

# AASHTO LRFD Bridge Design Specifications: Minimum Reinforcement Requirements, Strand Bond, and Prestressed Concrete Piles

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During the June 2025 meeting of the American Association of State Highway and Transportation Officials' (AASHTO's) Committee on Bridges and Structures (COBS) in Dallas, Tex., COBS approved several agenda items regarding changes to be incorporated in the forthcoming 11th edition of the *AASHTO LRFD Bridge Design Specifications*.<sup>1</sup> This article provides an in-depth overview of three of those approved items: agenda items 36, 39, and 40. For discussion of other approved AASHTO agenda items, refer to articles in the Fall 2025 and Spring 2026 issues of *ASPIRE*®.

## Agenda Item 36

This agenda item implements the proposed recommendations from the National Cooperative Highway Research Program's *LRFD Minimum Flexural Reinforcement Requirements* (NCHRP Report 906),<sup>2</sup> which focuses on the minimum flexural reinforcement requirements of the AASHTO LRFD specifications. The estimate of the in situ tensile strength of concrete plays a significant role in determining the required minimum flexural strength of prestressed concrete components. For additional information about this topic, interested readers are referred to *fib* (International Federation for Structural Concrete) Bulletin 1, *Structural Concrete*,<sup>3</sup> and an article by Tuchscherer and Bayrak.<sup>4</sup> According to *fib*,<sup>3</sup> as beam depth increases, the flexural tensile strength of concrete (as determined by a beam test or a modulus of rupture test) approaches the tensile strength measured in a direct tension test. An in-depth investigation of the variability of tensile strength of concrete and its dependence on the member depth is discussed in *fib* Bulletin 1. This size effect that influences the tensile strength of concrete can be quite significant, and deeper members may crack under lower tensile stresses. Incorporating this behavior into the AASHTO LRFD specifications through the findings of NCHRP Report 906 provides significant benefits when calculating minimum flexural reinforcement. These requirements are intended to ensure ductility by specifying sufficient reinforcement to carry the tensile resultant force in the concrete and transfer it to the reinforcement crossing the flexural crack if and when flexural cracking occurs. With this discussion serving as background, Agenda Item 36 makes several modifications to the AASHTO LRFD specifications.

The notation in Article 5.3 will be revised as follows:

$h$  = overall thickness or depth of a member (in.); lateral dimension of the cross-section in the direction considered (in.); overall dimension of precast member in the direction in which splitting resistance is being evaluated (in.); least thickness of component section (in.) (5.6.3.3) (5.8.4.5.3) (5.9.4.4.1) (5.10.6)

$\alpha_s$  = strength factor for minimum reinforcement (5.6.3.3)

Article 5.4.2.6 will be revised to read:

*Unless determined by physical tests, the modulus of rupture,  $f_r$ , for lightweight concrete with specified compressive strengths of up to 10.0 ksi and normal weight concrete with specified strengths up to 15.0 ksi may be taken as  $0.24\lambda\sqrt{f'_c}$  where  $\lambda$  is the concrete density modification factor as specified in Article 5.4.2.8.*

*Where physical tests are used to determine modulus of rupture, the tests shall be performed in accordance with AASHTO T 97<sup>(5)</sup> and shall be performed on concrete using the same proportions and materials as specified for the structure. The test units shall be cured in the same manner as the production components.*

Commentary C5.4.2.6 will be revised as follows:

*Most modulus of rupture test data on normal weight concrete are between  $0.24\lambda\sqrt{f'_c}$  and  $0.37\lambda\sqrt{f'_c}$  (ksi) (Walker and Bloem, 1960<sup>(6)</sup>) (Khan, Cook, and Mitchell, 1996<sup>(7)</sup>). A value of  $0.37\lambda\sqrt{f'_c}$  has been recommended for the prediction of the tensile strength of high-strength concrete (ACI 363, 2010<sup>(8)</sup>). However, the modulus of rupture is sensitive to curing methods, and nearly all of the test units in the dataset mentioned previously were moist cured until testing. Carrasquillo et al. (1981<sup>(9)</sup>) noted a 26 percent reduction in the 28-day modulus of rupture if high-strength units were allowed to dry after 7 days of moist curing over units that were moist cured until testing.*

*The flexural cracking stress of concrete members has been shown to decrease with increasing member depth. Past research has suggested that the flexural cracking stress may be considered to be proportional to member height (Shioya et al., 1989<sup>(10)</sup>) (Carpinteri and Corrado, 2011<sup>(11)</sup>). For example, the research shows 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 a typical bridge member composed of the same concrete.*

*The properties of higher-strength concretes are particularly sensitive to the constitutive materials. If test results are to be used in design, it is imperative that tests be made using concrete with not only the same mix proportions,*

but also the same materials and curing procedures as the concrete used in the structure.

