NOTATION

SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
A	area of cross section of stringer or beam	A (4.6.2.2.1)	—
A	constant	—	—
A	maximum area of the portion of the supporting surface that is similar to the loaded area and concentric with it and does not overlap similar areas for adjacent anchorage devices	A (5.10.9.7.2)	—
A	effective tension area of concrete surrounding the flexural tension reinforcement and having the same centroid as that reinforcement, divided by the number of bars or wires; when the flexural reinforcement consists of several bar sizes or wires, the number of bars or wires shall be computed as the total area of reinforcement divided by the area of the largest bar or wire used	A (5.7.3.4)	A (8.16.8.4)
A_b	net area of a bearing plate	A_b (5.10.9.7.2)	—
A_c	area of core of spirally reinforced compression member measured to the outside diameter of the spiral	A_c (5.7.4.6)	A_c (8.18.2.2.2)
A_c	total area of the composite section	—	—
A_c	area of concrete on the flexural tension side of the member	—	—
A_{cs}	cross-sectional area of a concrete strut in strut-and-tie model	A_{cs} (5.6.3.3.1)	—
A_{cv}	area of concrete section resisting shear transfer	A_{cv} (5.8.4.1)	A_{cv} (8.16.6.4.5)
A_g	gross area of section	A_g (5.5.4.2.1)	A_g (8.1.2)
A_g	gross area of bearing plate	A_g (5.10.9.7.2)	—
A_h	area of shear reinforcement parallel to flexural tension reinforcement	A_h (5.13.2.4.1)	A_h(8.15.5.8, 8.16.6.8)
A_o	area enclosed by centerlines of the elements of the beam	C4.6.2.2.1	—
A_{ps}, A^*_s	area of prestressing steel	A_{ps} (5.5.4.2.1)	A^*_s (9.17)
A_{PT}	transverse post-tensioning reinforcement	—	—
A_s	area of non-prestressed tension reinforcement	A_s (5.5.4.2.1)	A_s (9.7, 9.19)
A_s	total area of vertical reinforcement located within the distance (h/5) from the end of the beam	—	—
A'_s	area of compression reinforcement	A'_s (5.7.3.1.1)	A'_s (9.19)
A_{sf}	steel area required to develop the compressive strength of the overhanging portions of the flange	—	A_{sf} (9.17)
A_{sk}	area of skin reinforcement per unit height in one side face	A_{sk} (5.7.3.4)	A_{sk} (8.17.2.1.3)

NOTATION

SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
A_{sr}	steel area required to develop the compressive strength of the web of a flanged section	—	A_{sr} (9.17-9.19)
A_{ss}	area of reinforcement in an assumed strut of a strut-and-tie model	A_{ss} (5.6.3.3.4)	—
A_{st}	total area of longitudinal mild steel reinforcement	A_{st} (5.6.3.4.1)	A_{st} (8.16.4.1.2, 8.16.4.2.1)
A_t	area of one leg of closed transverse torsion reinforcement	A_t (5.8.3.6.2)	—
A_v	area of transverse reinforcement within a distance s	A_v (5.8.2.5)	A_v (9.20)
A_{vh}	area of web reinforcement required for horizontal shear	—	—
A_{vf}	area of shear-friction reinforcement	A_{vf} (5.8.4.1)	A_{vf} (8.15.5.4.3)
A_{vf}	total area of reinforcement, including flexural reinforcement	A_{vf} (5.10.11.4.4)	—
$A_{v\text{-}min}$	minimum area of web reinforcement	—	—
a	distance from the end of beam to drape point	—	—
a	depth of equivalent rectangular stress block	a (5.7.2.2)	a (8.16.2.7, 9.17.2)
a	lateral dimension of the anchorage device measured	a (5.10.9.6.2)	—
a_f	distance between concentrated load and face of support	a_f (5.13.2.5.1)	—
a_v	shear span, distance between concentrated load and face of support	a_v (5.13.2.4.1)	a_v (8.15.5.8, 8.16.6.8)
B	constant	—	—
B	buoyancy	—	B (3.22)
BR	vehicular braking force	BR (3.3.2)	—
b	the lateral dimension of the anchorage device measured parallel to the smaller dimension of the cross-section	b (5.10.9.6.2)	—
b	width of bottom flange of the beam	—	—
b	effective flange width	—	—
b	width of beam	b (4.6.2.2.1)	—
b	width of compression face of member	b (5.7.3.1.1)	b (8.1.2)
b	width of pier or diameter of pile	—	b (3.18.2.2.4)
b'	width of web of a flanged member	—	b' (9.1.2)
b_v , b_e	effective web width of the precast beam	b_v (5.8.2.7)	—

