

**INVESTIGATION OF TWO-DIMENSIONAL
INTERACTION
BETWEEN PILES DUE TO PILE DRIVING
ACTION**

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Degree of Master of Engineering

Department of Civil Engineering

University of Moratuwa
Sri Lanka

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ABSTRACT

Pre-Cast piles, which are mostly friction piles, are commonly used as deep foundations for bridges, multi storied buildings and as tower foundations. During the design stage, Engineers are not fully informed of the effect on adjacent pile due to pile driving and minimum safe distance between two piles for driving. The research is to investigate the effect on adjacent piles due to pile driving and to suggest suitable minimum spacing between piles.

Pile driving displaces adjacent piles. It is simulated numerically using Finite Element Analysis software package PLAXIS. This project investigates numerically the influence of spacing on the displacement of afore driven piles due to driving a pile in the case of driven piles, by using the Finite Element Method. Horizontal displacement caused by the above activities in the pile is used as the prime indicator of disturbance. Pile material and soils are idealized as linearly elastic materials and different soils are represented by varying the Young's modulus and Poisson's ratio. The pile is assumed as infinitely long walls and the smear zone is modeled around the pile using material of lower stiffness considering the compression of soil around. Pile driving is modeled by progressive expansion of a cavity and a parametric study is carried out with different soils and with different spacing.

Investigation is limited only to the variation of lateral displacements at the head of the adjacent pile caused by the actions mentioned above.

Finally, suggestions are made to validate the model, when relevant field data can be accessed.

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G.G.N.N.Amarakoon

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LIST OF ABBREVIATIONS

Abbreviation	Description
Constitutive model	Relationship between forces and corresponding displacement
E	Young's Modulus
d	Diameter of the pile
F	Force
FE/FEM	Finite Element Method
Head	Top part of a pile
Pile	Slender member used as foundation when the soil is weak
Plaxis V8.2	Finite element programme developed in Netherlands
Spacing	Centre to centre distance between piles
Tip	Bottom part of the pile
USACE	United States Army Corps of Engineers
ν	Poisson's ratio

