Upcoming Changes to the *AASHTO LRFD Bridge Design Specifications*

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The 2025 meeting of the American Association of State Highway and Transportation Officials' (AASHTO) Committee on Bridges and Structures (COBS) took place in June 2025, in Dallas, Tex. The AASHTO Concrete Committee presented seven agenda items for approval by COBS, and all seven items were approved. In addition, the Safety and Evaluation (SE) technical committee presented an agenda item that relates to the load rating of segmental concrete bridges, which was approved as well. This article provides an overview of these eight agenda items, which will be discussed in greater detail in upcoming issues of *ASPIRE*®.

The eight agenda items approved at the 2025 COBS meeting are as follows:

1. Agenda item 34 (working agenda item [WAI] 235): Strain Compatibility. Strain compatibility analyses typically require the use of commercial, open source, or academic software. Strain compatibility analyses can also be performed by using spreadsheet applications, which have been developed by many designers. Performing such analyses was once burdensome, and many designers preferred to use simplified hand calculation tools. However, with the advent of computers and appropriate software, strain compatibility analyses have become more feasible for designers to consider. Consistent with this trend, this agenda item informs the design engineer of cases when the closed-form equations of the *AASHTO LRFD Bridge Design Specifications*[1] Article 5.6.3 that use a rectangular stress distribution method can be overly conservative. In addition, the item provides guidance to design engineers for performing strain compatibility analysis. The closed-form equations of Article 5.6.3 can significantly underpredict the flexural resistance of flanged precast, prestressed concrete girders. In contrast, strain compatibility analyses provide more accurate estimates of flexural capacity.

2. Agenda item 35 (WAI 233): AASHTO/National Concrete Bridge Council (NCBC) Guide to Post-Tensioned Transportation Structures: Volume I – General. One of the major advancements in bridge construction in the United States in the second half of the 20th century was the development and use of prestressed concrete—here, prestressed concrete refers to both pretensioned and post-tensioned concrete bridges. With their proven field performance, prestressed concrete bridges offer a broad range of engineering solutions and a variety of aesthetic opportunities. Additionally, prestressing in concrete bridges offers potential benefits in costs and durability. The objective of this agenda item and guide is to provide guidance to individuals involved in the design, installation, grouting, and inspection of post-tensioning tendons for prestressed concrete bridges, primarily during construction. While providing new information, this document also includes, revises, and updates the body of knowledge previously presented in the FHWA *Post-Tensioning Tendon Installation and Grouting Manual*.[2]

3. Agenda item 36 (WAI 225): Minimum Reinforcement. It has been shown that the flexural cracking stress of concrete members significantly decreases as member depth increases. Past research has suggested that flexural cracking strength may be proportional to member height. For example, a 36.0-in.-deep girder achieves a flexural cracking stress that is 31% to 57% percent lower than that of a 6.0-in.-deep modulus-of-rupture test specimen. Since modulus-of-rupture units are either 4.0 or 6.0 in. deep and typically moist cured up to the time of testing, the modulus of rupture should be significantly greater than the flexural cracking stress of an average-size, typical bridge member composed of the same concrete. Based on this technical fact, this agenda item serves to revise the *AASHTO LRFD Bridge Design Specifications*[1] in the manner outlined in National Cooperative Highway Research Program (NCHRP) Research Report 906, *LRFD Minimum Flexural Reinforcement Requirements*.[3] The approved changes in Agenda item 36 offer significant advantages in meeting the minimum reinforcement design requirements of the AASHTO LRFD specifications in a rational way.

4. Agenda item 37 (WAI 238): Reinforcement Properties. This agenda item consolidates information about reinforcing bar properties found in multiple locations in Section 5 of the AASHTO LRFD specifications into one table. With this agenda item, specified minimum yield strength, minimum tensile strength, and minimum tensile strain properties of ASTM A615,[4] A706,[5] A955,[6] A1035,[7] and A1064[8] reinforcement are consistently presented in a new table.

5. Agenda item 38 (WAI 234): ASTM A615 Updates. This agenda item intends to correct the ratios of minimum yield strength to ultimate tensile strength for AASHTO M 31[9] (ASTM A615) Grade 60 and Grade 80 reinforcing bars. This correction will increase the cracking moment M_{cr}, which would increase the minimum amount of flexural reinforcement required in cases where M_{cr} is less than 1.33 times the ultimate moment M_u. Agenda item 38 also adds the ratios for AASHTO M 31 (ASTM A615) Grade 100 reinforcing bar, ASTM A706 Grade 100 reinforcing bar, and ASTM A955 Grades 60, 75, and 80 reinforcing bars. Additionally, it provides correct values for minimum tensile strength of reinforcing bar to use when determining spacing of noncontact lap splices of longitudinal reinforcement that extends from columns and anchors in oversized drilled shafts. This agenda item refers users to the new table discussed in agenda item 37.

6. Agenda item 39 (WAI 146): Strand Bond. Earlier this year, PCI updated the "Recommended Practice to Assess and Control Strand/Concrete Bonding Properties of ASTM A416 Prestressing Strand."[10] The PCI recommended practice establishes ASTM A1081[11] minimum values for standard bond and high bond strand. The standard bond strand is considered as the strand typically

used in pretensioned applications. This agenda item incorporates information from the updated PCI recommended practice, which includes resolution testing. The implementation of this agenda item is covered in a Concrete Bridge Technology article in this issue of *ASPIRE*. In addition, the August 20, 2025, webinar hosted by NCBC focused on this item. The recording of the webinar can be accessed through the NCBC website (https://nationalconcretebridge.org/webinars).

