1.3Depth and spacing of bore hole:

The number of bore holes depends on:

(i) Type and size of the project

(ii) Budget for site investigation

(iii) Soil variability

The bore holes have to be located where the loads are expected.

SPACING OF BORINGS (Das, 1999)

S.No	Type of project	Spacing (m)
1.	Multistory buildings	10 – 30
2.	One-story industrial plants	20 – 60
3.	Highways	250-500
4.	Residential subdivision	250-500
5.	Dams and dikes	40 - 80

Table 1Spacing of bornings

Minimum depth of boring (ASCE, 1972)

- Determine the net increase of stress, Δσ, under the foundation (as shown in Figure 1)
- Estimate the variation of the vertical effective stress, σ'v , with depth
- Determine the depth D = D1, at which stress increase Δσ = q/10, where q = estimated net stress on the foundation
- Determine the depth D = D2, at which Δσ/ σ'v = 0.05.
- Unless bedrock is encountered, the smaller of the two depths, D1 and D2 will be the approximate minimum depth of boring required.

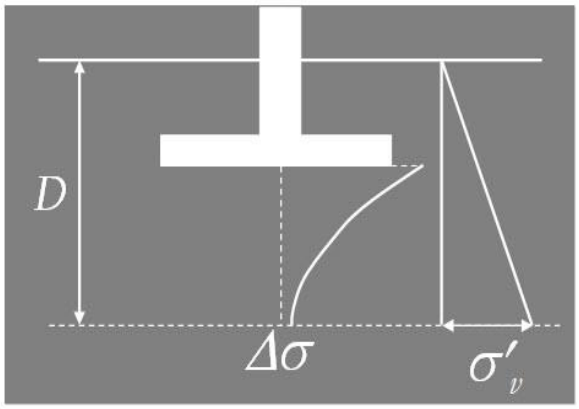


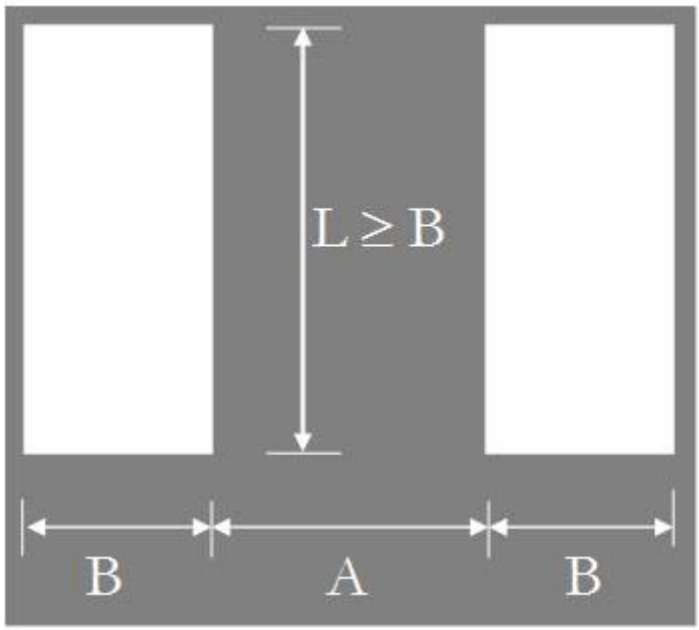
Fig 1.Minimum depth of boring

The minimum depth of boring for a building with a width of 30.5 m (100 ft) will be as follows (Sowers and Sowers, 1970)

S.No	No of stories	Boring depth
1.	1	3.5 m
2.	2	6.0m
3.	3	10 m
4.	4	16 m
5.	5	24 m

Table 2. Depth of Borings (according to IS 1892-1979)

S.NO	Type of foundation	Depth of boring
1.	Isolated spread footing or raft	One and half times the width (B) of the foundation
2.	Adjacent footings with clear spacing	One and half times the length (L) of less than twice the width footing
3.	Pile and well foundation	To a depth of one and half times the width of structure from the bearing level (toe of pile or bottom of well)
4.	(a) road cut	Equal to the bottom width of the cut
5.	(b) Fill	Two meters below ground level or equal to the height of the fill whichever is greater.



