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ANALYSIS OF ADDITIVE LOAD OF PIPE JACKING CONSTRUCTION ON ADJACENT PILE

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Abstract

Based on the method of images, the three-dimensional soil additive load formula caused by pipe jacking soil loss was derived by using non-uniform soil displacement mode. Combining the formulas of additive load induced both by bulkhead additive thrust, force of friction between shield and soil, force of friction between follow-up pipes, which are based on the Mindlin solution, the formulas of total soil additive load were obtained. The distribution regularity of total additive load on adjacent pile during pipe jacking construction, which are caused by all of the factors, were analyzed by using an analytical calculation case. The analytical results show that, the distribution regularity of additive load is closely related with the relative position of pile and shield, and it is a three-dimensional problem. In the thrust direction, the additive stress changes from tension behind into pressure ahead of the excavation face. The additive stress in thrust direction to the pipe wall has larger extension over the additive stress in perpendicular direction. In addition, the value of additive load in thrust direction is bigger than that of perpendicular to the pipe wall. The pile foundation is subject to a small vertical additive stress, and in the vicinity of the tunnel axis, there is an additive stress in the opposite direction to both ends showing bow shaped distribution curve.

Key words: additive load, bulkhead additive thrust, force of friction, pipe jacking, pile foundation

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