Theoretic Evaluation of Development of Soil Plug in Driving Open-Ended-Pile

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ABSTRACT

Empirically, it is known that the thickness of the earth plug due to the penetration of soil into the open-ended pile is proportional to the diameter of the pile and there is a limit value of the thickness. In this study, a theoretical approach to the calculation of the thickness of the soil plug was presented using a simple and perfectly symmetrical open type pile, and it was made possible to evaluate the thickness of the soil plug with various pile shapes. Based on the relationship between Housel's bearing capacity of shallow foundation and shape (area and edge) of the footing, the convergence tendency of the friction coefficient ($\tan\phi$) which can be expressed as the internal friction angle (ϕ) of the soil flowing into the pile wall and the static earth pressure coefficient ($1-\sin\phi$) was derived. The thickness of the theoretical earth plug according to the shape of the pile could be calculated by the derived process. In addition, the potential extensive use of the derived theory that can predict the behavior of soil under constrained conditions is presented.

REFERENCES

Housel, W. S. (1929), "A Practical Method for the Selection of Foundations Based on Fundamental Research in Soil Mechanics", University of Michigan Research Station, Bulletin No. 13, Ann Harbor.

Verma, A. (2018), "Development of Soil Slug in Pipe Pile: A Review", International Journal of Applied Engineering Research, 13(11), 8929-8935.