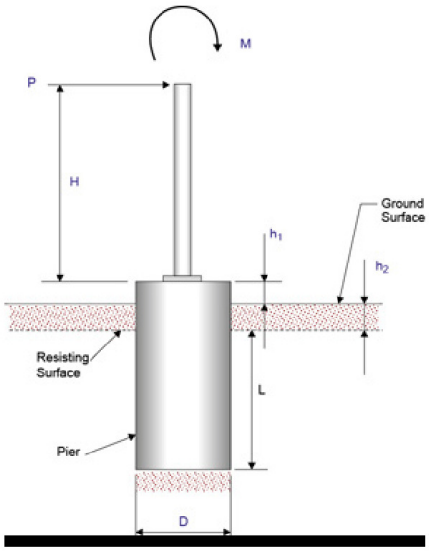
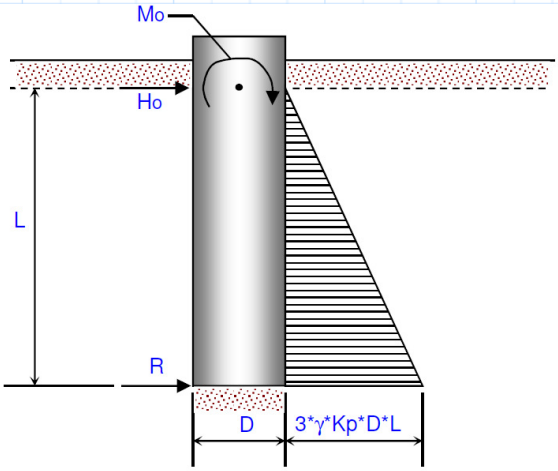
Assumptions: A pole foundation consists of a rigid round pier that is assumed to be free or unrestrained at the top and subjected to lateral loads

References: USS/Teng Method

L = Recommended embedment length (ft)
H_o = Lateral force applied at resisting surface (kip)
K_p = Passive earth pressure coefficient
γ_s = Unit weight of soil (pcf)
D = Pier foundation diameter (ft)
M_o = Moment applied at resisting surface ($kip \cdot ft$)
h_1 = Pier height above soil (ft)
h_2 = Depth to resisting surface (ft)
H = Height to lateral load from base (ft)
P = Lateral load (kip)
M = Additional moment, if present ($kip \cdot ft$)
OLF = Overload factor





$D := 5\ ft \quad h_1 := 0\ ft \quad h_2 := 0\ ft \quad H := 10\ ft \quad \gamma_s := 134\ pcf \quad K_p := 3.6 \quad OLF := 2$
$P := 120\ kip \quad M := 0$

Calculations

$H_o := P \cdot OLF = 240\ kip \qquad M_o := M + P \cdot (H + h_1 + h_2) \cdot OLF = (2.4 \cdot 10^3)\ kip \cdot ft$

$$L^3 - \frac{(2 \cdot H_o \cdot L)}{(K_p \cdot \gamma_s \cdot D)} - \frac{(2 \cdot M_o)}{(K_p \cdot \gamma_s \cdot D)}$$