Discussion of "Centrifuge Model Study of Laterally Loaded Pile Groups in Clay" by T. Ilyas, C. F. Leung, Y. K. Chow, and S. S. Budi

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The discusser realizes that the authors have struggled to ensure that the paper fits within the size limit of the ASCE *Journal*, this limitation no doubt forced them to leave out a few points that could have made the results more clear to a reader, such as comments on the potential influence of the boundary conditions. The width of the 500-mm square box corresponds to 46 single-pile diameters (D). However, in relation to the width B of the respective pile group, the box width ranges from $4.2B$ through $11.5B$ and the distance from the edge of the pile group to the side of the box ranges from $1.6B$ through $5.2B$. The authors have compared the response of groups consisting of different numbers of piles with the piles placed at a spacing of $3D$ and $5D$, but they have not addressed the boundary conditions. The discusser would expect the nearness to the box side for the larger pile groups to have had a substantial influence on the results, however. Therefore, conclusions drawn from comparing results from tests on the different pile groups, and with real-life pile groups, are open to question. The inequality of the distance to the side of the box is illustrated in Fig. 1, which shows the box and pile groups of the original paper's Fig. 2(e) (4 × 4 piles at $3D$ spacing) and Fig. 2(g) (3 × 3 piles at $5D$ spacing) plotted to the scale of the respective pile-group width.

A comparison of the influence of spacing ($3D$ versus $5D$) at equal boundary conditions is probably possible for the pile groups in the paper's Fig. 2(e) (4 × 4 piles at $3D$ spacing) and 2(g) (3 × 3 piles at $5D$ spacing), which have similar "width-distance" to the side of the box, i.e., $1.8B$ and $1.6B$, respectively. Figs. 3 and 4 include the average load displacement of the two pile groups, suggesting a slightly less stiff response of the average of the piles in the smaller-width pile group, as shown in the original paper's Fig. 2(e), as opposed to the average of the piles in the larger-width group, shown in Fig. 2(g). A comparison of individual piles is also possible for the approximately equal boundary conditions in pile groups "(e)" and "(g)." Figs. 11(a) and 11(b) in the original paper, however, present the load-displacement curves for pile groups in "(d)" and "(e)" (also 3 × 3 and 4 × 4 number of piles, respectively, both at $3D$ spacing), which pile groups have a distance to the box side of $2.8B$ and $1.8B$, respectively. The curves in Fig. 11, therefore, do not provide a comparison at equal boundary conditions.

With regard to the shadowing effect expressed by the authors in the "p-multiplier" approach, the discusser is reminded of the late Dr. G. G. Meyerhof's recommendation to allow only for resistance from the lead row plus side-row piles and to disregard the inside piles. For example, if the loads measured for the center and rear piles in Fig. 11(a) are distributed on the other seven piles (lead row and outer row piles), the average curve (see Fig. 3) would lift to become very close to the curve for the single pile.

The authors' Conclusion 3 refers to "lateral load and bending moment capacity." However, the discusser is puzzled because nowhere in the paper is either type of capacity mentioned, and nowhere is any curve shown that can be used to deduce a "capacity," i.e., ultimate resistance.

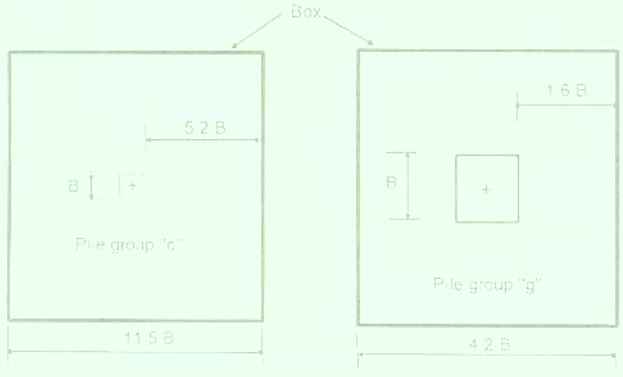

Fig. 1. Comparison of scale effect in terms of width of box to width of pile group

Corrections

The "box" is cylindrical not square. The diameter of the box is 550 mm. The 500-mm quote is a typo. Note 46 times the 12 mm pile diameter is equal to 552 mm. Diameter of equivalent circular area is 13.5 mm.

Fellenius, B. H., 2005. Centrifuge model study of laterally loaded pile groups in clay. Discussion. ASCE Journal of Geotechnical and Environmental Engineering, Vol. 131, No. 10, p.1305.