Evaluation of Concrete Structures Affected by ASR and/or DEF

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Abstract:

Despite sometimes severe reductions in the strength and stiffness of ASR-affected concrete, there is typically minimal impact on the load-carrying capacity of reinforced structures. Obtaining an accurate estimate of the expansion to-date has also proved difficult; this information can be used to determine if reinforcement has yielded and may by correlated to the loss of mechanical properties of the concrete. Research sponsored by the Texas Department of Transportation seeks to improve on existing evaluation protocols, particularly with respect to the impact of the reaction on structural performance. Three full-scale beams were fabricated, monitored and load tested to determine the impact of severe ASR on flexural capacity and deflection. Extensive testing of smaller-scale laboratory specimens was conducted to attempt to link changes in mechanical properties to expansion. The project also evaluated established non-destructive test (NDT) methods, and identified two promising methods in development, for their potential applicability to ASR-affected concrete.