Standardized Definitions and Laboratory Procedures for Soil-Cement Specimens Applicable to the Wet Method of Deep Mixing

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Abstract

The wet method of deep mixing is an important technology used to construct excavation support systems and improve ground beneath embankments and structures. However, a wide variety of terminology and varying definitions for the same terms create confusion and cause miscommunication among designers, contractors, and testing laboratories. Furthermore, different testing laboratories produce quite different strength test results because there is not a standardized and widely-accepted laboratory procedure in the United States for preparing, curing, and testing soil-cement specimens applicable to the wet method of deep mixing. This paper proposes use of a set of well-defined terms, including volume ratio, cement factor, cement factor in-place, cement content, water-to-cement ratio of the slurry, and total-water-to-cement ratio of the mixture. Relationships among these terms are provided in forms that can be used to control construction operations and determine mixture component quantities for laboratory testing. In addition, a laboratory procedure is described that controls the principal factors producing variability in test results. The laboratory procedure is applied to five easily-mixed soils, and the unconfined compressive strengths of the mixtures correlate more strongly with total-water-to-cement ratio than with cement factor, cement factor in-place, or cement content.