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7. AUTHOR(S) Steven M. Trost, Ph.D., P.E.				8. PERFORMING ORGANIZATION REPORT NO. SS-0310302	
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16. ABSTRACT <p>Portland cement concrete (PCC) pavement design relies upon the modulus of rupture, or flexural strength, of the concrete as a primary design input. However, the beam specimens required for the flexural strength test (ASTM C78) are heavy and easily damaged prior to testing. As such, many state highway agencies rely upon cylinder specimens tested in compression as a means to monitor and control the quality of concrete pavements. Unfortunately, the failure mechanisms associated with compressive-strength testing do not parallel those of the flexure test, leaving agencies potentially exposed to the risk of accepting concrete pavements of questionable quality.</p> <p>The goal of this research was to overcome the difficulties associated with determining flexural strengths in the field by demonstrating effective alternative methods for verifying concrete flexural strengths. As such, the focus of the research was to examine the suitability of alternative test methods that could potentially replace field-cast beam specimens while still measuring the same or similar strength properties as the flexure test.</p> <p>Three alternative test methods were evaluated – pullout (ASTM C900), direct tension, and modified pullout. Of the three methods investigated, the pullout and direct tension tests both showed promise as potential methods to replace field-cast beams as means for flexural strength quality control, with the direct tension test showing the most promise due to its lower coefficient of variation (7.8% versus 12.3%) and close similarity of its failure characteristics with the flexure test. Though not included as part of the study, the splitting tension test (ASTM C496) is also recognized as an alternative means for flexural strength quality control. A protocol for beneficially using concrete maturity methods for flexural strength quality control is also provided.</p>					
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