

This topic is “practice ready.” Yes No

Durable High Early Strength Concrete

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Abstract

Repair of concrete pavements and bridge decks is a major activity in sustaining Kansas highway infrastructure. This maintenance activity often requires high early strength concrete to limit interruption of traffic flow. However, recent evaluation of repair slabs show premature deterioration in the form of map cracking that later morphed into freeze-thaw damage. Currently, repair slabs do not last more than 5 to 10 years. This experimental study will develop an alternative high early strength concrete mixture design and criteria that can provide a durable 20-year pavement service life yet satisfying current minimum strength requirements for opening to traffic. A concrete pavement mix design used for full-depth patching that deteriorated rapidly will be used as the base point of failure. Another concrete pavement patching mix design that has not deteriorated yet will be used as the control mix. Mixes from both mix designs will be subjected to isothermal calorimetry, compressive and tensile strength, dry shrinkage (ASTM C 157), freeze-thaw (ASTM C666 procedure B) (KDOT Modified), scaling resistance (ASTM C672), and surface resistivity (KT-79) tests. By running the tests on these two mix designs and interpreting the data collected, alternative mix designs that contain supplementary cementitious materials such as sulfoaluminate cement, metakaolin, and alternative non-chloride accelerators can be developed. These alternative mix designs should also provide the minimum strength required for opening to traffic and the 20-year pavement patch durability.

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