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RESEARCH UPDATE

Update No. U92-1

CONCRETE AND MASONRY SEALERS
ON BRIDGE CURBING
(Initial Report)

REFERENCE: Work Plan 90-C-11, Category II Experimental Project

HISTORY: Chloride contamination of concrete is of great concern due to its direct detrimental effect on the composite strength of reinforced steel/concrete structural members. It causes corrosion of the steel which delaminates and damages the concrete. This project is an ongoing study to determine if the application of two proprietary concrete and masonry sealers significantly reduces the infusion of chlorides, thus retarding corrosion.

In 1990, Bridge 70-S on Interstate 89 over the Winooski River in the towns of South Burlington and Winooski, was rehabilitated by Cianbro Inc. of Pittsfield, Maine. The three span bridge, built in 1962, was widened to accommodate three lanes of traffic and received numerous repairs including a new deck and pier rehabilitation. After completion of the repairs, and prior to reopening the bridge to traffic, two concrete sealers were applied to portions of the bridge curbing.

MATERIALS USED: The following epoxy-based concrete sealers were applied by the distributor, Epoxy Systems, Inc. Jericho, Vermont:

- A: Epoxy Systems, Inc. 50% Solid Epoxy Sealer Product #8; manufactured by Epoxy Systems, Inc., RD 1 Box 411, Jericho, Vermont 05465
- B: 3M Brand Siloxane Concrete and Masonry Sealer 2000, manufactured by 3M Contractor Products, Building 223-2N-06, 3M Center, St. Paul, Minnesota 55144.

GENERAL CONDITIONS: The weather was clear and sunny with a light breeze. The concrete bridge curbing surface was clean and dry. Concrete surface temperatures ranged from 47 to 63 degrees F, while the ambient temperatures ranged from 45 to 58 degrees F.

The product application areas began at the first full-length curb section, on the northwesterly curb of Bridge 70-S. Separations between coating types were marked by polyurethane curb joints. All distances measured were to the nearest foot.

The application areas were as follows:

- a. 87' double coat of Epoxy Systems Inc. Product #8
- b. 83' single coat of Epoxy Systems Inc. Product #8
- c. 80' double coat of 3M Siloxane 2000
- d. 84' single coat of 3M Siloxane 2000
- e. 144' uncoated control section
- f. Remainder: 3 coats 50-50 linseed oil and mineral-spirit solution

MATERIAL DESCRIPTION/PLACEMENT:

A: Epoxy Systems Inc. Product #8. Product #8 is a thin, low viscosity, almost transparent liquid. It is a two part system which, when mixed according to manufacturer's instructions for a period of three minutes, has a pot life of approximately one hour. This system was applied with rollers and brushes. The manufacturer suggests a curing time of 4-5 hours between coats.

The area treated with a single coat of Epoxy System's Product #8 was approximately 83' in length and had a coverage of about 220 square feet per gallon (sf/gal). The application rate was about 180 square feet per man hour (sf/mh).

The area treated with a double coat was approximately 87' in length. The first coat coverage was 220 sf/gal, and the second coat coverage was 325 sf/gal. The rate of application for the first coat was 180 sf/mh, and 348 sf/mh for the second coat.

B: 3M Brand Siloxane 2000. 3M Siloxane 2000 is a thin, low viscosity material. It also is transparent. It is a one-part system with a suggested minimum curing time of one hour between coats. This system was applied with rollers and brushes.

The area treated with a single coat of 3M Siloxane 2000 was approximately 84' in length and had a coverage of about 249 sf/gal and an application rate of about 328 sf/mh.

The area treated with a double coat was approximately 80' in length. The first coat coverage was 249 sf/gal and the second coat, 249 sf/gal. The rate of application for the first coat was 328 sf/mh, and 240 sf/mh for the second coat.

Application rates are based only on times observed for this particular test application and its unique circumstances. Actual application rates will vary depending upon many factors such as number and speed of workers, as well as surface and climatic conditions.

CONTROL SECTION AND TREATMENT: A 144 linear foot section of curbing was left untreated adjacent to the test sections, while the remainder of the curbing was treated with three coats of a 50-50 solution of boiled linseed oil and mineral spirits.

FOLLOW UP: Prior to the application of the two products, chloride samples were taken in the areas of each product application and also in the untreated area. Periodically, chloride samples from the curbing will be extracted, tested and evaluated. The results of this testing will be used along with cost data to evaluate the success and cost effectiveness of these products.