

1.4.4.a Settlement:

If shallow footings exist and no improvement has done, differential settlement more than the maximum liquefaction induced settlement should be expected and considered.

1.4.4.b Surface manifestation:

Surface manifestation such as sand boils or ground fissure may be occurred during earthquake shaking emphasising that ground settlement have already takes place noting that the settlement may be occurred even with the absence of surface manifestation. The evaluation of the potential for ground cracking and sand boils (Ishihara, 1985) is based on the thickness of the potentially liquefiable layer and the thickness of the non-liquefiable crust.

1.4.4.c Loss of bearing capacity for shallow foundation:

As per the Implementation Committee, the loss of bearing capacity may be significantly occurred if the induced vertical stresses on liquefiable layer located at certain depth exceeds 10% of the bearing pressure imposed by the foundation. There is no recognized analytical method to evaluate the loss of bearing capacity at this time. The Committee recommends that Ishihara’s method of surface manifestation analysis to be used for shallow foundations.

1.4.4.d Loss of lateral soil stiffness:

Loss of lateral soil stiffness has a greater impact on the design of piling and shoring works. The negative skin friction for the untreated fill layer shall be considered in determination of the pile capacity. The pile shall be considered unconstrained along the untreated layer in both vertical and lateral analysis. Lateral load to be considered due to ground motion from an earthquake of $a=0.225g$ at ground level or $0.15g$ at cap rock level.

1.4.4.e Lateral spreading or land sliding:

Such spreads can occur on gently sloping ground or where nearby drainage or stream channel can lead to static shear biases on essentially horizontal ground (Youd, 1995).

1.4.5 LATERAL EXTEND OF GROUND IMPROVEMENT

To mitigate the liquefaction hazards, the treatment of the fill material shall be extended laterally by two-thirds the liquefiable layer thickness beyond the whole building foundation limits, (Lai 1988).

1.5 SHORING GUIDELINES

- a) For neighbouring shallow foundation or for excavations deeper than 1.50 m, suitable side protection have to be ensured so that the excavation shall not pause a threat to the personnel working on site or cause any damage to nearby existing buildings or roads. Fig. (1.33) shows the method statement for contiguous, secant and soldier piles shoring systems.

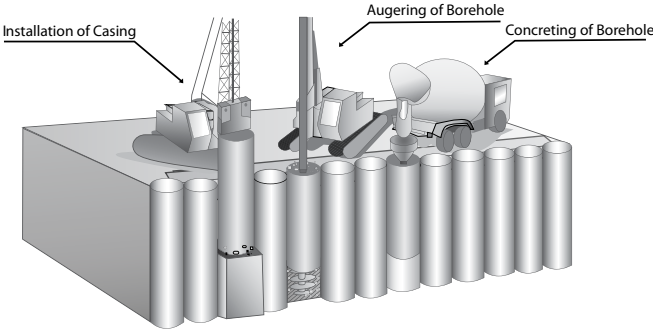


Fig. (1.33-a). Contiguous Piles Shoring System

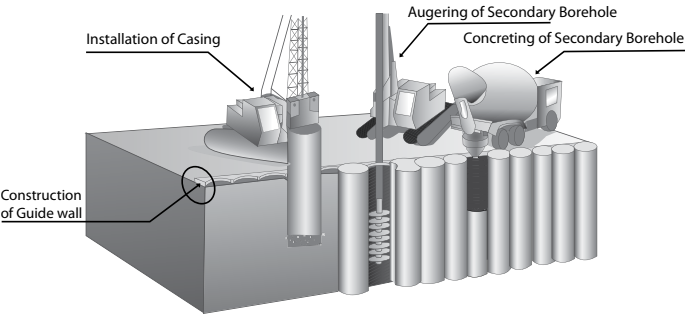


Fig. (1.33-b): Secant Piles Shoring System