

Upcoming Changes to the *AASHTO LRFD Bridge Design Specifications* and Other Items Presented by the Concrete Committee

by Dr. Oguzhan Bayrak, University of Texas at Austin

When the 2026 meeting of the American Association of State Highway and Transportation Officials' (AASHTO) Committee on Bridges and Structures (COBS) took place in June in Charlotte, N.C., COBS approved all 10 agenda items presented by the AASHTO Concrete Committee. This article provides an overview of those working agenda items (WAIs). I will discuss each agenda item in greater detail in future issues of *ASPIRE*.

Ballot Item 4 (WAI 232): AASHTO Guide Specifications for Structural Design with Ultra-High-Performance Concrete, Section 2. Material Conformance Guidance

This agenda item presents the second edition of the *AASHTO Guide Specifications for Structural Design with Ultra-High-Performance Concrete*. This edition will include material conformance specifications that cover requirements for qualification and acceptance testing of ultra-high-performance concrete (UHPC) materials.

The first edition of these guide specifications,¹ which was published in March 2024, is based on extensive research carried out by the Turner-Fairbank Highway Research Center of the Federal Highway Administration (FHWA), the Precast/Prestressed Concrete Institute (PCI), and other researchers from around the world. The material behavior of UHPC is directly related to its constituent materials, mixture proportions, mixing procedures, curing regimens, and placement methods. Therefore, during the development of the first edition, it became clear that, in addition to structural design specifications, the industry also needs UHPC material conformance specifications.

Ballot Item 5 (WAI 231b): Bridge Construction Specifications for Adjacent Members

Concrete box-beam bridges can be constructed by placing box beams side by side and connecting them with shear keys. Cracking of these shear keys has been a long-term problem for adjacent box-beam bridges. Research conducted as part of National Cooperative Highway Research Program (NCHRP) Project 12-95A² at the University of Cincinnati showed that cracking can be caused by temperature-induced deformations and movements. More specifically, solar energy causes the top slabs of the adjacent members to heat up and expand. The shear keys are usually filled with a grout material when the adjacent members are expanded, and cracking is caused by subsequent contraction when the members cool. Poor bond between the shear key material and the sides of the girders contributes to cracking. The results of NCHRP Project 12-95A showed that not filling the top 4 in. of the shear key with grout keeps the shear key material out of the zone of greatest thermal movement. Using a deeper shear key, roughening and prewetting the girder surfaces, and using a high-bond-strength shear key material improves the bond between the adjacent members and the shear keys, thereby mitigating cracking. An article in the Summer 2025 issue of *ASPIRE* summarized the NCHRP project. The specific changes to the *AASHTO LRFD Bridge Construction Specifications*³ addressed in this ballot item include requiring a Concrete Surface Profile of 4 (CSP4) or rougher, as defined by the International Concrete Repair Institute,⁴ for the vertical surfaces of the shear keys of adjacent members or an exposed aggregate surface, provided that this surface does not adversely affect the cover or create a situation where aggregates can be dislodged.

Ballot Item 6 (WAI 255): Guide Specification for Conducting Environmental Life-Cycle Assessments of New Bridges

This agenda item introduces a new guide specification to establish the minimum requirements for conducting environmental life-cycle assessments (LCAs) of new bridges. This guide specification is not intended for asset management decisions for in-service bridges. Instead, the intent is to provide uniform practices that bridge designers and owners can adopt to conduct environmental LCAs of new bridges. This guide specification provides criteria that bridge design teams can use to assess and compare the environmental LCA results associated with a reference design and a final design of an identified bridge, or the comparison of design options (preliminary designs) based on the same primary material selection being considered during the design of a bridge. The guide specification deals specifically with the environmental impacts of materials selected—including those due to construction, associated maintenance and replacement cycles, and end of life—over a target service life. The agenda item reflects collaborative efforts of the National Concrete Bridge Council and National Steel Bridge Alliance and benefited from the review comments provided by several AASHTO technical committees.

Ballot Item 7 (WAI 241): AASHTO Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition

This ballot item corrects an error in the *AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete*.⁵ Specifically, it corrects the upper-bound limit for the shear resistance of concrete reinforced with

glass-fiber-reinforced polymer (GFRP), making that limit consistent with Section 5 of the *AASHTO LRFD Bridge Design Specifications*.⁶ This change improves the design efficiency of GFRP-reinforced concrete; as a result, longer span lengths can be achieved before the conservative web-crushing limit is reached, without increasing the member size. The upper limit of V_n given by Eq. 2.7.2.5-1 in the GFRP guide specifications, is intended to ensure that the concrete in the web of the beam will not crush before the average maximum design strain limit (currently 0.004) of the transverse reinforcement across the critical shear crack plane is reached, as described in Commentary C2.7.2.5 of the GFRP guide specifications. With that stated, the maximum shear stress limit has been revised in the GFRP guide specifications to be 25% of the compressive strength of concrete rather than square root of the compressive strength of concrete, consistent with modified compression field theory based shear designs.

