

This topic is “practice ready.” Yes No

Causes of Transverse Cracking in Concrete Bridge Decks

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Abstract

Transverse deck cracking is a problem that has existed in bridges for many years and unfortunately, these type of cracks commonly occur shortly after construction. The situation becomes very problematic because those cracks provide a direct pathway for the intrusion of water and chlorides. It is widely accepted that the occurrence of early age deck cracking is mainly due to concrete volume change and restraint to the deck concrete dependent upon many factors categorized into three broadly sweeping categories: (1) concrete material properties and proportions; (2) construction environment and techniques; (3) structural design attributes. Due to a large number of factors and the complicated cracking mechanisms, conclusive findings on the relationships between the factors and transverse deck cracking are not easily available. Accordingly, the objective of this study is to examine the actual correlations between the degree of transverse deck cracking and the magnitudes/characteristics of all the important factors through a systematic statistical analysis. First, the important factors related to structural, material, and construction conditions have been identified based on rigorous literature search results. Then, more than twenty bridges constructed in the past 5 years were inspected and the deck cracks of those bridges were mapped and analyzed. A factor termed the crack rate - determined as the ten times the crack amount divided by the bridge width – was established to allow a statistical analysis of the factors most likely to result in cracking. After the information on structural, construction and material factors were collected for the different bridges with different crack rates, the correlations between the important factors and crack rates were analyzed. Finally, the conclusions were made based on the correlation analysis results.

Keywords: Concrete Bridge Decks—Transverse Cracking—Correlation Analysis

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