



PROJECT PROFILE

CALTRANS

Investigation of Early-Age Cracking of Concrete Bridge Decks | Statewide, CA



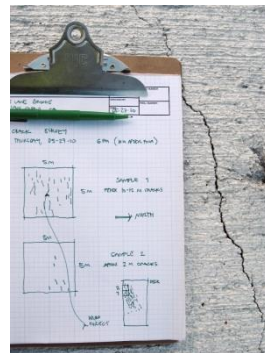
CLIENT

California Department of Transportation

BACKGROUND

WJE's field investigation was focused on two of Caltrans' concrete box-girder bridges, which consist of concrete beams in the shape of a hollow box and steel cables for post-tensioning.

Early-age cracking of bridge decks is a persistent and complex problem facing the California Department of Transportation (Caltrans) as well as its counterparts across the country. These early-age cracks, which typically form six to twelve months after construction, are only fractions of an inch wide but are deep enough to extend the thickness of the bridge deck. The cracks allow deicing solutions to leak through the concrete decks and onto the supporting beams below, causing premature corrosion and seriously compromising a bridge's structural integrity.



SOLUTION

Due to their extensive experience studying early-age cracking, several experts at WJE were retained by Caltrans to evaluate the state's current practices, specifications, and conditions and to recommend methods for preventing early-age deck cracking on the state's roadways.

To begin, WJE's experts reviewed prior research and learned how other state departments of transportation had developed approaches to mitigate cracking. Next, WJE collected a wealth of data using specialized instruments including strain gages, thermocouples, relative humidity gages, a weather station, and strain and temperature sensors. Concrete samples were also collected and sent to WJE laboratories for tests to determine shrinkage, modulus of elasticity, thermal expansion, creep, slump, and compressive strength.

After developing various analytical models of bridge decks, the WJE project team was able to make several recommendations to Caltrans, including reducing the cementitious material content of the concrete, casting decks later in the day and at cooler temperatures, building single-span bridges, and reducing span lengths when possible. By taking these steps when designing and constructing California's roadways, Caltrans will be able to reduce the occurrence of early-age cracking and its hazardous effects.

