

RELIABILITY-BASED DESIGN FOR EXTERNAL STABILITY OF NARROW MECHANICALLY STABILIZED WALLS: CALIBRATION FROM CENTRIFUGE TESTS

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Abstract: A narrow mechanically stabilized earth (MSE) wall is defined as a MSE wall placed adjacent to an existing stable wall, with a width less than that established in current guidelines. Because of space constraints and interactions with the existing stable wall, various studies have suggested that the mechanics of narrow walls differ from those of conventional walls. This paper presents the reliability-based design (RBD) for external stability (i.e., sliding and overturning) of narrow MSE walls with wall aspects L/H ranging from 0.2 to 0.7. The reduction in earth pressure pertaining to narrow walls is considered by multiplying a reduction factor by the conventional earth pressure. The probability distribution of the reduction factor is calibrated based on Bayesian analysis by using the results of a series of centrifuge tests on narrow walls. The stability against bearing capacity failure and the effect of water pressure within MSE walls are not calibrated in this study because they are not modeled in the centrifuge tests. An RBD method considering variability in soil parameters, wall dimensions, and traffic loads is applied to establish the relationship between target failure probability and the required safety factor. A design example is provided to illustrate the design procedure.

Full reference:

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