

Study on the Spacing of Group Piles Considering the Arching Effect

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ABSTRACT

Typically, group pile foundation designs require that the center-to-center spacing between piles be at least 1.5 times the pile diameter. When piles are placed too close together, overlapping stress in the soil leads to the group pile effect, reducing bearing capacity. However, because group pile behavior is influenced by a complex interplay of factors, it's overly simplistic to assess this effect based solely on pile spacing. This study uses theoretical approaches, incorporating the Arching Effect and the Terzaghi model, to estimate the optimal spacing range considering the soil's shear resistance angle. Laboratory model experiments show that group efficiency exceeds 100% when the center-to-center spacing is less than 1.5D, and that the Arching Effect at the pile tips enhances bearing capacity. These findings suggest that new design standards for group piles, which account for spacing ranges tailored to specific ground conditions, could improve efficiency over current methods.

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