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Fluidization Mechanism in Fine and Coarse Soils: an Experimental Insight on the Effect of Uniformity Coefficient on the Behavior of Soils

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The dominant geotechnical factors influencing the occurrence of flow slides are investigated by means of a newly-developed ring shear apparatus. The particle size distribution of a soil is usually represented by a parameter known as uniformity coefficient. But, just how reliable is uniformity coefficient? Soils constituted to various uniformity coefficients were classified as well graded (WG), intermediately graded (ING), narrowly graded (NAG) and gap graded (GAG) and tested under a wide range of laboratory conditions. Results show that gap graded specimens have the highest uniformity coefficient but the lowest peak and steady state strengths; with their peak strengths ranked in the following order - WG> ING>NAG>GAG. The steady strength of the specimens are ranked as NAG>ING>WG>GAG.

The higher uniformity coefficient of GAG should have given rise to higher shear strengths but that was not the case thus questioning the reliability of uniformity coefficient as a measure of soil expected soil strength.The results suggest that the pre- and post-failure behaviour of soil samples can differ widely, and that predictions based solely on speculation without careful laboratory tests could backfire.

On conditions triggering liquefaction and flow, the research found that there was a critical pore water pressure above which sudden collapse and liquefaction occurred and below which soil deposits dilated and gained some measure of strength. Compared to the effect of grading, void ratio, rate of loading, and confining stress, exceeding the critical pore pressure appeared to be a bigger factor determining whether or not a soil flow-liquefied.