NOTATION

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
b_v	width of cross section at the contact surface being investigated for horizontal shear	b_v (5.8.4.1)	b_v (9.20)
b_w	width of a web of a flanged member	b_w (5.7.3.1.1)	b_w (8.15.5.1.1)
b_w	width of web adjusted for the presence of ducts	b_w (5.8.2.5)	—
C	stiffness parameter = K(W/L)	—	C (3.23.4.3)
C	centrifugal force in percent of live load	—	C (3.10.1)
C_a	creep coefficient for deflection at time of erection due to loads applied at release	—	—
C_u	ultimate creep coefficient	—	—
C_u'	ultimate creep coefficient for concrete at time of application of the superimposed dead loads	—	—
CE	vehicular centrifugal force	CE (3.3.2)	—
CF	centrifugal force	—	CF (3.22)
CR	creep	CR (3.3.2)	—
CT	vehicular collision force	CT (3.3.2)	—
CV	vessel collision force	CV (3.3.2)	—
$C(t,t_o)$	creep coefficient at a concrete age of t days	—	—
c	cohesion factor	c (5.8.4.1)	—
c	vehicular braking force	—	—
c	distance from extreme compression fiber to neutral axis	c (5.7.2.2)	c (8.16.2.7)
D	parameter used in determination of load fraction of wheel load	—	D (3.23.4.3)
D	prestressing steel elongation	—	—
D	a constant that varies with bridge type and geometry	—	—
D	width of distribution per lane	—	—
D	dead load	D (3.3.2)	D (3.22)
DC	dead load of structural components and nonstructural attachments	DC (5.14.2.3.2)	—
DD	downdrag	DD (3.3.2)	—
D.F.	fraction of wheel load applied to beam	—	D.F. (3.28.1)
DFD	distribution factor for deflection	—	—

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
DFM	distribution factor for bending moment	—	—
DF_m	live load distribution factor for moment	—	—
DFV	distribution factor for shear force	—	—
DL	contributing dead load	—	DL (3.1)
DW	dead load of wearing surfaces and utilities	DW (3.3.2, 5.14.2.3.2)	—
d	distance from extreme compressive fiber to centroid of the pretensioning force	—	d (9.1.2)
d	depth of beam or stringer	d (4.6.2.2.1)	—
d	precast beam depth	—	—
d	distance from extreme compressive fiber to centroid of the reinforcing but not less than 0.8h . In negative moment section, the reinforcement is assumed to be located at the mid-height of the slab. For computing horizontal shear strength of composite members, d should be the distance from extreme compression fiber to centroid of tension reinforcement for entire composite section.	—	d (9.1.2)
d_b	nominal diameter of a reinforcing bar or wire	d_b (5.10.2.1)	d_b (8.1.2)
d_b	nominal diameter of prestressing steel	d_b (5.10.2.1)	D (9.17, 9.27)
d_c	thickness of concrete cover measured from extreme tension fiber to center of bar or wire located closest thereto	d_c (5.7.3.4)	d_c (8.16.8.4)
d_e	distance between the center of exterior beam and interior edge of curb or traffic barrier	d_e (4.6.2.2.1)	—
d_e	effective depth from extreme compression fiber to the centroid of the tensile force in the tensile reinforcement	d_e (5.7.3.3.1)	—
d_{ext}	depth of the extreme steel layer from extreme compression fiber	—	—
d_i	depth of steel layer from extreme compression fiber	—	—
d_p	distance from extreme compression fiber to the centroid of the prestressing tendons	d_p (5.7.3.1.1)	—
d_s	distance from extreme compression fiber to the centroid of the non-prestressed tensile reinforcement	d_s (5.7.3.2.2)	d_t (9.7, 9.17-9.19)
d_v	effective shear depth	d_v (5.8.2.7)	—
d_s'	distance from extreme compression fiber to centroid of compression reinforcement	d_s' (5.7.3.2.2)	d' (8.1.2)

