

New Mixture Design and Guide Specifications and Inspector's Manual

by Bruce Johnson

Shotcrete has not traditionally been a material of choice for repair of bridge structures by many state highway departments. One reason for this is that bridge engineers have not been aware of advances in the quality and durability possible with high-performance shotcrete over the last 10 to 15 years. In 1995, an effort was made to help facilitate and encourage the use of shotcrete in bridge repair, especially where it is particularly advantageous: in overhead and vertical surfaces and in thin layers, or a combination of thin and highly reinforced thick layers. The effort was organized by the AASHTO-AGC-ARTBA Joint Committee.

Joint Task Force 37, chaired by Gerald White, structural team manager for the North Dakota State Department of Transportation, prepared a *Guide Specification for Shotcrete Repair of Highway Bridges* that was published in February 1998. This Task Force Report includes guide specifications for both dry-mix and wet-mix shotcrete, an introduction and checklist for using the specifications, and a commentary. It also contains mixture design recommendations, production testing requirements, and inspection guidelines. It is available from AASHTO. A Word® file of the report can be downloaded from the website <http://www.fhwa.dot.gov/oregon/reports>.

The Task Force has also prepared an *Inspector's Guide for Shotcrete Repair of Highway Bridges*, which was published in 1999. It was prepared not only to act as a detailed guide for quality assurance of field applications, but to be a state-of-the-practice reference for relatively inexperienced inspectors on how a shotcrete project should be set up and conducted. The guide is available as a full color publication on heavy, durable paper from AASHTO (order number IGSRB). A PDF® file of the guide can be downloaded from the website <http://www.fhwa.dot.gov/oregon/reports>.

Members of the Task Force have a significant amount of experience in the successful use of high quality shotcrete for repair of highway bridges. In areas where forming is difficult and time is a critical factor in performing the repairs, properly placed shotcrete can be the most effective and durable repair material. The Task Force is committed to facilitating greater use of properly placed shotcrete and demonstrating its durability when properly formulated. We hope anyone who has suggestions or comments about the Guide Specification or Inspector's Guide will let us know.

The Guide Specification was based heavily on the publication, *Recommended Practice for Shotcrete Repair of Highway Bridges*, which was prepared by Dr. D. R. Morgan, P. Eng. of HBT AGRA Limited (now AMEC), Vancouver, B.C., Canada,

under the auspices of the Canadian Strategic Highway Research Program—(C-SHRP) study titled: "Durability of Shotcrete Rehabilitation Treatments of Bridges." That original document was revised and adapted for use in the U.S. by Joint Task Force 37, Shotcrete Repair of Highway Bridges. Its members were:

Jim Asher
Ken Boedecker
Jim Dikeou
Mahmoud Elnahal*
Steven H. Gebler*
George Yoggy*
Leon Glassgold
Frank Nelson*
Christy Philipp*
Dan Thomas*
John Simmons
Peter C. Tatnall
Larry Totten*
Curt White*
Gerald White, Chairman*
Bruce Johnson, Secretary*

The members with an asterisk also worked on the preparation of the Inspector's Guide.

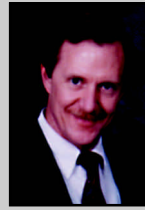
The Guide Specification represents the best current practice for the durable shotcrete repair of bridges, and is based on the professional experience of the prime author of the C-SHRP document, Dr. D. R. Morgan, and the persons acknowledged above, in the implementation of many shotcrete bridge repair projects. It is believed that if remedial works are conducted rigorously in accordance with the procedures outlined in this Guide Specification, the owner will be provided with durable shotcrete repairs and greater service-life than the surrounding non-repaired concrete.

Shotcrete Corner

The Joint Task Force recognized that a national specification cannot be written that would be directly applicable to each state or even each region of the country. Nevertheless, the specifier should be able to readily adopt material from the document in preparation of project-specific specifications, including combining the two guide specifications to allow the contractor to select the most efficient process for a given project.

These documents concentrate on technical requirements for the remedial work. The Specifications and Commentary will help the specifier to make certain design selections and choices in preparing a specification. The payment section was based on a consensus of the Joint Task Force. Nevertheless, it is recognized that agencies may change to other methods of measurement and payment depending on local preferences.

In addition to the specification of proper mixture design, materials, application procedures and quality control testing, which result in a high performance structural repair material, the Guide Specifications and Inspector's Guide present certain basic considerations that should be applied in the design of shotcrete repairs for bridges in order to provide durable, long service-life repairs.



Bruce Johnson completed a Master's Degree in Structural Engineering at Iowa State University in 1981. He has been a registered structural engineer in California since 1980. He is currently the division bridge engineer in Oregon for the Federal Highway Administration. He has been an ex-officio member of ACI Committee 506, Shotcreting, since 1995. He has been the World Bank's primary structural engineer advisor for the Bridge Rehabilitation Project of the Russian Federation since 1994, where he provided oversight for design and construction of rehabilitation or reconstruction of 130 bridges located in European Russia, Siberia, and the Far East.

2001 ASA Annual Membership Meeting Registration

Date - March 1, 2001 Time - **Breakfast** 7:00 AM; **Meeting** - 7:30 AM
Place - Paris Las Vegas Hotel & Casino, Las Vegas, Nevada

Attendance at breakfast is not required for attendance at the meeting and there is no cost for the meeting. However, we need to know if you will be attending so we can have sufficient space for everyone.

Register me for the breakfast AND meeting. On or before February 1, 2001..... \$30.00
After February 1, 2001 \$40.00

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