

3.4 Dilatometer Test (DMT)

(1) General

- The DMT is carried out by pushing a dilatometer blade into the soil, and then using gas pressure to inflating and deflating a 60 mm dia. thin steel membrane (mount on one side of blade) by using gas pressure.

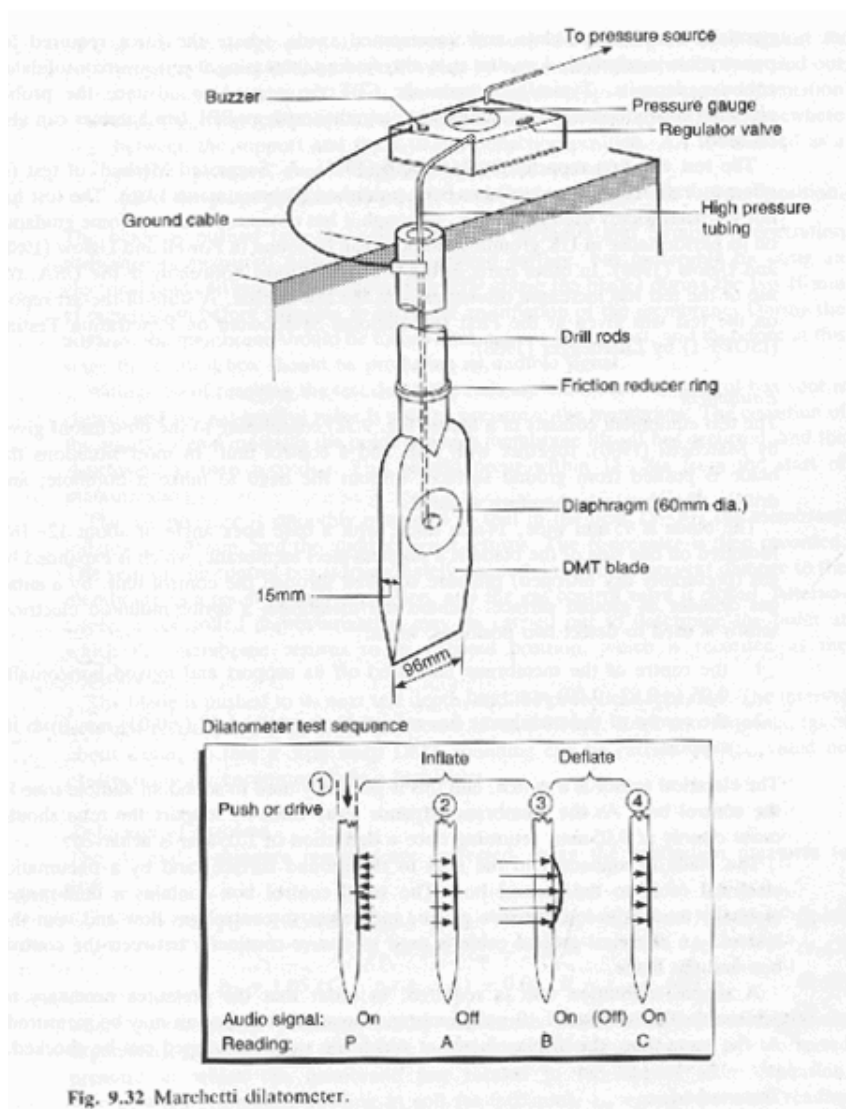


Fig. 9.32 Marchetti dilatometer.

- Record pressures at ② (A) of 0.05mm inflation, ③ (B) 1.10mm inflation ④ (C) 0.05mm deflation

- With calibrating pressure, find p_0 at 0.0mm, p_1 at 1.10mm inflation and p_2 at 0.05mm deflation.

$$p_0 = 1.05(A - Z_M + \Delta A) - 0.05(B - Z_M - \Delta B)$$

$$p_1 = B - Z_M - \Delta B$$

$$p_2 = C - Z_M + \Delta A$$

ΔA and ΔB are pressure of membrane of 0.05 mm and 1.10 mm inflation or deflation in air.

