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**SUBSURFACE EXPLORATION**

**QUESTION 1**

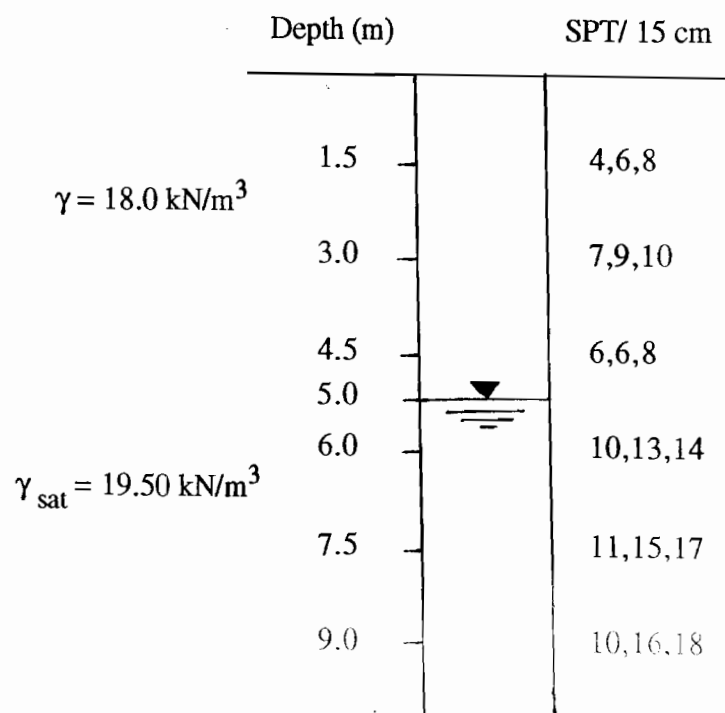
The inside and outside diameters of a Shelby tube are 3.25 in. and 3.5 in., respectively. Determine the area ratio. What should be the inside diameter of the tube to give an area ratio of 10%?

**QUESTION 2**

A proposed building site is underlain by up to 2.5 m of random fill. Would test pits or shallow borings be better suited to allow for evaluation of the quality of the fill and its ability to support concrete slabs outside the building? Borings will be drilled within the building area. Explain your answer.

**QUESTION 3**

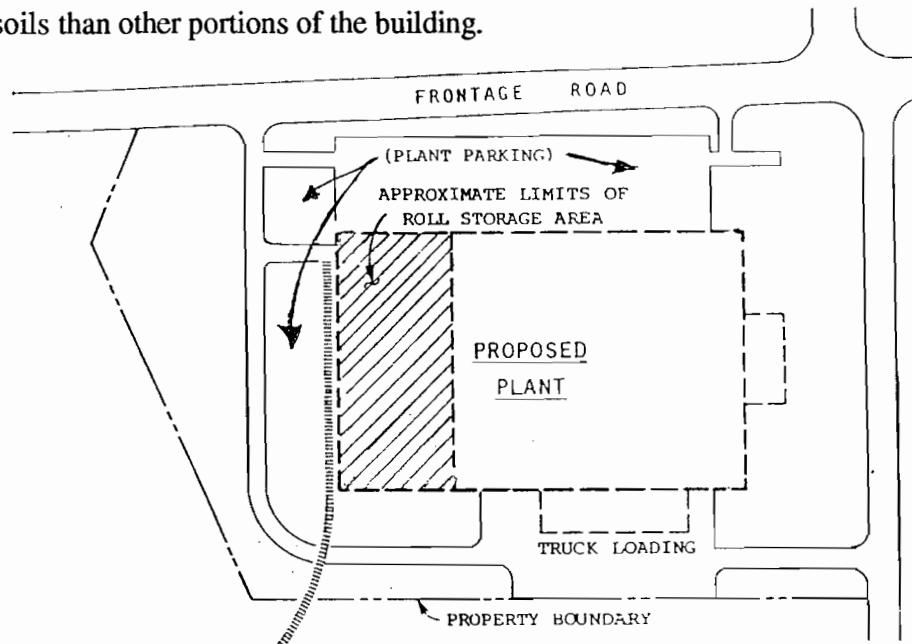
A boring log in a sandy soil is shown below. The unit weight of the soil above the ground water table is  $18.0 \text{ kN/m}^3$  and that below the ground water table is  $19.50 \text{ kN/m}^3$ . Determine the standard penetration number and correct it for overburden. Estimate the relative density and the angle of internal friction of the soil.



#### QUESTION 4

Preliminary investigations have indicated that the proposed factory (shown below) can be supported either on spread footings or shallow drilled pier foundations, which will require subsurface information to a depth of about 15 m. The project budget will allow for 8 borings to this depth (15 m) and 1 or 2 borings (2 to 4 m deep) in the parking lot areas. On the figure below, indicate proposed boring locations by a small circle.

Note: the cross-hatched roll storage area will impose much higher loads on the subsurface soils than other portions of the building.



#### QUESTION 5

A layout plan for an industrial plant is shown below.

- Propose a site investigation program giving the location and depth of boreholes and specifying the type of sampling method and field test to be used.
- List down the laboratory tests which are to be conducted on the recovered samples.

Note: The foundation soil consists of granular soil in general with uniform stratification.

