

NO FINES CONCRET USING NON-SPECIFICATION COAL FLY ASH

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ABSTRACT

An investigation was carried out to develop a porous, low-strength concrete for permeable base course that uses large amounts of off-specification coal fly ash (high-carbon ash). Four series of no-fines, permeable concrete mixtures were developed. Fly ash content of the mixtures, expressed as a percentage of total cementitious materials was 0, 17, 33, and 49%, respectively. Cement content was varied between 85 and 128 kg/m³. Tests were performed for fresh as well as hardened concrete properties. Compressive strength, splitting tensile strength, and flexural strength tests were performed at 3, 7, 28, and 91 days. Drying shrinkage, length change under sulfate-exposure, and freezing and thawing resistance of the concrete mixtures were also determined.

Test results indicate that a desired level of compressive strength at the age of 28 days can be made for mixtures containing different percentages of off-specification fly ash. The compressive strength, splitting tensile and flexural strength of all concrete mixtures increased with age. Drying shrinkage of the concrete mixtures was approximately 0.05% or less at the age of 140 days. Permeable concrete mixtures subjected to sulfate-exposure also exhibited 0.03% change at the age of 65 days. At the end of the prescribed cycles of freezing and thawing, percentage weight loss varied between 1 and 3.5%.

Based on these results, it can be concluded that off-specification fly ash could be effectively used in a no-fines, permeable concrete for base course for roadways, highways, and airfield pavements, as well as for parking lots, storage yards, and other similar slab-on-grade construction.