

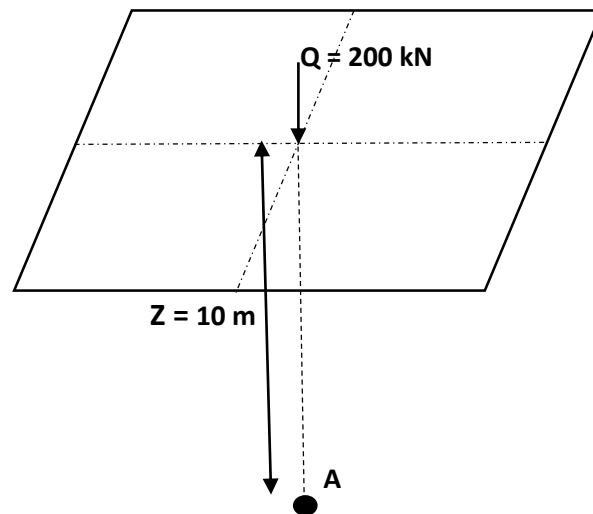
DEPARTMENT OF CIVIL ENGINEERING
19CEB301 – SOIL MECHANICS
UNIT III – STRESS DISTRIBUTION AND SETTLEMENT

STUDENT'S WORKSHEET - 1
THEORIES ON STRESS DISTRIBUTION ON SOIL – Boussinesq's Theory

SOLVE THE PROBLEM

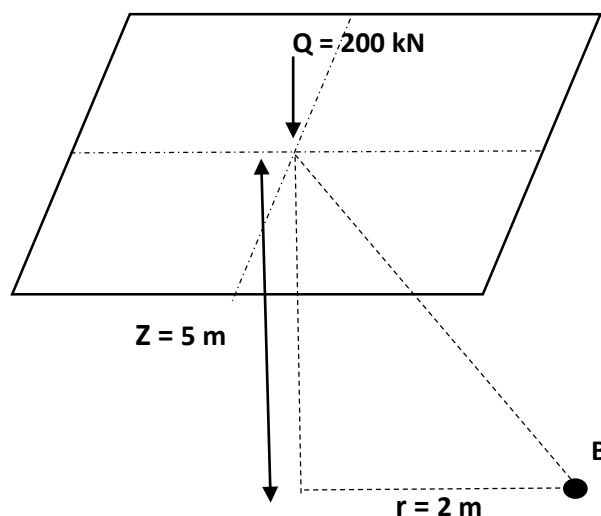
1. A concentrated point load of 200 kN acts at the ground surface. Find the intensity of vertical pressure at a depth of 10 m (POINT A) below the ground surface, and situated on the axis of the loading. What will be the vertical pressure at a depth of 5 m and at a distance of 2 m from axis of loading (POINT B)? Use boussinesq's analysis.

Condition 1:



$$\sigma_z = \frac{Q}{z^2} K_B$$
$$K_B = \frac{3}{2\pi} \left[\frac{1}{\left(1 + \left|\frac{r^2}{z^2}\right|\right)^{5/2}} \right]$$

Condition 2:



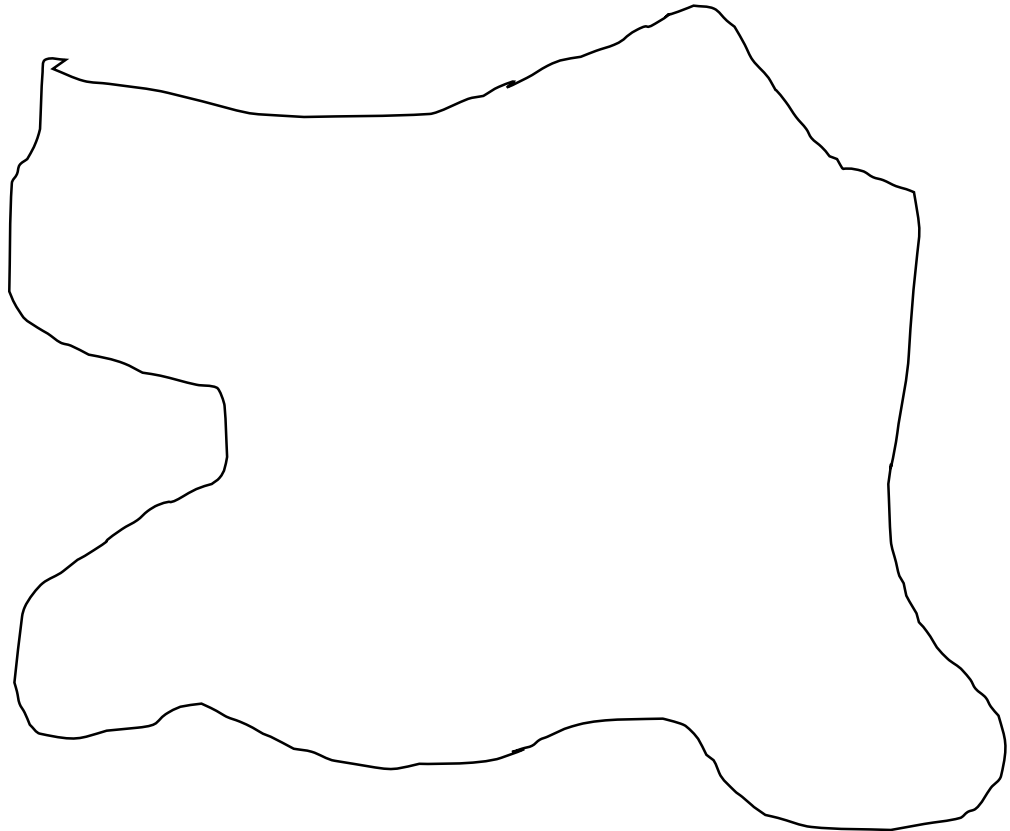
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STUDENT'S WORKSHEET – 3

Find out stress Distribution for Given Irregular Surface using Newmark's Chart

Intensity of loading $q = 150 \text{ kN}$



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STUDENT'S WORKSHEET – 3

SETTLEMENT

Shape Split Cards

COMPONENTS OF SETTLEMENT & SOME BASIC DEFINITION

- Immediate Settlement
- Primary Settlement
- Secondary Settlement
- Compressibility
- Consolidation

IMMEDIATE SETTLEMENT	Settlement occurs almost immediately after the load is imposed
Predominates in cohesion less soils and unsaturated clay	Important for design of shallow foundation

PRIMARY SETTLEMENT	Squeezing out of pore water from a loaded saturated soil causing time dependent decrease in volume
Dominates in saturated/nearly saturated fine grained soils	It is an extreme case

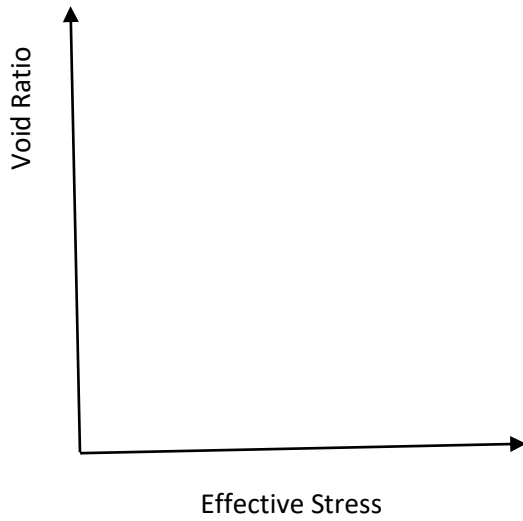
SECONDARY SETTLEMENT	Some soil exhibit time dependent settlement at constant effective stress (creep settlement)
Predominates in highly plastic clays and organic clays.	This is relatively minor

Consolidation	The process by which soil particles are packed more closely together under the application of static loading
Compaction	The process by which solid soil particles are packed more closely together by mechanical means.

