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DOWEL BAR RETROFITS

Investigation of Curing Time and Strength Development of Prime Coat Materials

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The University of Texas-Austin initiated a series of research studies to investigate prime coat properties.

The first study aims at capturing the effect of weather conditions, application method and type of prime coat on curing time, and also to look into prime coat's other properties such as penetration, permeability and strength.

The second research study focuses on how long it takes for prime coat materials to achieve maximum strength, investigating the relationship between weight loss and strength growth. There is a relationship between weight loss and strength gain, and an experiment was conducted at a TxDOT laboratory to discover the actual relationship. This article summarizes the results of the second experimental study.

To make the results comparable to the first study, the researcher kept the prime coat materials, base material, application method and application rate, etc. the same as the first experiment. Prime coat materials used were MC-30, CSS-1h, SS-1h, AEP, EC-30 and TSB. The base material chosen was limestone, which is most commonly used in Texas. Two application methods, spray on and mixed-in, were used to prepare the specimens.

The test was conducted during the summer of 2011, when average temperature ranged from 73.6 to 101.5 deg F, and average relative humidity was 55.5 percent. The sample was not left outside to cure during rainfall.

The strength and weight of samples was tested every 24 hours. Unconfined compressive strength of primed base samples was tested using a pocket penetrometer. The measurement is done by inserting the shaft to a ¼-in. depth with a smooth constant force into the soil sample. Once the penetrometer is ¼-in. deep, a reading is taken from the top of the indicator ring. One interval on the scale represents 1 kg per sq. cm. (14.2 psi). For each type of prime coat and each application method, three samples were prepared to reduce the random effect that may influence the accuracy of the results.

The curing of prime coat is assumed to end when the reduction in weight drops below 0.1 gram, or when the strength reaches its maximum value, whatever occurs later.

This testing brings the following conclusions:

- TSB has the highest strength among all the prime coat materials
- TSB cures the fastest among all the prime coat materials
- AEP has the lowest strength among all the prime coat materials
- MC-30 cures the slowest, up to 240 hours
- Application methods (spray-on or mix in) have no significant impact on curing time, and
- Application methods have significant impact on unconfined compressive strength; mixed-in type applications have higher strength than sprayed-on type applications.

The curing time and unconfined compressive strength for all prime coat materials are summarized in Fig. 1. For more information on this study please visit www.utexas.edu/research/tppc/news/newsletter_issue_23.pdf.

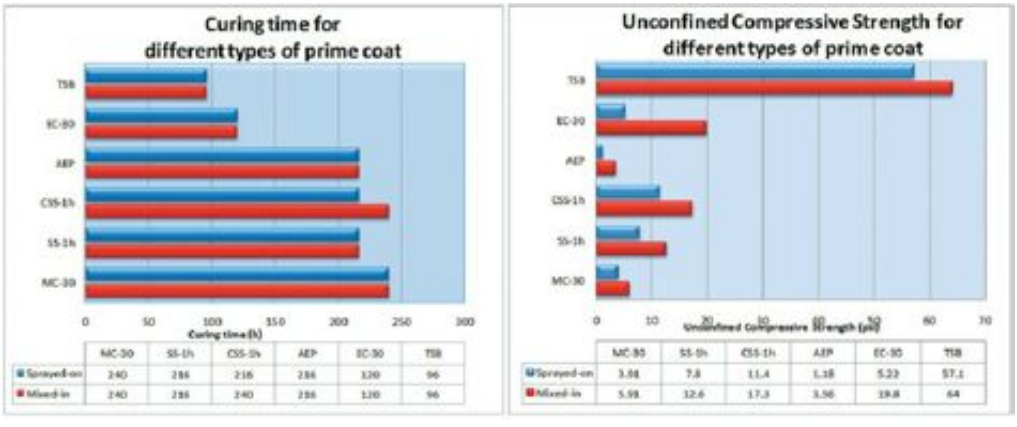

Fig. 1: Curing time and strength comparison between prime coats

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