State of Packing	Relative Density	Standard Penetration Resistance (N)	Static Cone Resistance (q_c)	Angle of Internal Friction (ϕ)
	Percent	Blows / ft	Tsf or kgf/cm 2	Degrees
Very Loose	< 20	< 4	< 20	< 30
Loose	20 - 40	4 - 10	20 - 40	30 - 35
Compact	40 - 60	10 - 30	40 - 120	35 - 40
Dense	60 - 80	30 - 50	120 - 200	40 - 45
Very Dense	> 80	>50	> 200	> 45

Table (1.1): Correlation between SPT Blows & Sand Relative Density

Fig. (1.3): Rock Core

1.2.11 Soil identification, including Atterberg limits; sieve analysis; moisture content and sulfate content tests should be performed for each soil as per the attached soil classification system in Table (1.2).

1.2.12 c kN/m2 (cohesion of soil) and ϕ(angle of internal shearing resistance) by providing direct shear test (Minimum of Two Samples for each layer). Correlations to be as per Table (1.3).

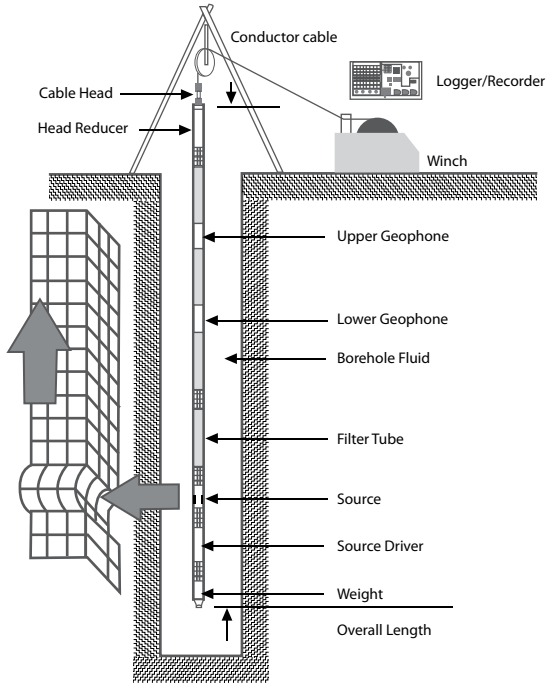
1.2.13 Unit weight of soil (γs) kN/m^3 (above and below the ground water table). Correlations to be as per Table (1.3).

1.2.14 Active, passive, and at rest earth pressure coefficients (ka, kp, and ko). Correlations to be as per Table (1.3).

1.2.15 Unconfined Compressive Strength (UCS) MN/m2 (Minimum of Two samples for each rock layer especially when pile foundation is used, enabling the structural designer for calculations of the socket friction and end bearing). Table (1.4) indicates Rock Fracture State, Table (1.5) indicates Rock Strength Classification & Table (1.6) indicates Sandstone / Conglomerate Properties.

1.2.16 Pressure meter/dilatometer test, Fig. (1.4), must be done if the soil stiffness values versus depths are required as and when soil stratum is modelled using advanced material model through finite element analysis of the geotechnical structure. Table (1.7) indicates Elastic Parameters for Various Soils.

1.2.17 Piezo Cone Penetration Test for reclaimed soil.



Concept illustrataion of P.S logging system

Fig. (1.4). Pressure meter / Dilatometer Test