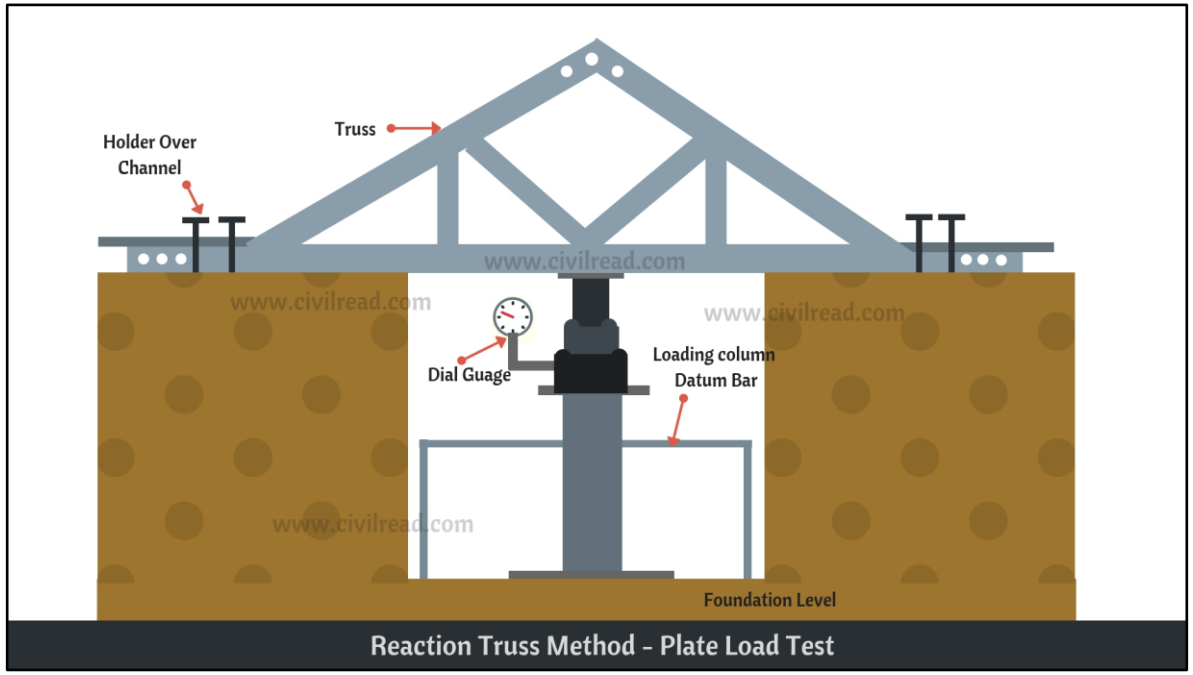
Lab manual

Plate load test



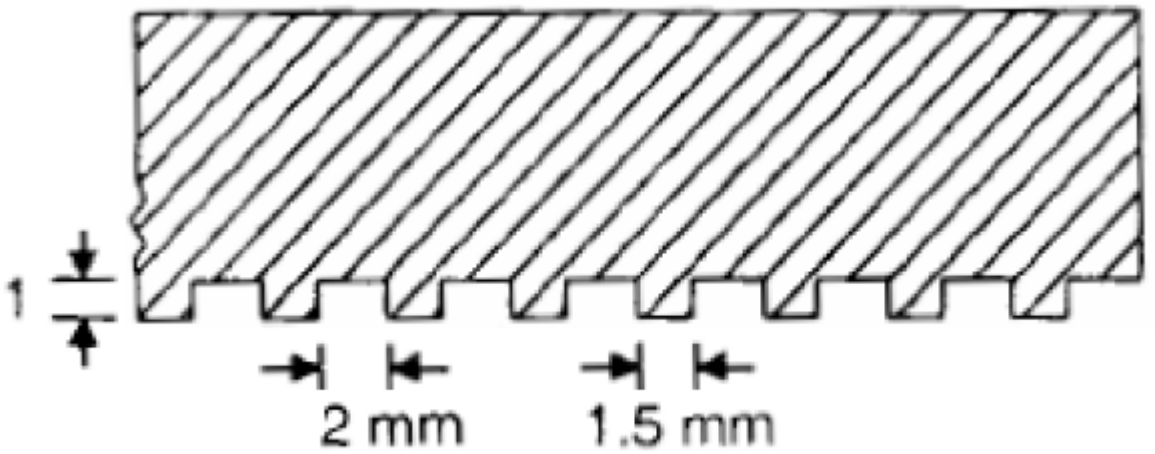
Need and Scope

- Bearing capacity of foundation
- Settlement of foundation
- Modulus of subgrade reaction

