20.14. ROWE'S MOMENT REDUCTION CURVES

As sheet piles are relatively flexible, these deflect considerably. Their flexibility causes a redistribution of lateral earth pressure. The net effect is that the maximum bending moment is considerably reduced below the value obtained for the free-earth supports discussed in the preceding section.

Rowe (1952) developed a theoretical relation between the maximum bending moment and the flexibility of the sheet pile and gave moment reduction curves. The relative flexibility (ρ) is defined as

$$\rho = \frac{(h + D)^4}{EI} = 1.1 \times 10^{-6} \frac{(H)^4}{EI} \qquad \text{...(20.45)}$$

where h = retained height (m), D = actual driving depth (m),

E = Young's modulus of the pile material (MN/m^2) and I = moment of inertia of the pile (m^4/m),

H = total length of the pile.

For anchored sheet piles in cohesionless soils, the relative density is important. The relative depth of anchor factor, $\beta = e/H$ is also relevant.

For anchored sheet piles in cohesive soils, the stability number (S_n), as given below, is also required.

$$S_n = 1.25\, c/(\gamma\, h) \qquad \text{...(20.46)}$$

The relative height of piling factor $\alpha = h/H$ is also important for cohesive soils.

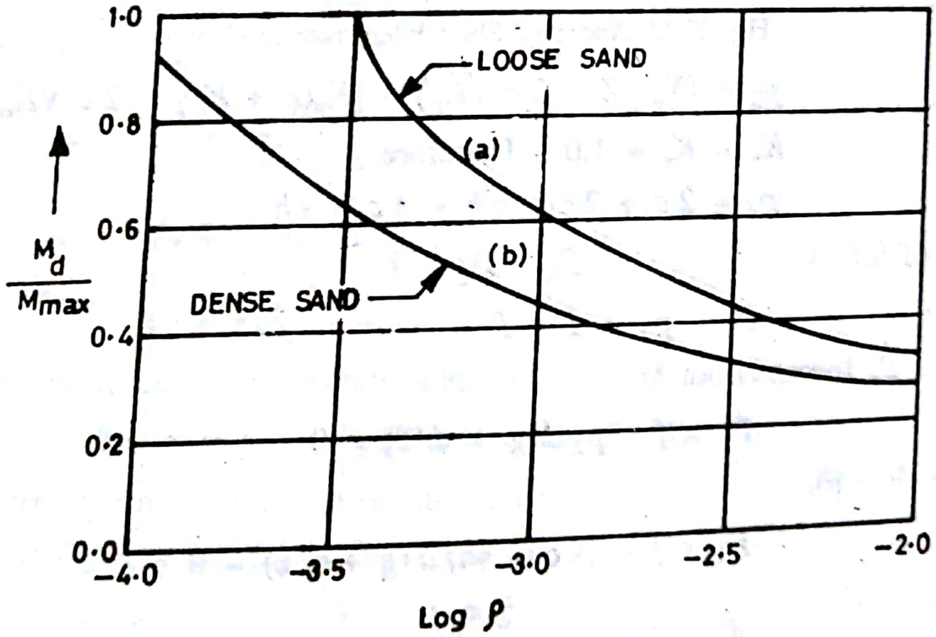

Fig. 20.24.

Fig. 20.24 shows a typical moment reduction curves for cohesionless soils. The ratio M_d/M_{max} is determined directly for the given value of ρ. The curve (*a*) is for loose sand (relative density = 0) and the curve (*b*) for dense sand (relative density = 100%). The value of M_{max} being known from the free-earth support analysis, the design moment M_d can be computed.

(For more details, the original paper may be consulted).