

Investigation of Sand-Biochar Mixtures as a Potential Roadway Fill Material

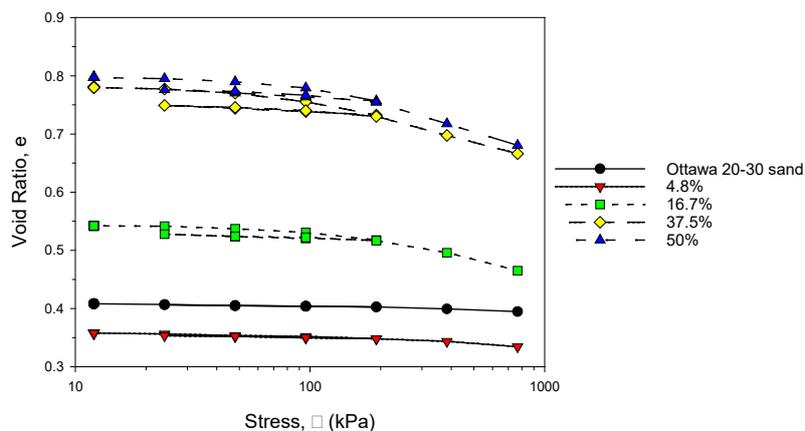
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ABSTRACT

Biochar is a sustainable and lightweight carbon-rich material with a high surface area and porosity. Previous studies reported that biochar can reduce soil erosion and cracking, retain contaminants, and enhance soil aggregation. Given these favorable properties, soil-biochar mixtures have the possibility to serve as a multifunctional lightweight fill material for roadway embankment applications. This research investigated the consolidation and hydraulic properties of sand-biochar mixtures to assess the suitability of sand-biochar mixtures as a lightweight fill material. 1D consolidation tests instrumented with bender elements were performed to investigate the shear modulus and compressibility of the sand, sand-biochar mixtures, and lightly cemented sand-biochar mixtures with different mixing ratios of sand, biochar, and cement. The hydraulic conductivities of different mixtures were also measured. Based on results of the tests, an optimal mixing ratio of sand, biochar, and cement (i.e., high mechanical strength and excellent drainage properties) was determined for lightweight fill applications. The micro-scale morphologies and pore structures of the lightly cemented sand-biochar mixtures were also investigated using a scanning electron microscope (SEM).



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Fig. 1. Void ratio versus applied stress for lightly cemented sand-biochar mixtures.