

Reviewed by:

Robert F. Cauley
Robert F. Cauley, P.E.
Materials & Research Engineer

MATERIALS & RESEARCH



Prepared by:

Philip Carter
Philip Carter
July 29, 1998

U1998-6

RESEARCH UPDATE

TYFO S FIBRWRAP

References

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

Introduction

Bridge #60 in Williston underwent rehabilitation in June, 1994 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.

Evaluation

The TYFO material on Bridge #60 was inspected by Research and Development personnel on July 10, 1998. After 4 years of service, the three columns of Pier #1 were examined and found to be in excellent condition. The fiberwrap material shows no signs of distortion, cracking, or discoloration.

During the August 1997 inspection several air pockets were discovered, showing up as bulges in the material ranging from approximately 20 to 60 mm in diameter. The July, 1998 inspection showed no change in the size or shape of the air pockets, indicating that they were a result of air being trapped between the fiber wrap and the concrete at the time of installation and not a result of subsurface activity in the concrete. The paint covering the TYFO was also intact, further confirming that there has been no substrate movement.

After four years of service the exterior surface of the TYFO S Fibrwrap has shown no change in condition that would indicate that the underlying concrete column is continuing to deteriorate. Similarly, cores taken in 1997 (see Update U97-12) turned up no signs of distress in the concrete.

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.

Follow Up

After four years of service the material has visibly remained unchanged. The next update will include results of a ground penetrating radar survey of the pier columns. It is hoped that the survey will better clarify the structural integrity of the columns, particularly if chloride related distress is continuing inside of the fiber wrap.