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SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
d"	distance from centroid of gross section, neglecting the reinforcement, to centroid of tension reinforcement	—	d" (8.1.2)
E	earth pressure	—	—
E	width of slab over which a wheel load is distributed	—	E (3.24.3)
E_b	the modulus of elasticity of the bearing plate material	E_b (5.10.9.7.2)	—
E_c	modulus of elasticity of concrete	E_c (5.4.2.4)	E_c (3.26.3, 8.7.1)
E_{ci}	modulus of elasticity of concrete at transfer	E_{ci} (5.9.5.2.3a)	—
E_{eff}	effective modulus of elasticity	E_{eff} (C5.14.2.3.6)	—
E_p, E_s	modulus of elasticity of pretensioning reinforcement	E_p (5.4.4.2)	E_s (9.16.2.1.2)
E_s	modulus of elasticity of non-pretensioned reinforcement	E_s (5.4.3.2)	E_s (3.26.3, 8.7.2)
E_c^*	age adjusted effective modulus of concrete for a gradually applied load at the time of release of prestressing	—	—
EH	horizontal earth pressure load	EH (3.3.2)	—
EQ	earthquake	EQ (3.3.2)	EQ (3.22.1)
EQ	equivalent static horizontal force applied at the center of gravity of the structure	—	EQ (3.1)
ES	earth surcharge load	ES (3.3.2)	—
EV	vertical pressure from dead load of earth fill	EV (3.3.2)	—
e	eccentricity of the strands at h/2	—	—
e	eccentricity of strands at transfer length	—	—
e	correction factor for distribution	e (4.6.2.2.1)	—
e	eccentricity of a lane from the center of gravity of the pattern of girders	e (4.6.2.2.2d)	—
e	the eccentricity of the anchorage device or group of devices, with respect to the centroid of the cross-section, always taken as positive	e (5.10.9.6.3)	—
e'	difference between eccentricity of pretensioning steel at midspan and end span	—	—
e_c	eccentricity of the strand at the midspan	—	—
e_e	eccentricity of pretensioning force at end of beam	—	—
e_g	distance between the centers of gravity of the basic beam and deck	e_g (4.6.2.2.1)	—

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SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
e_p	eccentricity of the prestressing strands with respect to the centroid of the section	—	—
F_b	allowable tensile stress in the precompressed tensile zone at service loads	—	—
F_b	allowable bending stress	—	F_b (2.7.4.2)
F_{cj}	force in concrete for the j th component	—	—
FR	friction	FR (3.3.2)	—
F_{pi}	total force in strands before release	—	—
F_ε	reduction factor	F_ε (5.8.3.4.2)	—
f	stress	—	—
f_D	sum of dead load bending stresses	—	—
$f_{(L+I)}$	live load plus impact bending stress	—	—
f_b	concrete stress at the bottom fiber of the beam	—	—
f_b	average bearing stress in concrete on loaded area	—	f_b (8.15.2.1.3, 8.16.7.1)
f_c	extreme fiber compressive stress in concrete at service loads	—	f_c (8.15.2.1.1)
f'_c	specified compressive strength of concrete at 28 days, unless another age is specified	f'_c (5.4.2.1)	f'_c (8.1.2)
f_{ca}	concrete compressive stress ahead of the anchorage devices	f_{ca} (5.10.9.6.2)	—
f_{cds}	average concrete compressive stress at the c.g. of the prestressing steel under full dead load	—	f_{cds} (9.16)
f_{cgp}	concrete stress at the center of gravity of pretensioning tendons, due to pretensioning force at transfer and the self-weight of the member at the section of maximum positive moment	f_{cgp} (5.9.5.2.3a)	f_{cir} (9.16)
f'_{ci}	compressive strength of concrete at time of initial prestress	f'_{ci} (5.9.1.2)	f'_{ci} (9.15)
f_{ct}	average splitting tensile strength of lightweight aggregate concrete	f_{ct} (5.8.2.2)	f_{ct} (9.1.2)
$(f'_c)t$	compressive strength of concrete at t days	—	—
f_{cu}	the limiting concrete compressive stress for design by strut-and-tie model	f_{cu} (5.6.3.3.1)	—
f_d	stress due to unfactored dead load, at extreme fiber of section where tensile stress is caused by externally applied loads	—	f_d (9.20)