Ballot Item 8 (WAI 243): Grade 80 Reinforcing Bars

The American Concrete Institute removed Grade 75 reinforcing bars from the 2011 edition of *Building Code Requirements for Structural Concrete (ACI 318) and Commentary (ACI 318R)*.⁷ In the 2019 edition of ACI 318,⁸ Table 20.2.2.4(a), Nonprestressed Deformed Reinforcement, shows maximum values of yield strength f_y permitted for design calculations for ASTM A615, A706, A955, and A996 deformed bars. ASTM International moved Grade 75 reinforcing bar specifications to Annex A2 in the 2018 revision of ASTM A615, *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement*.⁹ Grade 80 reinforcing bar specifications are listed in the main body of both ASTM A615 and A706, *Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement*.¹⁰ The change in these specifications seems to consolidate Grade 75 into Grade 80 for the design and material specifications. The small difference in the yield strength of 5 ksi allowed the two bar grades to be considered interchangeable from the standpoint of steel reinforcing bar manufacturing. Current design provisions in the AASHTO LRFD specifications stipulate a yield strength limit of 75 ksi

in various places, such as Articles 5.6.4.6, 5.7.2.7, 5.8.2.1 (just to name a few). As a result, Grade 80 reinforcing bars have been precluded from use in the design. To be consistent with the aforementioned design and material specifications moving away from specifying 75-ksi yield strength, revisions to change the specified minimum yield strength from 75 ksi to 80 ksi, where applicable, are made to the AASHTO LRFD specifications.

Ballot Item 9 (WAI 239): GFRP Axial Resistance

This ballot item makes revisions to Article 2.6.4.2 and its commentary in the *AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete*, second edition. The intent of the revisions is to better align the guide specifications and recent research on the axial compressive resistance of GFRP. In short, the proposed revisions credit GFRP axial stiffness and strength in an amount similar to concrete that surrounds the GFRP bars.

Ballot Item 10 (WAI 240): GFRP Material Specifications

The *AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete*, second edition, only refers to ASTM D7957, *Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement*,¹¹ for material specifications and does not include ASTM D8505, *Standard Specification for Basalt and Glass Fiber Reinforced Polymer (FRP) Bars for Concrete Reinforcement*,¹² which covers higher-strength, straight GFRP bars. This ballot item, which has numerous subsections and additional references, addresses this oversight and aligns the guide specifications with the materials available in the marketplace.

Ballot Item 11 (WAI 242): Distribution Reinforcement

In the current AASHTO LRFD specifications, the provisions for distribution reinforcement are provided in Article 5.12.2.1 for slab bridges and Article 9.7.3.2 for deck slabs. Both articles provide equations for calculating the distribution reinforcement area based on a percentage of the primary reinforcement area. Use of the calculations is challenging when the primary reinforcement is high-strength

steel or prestressing steel and the distribution reinforcement is normal-strength mild steel. If the percentage of the area of the high-strength primary reinforcement is used to calculate the area of normal-strength steel, the result can be a very small amount of distribution reinforcement. For example, with partial-depth prestressed concrete deck panels, applying the AASHTO percentage in Article 9.7.3.2 to the prestressing steel area, using the primary prestressing strand area to size the mild distribution steel, produces a very small amount of distribution reinforcement. In such cases, excessive cracking in the panels perpendicular to the distribution steel could occur. If the same panel is designed using mild steel reinforcement in both directions, the amount of distribution reinforcement would be almost three times more.

The original provisions for distribution reinforcement were likely developed with members with equal strength reinforcement. In contrast, in this recommended revision to the AASHTO LRFD specifications, the amount of distribution reinforcement is based mostly on the strength of the section, not necessarily the area of reinforcement. Adjustment factors are proposed to account for different strengths of reinforcing steels. The concept of adjusting the percentage of primary reinforcement for differing steels is not new. In the AASHTO LRFD specifications, Eq. 5.12.2.1-2 uses this type of ratio; however, the equation is based on Grade 60 distribution reinforcement. The new provisions account for any combination of reinforcing steels using the same approach as Eq. 5.12.2.1-2. If the intent of these provisions is to have distribution reinforcement generally based on a percentage of strength, the proposed ratio should be applied to the percentage calculation and not be limited to the 50% and 67% values.

Ballot Item 12 (WAI 205): Definition of the Flexural Tension Side of Members

The changes detailed in this ballot item clarify the term A_{ps} that is currently used in various articles of Section 5 of the AASHTO LRFD specifications. A_{ps} is reserved for defining the area of prestressed reinforcement on the flexural tension side of a flexural member. This

agenda item offers clarifications for pretensioned members with harped strands or post-tensioned members with draped and straight tendons. It is aimed at achieving uniform assumptions by all designers. Importantly, the proposed clarifications were checked against an extensive database to ensure that the recommendations are conservative and accurate.

Ballot Item 13 (WAI 231a): Bridge Design Specifications for Adjacent Members

This ballot item, which has 15 subitems and many references, implements the design recommendations that were developed in NCHRP Project 12-95A.² It improves the AASHTO LRFD design provisions that apply to adjacent member use in superstructure construction and complements the construction provisions covered in Ballot Item 5, which was previously discussed.

Concluding Remarks

The AASHTO Concrete Committee has been very active in developing these ballot items, as well as a comparable number of working agenda items slated to be finished for the next cycle. I look forward to sharing the details of the 10 agenda items outlined in this article with our concrete bridge community in future issues of *ASPIRE*.

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