

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 21-434 (project 316) | May 2021

Mitigation of Corrosion in Continuously Reinforced Concrete Pavement



the ISSUE

Between 1995 and 2009, the South Dakota DOT replaced more than 250 miles of two-lane Interstate with continuously reinforced concrete pavement (CRCP). After being in service for less than 15 years, several of these pavement sections showed signs of undesired distress. Between 1995 and 2009, the South Dakota DOT replaced more than 250 miles of two-lane Interstate with continuously reinforced concrete pavement (CRCP). After being in service for less than 15 years, several of these pavement sections showed signs of undesired distress.

the RESEARCH

An evaluation of CRCP was conducted to determine the extent of possible corrosion within the pavements on selected Interstates in South Dakota. General observations showed that there were sections of severe and localized reinforcement corrosion at some crack locations. Crack mapping, chloride test profiles, scanning electron microscope (SEM) analyses, and half-cell potential measurements (a standard monitoring technique for corrosion) were conducted in the field. Half-cell potential measurements and crack density were investigated for correlations to corrosion. Results showed there was a significant positive correlation between elevated half-cell potential measurements and crack density.

Typically applied corrosion mitigation products were applied at test sections of CRCPs. Field testing consisted of evaluating the change in half-cell potential of the reinforcement before and after the corrosion mitigation products were applied to sections. Laboratory testing consisted of casting reinforced concrete specimens that used mix designs similar to the pavements evaluated in the field. The half-cell potentials for each specimen were monitored during the duration of the research project. Four of the laboratory specimens were also tested using chloride ion analysis and scanning electron microscopy (SEM) techniques.



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Lead Investigator(s)

Allen Jones, Ph.D.
South Dakota State University
allen.jones@sdstate.edu

Co-Investigator(s)

Nadim Wehbe, Ph.D.
South Dakota State University
nadim.wehbe@sdstate.edu

Research Assistant(s)

Stephannie Klay, GRA, MS
Shaun Maassen, GRA, MS

Project Title

Mitigation of Corrosion in
CRC Pavement

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the FINDINGS

Corrosion was only observed at cracked or patched locations. Also, there were areas of severe spalling and cracks that did not show signs of corrosion. Researchers concluded that observed pavement distresses were likely not the effect of corroded reinforcement. Second, the limited observed loss of cross-sectional area was only in restricted sections of reinforcement; therefore, complete shear failure in these CRCPs, leading to reduced pavement performance, would not be widespread.

Typically applied corrosion mitigation products tested did not appear to be effective in the field. The results were inconclusive on effectiveness at reducing corrosion in a laboratory setting when a high concentration of chlorides was introduced after the products were applied, as shown in the wet, cracked specimens. When no chlorides were applied after the product application, several of the products did appear to be effective at reducing half-cell potentials in comparison with the control specimens.

the IMPACT

Data collected as part of this project can be used by state DOTs in evaluating CRCP distress relative to corrosion of reinforcements. Crack density was determined to be a good indicator of corrosion susceptibility in CRCP. This results in a method that is cost-effective in evaluating CRCP corrosion potential.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1033>

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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