

Investigation on the effects of twin tunnel excavations beneath a road underpass

Abstract:

Excavation of tunnels underneath cities often intrudes the existence of piled foundation and in severe cases, can cause damage to the overlying structures. As there are very limited published case studies concerning understanding of the interaction between piled structure and tunneling, there is a significant uncertainty regarding tunnel-pile interaction. In this paper, a case study of the effects of two subway tunnels on the contiguous pile walls which support a road underpass is investigated using three-dimensional Finite Element simulations. The interaction between the tunnels and piles is investigated with a special attention to the effect of tunnel face pressures. Through the numerical modelling and field data, it is shown with presence of the piles, the minimum pressure to support the tunnel face is less than minimum face pressure in the green field condition. Field experience indicates that excessive tunnel face pressure can cause temporary heave to the ground surface but also cause damage to the cutter head of tunnel boring machine.