

Short Laterally Loaded Pile Calculation (“SHORTPIL”)

Description: "SHORTPIL" designs a short laterally loaded rigid caisson. Typically, this program will be used to design foundations for light standards and traffic masts. It requires that the pile be free to rotate at the top. Also the ratio of length divided by width must be less than 10. It is recommended that the designer use "LATPILE" to design piles falling outside these limits, as well as to determine deflections.

Theory: The method used was derived by Bengt B. Broms, published in ASCE Journal of the Soil Mechanics and Foundations Divisions, March 1964, May 1964 and May 1965.

The method uses an ultimate strength approach. The designer is required to apply a load factor to the horizontal load and a strength reduction factor to the soil properties.

The ultimate pressure of clay at failure is,

$$P_{\max, \text{clay}} = 9 * C_u$$

where  $C_u$ =cohesion= $Q_u/2$

$Q_u$ =unconfined comp. strength

The ultimate pressure of sand at failure is,

$$P_{\max, \text{sand}} = 3 * W_t * \text{Depth} * K_p$$

where  $W_t$ = soil weight

$K_p$ =Rankine passive soil coefficient

The program describes the theory in the printed output.

It should be noted that when clay is loaded for a long time the cohesion will reduce to near zero strength. Therefore, the designer should analyze clay as a cohesionless soil for long term loading.

Also, repetitive loading of a pile in sand in a vibratory nature may produce excessive deflections which the designer must consider. This type of loading is outside the scope of the program.