Equipments

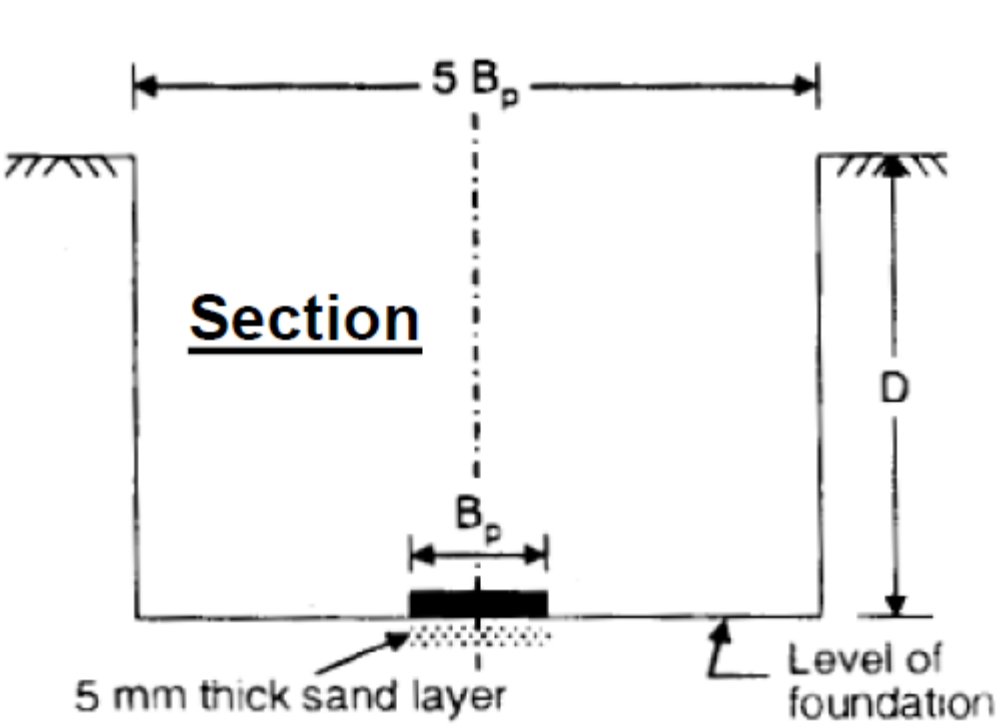
Bearing Plate

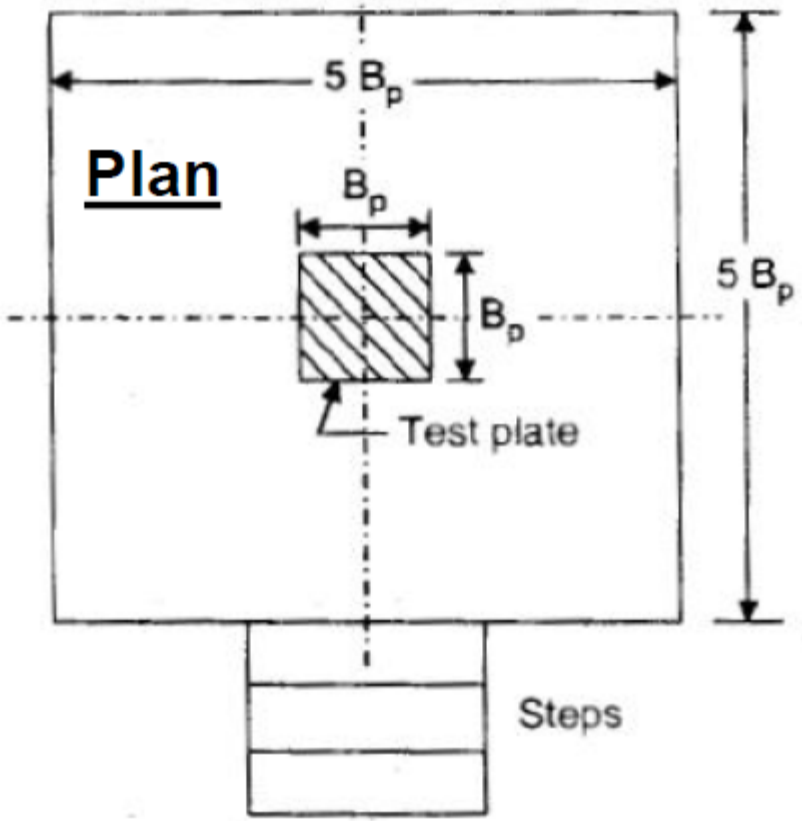
- Mild steel plate circular or square section
- Size: 30 cm, 45 cm, 60 cm or 75 cm
- Grooved plate **(Why??)**



Test pit

- Dimension (5 Bp)
- Depth of foundation is same as proposed depth of foundation
- Sand layer of thickness 5 mm at bottom **(Why??)**





Procedure

- Test is carried out at proposed level of foundation
- Test plate is kept over the sand layer of 5 mm and is proper concentric with the loading arrangement
- Loading: **Gravity loading, Reaction frame loading**
- A seating pressure of 7 kPa is applied initially and removed before test **(why??)**
- Loading increments can be done at interval of 0.5 kN and settlement readings are taken at time intervals of 1, 2, 4, 6, 9, 16, 25 min and then 1 hour
- For clayey soils, the load is increased when the settlement exceeds 70-80% of probable ultimate settlement at that stage or at the end of 24 hour.
- For other soils, rate of settlement drops below 0.02 mm/min