Article 5.6.3.3 will be revised as follows:

Unless otherwise specified, at any section of a noncompression-controlled flexural component, the amount of prestressed and nonprestressed tensile reinforcement shall be adequate to develop a factored flexural resistance,  $M_r$ , greater than or equal to the lesser of the following:

- $\alpha_s$  times the factored moment required by the applicable strength load combination specified in Table 3.4.1-1;

$$M_{cr} = \gamma_3 \left[ (\gamma_1 f_r + \gamma_2 f_{cpc}) S_c - M_{dnc} \left( \frac{S_c}{S_{nc}} - 1 \right) \right] \quad (5.6.3.3-1)$$

where:

$\alpha_s$  = strength factor for minimum reinforcement

For prestressing steel:

$$1.0 \leq \alpha_s = 1.0 + \frac{0.33(\epsilon_t - \epsilon_{cl})}{\epsilon_{tl} - \epsilon_{cl}} \leq 1.33 \quad (5.6.3.3-2)$$

For nonprestressed reinforcement:

$$1.0 \leq \alpha_s = 1.0 + \frac{0.2(\epsilon_t - \epsilon_{cl})}{\epsilon_{tl} - \epsilon_{cl}} \leq 1.2 \quad (5.6.3.3-3)$$

$\epsilon_t$  = net tensile strain in the extreme tension steel at nominal resistance (in./in.)

$\epsilon_{cl}$  = compression-controlled strain limit in the extreme tension steel (in./in.)

$\epsilon_{tl}$  = tension-controlled strain limit in the extreme tension steel (in./in.)

$M_{cr}$  = cracking moment (kip-in.)

$f_r$  = modulus of rupture of concrete specified in Article 5.4.2.6

$f_{cpc}$  = compressive stress in concrete due to effective prestress forces only (after allowance for all prestress losses) at extreme fiber of section where tensile stress is caused by externally applied loads (ksi)

$S_c$  = section modulus for the extreme fiber of the composite section where tensile stress is caused by externally applied loads (in.<sup>3</sup>)

$M_{dnc}$  = unfactored dead load moment acting on the monolithic or noncomposite section (kip-in.)

$S_{nc}$  = section modulus for the extreme fiber of the monolithic or noncomposite section where tensile stress is caused by externally applied loads (in.<sup>3</sup>)

Appropriate values for  $M_{dnc}$  and  $S_{nc}$  shall be used for any intermediate composite sections. Where the beams are designed for the monolithic or noncomposite section to resist all loads, substitute  $S_{nc}$  for  $S_c$  in the above equation for the calculation of  $M_{cr}$ .

The following factors shall be used to account for variability in the flexural cracking stress of concrete members,

variability of prestress, and the ratio of nominal yield stress of reinforcement to ultimate:

$$\begin{aligned} \gamma_1 &= \text{flexural cracking variability factor} \\ &= 1.2 (h/12)^{-0.15} \text{ for precast segmental structures} \\ &= 1.6 (h/12)^{-0.15} \text{ for all other concrete structures,} \end{aligned}$$

where  $h$  is the overall thickness or depth of a member (in.)

The first and third paragraphs in Commentary C5.6.3.3 will be revised to read:

Minimum reinforcement provisions are intended to decrease the probability of brittle failure by providing flexural capacity greater than the cracking moment. If this condition is not met, additional flexural strength is required by multiplying the required factored moment by  $\alpha_s$ . For tension-controlled sections,  $\alpha_s$  is 1.33, which is equivalent to the inverse of the resistance factor ( $\phi$ ) for compression-controlled sections. For compression-controlled and transition sections,  $\alpha_s$  is decreased to avoid double counting the additional strength requirement for decreased ductility that is already accounted for in  $\phi$ . Based on the experimental data, a member having the minimum reinforcement is expected to possess a minimum displacement capacity of 1.0% of the span length.

For precast segmental construction, cracking generally starts at the segment joints. Research at the University of California, San Diego, has shown that flexure cracks occur adjacent to the epoxy-bonded match-cast face, where the accumulation of fines decreases the tensile strength (Megally et al., 2003<sup>[12]</sup>). Based on this observation, a decreased  $\gamma_1$  factor of  $1.2 (h/12)^{-0.15}$  is justified.

