

SECTION 400 PRESTRESSED CONCRETE

401 DESIGN CRITERIA

401.01 GENERAL

Prestressed design criteria shall be as specified in Section 9 of AASHTO except as clarified or modified in this manual.

Members shall be designed to meet both Service Load Design and Strength Design (Load Factor Design) criteria as specified in AASHTO.

Prestressing steel for precast prestressed members and cast-in-place post-tensioned members shall be 12.50 millimeter diameter "Uncoated Seven-wire High Tensile Cold Drawn Low Relaxation Strand for Prestressed Concrete" as specified in ASTM A416, Grade 270 with $f'_c = 18\,360 \text{ kg/cm}^2$ and $E_{ps} = 2\,039\,470 \text{ kg/cm}^2$. Use of 15.20 millimeter diameter strand is allowed for cast-in-place post-tensioned members only.

The yield point stress of prestressing steel, f^*_y , may be assumed equal to $0.90 f'_c$ for low relaxation strand.

Prestress losses shall be calculated in accordance with AASHTO Article 9.16.2.1. The estimated losses contained in Table 9.16.2.2 and Article 9.16.2.2 shall not be used.

Section properties shall be based on gross area of members. Use of the transformed area of bonded reinforcement shall only be used for unusual structures and only when approved.

Web reinforcement for shear shall consist of rebars; not welded wire fabric.

The minimum top cover for slab reinforcement specified in AASHTO Article 9.25.1.2.1 shall be 50 millimeters with 50 millimeter Asphaltic wearing surface.

Expansion and contraction design criteria shall be as specified in Part 3, Section 600 of this manual.

401.02 ALLOWABLE STRESSES— CONCRETE (AASHTO 9.15.2.2)

The maximum allowable tensile stresses in a precompressed tensile zone at service load after losses have occurred shall be in accordance with AASHTO except as modified below:

Tension	
Load Condition Stress	Allowable
Girder DL + Prestress	0
Total Service Load	$0.8\sqrt{f'_c}$

401.03 SHEAR (AASHTO 9.20)

Shear design shall be in accordance with Ultimate Strength Design Method contained in the latest AASHTO Specifications.

Prestressed concrete members shall be reinforced for diagonal tension stresses. Shear reinforcement shall be placed perpendicular to the axis of the member with spacing not-to-exceed three-fourths the depth of the member.

The critical sections for shear in simply supported beams will usually not be near the ends of the span where the shear is a maximum, but at some point away from the ends in a region of high moment.

For the design of web reinforcement in simply supported members carrying moving loads, it is recommended that shear be investigated only in the middle half of the span length. The web reinforcement required at the quarter points should be used throughout the outer quarters of the span if the critical shear section is included within the design section.

For continuous bridges whose individual spans consist of precast prestressed girders, web reinforcement shall be designed for the full length of interior spans and for the interior three-quarters of the exterior span and based on the critical shear design section.