Gravity Loading Method

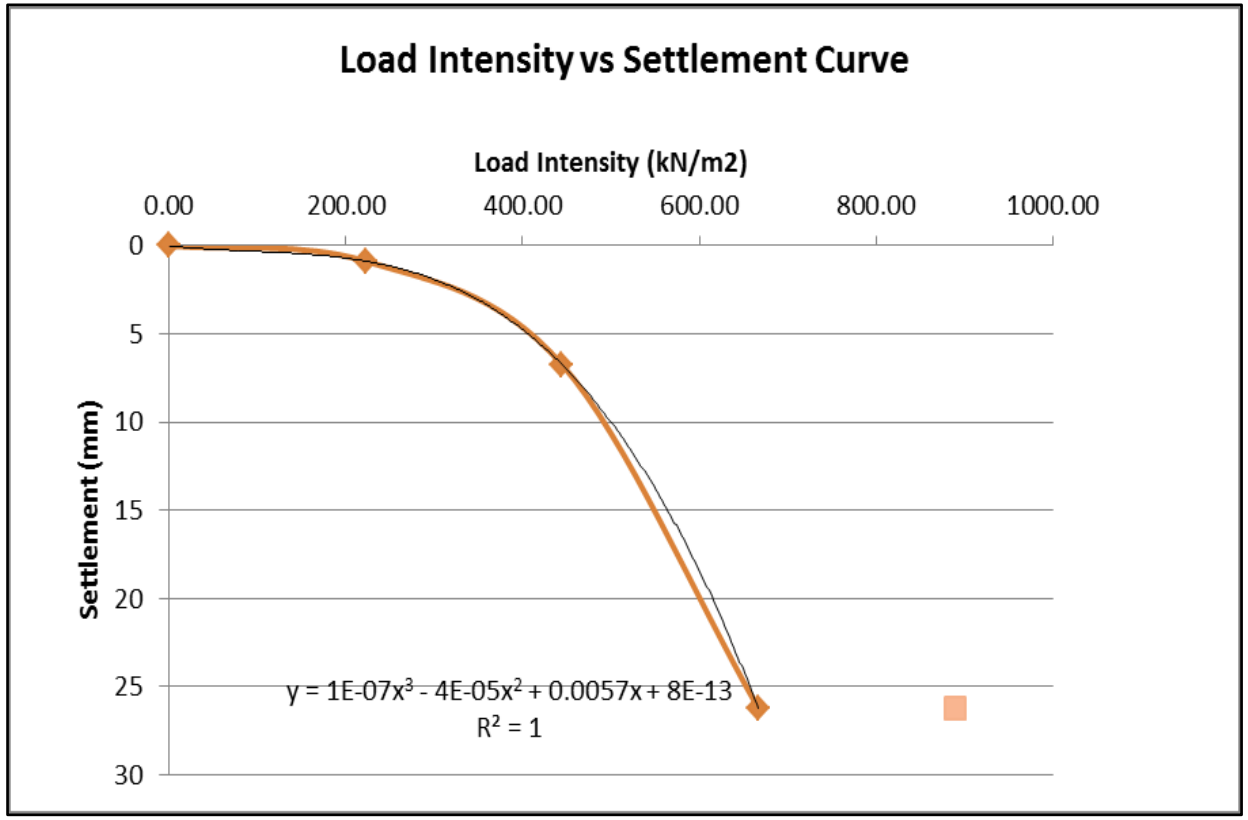
Reaction Frame Loading

IITGN Plate load test

