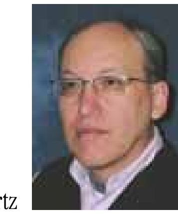
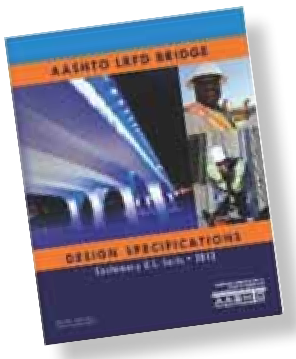
2012 Interim Changes Related to Concrete Structures



by Dr. Dennis R. Mertz



At the annual meeting of the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures (SCOBS), hosted in May 2011 by the Virginia Department of Transportation (VDOT) in Richmond, Va., the subcommittee considered and adopted four agenda items specifically related to concrete structures. Technical Committee T-10, Concrete Design, developed Agenda Items 51 through 54 over the past several years and moved them to the subcommittee ballot for consideration in Richmond. The agenda items represent revisions and additions to the *AASHTO LRFD Bridge Design Specifications*. This column reviews the 2011 concrete-structures agenda items, which are integrated into the 6th Edition of the *AASHTO LRFD Bridge Design Specifications* published earlier this year.

Agenda Item 51 revises Article 5.5.4.2.1, which specifies resistance factors for conventional construction (as opposed to segmental construction) at the strength limit states. The shear resistance factor for lightweight concrete is increased from 0.70 to 0.80. The original shear resistance factor for lightweight concrete of 0.70, a reduction from the value of 0.90 for normal weight concrete, was introduced during the initial development of the *AASHTO LRFD Bridge Design Specifications* because of a lack of available data to evaluate the statistical variability of lightweight concrete. Research by professor Andy Nowak of the University of Nebraska, Lincoln, based upon statistical evaluation of 8889 lightweight concrete cylinder compression test results from projects across the United States and the comparison of shear test results to shear capacities computed using the General Method of the *AASHTO LRFD Bridge Design Specifications*, concluded that the resistance factor for shear for lightweight concrete could be increased from its current value of 0.7 to the new value of 0.8.

Through **Agenda Item 52**, provisions and commentary in Articles 5.4.2.6 and 5.7.3.3.2, are revised. The revision in Article 5.4.2.6, modulus of rupture, basically removes the specific modulus of rupture equation for Article 5.7.3.3.2 reverting to the basic equation. The revisions to Article 5.7.3.3.2 replace 1.2M_{cr} with a varying coefficient multiplied by M_{cr}. This coefficient is a function of the component's effect on modulus of rupture, the effective prestress, and the ratio of yield to ultimate strength in the prestressing steel. This revision results in a less severe minimum reinforcement requirement for continuous concrete box girder bridges with parabolic post-tensioning, and segmentally constructed concrete box girders because f_{cpe} becomes less significant. The agenda item also exempts compression-controlled members from the minimum reinforcement requirement.

Agenda Item 53 adds detailed provisions specific to curved post-tensioned box girder bridges in a new article, Article 5.8.1.5, webs of curved post-tensioned, box girder bridges, and revises other articles to accommodate this addition. These revisions are based upon California's demonstrated success with hundreds of curved post-tensioned, box girder bridges.

The concept of partial prestressing and all the provisions in the *AASHTO LRFD Bridge Design Specifications* relative to it are removed through **Agenda Item 54**. The term "partial prestressing" has gradually lost its significance since the publication of the *AASHTO LRFD Bridge Design Specifications*, first edition in 1994. Due to the lack of adoption of this concept, the presence of articles about partial prestressing in the specifications is an unnecessary complication.

The AASHTO SCOBS will be meeting this year in Austin, Tex., July 8 to 12, and will be considering proposed revisions for publication in 2013.

EDITOR'S NOTE

If you would like to have a specific provision of the AASHTO LRFD Bridge Design Specifications *explained in this series of articles, please contact us at www.aspirebridge.org.*