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
f_f	fatigue stress range in reinforcement	f_f (5.5.3.2)	f_f (8.16.8.3)
f_{min}	algebraic minimum stress level in reinforcement	f_{min} (5.5.3.2)	f_{min} (8.16.8.3)
f_n	nominal concrete bearing stress	f_n (5.10.9.7.2)	
f_{pb}	compressive stress at bottom fiber of the beam due to prestress force	—	—
f_{pc}	compressive stress in concrete (after allowance for all prestress losses) at centroid of cross section resisting externally applied loads or at junction of web and flange when the centroid lies within the flange (In a composite member, f_{pc} is resultant compressive stress at centroid of composite section, or at junction of web and flange when the centroid lies within the flange, due to both prestress and moments resisted by precast member acting alone.)	f_{pc}(C5.6.3.5)	f_{pc} (9.20)
f_{pe}	effective prestress after losses	f_{pe} (5.6.3.4.1)	f_{se}
f_{pe}	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	—	f_{pe} (9.20)
f_{pi}	initial stress immediately before transfer	—	—
f_{pj}	stress in the prestressing steel at jacking	f_{pj} (5.9.3)	—
f_{po}	stress in the prestressing steel when the stress in the surrounding concrete is 0.0	f_{po} (5.8.3.4.2)	—
f_{ps}	average stress in prestressing steel at the time for which the nominal resistance of member is required	f_{ps} (C5.6.3.3.3)	—
f_{pt}	stress in prestressing steel immediately after transfer	f_{pt} (5.9.3)	—
f_{pu}, f_s'	ultimate strength of prestressing steel	f_{pu} (5.4.4.1)	f_s' (9.15, 9.17)
f_{py}	yield point stress of prestressing steel	f_{py} (5.4.4.1)	f_y^* (9.15)
f_r	the modulus of rupture of concrete	f_r (5.4.2.6)	f_r (9.18, 8.15.2.1.1)
f_s	allowable stress in steel, but not taken greater than 20 ksi	—	—
f_s	tensile stress in reinforcement at service loads	—	f_s (8.15.2.2)
f_{sa}	tensile stress in the reinforcement at service loads	f_{sa} (5.7.3.4)	—
f_{se}	effective final pretension stress	—	—
f_{si}	effective initial pretension stress	—	—
f_{su}^*	stress in prestressing tension steel at ultimate load	—	f_{su}^*

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SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
f_t	extreme fiber tensile stress in concrete at service loads	—	f_t (8.15.2.1.1)
f_t	concrete stress at top fiber of the beam for the non-composite section	—	—
f_{tc}	concrete stress at top fiber of the slab for the composite section	—	—
f_{tg}	concrete stress at top fiber of the beam for the composite section	—	—
f_y	specified yield strength of non-prestressed conventional reinforcement	f_y (5.5.4.2.1), f'_y(5.7.3.1.1)	f_y (8.1.2), f'_y (9.19), f_{sy} (9.19, 9.20)
f_{yh}	specified yield strength of transverse reinforcement	f_{yh} (5.7.4.6)	—
g	A factor used to multiply the total longitudinal response of the bridge due to a single longitudinal line of wheel loads in order to determine the maximum response of a single girder	—	—
g	distribution factor	g (4.6.2.2.1)	—
H	average annual ambient mean relative humidity, percent	H (5.4.2.3.2)	RH (9.16.2.1.1)
H	height of wall	H (A13.4.2)	—
h	overall thickness or depth of a member	h (5.8.2.7)	h (9.20)
h_c	total height of composite section	—	—
h_f	compression flange thickness	h_f (5.7.3.1.1)	h_f (8.1.2)
I	moment of inertia about the centroid of the non-composite precast beam	I_g (5.7.3.6.2)	I (9.20)
I_c	moment of inertia of composite section	—	—
I_{cr}	moment of inertia of cracked section transformed to concrete	I_{cr} (5.7.3.6.2)	I_{cr} (8.13.3)
I_e	effective moment of inertia	I_e (5.7.3.6.2)	I_e (8.13.3)
I_g	moment of inertia of the gross concrete section about the centroidal axis, neglecting reinforcement	I_g (5.7.3.6.2)	I_g (3.23.4.3, 8.1.2, 9.20)
I_s	moment of inertia of reinforcement about centroidal axis of member cross section	I_s (5.7.4.3)	I_s (8.1.2)
IC	ice load	—	—
ICE	ice pressure	—	ICE (3.22.1)
IM	vehicular dynamic load allowance	IM (3.6.1.2.5)	I (3.8.2)