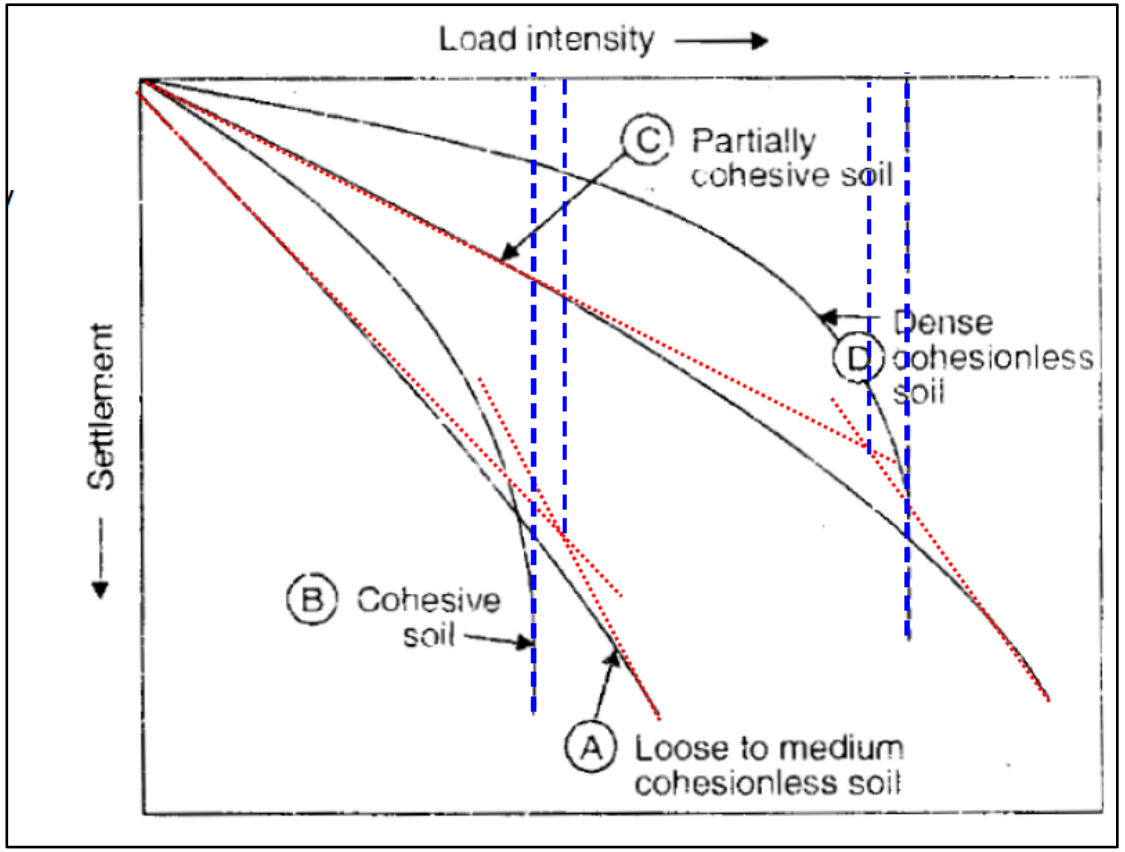
Observation Table and Calculation

Load-settlement data:

Average Settlement							
20 kN Load		40 kN Load		60 kN Load		80 kN Load	
Time (min)	Average Settlement	Time (min)	Average Settlement	Time (min)	Average Settlement	Time (min)	Average Settlement
0	0.76	0	3.85	0	17.85	0	26.235
1	0.79	1	4.835	1	21.275	1	26.235
2	0.79	2	5.19	2	22.335	2	26.235
4	0.79	4	5.53	4	23.345	4	26.235
6	0.815	6	5.77	6	24.03	6	26.235
9	0.815	9	6.045	9	24.65	9	26.235
16	0.82	16	6.335	16	25.55	16	26.235
25	0.87	25	6.73	25	26.235	25	26.235



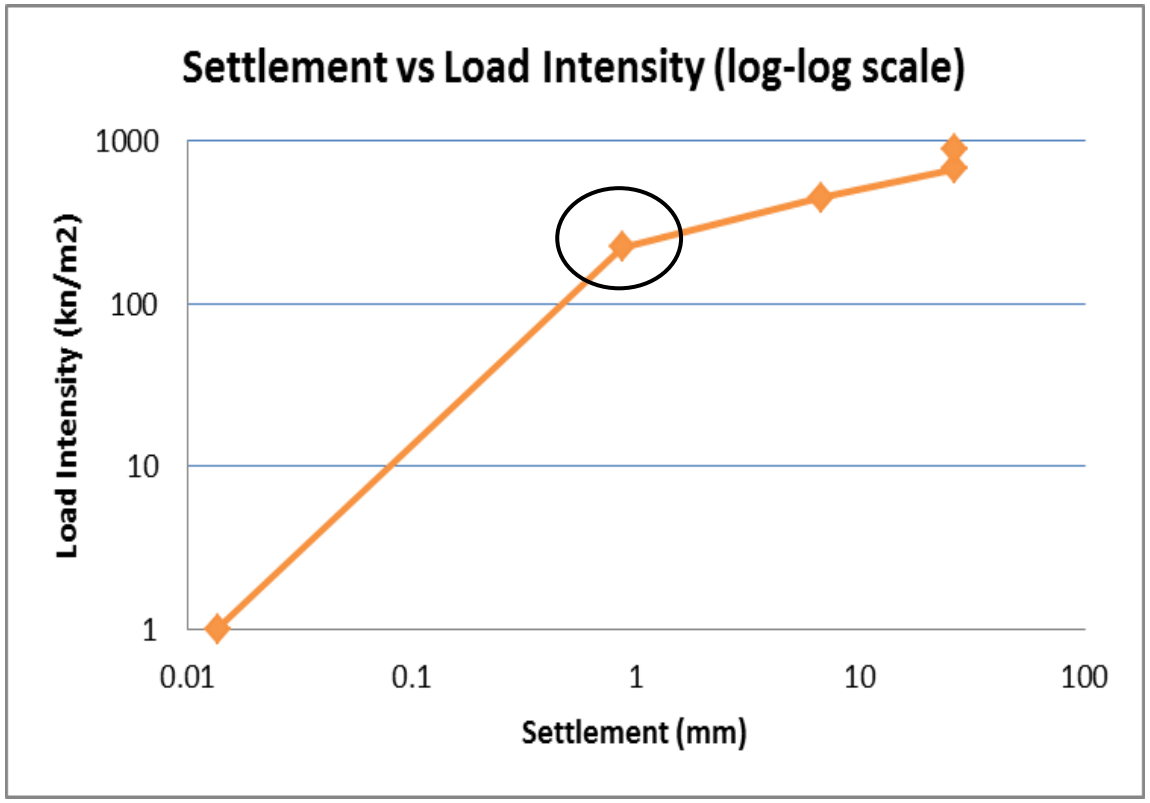
Determination of bearing capacity of plate