Z_M is initial pressure reading

- DMT indices

- ① Dilatometer modulus

$$E_D = 34.7(p_1 - p_0)$$

- ② Horizontal index

$$K_D = \frac{p_0 - u_0}{\sigma'_{v0}}$$

- ③ Material index

$$I_D = \frac{p_1 - p_0}{p_0 - u_0}$$

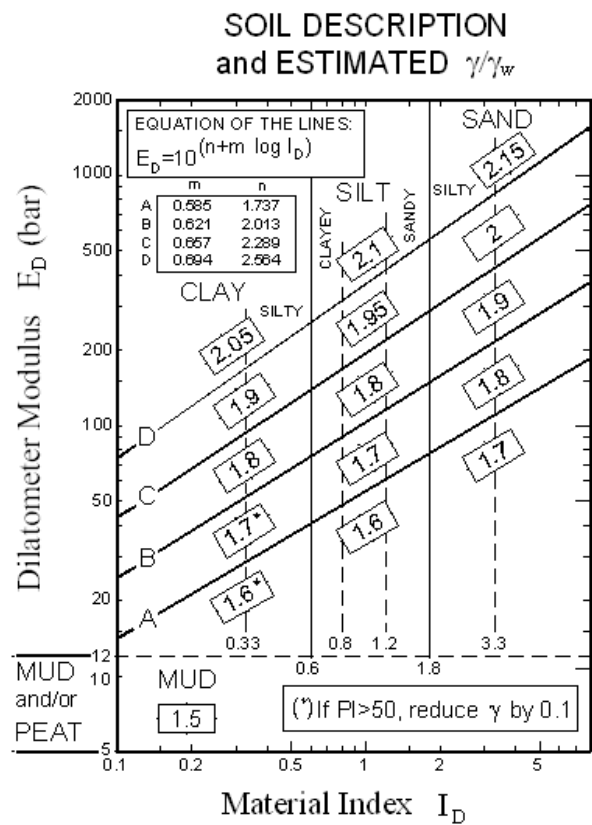
- ④ Pore pressure index

$$U_D = \frac{p_2 - p_0}{p_0 - u_0}$$

(2) Determination of soil parameters

i) Soil classification

- Marchetti and Crapps(1981)



ii) undrained strength

- Marchetti (1980)

$$s_u = 0.22\sigma'_{v0} (0.5K_D)^{0.25}$$

- Roque et al (1988)

$$s_u = \frac{(p_2 - \sigma_{h0})}{N_D}$$

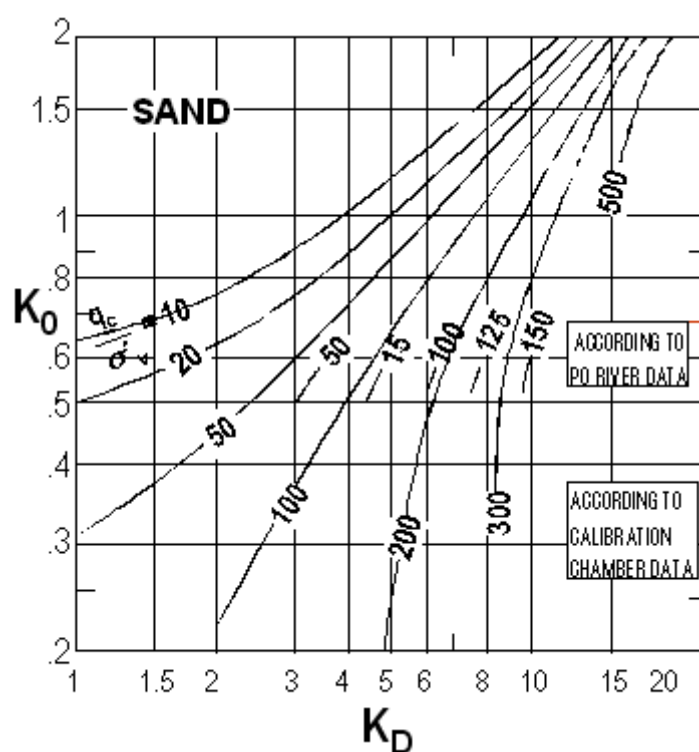
Soil Type	N_D
Brittle clay and silt	5
Medium clay	7
Non-sensitive plastic clay	9

iii) K_0 value

- Clayey soils(Marchetti, 1980)

$$K_0 = \left(\frac{K_D}{1.5} \right)^{0.47} - 0.6 \quad (I_D \leq 2)$$

- Sandy soil (Marchetti, 1985) : together with q_c



iv) Horizontal coefficient of consolidation (c_h)

- Measure C value repeatedly at the same location, with time
- Determine c_h

$$C_h = 600 \left(\frac{T_{50}}{t_{50}} \right) \quad [\text{mm}^2/\text{min}]$$

E/s_u	100	200	300	400
T_{50}	1.1	1.5	2.0	2.7

