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Institute for Research in Construction

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Evaluation of Corrosion-Inhibiting Systems on the Vachon Bridge in Laval, QC

Objectives

To evaluate the field performance of concrete bridge barrier walls containing various systems that inhibit reinforcement corrosion and to better understand the factors influencing their performance and durability.

Background

This project was part of IRC's continuing research to promote technologies that extend the service life of concrete bridge structures. Between 1996 and 2006, IRC researchers evaluated the performance of various corrosion-inhibiting systems in the newly reconstructed concrete barrier walls of the Vachon Bridge in Laval, Quebec.

Statement of Work

Evaluated the performance of corrosion-inhibiting systems by:

- periodical assessment of the risk and rate of corrosion of the reinforcement;
- remote monitoring of the environmental conditions of the concrete barrier walls using embedded instrumentation;
- core sampling from the barrier walls to measure changes in chloride ion concentration, concrete permeability, and strength.

Results

The lack of active corrosion on the wall reinforcement in either the corrosion-inhibiting systems or the control test sections after ten years of service highlights the effectiveness of low-permeability concrete and adequate thickness of concrete cover The corrosion-inhibiting systems provided a second line of defence in the event the concrete cover was breached because of shrinkage cracking, which was the case. Of the corrosion-inhibiting systems tested, the system using an inorganic anticorrosion admixture consistently provided the best performance (e.g. lowest risk of corrosion and negligible concrete damage), followed closely by the systems using organic anticorrosion admixtures. The use of a migrating sealer at the concrete surface was also shown effective at reducing the rate of chloride ingress into concrete.

Outcome

A report on the performance of corrosion-inhibiting systems and guidelines for their use in reinforced concrete structures built in corrosive environments was delivered to the clients.

Partners

Ministère des transports du Québec, Cortec Corporation, Axim-Italcementi Group, W. R. Grace & Co.-Conn., and Euclid Admixture Canada.

Start/Expected Completion Dates

This project began in March 2003 and was completed in December 2006.

Project Manager

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For more information, see http://irc.nrc-cnrc.gc.ca/ui/cs/vachonbridge_e.html

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