Research Need for Pavement Design, Management and Materials Technical Advisory Group

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SUMMARY OF PROBLEM: Continuously reinforced concrete pavements (CRCP) have the highest initial cost, but several aspects of pavement design and construction could be revised to reduce the cost while still providing the benefits of low maintenance costs during service life. The areas for which study is required are terminal joints, construction joints, erodibility of the stabilized subbase, and use of lightweight aggregate.

- Terminal or transition joints in CRCP (e.g., wide flange beams or lugs) are expensive to construct, can result in high maintenance costs, and in some cases have been shown to be functionally ineffective.
- Other types of joints, such as transverse/longitudinal construction joints, may be located or reinforced in a less than optimal way, resulting in increased early-life maintenance.
- CRCP performance is directly impacted by the uniformity and erodibility of the stabilized subbase layer. With the increased use of recycled materials [reclaimed asphalt pavement (RAP) or crushed concrete] in the support layer and overlays, the erosion resistance of the stabilized subbase layer must be characterized under repeated loading in the presence of moisture.
- Lightweight aggregate has been shown to help with internal cure of concrete slabs by aiding with moisture absorption during hydration. This improved cure can potentially increase mixture strength, which could reduce thickness and initial construction cost.

CRCP provides a superior ride and low long-term maintenance, but improper terminal joint and transverse/longitudinal construction joint design, potential erosion of stabilized subbase, and less than optimal mix design can result in recurring maintenance and premature failures (punch-outs or spalling). The benefit of CRCP in a life-cycle cost analysis assessment should be more apparent with these proposed improvements.

DESIRED RESULTS/OUTCOME: The proposed research outcomes would provide the Illinois Department of Transportation (IDOT) with a new terminal joint design that accommodates the expected movement of the project-specific section based on its section length, type of stabilized subbase, and anticipated temperature contraction and material shrinkage. Second, better guidelines and placement and reinforcement details for CRCP construction joints (transverse/longitudinal) will minimize future maintenance/repair of incorrectly locating or selecting inadequate reinforcing of these types of joints in

CRCP. Third, a stabilized subbase erosion test protocol for CRCP using readily available equipment will allow selection of support layers that can withstand repeated loading under moisture and the higher deflections associated with CRCP. Furthermore, this erosion test can be used to evaluate existing stabilized materials that may become support layers for concrete overlays. Finally, incorporating lightweight aggregate into CRCP mix designs should improve curing and ultimate pavement performance.