A new fourth paragraph will be added to Commentary C5.6.3.3 that reads:

The flexural cracking stress of concrete members has been shown to decrease with increasing member depth. Sriharan et al. (2019<sup>[2]</sup>) observed that the flexural cracking strength is proportional to  $h^{-0.15}$ . A similar equation for estimating the flexural cracking strength on the basis of the depth is found in fib Model Code 2010 for Concrete Structures.<sup>[13]</sup>

## Agenda Item 39

PCI has published the *Recommended Practice to Assess and Control Strand/Concrete Bonding Properties of ASTM A416 Prestressing Strand*,<sup>14</sup> which includes  $\kappa$  factors for the transfer length equation from NCHRP Report 603, *Transfer, Development, and Splice Length for Strand/Reinforcement in High-Strength Concrete*.<sup>15</sup> The recommended  $\kappa$  factors are 0.8, 1.0, and 1.6. The 0.8  $\kappa$  factor is used as a lower bound for evaluating end region stresses. The 1.0 and 1.6  $\kappa$  factors are based on high-bond strand and standard-bond strand, respectively. The PCI recommended practice establishes ASTM A1081<sup>16</sup> minimum values for standard-bond and high-bond strand. The standard-bond strand is considered as the strand typically used in pretensioned applications. The PCI recommended practice does not explicitly include the  $\kappa$  factors within the development length equation. This agenda item incorporates the latest update to the PCI recommended

practice, which includes resolution testing. Agenda Item 39 makes the following changes.

Article 5.9.4.3.1 is revised, and a new seventh paragraph is added to read as follows:

*In determining the resistance of pretensioned concrete components in their end zones, the gradual buildup of the strand force in the transfer and development lengths shall be considered.*

*The stress in the prestressing steel may be assumed to vary linearly from zero at the point where bonding commences to the effective stress,  $f_{pe}$ , at the end of the transfer length.*

*Between the end of the transfer length and the development length, the strand stress may be assumed to increase linearly, reaching the stress at nominal resistance,  $f_{ps}$ , at the development length.*

*For the purpose of this article, the transfer length may be taken as 60 strand diameters and the development length shall be taken as specified in Article 5.9.4.3.2.*

*The effects of debonding shall be considered as specified in Article 5.9.4.3.3.*

*The provisions of Article 5.9.4.3 may be used for design concrete compressive strengths specified in Article 5.1, including normal weight concrete with design concrete compressive strengths up to 10.0 ksi at transfer ( $f'_{ci}$ ) and up to 15.0 ksi for design ( $f'_c$ ).*

*The resolution testing methods articulated in PCI's Recommended Practice to Assess and Control Strand/Concrete Bonding Properties of ASTM A416 Prestressing Strand (2025) shall be used to directly evaluate the bond quality of strands. The refined transfer and development length expressions in PCI Recommended Practice are intended for use in resolution testing and data analysis, and they shall not be used in lieu of a transfer length of 60 strand diameters and development length given in Equation 5.9.4.3.2-1.*

Commentary C5.9.4.3.1 is revised as follows:

*Between the end of the transfer length and development length, the strand stress grows from the effective stress in the prestressing steel after losses to the stress in the strand at nominal resistance of the member.*

*The extension of the transfer and development length provisions to normal weight concrete with design concrete compressive strengths up to 10.0 and 15.0 ksi for  $f'_{ci}$  and  $f'_c$ , respectively, is based on the work presented in NCHRP Report 603 (Ramirez and Russell, 2008).*

*PCI's Recommended Practice to Assess and Control Strand/Concrete Bonding Properties of ASTM A416 Prestressing Strand (2025) establishes ASTM A1081 minimum average values for standard-bond strand and high-bond strand. Standard bond strands are deemed to satisfy the performance expectations for bridge pretensioned members except for cases where limited internal redundancy provided by strands is critical. The anchorage of the tension force specified in Article 5.7.3.5 is critically important, particularly for members with a large percentage of debonded strands.*

*ASTM A1081 testing involves the use of a surrogate material. The testing is intended to demonstrate to the precast concrete producer that the QC [quality control] practices of the strand manufacturer are consistent and repeatable. In addition, the PCI's Recommended Practice provides methods for assessing transfer and development length through testing in production concrete and using refined calculation methods. In the event that results representative from QC and QA [quality assurance] testing contradict each other, the resolution testing articulated in the PCI's Recommended Practice and the associated transfer and development length expressions may be used by the Owner for evaluation and making decisions.*

