A SIMPLIFIED METHOD OF PILE GROUP UNDER HORIZONTAL FORCE

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Considering the stress relaxation and pressure overlapping effect of earth beside piles, a formula is theoretically deduced to calculate the pile group reduction ratio of horizontal foundation coefficients. Based on the observation data and calculation, a simplified formula to calculate the pile group reduction ratio of horizontal foundation coefficient is given to make pile group calculation to be the single pile calculation after a reduction of horizontal foundation coefficient. The conclusions are as follows:

1. Under horizontal force, piles of the pile group have horizontal movements. The rigidity of earth between piles decreases because of stress relaxation and overlapping of earth pressure, which also cause decrement of horizontal foundation coefficients. This article suggests formulas to calculate the pile group reduction ratio of horizontal foundation coefficients (or proportion coefficients) of every pile in the pile group. The calculation results are close to the measured values in the experiment. The formulas are relatively well applicable and especially given consideration to soil properties.

2. Based on the horizontal foundation coefficient (or proportion coefficient) of the single pile measured ,in the experiment and ζ calculation formula recommended in this article, the horizontal foundation coefficient of every pile in the pile group could be calculated, and the pile group calculation could be simplified to the single pile calculation after a reduction of horizontal foundation coefficient. For the pile row with all straight piles designed as pile group, under non-reciprocating horizontal load, the pile which is the farthest from the loading point could be designed as a single pile; other piles could be designed as the single pile after a reduction of horizontal foundation coefficients. The reduction coefficients could be taken according to the recommended formula $K' = \zeta K$ ...in which, K --horizontal foundation coefficient of a single pile (or proportion coefficient) ; ζ --pile group reduction ratio of horizontal foundation coefficient (or proportion coefficient).

3. Following should be noted when the calculation formulas are applied: (1) formulas are only suitable for the pile group formed by vertical piles and with equal row pile spans.

(2)the pile group maybe totally break when the pile span is too less, the formulas should be discreetly applied when $S > 3D$.

(3)When the pile span is relatively large, the stress relaxation of earth in front of the

back-row piles has an obvious decrement, which is not reflected in the formulas and makes the calculation values on the low side. The above formula should be discreetly applied when $S > 6D$.

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