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
J	gross St. Venant torsional constant of the precast member	J (4.6.2.2.1)	J (3.23.4.3)
K	a non-dimensional constant	—	—
K	effective length factor for compression members	K (5.7.4.1)	k (8.16.5.2.3)
K	factor used for calculating time-dependent losses	—	—
K	wobble friction coefficient	K (5.9.5.2.2b)	K (9.16)
K_g	longitudinal stiffness parameter	K_g (4.6.2.2.1)	K (3.23.4)
K_r	factor used for calculating relaxation loss occurs prior to transfer		
k	factor used in calculation of distribution factor for multi-beam bridges	k (4.6.2.2)	—
k	factor used in calculation of average stress in pretensioning steel for Strength Limit State	—	—
k	live load distribution constant for spread box girders	—	k (3.28.1)
k_c	product of applicable correction factors = $k_{\ell a}$ (k_h) (k_s)	—	—
k_c	a factor for the effect of the volume-to-surface ratio	k_c (5.4.2.3.2)	—
k_{cp}	correction factor for curing period	—	—
k_f	a factor for the effect of concrete strength	k_f (5.4.2.3.2)	—
k_h	correction factor for relative humidity	k_h (5.4.2.3.3)	—
k_{la}	correction factor for loading age	—	—
k_s	product of applicable correction factors = k_{cp} (k_h) (k_s)	—	—
k_s	correction factor for size	k_s (5.4.2.3.3)	—
L	length in feet of the span under consideration for positive moment and the average of two adjacent loaded spans for negative moment	—	L (3.8.2.1)
L	Overall beam length or design span	—	—
L	span length measured parallel to longitudinal beams	—	—
L	length of the loaded portion of span from section under consideration to the far reaction when computing shear due to truck loads.	—	—
L	loaded length of span	L (5.7.3.1.2)	L (3.8.2)
LL, L	live load	LL (3.3.2)	L (3.22)
L	total length of prestressing steel from anchorage to anchorage	—	—

SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
L_c	critical length of yield line failure pattern	L_c (A13.4.2)	—
LF	longitudinal force from live load	—	LF (3.22)
LS	live load surcharge	LS (3.3.2)	—
L_r	intrinsic relaxation of the strand	—	—
ℓ_d	development length	—	—
ℓ_t	transfer length	—	—
ℓ_u	unsupported length of compression member	ℓ_u (5.7.4.1)	ℓ_u (8.16.5.2.1)
M_b	unfactored bending moment due to barriers weight	—	—
M_c	flexural resistance of cantilevered wall	—	—
M_{CIP}	unfactored bending moment due to cast-in-place topping slab	—	—
M_{const}	unfactored bending moment due to construction load	—	—
M_{cr}	moment causing flexural cracking at section due to externally applied loads	M_{cr} (5.7.3.6.2)	M_{cr} (8.13.3, 9.20)
M_{cr}^*	cracking moment	—	M_{cr}^* (9.18)
M_D	unfactored bending moment due to diaphragm weight	—	—
M_d	bending moment at section due to unfactored dead load	—	—
$M_{d/nc}$	non-composite dead load moment	—	$M_{d/nc}$ (9.18)
M_f	unfactored bending moment due to fatigue truck per beam	—	—
M_g	unfactored bending moment due to beam self-weight	—	—
M_{LL}	unfactored bending moment due to lane load per beam	—	—
M_{LL+I}	unfactored bending moment due to live load + impact	—	—
M_{LT}	unfactored bending moment due to truck load with dynamic allowance per beam	—	—
M_{max}	maximum factored moment at section due to externally applied loads	—	M_{max} (9.20)
M_n	nominal flexural resistance	M_n (5.7.3.2.1)	M_n (9.1.2)
$M_{n/dc}$	non-composite dead load moment at the section	—	—
M_r	factored flexural resistance of a section in bending	M_r (5.7.3.2.1)	—
$M_{service}$	total bending moment for service load combination	—	—