*The concrete mixture designs used at a precast concrete plant have been demonstrated to influence the bond behavior of the strands in precast concrete products as discussed in the PCI Recommended Practice. The resolution testing methods described in PCI's recommended practice directly and accurately benefit from the use of actual bond behavior between the strands and surrounding concrete in pretensioned members.*

The implementation of this agenda item is covered in a Concrete Bridge Technology article in the Fall 2025 issue of *ASPIRE*. In addition, the August 20, 2025, webinar hosted by the National Concrete Bridge Council (NCBC) focused on this item. The recording of the webinar can be accessed through the NCBC website (<https://nationalconcretebridge.org/webinars>).

## Agenda Item 40

The AASHTO LRFD specifications do not explicitly address the structural design of prestressed concrete piles. Instead, the specifications rely on provisions originally developed for the design of reinforced concrete compression members. This agenda item emphasizes that prestressed concrete piles represent a specialized type of compression member and therefore their designs can benefit from boundary conditions specific to such deep-foundation members. The unsupported portion of a foundation pile is an extension of the supported portion, which may be several times longer than the unsupported length. Thus, such a pile is deeply embedded into the ground and at some depth can be considered fixed against translation and rotation. Many static load tests have been performed on long, slender piles that were driven through very soft material and then into firm soil. These tests show that even very soft soils provide lateral restraint and tend to prevent buckling. Other differences between prestressed concrete piles and typical reinforced concrete columns include the effects of prestressing on cracking behavior under flexural loads, the degree of redundancy between piles in a footing and that in a column, and the determination of an effective column length for buckling considerations. The modifications introduced in Agenda Item 40 address these issues and directs the user to follow ANSI/PCI 142-24, *Specification for Precast, Prestressed Concrete Piles*,<sup>17</sup> as discussed herein.

Article 5.11.3.2.4 is revised as follows:

*For piles extending above grade, the top of pile confinement length shall be taken as defined in Article 5.11.4.5.2., and the bottom-of-pile confinement length shall be the upper 20 ft of the pile below grade or the segment of*

the pile from grade to the location of maximum moment below grade plus three pile dimensions, whichever is greater. For fully embedded piles, the confinement length shall be the upper 20 ft of the pile or the segment from the top of the pile to the location of maximum moment below grade plus three pile dimensions, whichever is greater. The pile dimension shall be taken as the outside diameter for round piles, and the perpendicular distance between flat surfaces for square and hexagonal piles.

For piles using a circular prestressed reinforcement configuration, the ratio of spiral or hoop reinforcement,  $\rho_s$ , within the confinement length shall not be less than:

$$\rho_s = 0.04 \left( \frac{f'_c}{f_{yh}} \right) \left( 2.8 + \frac{2.3P_u}{f'_c} \right) \quad (5.11.3.2.4-1)$$

For piles with a square prestressed reinforcement configuration, the total area of confinement reinforcing provided in each orthogonal direction,  $A_{sh}$ , within the confinement length shall not be less than:

$$A_{sh} = 0.03sh_c \left( \frac{f'_c}{f_{yh}} \right) \left( 2.8 + \frac{2.3P_u}{f'_c} \right) \quad (5.11.3.2.4-2)$$

Maximum spacing of transverse reinforcement within the confinement length shall be the minimum of 1/5 times the pile dimension, six times the strand diameter, or 4 in.

For the remaining length of pile outside the confinement length,  $\rho_s$  and  $A_{sh}$ , shall not be less than half that required within the confinement length.

where:

$A_{sh}$  = total cross-sectional area of transverse reinforcement provided separately in each direction, including cross-ties where applicable (in.<sup>2</sup>)

$h_c$  = cross-sectional dimension of pile core measured out-to-out of square tie reinforcement (in.)

$f_{yh}$  = specified yield strength of transverse reinforcement (ksi)

$f'_c$  = compressive strength of concrete for use in design (ksi)

$P_u$  = factored axial load on pile, as determined using all load combinations that include the effect of seismic load, EQ, per Table 3.4.1-1 (kips)

$s$  = pitch or spacing of transverse reinforcement measured along the length of the pile (in.)

