PARAMETRIC STUDY OF THE BEHAVIOR OF CONCRETE BLOCK QUAY WALLS PORT PARS PETROCHEMICAL UNDER NEAR-FIELD EARTHQUAKE

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This paper is focused on a parametric study of the effect of cohesion in a silt layer of soil on the behavior of quay walls under the combined effect of horizontal and vertical components of earthquake (Figure 1).

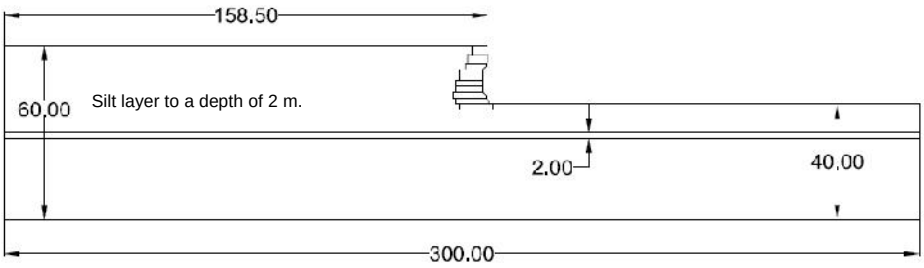

Figure 1. Dimension of model (soil and quay wall)

The wall used in this study is a crookback gravity wall (Figure 2). This wall utilizes its own weight to resist against soil's active pressure, lateral pressure, and gravity. The quay studied is the Southern Pars Quay (Asalouyeh), which is located near an active fault. The effect of the vertical component cannot be ignored in near-field data. On the other hand, this component can cause instability in gravity structures. The ABAQUS FEA software has been used in the current study (Figure 2). Some simplifications were necessary due to the complexity of the model. For instance, the effect of free water is considered using Westergaard's added mass scheme, and the soil conditions are assumed to be such that liquefaction does not occur. Vertical and horizontal components used in the study are the near-field data from Tabas and Bam earthquakes.

The results of the analysis show that under the assumptions of this study and for these two near-field records, the effect of variations in the cohesion of the silt layer, and the vertical component of motion are negligible (Figure 3). The maximum horizontal displacement of top of wall (i.e. 20 cm) was generated under the Bam earthquake excitation, which satisfy the serviceability requirements of OCDI (2002) for block quay wall structures. However, the simplification assumptions made on the analysed system tend to show more stablized wall behaviour. A more comprehensive study, considering a larger ensemble of near-field records is also nessacary to show the reliability and generality of this conclusion.

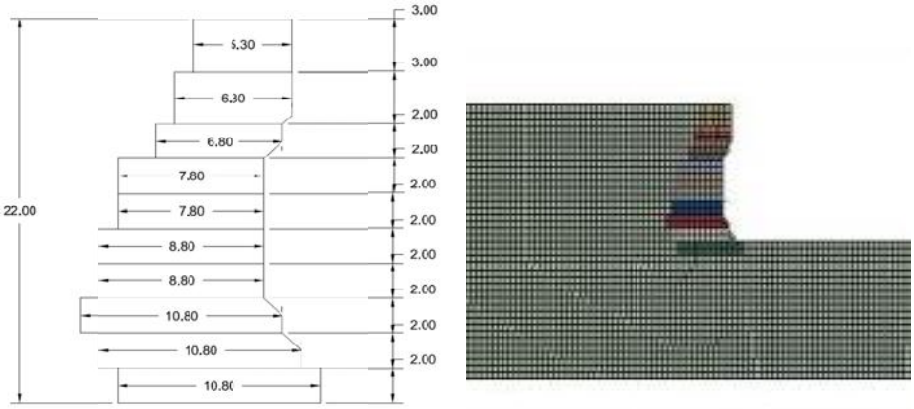

Figure 2. Left: Details of concrete blocks (m), Right: FE mesh in ABAQUS

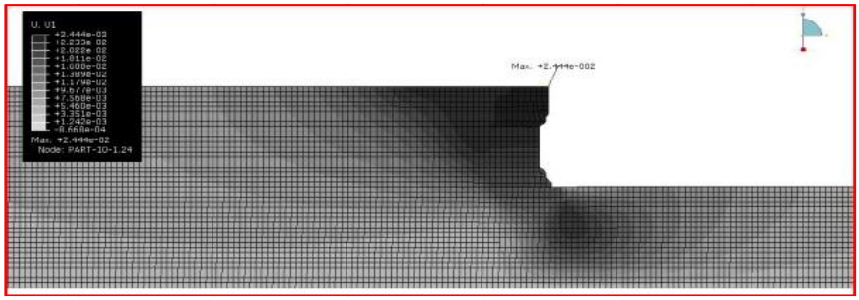

Figure 3. X-direction movement (with friction angle of 20)

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