

AN ABSTRACT OF A THESIS

COMPARISON OF AASHTO PLASTIC PCC AIR DETERMINATION TECHNIQUES

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The durability of Portland Cement Concrete (PCC) is a function of the air content it contains. Air Content of PCC can be determined in its hardened or plastic state. Plastic test methods are the most commonly used in industry today. The American Association of State Highway and Transportation Officials (AASHTO) currently specifies four methods for the determination of air content, of plastic PCC. The objective of this research was to recommend the most suitable AASTHO method.

Previous research has shown that with proper air entrainment durability can be increased. Advantages include freeze-thaw resistance, deicer attack resistance, and sulfate attack resistance, scaling reduction on the surface, increased workability, reduction in segregation, and bleeding. However, if too much air is introduced into the mixture reduction of compressive strength, flexural strength, and modulus of elasticity can occur. Therefore, a suitable method for testing air content is needed.

The Class A Tennessee Department of Transportation (TDOT) Mixture was chosen for the study. The research began by acquiring thirty-two three cubic yard batches of the standard mixture, from seven Tennessee concrete producers. The air content, of each batch, was then determined by all four AASHTO methods. Each method was run twice on every middle cubic yard. Next, temperature and slump measurements were recorded for each batch. Compressive strength tests were conducted on both 6"x12" and 4"x8" cylinders. Finally, the results of the plastic PCC tests were compared statistically.

It was found that 4"x8" cylinders produced higher compressive strengths than 6"x12" cylinders. The 4"x8" cylinders, on average, were 11.1% higher at 7-days and 9.6% higher at 28-days. The pressure method was found to be the most suitable currently available AASHTO method for determining plastic air content of normal weight aggregate PCC mixtures. The volumetric method was found to be the most suitable currently available AASHTO method for determining plastic air content of lightweight aggregate PCC.