OPTIMIZING SILANE APPLICATION TIME FOR BRIDGE DECKS

**Problem Statement:**

Silane is a penetrating sealer which can be applied to concrete surfaces such as bridge decks as a hydrophobic barrier. Silanes repel surface water which can harm concrete by causing expansion due to alkali-silica reaction (ASR) or by carrying chlorides which may corrode reinforcing steel. As a preventative measure, silanes are very valuable for protecting bridge decks from harmful water ingress. Silane manufacturers often recommend application after the concrete has reached 28 days of age. If silane is applied earlier in the concrete curing process it is possible that there will be a reduced penetration depth. A greater penetration depth typically implies better silane performance. Waiting 28 days to apply silane sealers to a bridge deck can be an additional delay among the many steps in the opening of a new bridge. It is possible that the reduction in penetration depth (if any) is still acceptable, this knowledge would allow application of silanes to bridge decks sooner. This would remove one of the barriers to opening a bridge to traffic sooner.

**Objectives:**

Investigating the penetration depth of silanes when applied at different concrete ages. Silanes from commonly used suppliers in Arkansas will be tested (both water based and solvent based). Penetration depth will be measured for Class S and S(AE) concrete mixes. Time of application will be varied, and penetration depth will be monitored over time. Cores will be taken from test sections to measure penetration depths and observe the effects (if any) of silane sealers on compressive strength gain. Additionally, the effect of multiple coats can be investigated. Other test methods may be employed to investigate the effectiveness of the silane (water absorption for example).

**Form of Research Implementation:**

Providing guidance as to the effects of early silane application, if any. If silane penetration is not reduced, or if the reduction is minimal, silanes can be applied sooner in the bridge construction process, saving time and money. If there is a significant negative effect of the early application, a recommended application age will be provided.

**Estimated Project Duration:** 24 months

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