

Investigation of Effective Parameters on Pullout Capacity in Soil Nailing with Special Attention to International Design Codes

Authors : R. Ziaie Moayed, M. Mortezaee

Abstract : An important and influential factor in design and determining the safety factor in Soil Nailing is the ultimate pullout capacity, or, in other words, bond strength. This important parameter depends on several factors such as material and soil texture, method of implementation, excavation diameter, friction angle between the nail and the soil, grouting pressure, the nail depth (overburden pressure), the angle of drilling and the degree of saturation in soil. Federal Highway Administration (FHWA), a customary regulation in the design of nailing, is considered only the effect of the soil type (or rock) and the method of implementation in determining the bond strength, which results in non-economic design. The other regulations are each of a kind, some of the parameters affecting bond resistance are not taken into account. Therefore, in the present paper, at first the relationships and tables presented by several valid regulations are presented for estimating the ultimate pullout capacity, and then the effect of several important factors affecting on ultimate Pullout capacity are studied. Finally, it was determined, the effect of overburden pressure (in method of injection with pressure), soil dilatation and roughness of the drilling surface on pullout strength is incremental, and effect of degree of soil saturation on pullout strength to a certain degree of saturation is increasing and then decreasing. therefore it is better to get help from nail pullout-strength test results and numerical modeling to evaluate the effect of parameters such as overburden pressure, dilatation, and degree of soil saturation, and so on to reach an optimal and economical design.

Keywords : soil nailing, pullout capacity, federal highway administration (FHWA), grout

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