Upcoming Changes to the *AASHTO LRFD Bridge Design Specifications*

Photo: Vermont Department of Transportation.

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This article covers the four working agenda items prepared by American Association of State Highway and Transportation Officials (AASHTO) Technical Committee T-10 that were approved at the 2018 meeting of the AASHTO Committee on Bridges and Structures, as well as the related changes to be made to Section 5 of the *AASHTO LRFD Bridge Design Specifications*.

Effect of Post-Tensioning Ducts on Shear Strength

Given the growing popularity of spliced girders and the use of both plastic and steel ducts, the Texas Department of Transportation sponsored research to evaluate the shear strength of full-scale specimens and make recommendations.[1] Researchers conducted 11 shear tests (10 with ducts and one without) to failure, using a total of seven full-scale bulb-tee specimens. The targeted variables in the testing included (a) presence of grouted post-tensioning ducts, (b) post-tensioning duct material (plastic or steel), (c) duct-diameter-to-web-width ratio, and (d) transverse reinforcement ratio. In the tests, grouted plastic ducts did not significantly reduce girder shear strength when compared with grouted steel ducts. The researchers statistically evaluated the results of these and 34 other similar tests to develop and refine strength reduction factors to account for the presence of ducts. The newly adopted design provisions more accurately represent the observed crushing behavior of compression struts and the resultant limitation on the contribution of transverse reinforcement in the truss shear-resistance mechanism.[1]

Development Length of Welded Wire Reinforcement

This change aims to eliminate a potential misinterpretation of Article 5.10.8.2.5b introduced prior to the 7th edition and to clarify existing specifications regarding splice and development lengths for welded wire reinforcement. A new equation identifies the modification factors applicable to welded wire reinforcement. Also, the commentary has new figures to help designers interpret the provisions. Depending on how designers previously interpreted the provisions, there may be minor changes to the development and splice lengths for welded wire reinforcement. The approved provisions also provide better consistency with the provisions of ACI 318-14.[2]

Stability of Precast, Prestressed Concrete Girders

With optimized sections, and through use of high-performance/high-strength materials, spans of pretensioned girders have been increasing in recent decades. Record-breaking spans, with lengths exceeding 200 ft, have been constructed in Washington, Nebraska, and Florida. The stability of pretensioned concrete girders may govern the design of long-span girders. Commentary and references are therefore added to Section 5 to emphasize the safety implications of stability considerations.[3,4]

Cover Requirements for Different Types of Reinforcement

Corrosion-resistant steel, such as AASHTO M 334 bars, are increasingly used in bridge structures due to their durability and strength. This change in the specifications allows designers to appropriately use reduced concrete cover for corrosion-resistant, epoxy-coated, and galvanized reinforcing steel while providing an equivalent or longer service life than that of ordinary uncoated reinforcing bars. Experiments and published analytical results demonstrate the viability of using reduced clear cover for ASTM A615 and A706 reinforcement while complying with AASHTO crack width requirements.[5-7]

The changes discussed in this article offer significant improvements to the specifications and will appear in the 9th edition of the AASHTO LRFD specifications. Upcoming articles will present the technical background and implications of some of these changes for the industry.

References

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3. Precast/Prestressed Concrete Institute (PCI). 2016. *Recommended Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders.* Chicago, IL: PCI.

4. Seguirant, S., R. Brice, and B. Khaleghi. 2009. "Design Optimization for Fabrication of Pretensioned Concrete Bridge Girders: An Example Problem." *PCI Journal* 54(4): 73-111.

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