D = 1.5 *B* for A ³ 4B and *D* = 1.5 *L* for A < 2B

D = 3 *B* for A >2*B* and <4*B*

D = 4.5 *B* for A < 2*B*

D = 1.5 *B* for A ³ 4*B*

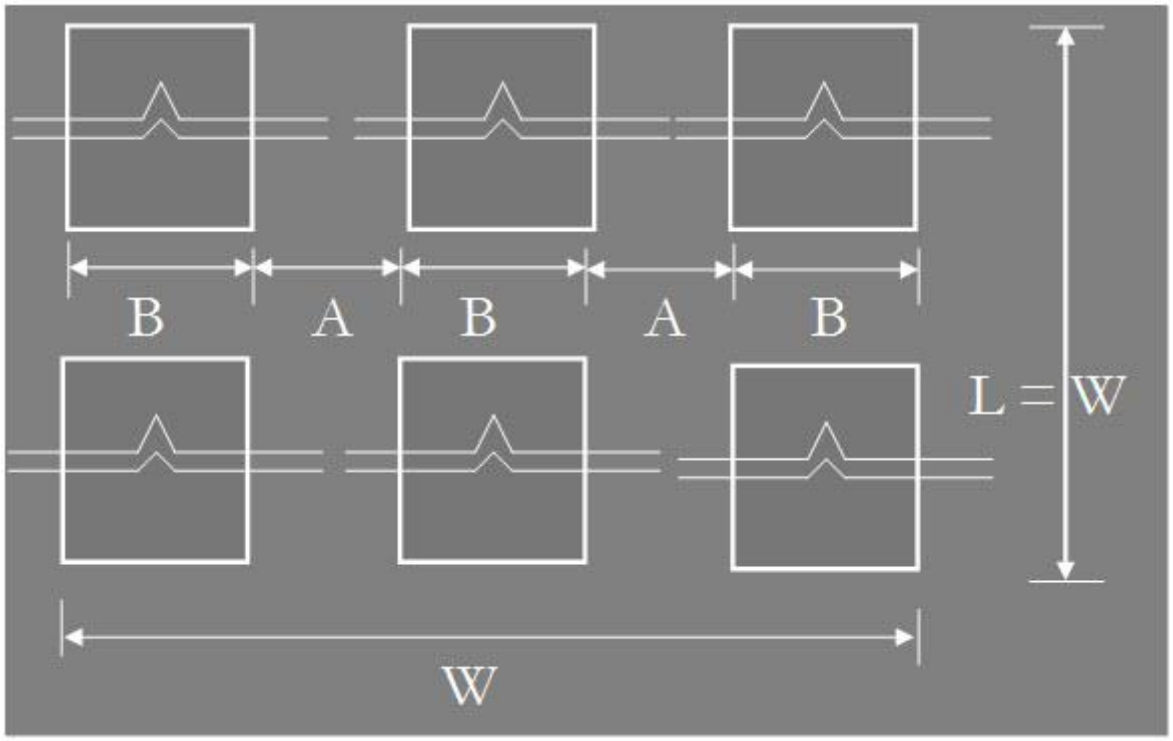


Fig 2 Depth of boring according to IS 1892-1979

Building area, m^2	Number of boreholes	Subdivision area, m^2	Number of boreholes
100	2	4000	2
250	3	8000	3
500	4	20000	4
1000	5	40000	5
2000	6	80000	7
5000	7	40000	15
6000	8	-	-
8000	9	-	-
10000	10	-	-

Table-3: Minimum number of boreholes for buildings and subdivisions based on area

Geo structure types	Minimum borehole depth	Minimum number of boreholes
Shallow foundation	5m, or foundation width time a value ranging from 1 to 3	One but place boreholes at node points along grids of sizes from 15mX15m to 40mX40m
Deep foundation	25-30m except for bedrock which is 3m	One but place boreholes at node points along grids of sizes from 15mX15m to 40mX40m

Retaining wall	1 to 2 times wall height, 3m for walls on bedrock	One borehole for wall-length smaller than 30m, For wall-length longer than 30m; 1 for every 30m or wall height times a value between 1 to 2
Bridge	25-30m except for bedrock which is 3m	Two boreholes for piers, Two boreholes for abutments
Embankments including roadway	Either 6m or two times embankment height, whichever is greater	1 for every 60m If soil does not vary crucially, otherwise 1 for every 120m
Cut slopes	6m below the bottom of the cut slope	On slope: 3 boreholes Along the length of the slope: 1 for every 60m If soil does not vary crucially, otherwise 1 for every 120m

Table-4: Minimum number and depth of boreholes for various geostructures based on soil type