

Numerical Investigation on Anchored Sheet Pile Quay Wall with Separated Relieving Platform

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Abstract : Anchored sheet pile has been used worldwide as front quay walls for decades. With the increase in vessel drafts and weights, those sheet pile walls need to be upgraded by increasing the depth of the dredging line in front of the wall. A system has recently been used to increase the depth in front of the wall by installing a separated platform supported on a deep foundation (so called Relieving Platform) behind the sheet pile wall. The platform is structurally separated from the front wall. This paper presents a numerical investigation utilizing finite element analysis on the behavior of separated relieve platforms installed within existing anchored sheet pile quay walls. The investigation was done in two steps: a verification step followed by a parametric study. In the verification step, the numerical model was verified based on field measurements performed by others. The validated model was extended within the parametric study to a series of models with different backfill soils, separation gap width, and number of pile rows supporting the platform. The results of the numerical investigation show that using stiff clay as backfill soil (neglecting consolidation) gives better performance for the front wall and the first pile row adjacent to sandy backfills. The degree of compaction of the sandy backfill slightly increases lateral deformations but reduces bending moment acting on pile rows, while the effect is minor on the front wall. In addition, the increase in the separation gap width gradually increases bending moments on the front wall regardless of the backfill soil type, while this effect is reversed on pile rows (gradually decrease). Finally, the paper studies the possibility of reducing the number of pile rows along with the separation to take advantage of the positive separation effect on piles.

Keywords : anchored sheet pile, relieving platform, separation gap, upgrade quay wall

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