

Abstract

Structural grade lightweight aggregates have been successfully utilized in the construction of a wide range of superstructures as a component of structural lightweight concrete. More recently, structural grade lightweight aggregates have been employed in a wide variety of geotechnical applications including backfill behind retaining walls, load compensation conditions and slope stability situations.

The following research investigates the viability of pumice aggregate as a viable structural grade lightweight aggregate for geotechnical fills. A series of tests including minimum and maximum dry unit weight tests, Standard Proctor Compaction tests, grain size analyses and direct shear tests were performed on varying samples of lightweight pumice aggregate.

The results indicate that pumice aggregate has an average minimum and maximum dry unit weight of 30.73pcf and 38.44pcf, respectively; both lower than the specification for lightweight aggregates commonly used in geotechnical applications. The stability of lightweight pumice aggregate is relatively high with internal angle of friction values ranging from 34.5° to 44° corresponding to varying gradations and relative densities. The abrasions resistance of lightweight pumice aggregate was not directly tested during this research; however, the vertical displacement results obtained from the direct shear tests indicate that pumice aggregate may experience breakdown at stresses greater than 2tsf depending on grading and relative density.

Although continued research is required, pumice aggregate is suitable as a structural grade lightweight aggregate under the correct conditions and geotechnical applications.