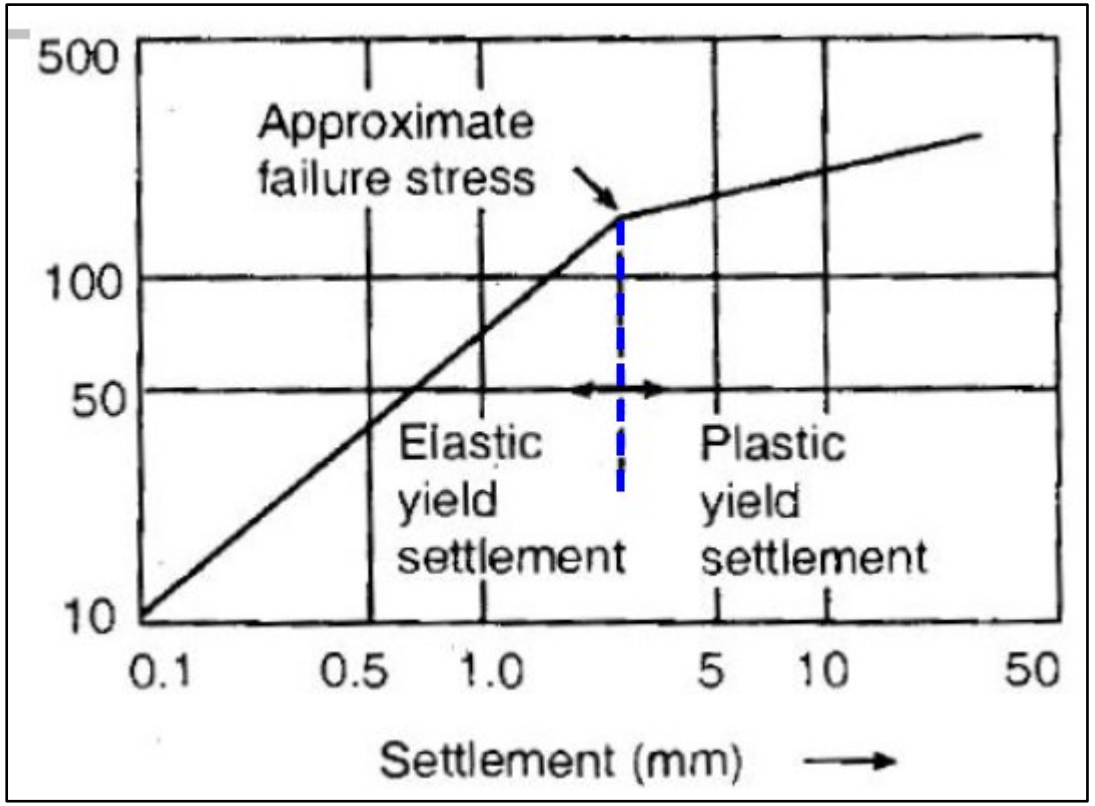


Zero correction??

Bearing capacity of plate

Alternative method of determination of bearing capacity of plate





For cohesionless soil → $\frac{q_{uf}}{q_{up}} = \frac{B_f}{B_p}$

For cohesive soil → $q_{uf} = q_{up}$

Determination of settlement of footing

Terzaghi and Peck (1948):

$$\frac{S_f}{S_p} = \left[\frac{B_f\left(B_p + 30\right)}{B_p\left(B_f + 30\right)}\right]^2$$

S_f = Settlement of a foundation of width B_f (cm)

