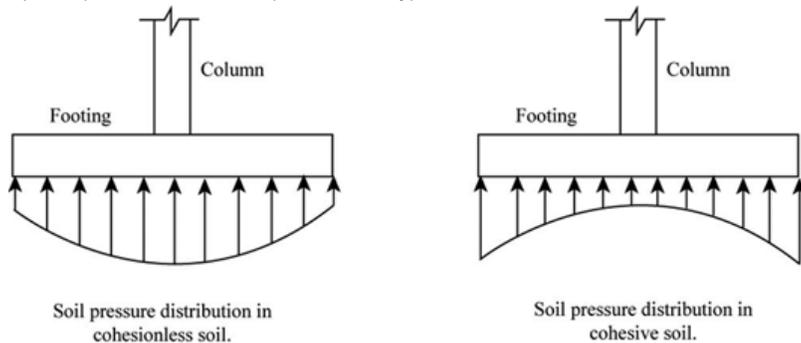
$$q_u = \gamma D_f + W$$

Here, q_u is the upward soil pressure, γ is soil density, D_f is foundation depth, and W is the self-weight of the foundation.



The above figure represents the upward soil pressure in a footing.

Upward pressure in the soil depends on soil type.



The above figure represents the upward pressure distribution in the cohesive soils and cohesionless soils.

Cohesive soils are those soils, which have sufficient cohesion between the particles of the soil. Clay is an example of the cohesive soil. Non-cohesive soils are those soils which have negligible cohesion between the particles of the soil. Sand is an example of the non-cohesive soil.

The distribution of the upward soil pressure in cohesive soil is higher in the edge portion because the shear resistance is added to upward pressure.

The distribution of upward soil pressure in the non-cohesive soil is higher in the middle portion because of outward shifting of the soil particles.

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Q: 1. (1 pt) A concrete-lined rectangular channel has a bottom width of 3.0 m and a Manning n of 0.015. The bed slope is 0.007. Use hand calculations (similar to what you would do on an exam) to determine if the dischar...

A: [See Answer](#)

Q: (1 pt) A channel lined with Kentucky bluegrass is 5.5 m wide and has side slopes of $m=3$. The channel is at a slope of 0.001, and the top width is 15 m. (a) What is the maximum flow that can be conveyed in this chann...

A: [See Answer](#)

Q: A 44-mm diameter by 3.5-m long steel rod (1) is stress free after being attached to rigid supports as shown. At A, a 25-mm diameter bolt is used to connect the rod to the support. [$E = 245 \text{ GPa}$, $\alpha = 11.9 \times 10^{-6} / ^\circ\text{C}$...

A: [See Answer](#)

Q: 9. (2.5 pts) A moderately sinuous trapezoidal channel lined with a grass-legume mixture will be sized to carry $Q = 7 \text{ m}^3/\text{s}$. The channel will have a bottom slope of $S_o = 0.002$ and side slopes of $m=3$. Proportion the cha...

A: [See Answer](#)

Q: 5. (1 pt) An unlined, earthen channel that is comprised of sandy silt is 10 ft wide and has side slopes of $m=2$. The channel has a Manning $n=0.02$, and is at a slope of 0.002. Using the maximum permissible velocity me...

A: [See Answer](#)

Q: CESA Question 2: Hind all moments in the structure shown below. Use Slope Detection Med E-coat 18 Marks
ZZZZZ $k_2 = 30$ - is 15 Yao Icons 4 Bc Four $k=k$, $\eta=1/30$ 2014 = 1 $K_2= \bar{n} = 0$ k (4- Yao Me= $2Ek$ (0 - 34A / 1 to Cha...

A: [See Answer](#)

Q: 1. Shown in the figure are the plan and cross section of a column and its foundation. The column has to take 450 kips load. Geotechnical investigation revealed the following soil properties: For silty sand: $\gamma = 110 \text{ p}...$

A: [See Answer](#)

Q: Question 2 Using table of monthly flow volumes feedingareservoir, determine the storage capacity required to supply the mean annual flow volume yield. Runoff (Mm' Demand (Mm) 5000 1 3400 1200 2000 2000 2000 2000 6 2X...

A: [See Answer](#)

Q: 1646 $1 + R_2$ 3 4 Each resistor in the circuit has a resistance of 4.522. The voltage source is 9 V. NOTES IMAGES DISCUSS UNITS STATS HELP Part Description Answer Chk History 8.91 pts. 98% What is the power dissipate...

A: [See Answer](#)

Q: Review Part A Learning Goal: To apply the theorem of conservation of energy to solve kinetic problems. Two children are trying to shoot a marble of mass m into a small box of negligible height using a spring-loaded d...

A: [See Answer](#)

Q: oke 4-36 Draw the shear and moment diagrams for the compound beam. 150 lb/ft 150 lb/ft 6 ft 3 ft 4 Prob. 4-36

A: [See Answer](#)

Q: 15.32 The length of each pipe in the network shown in Fig. P15.32 is 1000 ft. Determine the (a) flows in the pipe, and (b) pressure heads at the nodes. The pressure at point C is 40 ft. The elevations of different po...



and drill collars of 6.5-in OD and 2.25-in ID with the unit weight of 100 lbf/ft. The maximum WOB is ...

A: [See Answer](#)

Q: The 12-ft boom AB has a fixed end A. A steel cable is stretched from the free end B of the boom to a point C located on the vertical wall. If the tension in the cable is 400 lb, determine the moment about A of the fo...

A: [See Answer](#)

Q: Three identical small spheres, each weighting 2 lb, can slide freely on a horizontal frictionless surface. Spheres B and C are connected by a light rod and are at rest in the position shown when sphere A is struck squa...

A: [See Answer](#)

Q: **▼** Part A The bend is connected to the pipe at flanges A and B as shown. The diameter of the pipe is 1 ft and it carries a volumetric flow of 50 ft³/s. The total weight of the bend and the water within it is 400 lb,...

A: [See Answer](#)

Q: 5.4 The elevation of a city distribution reservoir is 400 ft (122 m) and that of the city is 250 ft (76 m). When city water consumption is at the rate of 16 ft³/s (453 L/s), the pressure in the city is 60 psi (416 kPa)...

A: [See Answer](#)

Q: A steel bar is attached to a wood support beam with four 22 mm diameter lag screws, as shown in the figure. The steel bar is 66-mm-wide by 6-mm-thick. For the steel bar, the yield strength is 255 MPa and the ultimate...

A: [See Answer](#)

Q: A municipal water system must always have positive pressure to avoid cavitation as well as prevent contaminants from leaking into the system. For a system press at is the maximum elevation change (in ft) allowed? ure...

A: [See Answer](#)

Q: 3. Problem 6.14 A freeway segment currently has four 11-ft wide lanes and a 3-ft right shoulder in the southbound direction. It is operating in LOS B with a traffic density of 15.6 pc/mi/ln and a peak-hour factor of 0.9...

A: [See Answer](#)

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