MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 22-483 (project 652) | December 2023

Evaluation of Concrete Bridge Deck Mixtures Using Shrinkage-Ring Tests

the **ISSUE**

Concrete is widely used in bridge construction because of its versatility, strength, durability, and low cost. It is a composite consisting of cement, water, coarse aggregates, fine aggregates, and admixtures to engineer the desired properties. During curing, concrete is subjected to changes in volume. These changes can cause cracking, which can allow corrosion and reduce the life of the deck. Maintaining the condition of bridge decks is one of the costliest components of bridge maintenance. There is a need to evaluate the effectiveness of various concrete mixes using different ways to mitigate shrinkage.

the **RESEARCH**

A suite of concrete mixtures using a granitic aggregate was evaluated using the dual-ring test method. This permits the use of coarse and fine aggregates. Results indicate that mitigation methods of fibers and shrinkage-reducing admixtures (SRAs) prolong the time to cracking. The recommendation is to combine both mitigation measures to delay cracking and permit additional tensile strength gains.

MOUNTAIN-PLAINS CONSORTIUM REGION 8

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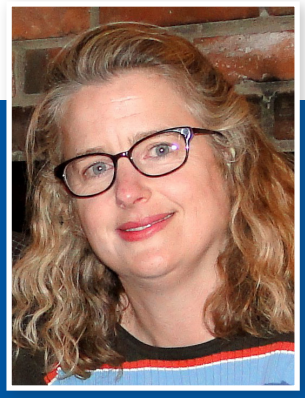

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Project Title

Reducing Shrinkage Cracking in Bridge Decks Using the Single and Double-Ring Test Methods

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the **FINDINGS**

Of the two mitigation measures evaluated, both polypropylene fibers and shrinkage-reducing admixtures served to delay the cracking time. Although the combined mitigation measures did not increase time to cracking, using both mitigation measures is still recommended.

the **IMPACT**

Findings from the research are expected to be used in formulating the WYDOT specification for concrete placed in new bridge decks. The new specification should reduce shrinkage and cracking and prolong the life of bridge decks and reduce maintenance costs.

For more information on this project, download the main report at https://www.ugpti.org/resources/reports/details.php?id=1107

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.

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