

Pavement & Materials Partnering Committee

Decision Document

Tie Wires in Dowel and Tie Bars Assemblies

October 31, 2022

Problem Statement

Allow tie wires in dowel and tie bar assemblies not to be cut in Section 40 of the Caltrans Standard Specifications since they give more stability to the assembly system.

Background

Dowel bar assemblies (also called dowel baskets or cages) are manufactured with tie wires for improved stability during shipping and installation.

During the paving operation, the initial loads from concrete placement and paving increases the risk of the dowel bar assemblies to collapse, deform or move. Even small movements in the dowel bar assemblies can lead to specification penalties for misaligned dowel bars. Smoothness values may also be negatively affected by the reduced rigidity of the dowel bar assembly which can cause “spring-back” as the paver moves over the dowels. Long-term pavement performance issues may arise when doweled joints “lock-up” due to the misalignment of dowel bars. To limit these risks, specifications should allow the tie wires to remain intact.

The FHWA has recommended leaving these tie wires intact throughout the paving operation and subsequent life of the pavement.

Current Caltrans specifications require tie wires to be cut. The major reason to cut the tie wires is to avoid interference with dowel location measurements using magnetic tomography-type systems like the MIT-SCAN 2. Since such systems are not specified in Caltrans specifications, there is no good reason why these tie wires should be cut.

Recommendation

Revise section 40-1.03D Dowel Bar Placement to read as follows:

- ❖ Use dowel bar baskets to hold the dowels at the specified depth and alignment before concrete placement. Anchor the baskets with at least 1 fastener per foot of basket section and at least 200 feet in advance of the pavement placement activity. You may request not to perform advance anchoring due to construction limitations or restricted access. After anchoring the baskets and before placing the concrete, demonstrate the dowel bars do not move from their specified depth and alignment during concrete placement.

Fiscal Impact

Although there are no measurable fiscal impacts anticipated, the cost of constructing concrete pavement may be slightly reduced by the elimination of the tie wire cutting task and the reduction in risk of dowel bar misalignment. Modifying the specification to

allow dowel bar tie wires to remain intact reduces the likelihood of long-term performance issues related to locked joints and misplaced dowels.

Stakeholder Impact

There are no known stakeholder impacts to adopting the recommendation.

Policy Impact

There are no known Caltrans policy impacts to adopting the recommendation.

Risks

Adopting the recommendation in this Decision Document involves one known minor risk. The use of magnetic tomography-type systems (MIT-SCAN 2) for non-destructive testing of dowel bar location and alignment would be affected when the tie wires are left intact. This has no real impact on projects since MIT-SCAN 2 is not part of the current specification requirements and METS has not developed a test method for the equipment. Attempts to use magnetic tomography as a QC or verification tool in California has resulted in mixed results. In addition, improvements to the MIT-SCAN 2 software are expected to eliminate (filter out) the influence of the tie wires on the dowel alignment measurements.

Risks related to a "Do Nothing" approach involve lost opportunities for improvements to construction quality, cost reduction, and long-term pavement performance.

Proposed Implementation Schedule


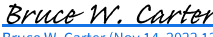
Section 40-1.03D would be revised through the next update to the Standard Specifications. This would occur in less than one year from approval of this Decision Document. Shortly after the specification revision, it is recommended that a Construction Policy Directive (CPD) be issued to explain the change to the Caltrans field staff, contractors, and testing laboratory personnel. Caltrans Office of Concrete Pavements will add this revision to their statewide concrete pavement training priorities.

Implementation Coordinator(s)






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Concrete Task Group, Concrete Pavements Sub Task Group
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APPROVAL RECOMMENDED BY:

<p><u></u> 11/21/2022 <small>Dulce Rufino Feldman (Nov 21, 2022 20:19 PST)</small></p> <hr/> <p>DULCE RUFINO FELDMAN Date Caltrans Decision Document Champion Office of Concrete Pavements</p>	<p><u></u> 11/14/2022 <small>Bruce W. Carter (Nov 14, 2022 12:55 PST)</small></p> <hr/> <p>BRUCE CARTER Date Industry Decision Document Champion Southwest Concrete Pavement Association</p>
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APPROVED BY CONCRETE TASK GROUP:

Caltrans Name (Recommendation)	Industry Name (Concurrence)
<p><u></u> 11/17/2022 <small>Keith Hoffman (Nov 17, 2022 08:42 PST)</small></p> <hr/> <p>KEITH HOFFMAN Date Caltrans Task Group Chair Materials Engineering and Testing Services</p>	<p><u></u> 11/16/2022 <small>George Butorovich (Nov 16, 2022 00:51 PST)</small></p> <hr/> <p>GEORGE BUTOROVICH Date Industry Task Group Lead Flatiron</p>
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