

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 17-329 (project 402) | September 2017

Seismic Performance of Self-Consolidating Concrete Bridge Columns



the **ISSUE**

Rectangular bridge columns in high seismic areas require high amounts of confining steel. Self consolidating concrete is ideal for the construction of concrete members with high steel congestion. However, there is lack of data on the seismic performance of rectangular self consolidating concrete bridge columns.

the **RESEARCH**

The study had two main objectives: 1) assess stress-strain relationships of self consolidating concrete (SCC), and 2) evaluate the seismic performance of rectangular SCC bridge columns. To accomplish the first objective, three SCC and four conventional concrete (CC) mixtures were designed, batched, and tested under uniaxial compression. Fresh and hardened properties were measured, and typical stress-strain parameters were evaluated to compare SCC to CC mixes. To fulfil the second objective, two SCC and two control CC rectangular column specimens were designed, fabricated, instrumented, and tested under combined axial load and quasi-static cyclic lateral loading.



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North Dakota State University
South Dakota State University

University of Colorado Denver
University of Denver
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Project Title

Seismic Performance of
Self-Consolidating Concrete
Bridge Columns

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the FINDINGS

The experimental results of the material tests showed that for the same concrete strength, SCC has higher strain at strength and ultimate strain, lower material ductility, and lower elastic modulus than conventional concrete. The results of the column specimens showed that SCC bridge columns provide adequate performance under high inelastic lateral load reversals. Compared to CC columns, SCC columns exhibited lower displacement ductility, higher drift ratio, and lower energy dissipation.

the IMPACT

Self consolidating concrete can be specified for the construction of bridge columns in seismic areas. The use of self consolidating concrete will expedite the construction process and will eliminate construction deficiencies arising from steel congestion in bridge columns.

For more information on this project, download the entire report at <http://www.ugpti.org/resources/reports/details.php?id=883>

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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