

## The Effect of Grading Characteristics on the Shear Strength and Mechanical Behavior of Granular Classes of Sand-Silt

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**Abstract :** Shear strength of sandy soils has been considered as the important parameter to study the stability of different civil engineering structures when subjected to monotonic, cyclic and earthquake loading conditions. The proposed research investigated the effect of grading characteristics on the shear strength and mechanical behavior of granular classes of sands mixed with silt in loose and dense states ( $D_r = 15\%$  and  $90\%$ ). The laboratory investigation aimed at understanding the extent or degree at which shear strength of sand-silt mixture soil is affected by its gradation under static loading conditions. For the purpose of clarifying and evaluating the shear strength characteristics of sandy soils, a series of Casagrande shear box tests were carried out on different reconstituted samples of sand-silt mixtures with various gradations. The soil samples were tested under different normal stresses (100, 200 and 300 kPa). The results from this laboratory investigation were used to develop insight into the shear strength response of sand and sand-silt mixtures under monotonic loading conditions. The analysis of the obtained data revealed that the grading characteristics ( $D_{10}$ ,  $D_{50}$ ,  $C_u$ ,  $ESR$ , and  $MGSR$ ) have significant influence on the shear strength response. It was found that shear strength can be correlated to the grading characteristics for the sand-silt mixture. The effective size ratio ( $ESR$ ) and mean grain size ratio ( $MGSR$ ) appear as pertinent parameters to predict the shear strength response of the sand-silt mixtures for soil gradation under study.

**Keywords :** grading characteristics, granular classes of sands, mechanical behavior, sand-silt, shear strength

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