

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 17-334 (project 502) | October 2017

Self-consolidating Concrete for Prestressed Bridge Girders



the **ISSUE**

Self-consolidating concrete (SCC) has high potential to be used for prestressed bridge girder construction due to exceptional workability and strength. However, many local precasters have struggled to maintain uniformity in SCC mixtures, which are necessary to achieve consistent, desirable performance, which are ultimate concerns to DOTs, including WisDOT.

the **RESEARCH**

The ultimate objective of this project was to develop widely accepted recommendations on self-consolidating concrete (SCC) mixture design for the use of SCC in WisDOT bridge projects. This project investigated the effects of material constituents on the material properties of trial SCC mixtures made by precastors in Wisconsin. A group of SCC mixtures were identified based on the experimental investigation of results, technical findings from a literature review, and input from a survey of several DOTs. The identified SCC mixtures were tested at plants for the evaluation of their material performance. With a detailed investigation of the results, high quality SCC mixtures were selected and used to build cylinders and prisms for the evaluation of their creep and shrinkage. The most appropriate SCC mixture was selected to fabricate a full-scale SCC girder to verify structural performance. The results of the SCC girder were compared to those of a conventional concrete (CC) girder. Then, field monitoring of prestress losses of both girders that were installed in a WisDOT bridge, was made from its erection to deck placement. At the end of this project, recommendations for SCC mixture design were established to promote SCC in prestressed bridge girders in Wisconsin.



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Project Title

Self-Consolidating Concrete
for Prestressed Bridge Girders

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the FINDINGS

Through this project, recommendations for SCC mixture design were established to promote use of SCC in prestressed bridge girders in Wisconsin. Key findings indicate that the full-scale SCC and CC girders exhibited almost identical long-term camber and prestress losses, but the transfer length of SCC girder was somewhat lesser than that for the CC girder.

the IMPACT

The recommendations for SCC mixture design that achieves desired performance for use in prestressed SCC girders for WisDOT will be widely accepted across Wisconsin and utilized for ensuring safety in bridge construction.

For more information on this project, download the entire report at <http://www.ugpti.org/resources/reports/details.php?id=891>

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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