7. Agenda item 40 (WAI 230): Concrete Piles. The AASHTO LRFD specifications do not explicitly address the structural design of prestressed concrete piles; rather, they rely on general provisions developed for the design of reinforced concrete compression members, and more specifically, for columns in buildings. There are important differences between a simple compression member and a compression member that is laterally supported, at least partially, due to the presence of soil around a drilled shaft or pile. Agenda item 40 considers boundary conditions that are more representative of drilled shaft or pile foundations and incorporates best practices in designing and detailing such deep foundations. As a result, this agenda item unifies the prestressed concrete pile provisions of the AASHTO LRFD specifications with the current research findings and best practice-based design provisions for piles presented in *Specification for Precast, Prestressed Concrete Piles* (ANSI/PCI 142-24).[12] With the approval of this agenda item, performance-based design techniques in ANSI/PCI 142 have been adopted by the AASHTO LRFD specifications.

8. SE agenda item 2: The changes proposed in this agenda item from the SE technical committee are aimed at improving AASHTO's *The Manual for Bridge Evaluation*.[13] The changes are based on recent findings from the NCHRP 12-123 research project,[14] which involved the calibration of load factors, multiple presence factors, and system factors; revision of provisions related to the application of striped versus design lanes; and introduction of stress limits in concrete for inventory and operating ratings at the service limit state, which are specific to segmental concrete bridges. This agenda item benefits from the work product of Corven Engineering published by the Florida Department of Transportation titled *New Direction for Florida Post-Tensioned Bridges—Volume 10A: Load Rating PostTensioned Concrete Segmental Bridges*.[15]

As I mentioned in my Fall 2024 AASHTO LRFD article, the AASHTO Concrete Committee, with the support and collaboration offered by various concrete technical institutes, has been quite active in developing these agenda items. In addition, the committee has been working on a comparable number of agenda items slated to be finished for the next cycle. The approved Concrete Committee agenda items noted in this article will be incorporated in the forthcoming 11th edition of the AASHTO LRFD specifications[16] and the approved SE agenda item will be included in the forthcoming 4th edition of *The Manual for Bridge Evaluation*.[17]

References

1. American Association of State Highway and Transportation Officials (AASHTO). 2024. *AASHTO LRFD Bridge Design Specifications*. 10th ed. Washington, DC: AASHTO.
2. Corven, J., and A. Moreton. 2013. *Post-Tensioning Tendon Installation and Grouting Manual*. Version 2.0. FHWA-NHI-13-026. Washington, DC: Federal Highway Administration.
3. Sritharan, S., H. Wibowo, M. J. Rosenthal, J. N. Eull, and J. Holombo. 2019. *LRFD Minimum Flexural Reinforcement Requirements*. National Cooperative Highway Research Program (NCHRP) Research Report 906. Washington, DC: National Academies Press. https://doi.org/10.17226/25527.
4. ASTM International. 2024. *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement*. ASTM A615/A615M-24. West Conshohocken, PA: ASTM International.
5. ASTM International. 2024. *Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement*. ASTM A706/A706M-24. West Conshohocken, PA: ASTM International.
6. ASTM International. 2020. *Standard Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement*. ASTM A955/A955M-20c. West Conshohocken, PA: ASTM International.
7. ASTM International. 2024. *Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement*. ASTM A1035/A1035M. West Conshohocken, PA: ASTM International.
8. ASTM International. 2024. *Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*. ASTM A1064/A1064M-24. West Conshohocken, PA: ASTM International.
9. AASHTO. 2022. *Specification for Deformed and Plain Carbon and Low-Alloy-Steel Bars for Concrete Reinforcement*. AASHTO M 31M/M 31-22. Washington, DC: AASHTO.
10. PCI Strand Bond Task Group. 2020. "Recommended Practice to Assess and Control Strand/Concrete Bonding Properties of ASTM A416 Prestressing Strand." *PCI Journal* 65 (6): 33–34. https://doi.org/10.15554 /pcij65.6-06.
11. ASTM International. 2021. *Standard Test Method for Evaluating Bond of Seven-Wire Steel Prestressing Strand*. ASTM A1081/A1081M-21. West Conshohocken, PA: ASTM International.
12. Precast/Prestressed Concrete Institute (PCI). 2024. *Specification for Precast, Prestressed Concrete Piles*. ANSI/PCI 142-24. Chicago, IL: PCI.
13. AASHTO. 2022. *The Manual for Bridge Evaluation*. 3rd ed., with 2022 interim revisions. Washington, DC: AASHTO.
14. Popok, K., A. Nowak, P. Hurtado, J. Chmielewski, R. Barnes, H. Nassif, P. Lou, C. Yang, S. Hanbay, F. Menkulasi, C. Eamon, F. Cakmak, B. Bhaktha, J. Corven, E. He, and B. Morris. 2024. *Load Rating of Segmental Bridges*. NCHRP Report 1128. Washington, DC: Transportation Research Board.
15. Corven Engineering. 2004. *New Direction for Florida Post-Tensioned Bridges—Volume 10A: Load Rating Post-Tensioned Concrete Segmental Bridges*. Final Report. Tallahassee, FL: Florida Department of Transportation.
16. AASHTO. Forthcoming. *AASHTO LRFD Bridge Design Specifications*. 11th ed. Washington, DC: AASHTO.
17. AASHTO. Forthcoming. *The Manual for Bridge Evaluation*. 4th ed. Washington, DC: AASHTO.