

USE OF UNDER-UTILIZED COAL-COMBUSTION PRODUCTS IN PERMEABLE ROADWAY BASE

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ABSTRACT

Permeable base-course concrete mixtures were produced using two sources of high-carbon, sulfate-bearing flue-gas desulfurization (FGD) materials (FGD-1 and FGD-2) and one source of variable-carbon fly ash (VCA). A total of nine mixtures were produced in the laboratory.

Three mixtures were produced incorporating up to 45% of FGD-1 (by mass of cement), with one half of the FGD-1 considered to be a cement replacement and the other half considered to be filler. Test results showed that up to 45% of FGD-1 could potentially be used without affecting the compressive and splitting-tensile strengths significantly.

Flexural strength decreased with increasing amount of FGD-1. The mass loss of permeable concrete specimens due to freezing and thawing was very small for up to 30% FGD-1.

Three additional mixtures were made incorporating up to 44% of FGD-2 as an additional cementitious material, not replacing any cement. Compared with Control Mixture (0% FGD-2), the compressive, splitting-tensile, and flexural strengths were equivalent for up to 30% FGD-2, and the freezing-and-thawing resistance was equivalent for up to 15% FGD-2.

The final three mixtures were produced by replacing up to 45% of cement with VCA. The strengths and freezing-and-thawing resistance were equivalent for up to 45% replacement of cement with VCA, with the exception of 14% replacement of cement with VCA, which resulted in lower freezing-and-thawing resistance.