



## Soil Mechanics, Soil Dynamics and Physical Modeling Laboratories



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### Laboratory Analysis Reinforced Soil Walls with Limited Width in front of the Nailed Slopes

#### Abstract

Nowadays, we face numerous limitation regarding stabilization of slopes in construction projects and mountain paths. Moreover, with the daily increase of population, construction of new paths and development of existing ones is an inevitable matter. Lack of space to construct low-cost retaining structures, along with expensive alternatives, has led researchers to seek other solutions. In 2009, Behnia proposed the hybrid system of reinforced soil wall with limited width in front of the nailed slope for stabilization of deep trenches at the B<sup>noo</sup>-ye <sup>ft</sup>b project in Tehran's Shahr-e Ziba district. By nailing the available soil, pressure on the mass of reinforced soil was reduced, and establishment of connection between the above layers of reinforcers helped the system regarding overturn. In 2011, Rahimi studied this system with a case study of the B<sup>noo</sup>-ye <sup>ft</sup>b project using numerical modeling in PLAXIS. Furthermore, in 2014, Kamali studied the system's seismic performance. In the present study, as very few studies have been conducted in this field, and, in previous researches, only numerical modeling and case studies have been conducted on a real sample, building physical model in the laboratory and performing static loading upon them, until bringing the samples to the point of rupture, have been the main goals. In the present thesis, taking into account the available time, it has been tried to qualitatively study the 4 parameters of moving the loading foundation, changing the width of the reinforced soil wall, increasing the number of nails, and increasing the number of connecting layers of the reinforcers. The results of experiments were then compared, and, by taking pictures of them, the effect of each parameter on the rupture trend of the samples was determined. By comparing the bearing capacity diagram in different experiments, it was witnessed that despite the reduction of the reinforced soil wall's width up to a half, by nailing the laboratory samples and connecting the reinforcing layers, equal or even greater bearing capacity can be achieved.

**Keywords:** dimensional analysis, hybrid system, nailed slope, physical model, reinforced soil wall, static loading experiment, wedge rupture