| Case | Pile depth | Base granular soil thickness | Pile Cap Width | $B_{eq}$ | $B_{eq}$ depth | POI (depth to center of "clay") | $\sigma_i'$ @ POI |
|---|---|---|---|---|---|---|---|
| 2-8 | 30 | 8 | 11 | 11+8 = 19 | 30+8 = 38 | 38+3.5 = 41.5 | 8(105) + 22(97) + 8(128) + 3.5(115) - 33.5(62.4) = 2310 |

**no surcharge fill**

only 18' of soil

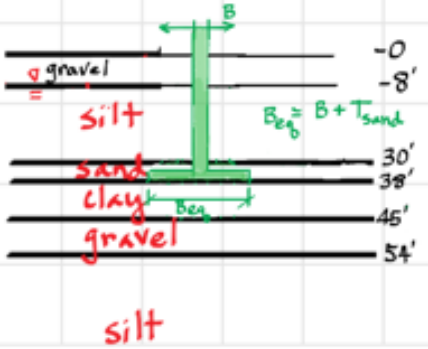
| $\sigma_p'$ | OCR | $\frac{S_u}{\sigma_i'}$ @ OCR | $S_u$ | $q_u = 8S_u + q$ (Basement = 20 ⇒ 18' of $q_b$) | $FS = \frac{q_{ult}(B_{eq})^2 - (V_{soil})(\gamma_{soil})}{P_{cent\ col}}$ |
|---|---|---|---|---|---|
| 2310(1.05) = 2426 | 1.05 | 0.52 | 0.52(2310) = 1201 | 8(1201) + [10(97) + 8(128)] = 11,600 | $\frac{11{,}600(19)^2 - 19^2(18)(110)}{1{,}200{,}000} = \frac{3{,}470{,}000}{1{,}200{,}000} = 2.89$ |

**with surcharge fill**

only 18' of soil

| $\sigma_p'$ | OCR | $\frac{S_u}{\sigma_i'}$ @ OCR | $S_u$ | $q_u = 8S_u + q$ (Basement = 20 ⇒ 18' of $q_b$) | $FS = \frac{q_{ult}(B_{eq})^2 - (V_{soil})(\gamma_{soil})}{P_{cent\ col}}$ |
|---|---|---|---|---|---|
| 2310+4000 = 6310 | $\frac{6310}{2310} = 2.73$ | 0.8 | 0.8(2310) = 1848 | 8(1848) + [10(97) + 8(128)] = 16,780 | $\frac{16{,}780(19)^2 - 19^2(18)(110)}{1{,}200{,}000\ lb} = 4.45$ |

Case 2-2




Bearing capacity - undrained only

$N_c^* = N_c s_c i_c d_c$

$N_\gamma = 0$ $N_q = 1$

[use $N_c^* = 8$ which also accounts for the small clay layer thickness]

Analyze the $B_{eq}$ foundation not the B foundation.