

Pavement**December 2024****Project Title:**Partnered Pavement Research
Center (PPRC) 17: Preservation**Task Number:** 3206**Completion Date:** September 30, 2020**Task Manager:**Alireza Shams
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Complete Early Age and Premature Cracking Evaluation

Identify what factors may lead to early-age and premature cracking on California roadways.

WHAT WAS THE NEED?

Jointed Plain Concrete Pavements (JPCPs) often experience early-age (within 12 months after construction) and premature cracking (within 12 month and half of its life span), which can reduce their lifespan significantly. There is a need to investigate both new and reconstructed concrete pavements and individual slab replacements sometimes reaching a terminal condition before reaching half of their design life and, occasionally, even before they spend one year in service. This creates additional maintenance costs and impacts infrastructure performance. Addressing these issues is critical for improving pavement longevity and reducing associated costs.

WHAT WAS OUR GOAL?

The goal was to investigate the causes of early-age and premature cracking in JPCPs and to identify and develop solutions that have been implemented to some extent.

WHAT DID WE DO?

An extensive literature review was conducted to evaluate the mechanics, types, and prevention of early-age cracking, with a detailed analysis of the factors contributing to cracking, including materials, environmental conditions, and construction practices.

WHAT WAS THE OUTCOME?

The literature review highlights that early-age and premature cracking in JPCP is influenced by numerous factors, including



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inappropriate curing, adverse weather conditions, and poor construction practices, with the latter being a common cause. Key strategies to mitigate these issues include optimized concrete mixtures, improved curing methods, and specific measures for extreme weather conditions. Recommended practices are categorized into three groups: mixture design, focusing on cement type, content, aggregate type, and admixtures; pavement design, addressing optimal joint spacing, saw cutting depth, and concrete-base bonding; and construction practices, emphasizing proper base conditioning, timely saw cutting, and effective curing. Furthermore, revisions to the California Department of Transportation (Caltrans) specifications, particularly for extreme weather conditions, are suggested to enhance prevention of early-age cracking.

WHAT IS THE BENEFIT?

Improved JPCP durability reduces maintenance costs, enhances road safety, and minimizes disruptions. These findings benefit Caltrans and other transportation agencies by providing actionable insights that can extend pavement life and improve resource allocation.

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Research Final Report:

<https://escholarship.org/uc/item/5sn5f1xn>