Coarse additions affect the plasticity and toughness of soil mixtures, Part II: Sand angularity and sand-size uniformity

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# Abstract

The Atterberg limits may offer a useful means to evaluate baseball infield soils because they quantitatively relate soil behavior to water content. Prior research has demonstrated that liquid and plastic limits (LL and PL) of sand-clay mixtures are affected by the quantity and type of admixed sand, but these studies have used <425 μm sand exclusively and little attention has been devoted to sand angularity and sand-size uniformity.

This research was conducted to clarify the effect of sand angularity and sand-size uniformity on the Atterberg limits of soil mixtures containing a range of sand contents and a significant mass percentage 425-2000 μm.

Experiment 1 compared the effect of mixing either an angular or a round sand (both 0.5-1 mm) with a kaolinitic clay at sand contents between 0 and 80%. Little difference was observed in LL and PL, suggesting angularity plays a minimal role on mix performance.

Experiment 2 compared the effect of mixing one of two sands having similar D50 (0.42 and 0.49 mm) but varying uniformity (uniformity coefficients of 1.9 vs. 3.9) with an illitic clay at sand content 0-80%. Mixtures including the high-Cu sand maintained their plasticity to higher sand content (~72.5%) than those produced with the low-Cu sand (~67.5%).

Calculations for the threshold fines content and intergranular porosity agreed closely with the experiments, indicating a potential to estimate TFC from sand porosity alone.