

### Technical Report Documentation Page

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<b>16. Abstract</b> <p>This study is designed to examine whether traditional limits used to describe the air-void system still apply to concrete prepared with new admixtures and materials. For this research, the concrete mixtures prepared were characterized with traditional and emerging equipment and tests used to measure hydrated cement paste properties. All concrete mixtures were prepared using materials that meet current MDOT specifications.</p> <p>Modern cements and the use of supplementary cementitious materials lead to a hardened cement paste that can potentially have a higher tensile strength and lower permeability. The classic limitation of an air-void system spacing factor less than or equal to 0.2 mm is still a safe value to ensure F-T durability, but evidence exists that concrete mixtures with a spacing factor greater than 0.2 mm can also be F-T durable. The durability of concretes produced with a reduced cementitious material content (CMC), in terms of the laboratory ASTM C666 testing conducted in this study, is superior to traditional 564 lbs/yd<sup>3</sup> CMC concrete.</p> <p>There is general agreement between methods of measuring the total air content of a concrete mixture, although the AVA generally does not perform well for this task. Test results for water content by AASHTO T 318 compared well with the mixture designs when the measured water content is corrected for aggregate absorption. Test results for <i>w/cm</i> by the Cementometer™ were not as promising, but may be improved with further attention to the calibration process. Semi-adiabatic calorimetry proved to be useful tool for identifying delayed-set mixtures.</p>			
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