$\rho_s$  = ratio of spiral or hoop reinforcement to total volume of pile core (5.6.4.6)

A new Article, Article 5.11.4.5.6, is added as follows:

#### 5.11.4.5.6 Precast Prestressed Piles

For piles extending above grade, the top of pile confinement length shall be taken as defined in Article 5.11.4.5.2, and the bottom-of-pile confinement length shall be the upper 35 ft of the pile below grade or the segment of the pile from grade to the location of maximum moment below grade plus three pile dimensions, whichever is greater. For fully embedded piles, the confinement length shall be the upper 35 ft of the pile or the segment from the top of the pile

to the location of maximum moment below grade plus three pile dimensions, whichever is greater. The pile dimension shall be taken as the outside diameter for round piles, and the perpendicular distance between flat surfaces for square and hexagonal piles.

For piles using a circular prestressed reinforcement configuration, the ratio of spiral or hoop reinforcement,  $\rho_s$ , within the confinement length shall not be less than:

$$\rho_s = 0.06 \left( \frac{f'_c}{f_{yh}} \right) \left( 2.8 + \frac{2.3P_u}{f'_c} \right) \quad (5.11.4.5.6-1)$$

For piles with a square prestressed reinforcement configuration, the total area of confinement reinforcing provided in each orthogonal direction  $A_{sh}$ , within the confinement length shall not be less than:

$$A_{sh} = 0.04sh_c \left( \frac{f'_c}{f_{yh}} \right) \left( 2.8 + \frac{2.3P_u}{f'_c} \right) \quad (5.11.4.5.6-2)$$

Maximum spacing of transverse reinforcement within the confinement length shall be the minimum of 1/5 times the pile dimension, six times the strand diameter, or 4 in.

For the remaining length of pile outside the confinement length,  $\rho_s$  and  $A_{sh}$ , shall not be less than half that required within the confinement length.

where:

$A_{sh}$  = total cross-sectional area of transverse reinforcement provided separately in each direction, including cross-ties where applicable (in.<sup>2</sup>)

$h_c$  = cross-sectional dimension of pile core measured out-to-out of square tie reinforcement (in.)

$f_{yh}$  = specified yield strength of transverse reinforcement (ksi)

$f'_c$  = compressive strength of concrete for use in design (ksi)

$P_u$  = factored axial load on pile, as determined using all load combinations that include the effect of seismic load, EQ, per Table 3.4.1-1 (kips)

$s$  = pitch or spacing of transverse reinforcement measured along the length of the pile (in.)

$\rho_s$  = ratio of spiral or hoop reinforcement to total volume of pile core per (5.6.4.6)

The last paragraph of Article 5.12.9.3.2 is revised as follows:

The full length of longitudinal steel shall be enclosed with spiral reinforcement or equivalent hoops. The spiral reinforcement shall be as specified in Article 5.12.9.4.4.

A new Article 5.12.9.4.1 is added as follows:

#### 5.12.9.4.1 General

Precast prestressed concrete piles shall be designed, detailed, and installed using provisions of PCI 142-24, Specification for Precast, Prestressed Concrete Piles, which is incorporated by reference, unless those provisions are specifically amended herein.

A new commentary section, C5.12.9.4, will read:

*C5.12.9.4.1*

*PCI 142-24 specification for precast prestressed concrete piles uses pound units instead of the kip units used in the AASHTO LRFD Bridge Design Specifications.*

*Excerpts from PCI 142-24 have been provided in this Article for emphasis. The absences herein of any provisions from PCI 142-24 do not negate their validity as part of that specification.*

*PCI 142-24, Section 3.2.2.1 implies that piles with compressive loads exceeding 40 tons require load testing. PCI 142-24, Section 4.7.4.1 imposes a compressive load limit on piles in moderate and high seismic risk zones.*

Article 5.12.9.4.1 is renumbered Article 5.12.9.4.2, Pile Dimensions. Article 5.12.9.4.2 is renumbered as Article 5.12.9.4.3, Concrete Quality. Article 5.12.9.4.3 is renumbered as Article 5.12.9.4.4, Reinforcement, and the associated commentary is renumbered as C5.12.9.4.4.

