More 2007 Interim Changes

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A discussion of the revisions and additions to Section 5: Concrete Structures, new to the Fourth Edition of the AASHTO *LRFD Bridge Design Specifications* began in the previous issue of *ASPIRE.*™ This discussion included Agenda Items 8 through 13 as considered by the AASHTO Subcommittee on Bridges and Structures (SCOBS) at their annual meeting in Utah in 2006. The final agenda items from the 2006 meeting relating to concrete bridges—Agenda Items 14 through 15A—are reviewed in this column.

The approximate equations of Article 5.7.3, intended to provide a simplified method of calculating the flexural resistance of reinforced and prestressed concrete members, are modified in Agenda Item 14. The previous equations inherently assume that both the tension and compression reinforcement are yielding at nominal resistance, which is not always the case. For compression reinforcement, a simple check that $c \geq 3d_s'$ can assure that the compression reinforcement is at or near yield at nominal flexural resistance. If not, the compression reinforcement can either be conservatively ignored, or a strain compatibility analysis can be performed. For mild steel tension reinforcement, a new limit of $c/d_s \leq 0.60$ assures yielding of the mild steel tension reinforcement in conjunction with the approximate equations.

Agenda Item 15 deals with interface shear transfer or shear friction, concentrating on Article 5.8.4 but including some other articles relating to interface shear transfer. The Third Edition of the *LRFD Specifications* requires substantially more interface shear reinforcement for slab-on-girder bridges than had been required by the AASHTO *Standard Specifications for Highway Bridges*. So much so that interface shear reinforcement requirements generally govern over vertical (transverse) shear reinforcement requirements.

An extensive review of available literature indicated that the interface shear resistance equation of the Third Edition was extremely conservative relative to experimental data. An effort was made, primarily by Chris Hill of Prestress Services Industries of Lexington, Kentucky, to reevaluate the content and format of the entire article with this agenda item and the subsequent interim changes. The overall objective is to eliminate over-design, introduce proper LRFD notation, eliminate a significant dependence on commentary equations for specification application, and eliminate numerous changes in units from one portion of the article to another. More economical design of bridges designed on the basis of interface shear transfer will result. A reduction in mild reinforcing steel within the girder, increased jobsite safety by virtue of fewer bars projecting from the top of the girder that construction workers might trip over, and cost savings associated with future slab removal will also be a benefit of this interim change. The end result is a more comprehensive list of cohesion and friction factors that represent a lower bound of the substantial body of experimental data available in the literature. One change from previous editions is the elimination of different factors for all-lightweight and sand-lightweight concrete.

A more economical design for interface shear transfer will result.

The final interim change related specifically to concrete bridges adopted in 2006 is Agenda Item 15A which consists of a list of editorial changes to Section 5: Concrete Structures. Despite SCOBS's best efforts to write concise and complete specifications and commentary, editorial changes are needed occasionally to correct mistakes or to provide further clarification. Agenda Item 15A includes 12 editorial changes related to loss of prestress calculations.

With the recent 2007 AASHTO SCOBS meeting in Wilmington, Delaware, in July, a new set of interim changes to the specifications was adopted. These interim changes will be published in 2008 as the first stand-alone changes to the Fourth Edition, and will be reviewed in a future column.