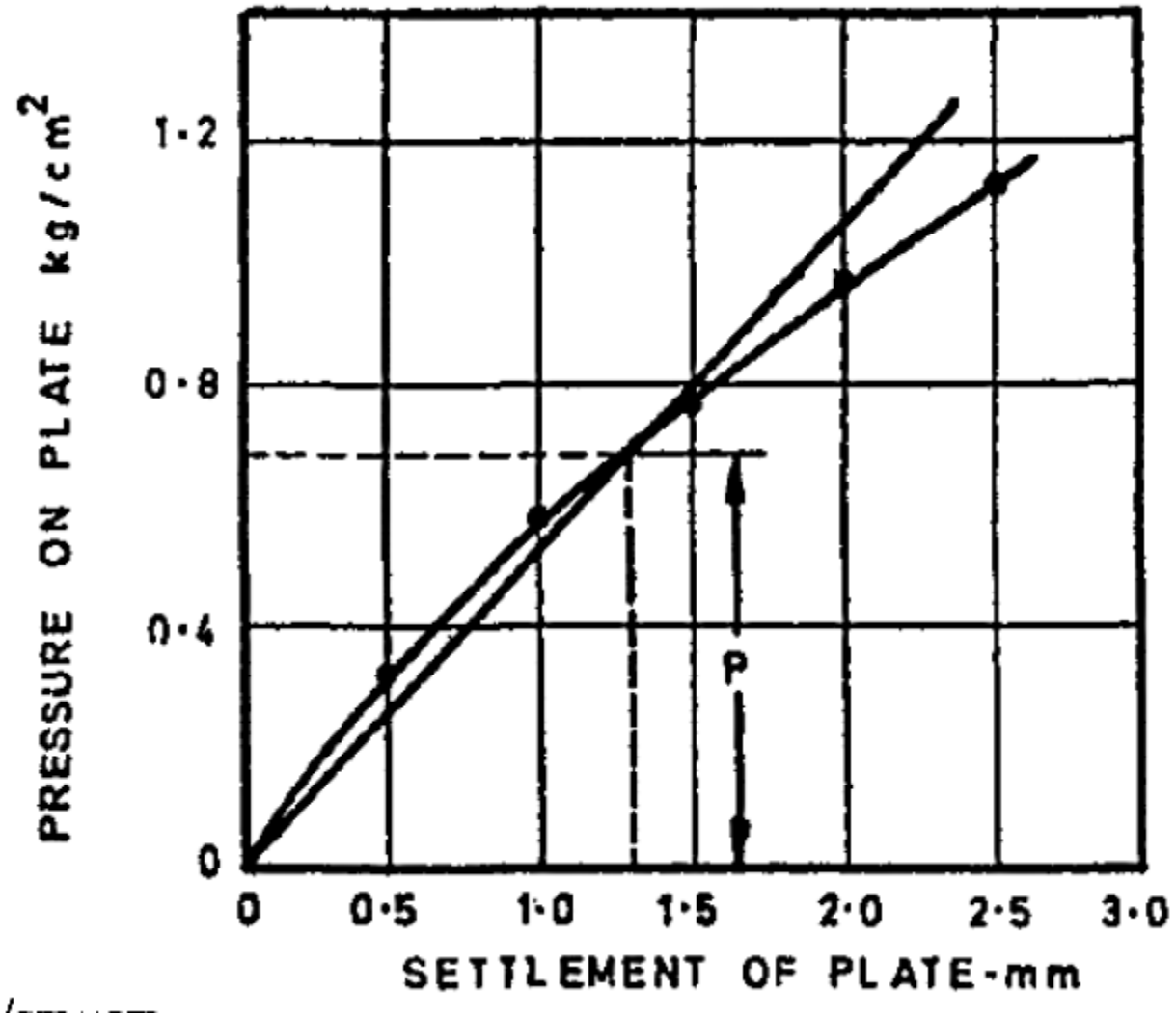
S_p = Settlement of the test plate of width B_p (cm) at the same load intensity as on the foundation

Bond (1961):

$$\frac{S_f}{S_p} = \left[\frac{B_f}{B_p}\right]^n$$

Soil	Index - n
Clay	1.03 to 1.05
Sandy clay	1.08 to 1.10
Loose sand	1.20 to 1.25
Medium sand	1.25 to 1.35
Dense sand	1.40 to 1.50

Determination of modulus of subgrade reaction (k)



$k=\frac{p}{1.25\ mm}$, p = Load intensity correcponding to 1.25 mm settlement of plate