

Plastic Deformation Behavior of a Pre-Bored Pile Filler Material Due to Lateral Cyclic Loading in Sandy Soil

Authors : A. Y. Purnama, N. Yasufuku

Abstract : The bridge structure is a building that has to be maintained, especially for the elastomeric bearing. The girder of the bridge needs to be lifted upward to maintain this elastomeric bearing, that needs high cost. Nowadays, integral abutment bridges are becoming popular. The integral abutment bridge is less costly because the elastomeric bearings are eliminated, which reduces the construction cost and maintenance costs. However, when this elastomeric bearing removed, the girder movement due to environmental thermal forces directly support by pile foundation, and it needs to be considered in the design. In case of pile foundation in a stiff soil, in the top area of the pile cannot move freely due to the fixed condition by soil stiffness. Pre-bored pile system can be used to increase the flexibility of pile foundation using a pre-bored hole that filled with elastic materials, but the behavior of soil-pile interaction and soil response due to this system is still rarely explained. In this paper, an experimental study using small-scale laboratory model test conducted in a half size model. Single flexible pile model embedded in sandy soil with the pre-bored ring, which filled with the filler material. The testing box made from an acrylic glass panel as observation area of the pile shaft to monitor the displacement of the pile during the lateral loading. The failure behavior of the soil inside the pre-bored ring and around the pile shaft was investigated to determine the point of pile rotation and the movement of this point due to the pre-bored ring system along the pile shaft. Digital images were used to capture the deformations of the soil and pile foundation during the loading from the acrylic glass on the side of the testing box. The results were presented in the form of lateral load resistance charts against the pile shaft displacement. The failure pattern result also established due to the cyclic lateral loading. The movement of the rotational point was measured due to the pre-bored system filled with appropriate filler material. Based on the findings, design considerations for pre-bored pile system due to cyclic lateral loading can be introduced.

Keywords : failure behavior, pre-bored pile system, cyclic lateral loading, sandy soil

Conference Title : ICASSI 2018 : International Conference on Analysis of Soil-Structure Interaction

Conference Location : Bali, Indonesia

Conference Dates : October 22-23, 2018