Research Needs for Structures TAG

Effective/Updated: 8/15/2019

1. Issue Identified:

Effectiveness of Bridge Deck Crack Sealing

2. Summary of Problem:

Full-depth, transverse bridge deck cracking has been a major concern in Illinois and other states for many years. There have been many research projects attempting to mitigate cracking in bridge decks with only moderate success to date. Chloride intrusion into those cracks is widely believed to be a major contributor to shortened service life of bridge decks.

IDOT performed a five-year study on the effectiveness of bridge deck sealing and produced a report in October 2009. The study focused on global sealing of the bridge deck and provided valuable recommendations but did not focus on individual crack sealing. Now, there is a need to evaluate various sealing products and techniques to determine if individual crack sealing is worthwhile and effective. Crack depth, crack width, and crack frequency may all be factors in selecting an appropriate treatment method. Options may include flood coating with products such as high molecular weight methacrylate, reaming cracks to widen followed by sealant application, simple caulking techniques, or possibly pressure injection. Tight cracks are often difficult or impossible for the materials to penetrate, and the product may simply pond on the deck surface. Excessive material may disperse in the mechanical grooves or tines adjacent to the crack.

Longevity of effective crack-sealing materials is also unknown. Crack sealing can be expensive. It is not known how long cracks typically remain sealed before additional sealing is required. Long-term performance is an issue to be studied.

The determination of life cycle costs as related to the performance and longevity of various crack treatment techniques is essential to the selection of the appropriate products.

3. Desired Results/Outcome:

- Study available concrete healer/sealer products in a laboratory setting to evaluate the performance of products under a variety of controlled conditions. Develop a laboratory evaluation process and subsequent performance measures to ensure performance of the products.
- Study the products found to be successful in lab testing on concrete bridge decks in IL subjected to the climate conditions found throughout the state. Develop a protocol for performance measurement under field conditions.
- Quantify healer/sealer effectiveness: What product criteria indicate a successful healer/sealer?
- Develop a specification for healer/sealers that IDOT could use to evaluate new products submitted for use in IL.
- Develop a maintenance guide for strategies to use for bridge deck concrete maintenance utilizing penetrating sealer and healer/sealers.
The ultimate outcome of this research project is the development of a field validated and verified bridge crack-sealing policy. The policy should include recommendations on the following issues:

- Acceptable product types
- Application rates for various products and application conditions
- Surface prep requirements
- Cure times vs ambient temperatures
- Flood coating vs individual crack sealing
- System applications including installation instructions and criteria for use
- Optimal time to seal cracks (immediately, one year after construction, other)
- Recommendations for resealing
- Proposed treatment for cracking of hard deck overlays