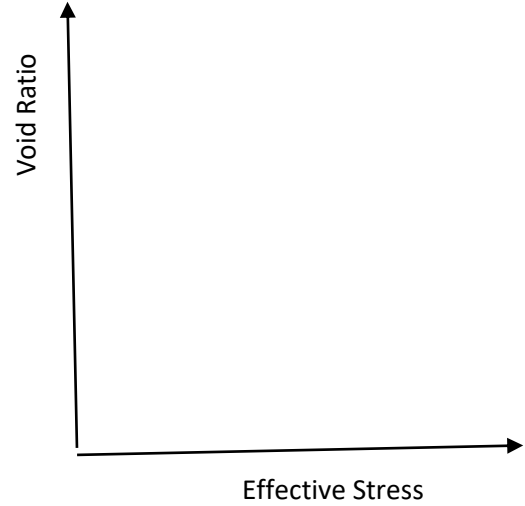
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STUDENT'S WORKSHEET – 4
COMPRESSIBILITY BEHAVIOUR OF SOIL

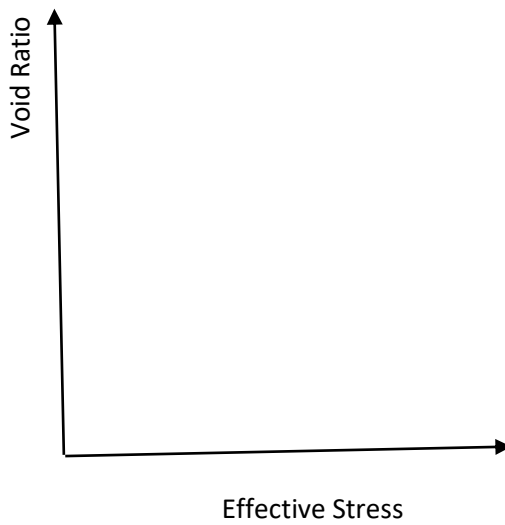
Draw the chart for Effect of compressibility behaviour of Cohesive and Cohesionless soil



Cohesionless Soil – Loose Sand



Cohesionless Soil – Dense Sand



Cohesive Soil – Clay

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STUDENT'S WORKSHEET – 5

TERZHAGHI'S ONE DIMENSIONAL CONSOLIDATION THEORY

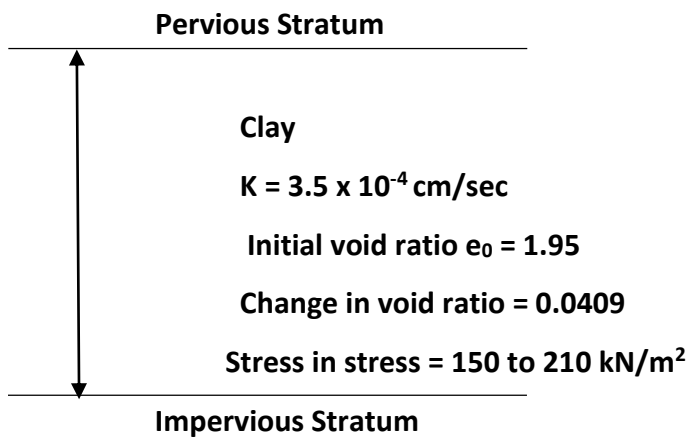
Determine Coefficient of Consolidation for Two type of soil and explain its effects

1. A Saturated soil stratum lies above an impervious stratum and below a pervious stratum.

It has the following properties at various location

$$C_v = \frac{k_z (1 + e_0)}{\alpha_v \gamma_w}$$

Location - A



$$\alpha_v = \frac{-\Delta e}{\Delta \bar{\sigma}}$$

Location - B

