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RESEARCH UPDATE

U 1999-4

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TYFO S FIBRWRAP

**REFERENCES:**

Report WP 94-R-7, U96-27, U97-12, U98-6

**INTRODUCTION:**

In June 1994, Bridge #60 in Williston underwent rehabilitation to repair damage from salt intrusion in the columns and piers. Rather than employ a standard concrete encasement, TYFO S Fibrwrap was applied to the columns of Pier #1 of Bridge #60. The columns are located close to the travel lanes and become coated with salt impregnated slush cast by high speed traffic. The TYFO S Fibrwrap was selected in order to prevent further contamination from the salt spray, along with providing structural reinforcement for the patched concrete members. If successful, the TYFO S Fibrwrap process could prove to be a cost effective alternative to rehabilitation through concrete encasement.

**PRODUCT DESCRIPTION:**

The TYFO S Fibrwrap system employs a fiberglass fabric impregnated with a two part epoxy resin. The fabric is wrapped with tension rollers around a concrete structure and then painted. The distributor, R.J. Watson, Inc., claims that the resulting column wrap is resistant to salt, soil, and UV radiation and offers increased shear and flexural strength.

## **INSPECTION:**

The TYFO S Fibrwrap material on Bridge #60 in Williston was inspected by Research and Development personnel on June 30, 1999. After 5 years of service all three columns of Pier #1 were found to be in good condition. The Fibrwrap material showed no signs of distortion, cracking or discoloration.

During an inspection in August 1997, several air pockets were discovered, showing up as bulges in the material ranging from approximately 20 to 60 mm in diameter. A July 1998 inspection showed no change in the size or shape of the air pockets, indicating that they are a result of air being trapped between the Fibrwrap and the concrete at the time of installation and not a result of subsurface activity in the concrete. In June 1999, a separation, approximately 20mm wide appeared along the seam of the bottom wrap of column #1. This separation had no substantial depth and since the installation of this material involves overlap, there is little concern for salt intrusion.

In 1997, core samples turned up no signs of distress in the concrete. During the June 1999 inspection it was discovered that one of the cored holes in column #2 was inadequately filled resulting in a small void in the top section of the hole. A sample location in column #1 showed some signs of rust leaching out around the perimeter of the former hole. There may have been some moisture trapped within when the hole was filled.

In order to determine if the TYFO S Fibrwrap has aided in the structural integrity of the columns, additional core samples will be taken and an effort will be made to perform a ground penetrating radar survey later this year.

## **FOLLOW UP:**

Based on these observations, TYFO S Fibrwrap appears to be a viable alternative to concrete encasement as a rehabilitative method for concrete bridge columns. In future applications of this product it is recommended that the same yearly inspections as were done on this project be conducted in order to insure that the column wrap does not mask serious failures in the structure which would otherwise be readily apparent on exposed concrete.