The new Article 5.12.9.4.4 is as follows:

*5.12.9.4.4 Reinforcement*

*Unless otherwise specified by the Owner, the prestressing strands should be spaced and stressed to provide a uniform compressive stress on the cross-section of the pile per Table 5.12.9.4.4-1 at the service limit state:*

**Table 5.12.9.4.4-1—Minimum Effective Prestress in Piles**

Pile Length, <i>L</i>	Minimum Effective Prestress
<i>L</i> < 30 ft	0.40 ksi
30 ft ≤ <i>L</i> < 50 ft	0.55 ksi
<i>L</i> ≥ 50 ft	0.70 ksi

*The full length of the prestressing strands shall be enclosed with spiral reinforcing as follows:*

*For piles not greater than 24.0 in. in diameter:*

- *spiral wire not less than W3.5;*
- *spiral reinforcement at each end of piles shall be five turns at 1.0-in. pitch followed by 16 turns at 3.0-in. pitch; and*
- *for the remainder of the pile, the spiral reinforcement shall not have more than 6.0-in. pitch.*

*For piles greater than 24.0 in. in diameter:*

- *spiral wire not less than W4.0;*
- *spiral reinforcement at each end of piles shall be four turns at 1.5-in. pitch followed by 16 turns at 2.0-in. pitch; and*
- *for the remainder of the pile, the spiral reinforcement shall not have more than 4.0-in. pitch.*

*For piles in Seismic Zone 2, reinforcing in the confinement zone shall be as specified in Article 5.11.3.2.4. For piles in Seismic Zones 3 and 4, reinforcing in the confinement zone shall be as specified in Article 5.11.4.5.6.*

The new Commentary C5.12.9.4.4 will read:

*The purpose of the minimum compression is to prevent cracking during handling and installation. A lower compression may be used if approved by the Owner.*

A new Article 5.12.9.4.5 is added as follows:

*5.12.9.4.5 Performance-Based Design*


*Where performance-based design is used as the design methodology for prestressed piles, Section 4.8 of PCI 142-24, Specification for Precast, Prestressed Concrete Piles shall be used as the basis of design.*

**Concluding Remarks**

The three agenda items discussed in this article and four others discussed in my Fall 2025 and Spring 2026 *ASPIRE* articles that followed the June 2025 COBS meeting will be incorporated in the forthcoming 11th edition of the AASHTO LRFD specifications. An additional agenda item that was also approved in the same meeting will be included in the forthcoming fourth edition of the *Manual for Bridge Evaluation*.<sup>18</sup> (For discussion of that item, see the LRFD article in the Winter 2026 issue of *ASPIRE*.) The next COBS meeting will take place from June 28 to July 2, 2026, in Charlotte, N.C. I look forward to reporting on the new developments and ballot items that are approved at that meeting.

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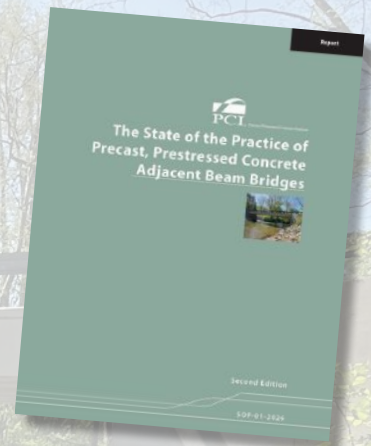
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## The State of the Practice of Precast, Prestressed Concrete Adjacent Beam Bridges

### FREE PDF (SOP-01-2026)

The second edition of this report has been prepared and reviewed by the Subcommittee on Adjacent Members for the Precast/Prestressed Concrete Institute (PCI) Committee on Bridges. It presents an updated state-of-the-practice for design and construction of precast/prestressed adjacent box beam bridges. New applications and recent research related to joint details have been added, as well as other types of adjacent components in addition to box beams. Much of the information in the report's first edition has been condensed and summarized by reference to other publications for more detail. This report is intended for reference by professional personnel who are competent to evaluate the significance and limitations of its contents and who are able to accept responsibility for the application of the material it contains. Actual conditions on any project must be given special consideration and more specific evaluation and engineering judgment may be required that are beyond the intended scope of this state-of-the-practice report.



[doi.org/10.15554/SOP-01-26](https://doi.org/10.15554/SOP-01-26)



## Recommended Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders

### FREE PDF (CB-02-26)

The revised Recommended Practice presents the methodology to analyze the lateral stability of long, slender bridge girders. Each stage of a girder's transition from the casting bed to its final location in the bridge is considered. Guidance covers how to handle girders with embedded or attached devices from the top and how to support girders from below during storage, transit, and in various conditions on the bridge during construction.

Topics expanded or added in this edition include an explanation of roll stability theory; the role of top temporary strands on girder stability; methods to estimate hauling parameters such as truck roll stiffness; special cases such as girders with unequal overhangs during hauling, eccentric loadings, and preformed camber; and a comprehensive girder design procedure that considers lateral stability. An updated calculation of post-erection bracing forces is provided.

This is a must-have publication for all stakeholders in bridge design, fabrication, hauling, and construction.



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