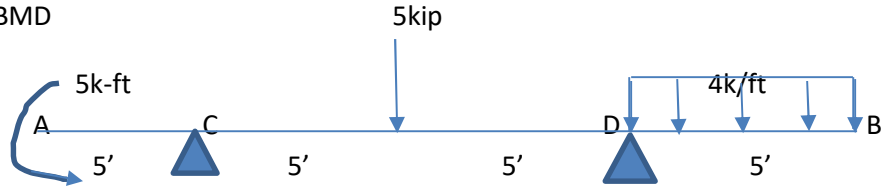
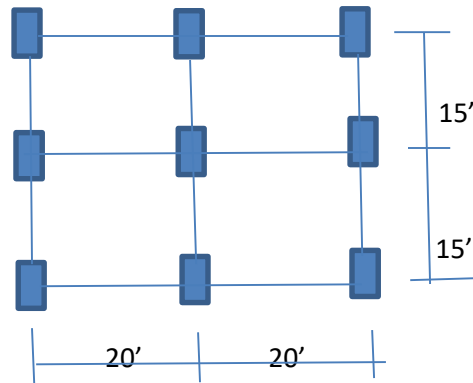


SGFL 2021

1. SFD and BMD



2. Primarily design a column. A load of 250 psf per floor, the column is at the ground floor of a five storied building. Given, $F_c' = 3000\text{psi}$, $F_y = 6000\text{psi}$



3. (a) A sample water plant has a raw water inflow rate of $0.6\text{ m}^3/\text{s}$ and it has been found through experimentation that all particles settle at a rate of $v_s = 0.004\text{ m}/\text{sec}$. A proposed rectangular settling tank has an effective settlement zone of $L=20\text{m}$, $H=2\text{m}$. $W=6\text{m}$.

(i) determine Surface Overflow Rate (SOR)

(ii) what fraction of particles can be expected to be removed from the tank

(b) An artesian aquifer 10m thick with piezometric surface 40m above the bottom confining later is being pumped by a fully penetrating well. The aquifer is medium sand (hydraulic conductivity $1.5 \times 10^{-4}\text{ m}/\text{s}$). steady state draw downs of 5 m and 1 m are observed at two non-pumping well located 20m and 200m respectively from the pumped well. Determine the discharge at the pumped well in m^3/sec .

4. Define (a) i) Effective Grain Size and ii) Optimum Moisture Content

(b) Saturated unit weight and moisture content are $19.3\text{ KN}/\text{m}^3$ and 28% respectively. calculate void ration e.

5. (a) Explain diagrammatically the method of attaining superelevation considering a crowned pavement revolved about the profile of the inside edge.

(b) A crest vertical curve as to be deigned to join a +3% grade with a -2% grade at a section of a two-lane Highway. Determine stopping sight distance (SSD) if the design speed of the Highway is 60mi/hr and a perception and reaction time is 2.5sec. the deceleration rate for braking (a) is $11.2\text{ ft}/\text{sec}^2$

6. (a) prove that for a constant rate of discharge and a constant value of friction factor f , the frictional head loss in a pipe varies as the fifth power of the diameter.

(b) A field sample of an unconfined aquifer is packed in a test cylinder. The length and diameter of the cylinder are 50 cm and 6cm respectively. The field sample tested for a period of 3 min under a constant head difference of 16.3cm. as a result of 45.2 cm³ of water is collected at the outlet. determine the hydraulic conductivity of the aquifer sample