

INTERACTION BETWEEN NEW AND EXISTING FOUNDATIONS DURING PILE INSTALLATION

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Abstract

Dense urban areas are becoming a challenge for many large growing cities due to the urbanisation. Gothenburg in Sweden is one of many examples of a city facing this challenge while also being located in an area with challenging soil conditions, constituting of deep deposits of soft clay. This needs to be considered during the design phase of large constructions, in which often requires deep foundations that can affect surrounding structures due to the mass displacements originating from the pile installation. This Thesis is an investigation of mass displacement due to pile installation in soft soil. The magnitude and extent of the soil movements will be investigated and the impact of existing structures quantified. The analysis was performed with numerical modelling in the geotechnical program Plaxis, where a parameter study was performed. Parameters such as pile length, width of raft, load on structure, soil stiffness, among other parameters, were varied to study the influence on the soil movement and the existing adjacent structure. The results are discussed in relation to analytical calculation methods and field data from similar conditions. The result shows a redistribution of heave and horizontal displacements from pile installation, caused by the interference of an existing piled foundation. The piles in the existing structure redistributed the soil movements while the load had little to no impact. The compressive loads in the existing piles reduced significantly due to nearby pile installation, with a risk of reducing further, leading to tensile loads. The displacements from pile installation acts similar as downdrag but in reverse on the existing piles. In addition to tension, the piles also experience increased bending moment, especially near the pile head, at the perimeter of the raft.