ABSTRACT

Strandquist, Brad V. M.S.C.E., Purdue University, December 2012. Assessment of Bridge Deck Protective Systems. Major Professors: Dr. Robert Frosch and Dr. Michael Kreger.

When considering the durability of a bridge, the concrete deck is often the most vulnerable component and can be the limiting factor affecting service life. To enhance the durability of both new and existing bridge decks, a protective system is often provided to prevent or delay the ingress of chlorides and moisture to the reinforcing steel. In the State of Indiana, this protective system typically comes in the form of a concrete overlay or a thin polymer overlay. Another protective system widely used in the United States and in many countries internationally consists of a waterproofing membrane overlaid with asphaltic concrete. Due to a history of poor performance in the 1970's and the 1980's, however, a moratorium has been placed on the installation of waterproofing membranes in Indiana. This study reevaluates the state-of-the-practice of bridge deck protection in Indiana with the goal of enhancing the Indiana Department of Transportation's toolbox of bridge deck protective systems. Consideration was given to the state-of-the-art and state-of-the-practice in bridge deck protective systems used by other state transportation agencies as well as by international transportation agencies. Focus was placed primarily on the practice of installing waterproofing membranes and the latest technologies being used. Based on the information gathered, various protective systems were evaluated, and guidance is provided on the selection of the most appropriate systems. Guidance is also provided regarding the best practices used to install and maintain these various protective systems.