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SYMBOL	**DESCRIPTION**	**CORRESPONDING AASHTO LRFD SPECIFICATIONS**	**CORRESPONDING AASHTO STANDARD SPECIFICATIONS**
M_S	unfactored bending moment due to slab and haunch weights	—	—
M_{SDL}	unfactored bending moment due to super-imposed dead loads	—	—
M_{SIP}	unfactored bending moment due to stay-in-place panel	—	—
M_u	factored moment at section $\leq \phi M_n$	M_u (C5.6.3.1)	M_u (9.17, 9.18)
M_{sw}	moment at section of interest due to self-weight of the member plus any permanent loads acting on the member at time of release	—	—
M_{ws}	unfactored bending moment due to wearing surface	—	—
M_x	bending moment at a distance (x) from the support	—	—
m	material parameter	—	—
m	stress ratio = $(f_y / 0.85)$	—	—
N	group number	—	N (3.22.1)
N_b, N_B	number of beams	N_b (4.6.2.2.1)	N_B (3.28.1)
N_L	number of traffic lanes	N_L (4.6.2.2.1, 3.6.1.1.1)	N_L (3.23.4)
NL	number of traffic lanes	—	—
N_u	applied factored axial force taken as positive if tensile	—	—
N_{uc}	factored axial force normal to the cross section, occurring simultaneously with V_u to be taken as positive for tension, negative for compression; includes effects of tension due to creep and shrinkage	N_{uc} (5.13.2.4.1)	N_u (8.16.6.2.2)
n	modular ratio of elasticity - E_s/E_c	n (5.7.1)	n (8.15.3.4)
P	concentrated wheel load	P (3.6.1.2.5)	—
P	live load intensity	P (C3.11.6.2)	—
P	live load on sidewalk	—	P (3.14.1.1)
P	load on one rear wheel of truck	—	P (3.24.3)
P	Diaphragm weight concentrated at quarter points	—	—
P_c	permanent net compression force	P_c (5.8.4.1)	—
P_{eff}	effective post-tensioning force	—	—
P_i	total pretensioning force immediately after transfer	—	—
P_n	nominal axial load strength at given eccentricity	P_n (5.5.4.2.1)	P_n (8.1.2)

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
P_n	nominal axial resistance of strut or tie	P_n (5.6.3.2)	—
P_n	nominal bearing resistance	P_n (5.7.5)	—
P_{nx}	nominal axial load strength corresponding to M_{nx}, with bending considered in the direction of the x axis only	—	P_{nx} (8.16.4.3)
P_{ny}	nominal axial load strength corresponding to M_{ny}, with bending considered in the direction of the y axis only	—	P_{ny} (8.16.4.3)
P_{nxy}	nominal axial load strength with biaxial loading	—	P_{nxy} (8.16.4.3)
P_o	nominal axial load strength of a section at 0.0 eccentricity	P_o (5.7.4.5)	P_o (8.16.4.2.1)
P_{pe}	total pretensioning force after all losses	—	—
P_s	prestress force before initial losses	—	—
P_s	design jacking force	—	—
P_{se}	effective pretension force after allowing for all losses	—	—
P_{si}	effective pretension force after allowing for the initial losses	—	—
P_r	factored bursting resistance of pretensioned anchorage zone provided by transverse reinforcement	—	—
P_T	factored axial resistance of strut or tie	P_r (5.6.3.2)	—
P_T	factored bursting resistance of pretensioned anchorage t zone provided by transverse reinforcemen	P_r (5.10.10.1)	—
PL	pedestrian live load	PL (3.3.2)	—
p	fraction of truck traffic in a single lane	p (3.6.1.4.2)	—
p	A_s'/bd, ratio of non-prestressed tension reinforcement	—	p (9.7, 9.17-9.19)
p'	A_s'/bd, ratio of compression reinforcement	—	p' (9.19)
p^*	A_s^*/bd, ratio of prestressing steel	—	p^* (9.17, 9.19)
p_c	outside perimeter of the concrete section	p_c (5.8.2.1)	—
p_h	perimeter of the centerline of the closed transverse torsion reinforcement	p_h (5.8.3.6.2)	—
Q	first moment of inertia of the area above the fiber being considered	—	—
Q	statical moment of cross sectional area, above or below the level being investigated for shear, about the centroid	—	Q (9.20)
Q	total factored load	Q (3.4.1)	—
q	generalized load	q (3.4.1)	—

NOTATION

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
q_i	specified loads	q_i (3.4.1)	—
R	reaction on exterior beam in terms of lanes	—	—
R	rib shortening	—	R (3.22)
R_u	flexural resistance factor	—	—
R_w	total transverse resistance of the railing	R_w (A13.4.2)	—
r	radius of gyration of cross section of a compression member	r (5.7.4.1)	r (8.16.5.2.2)
r/h	ratio of base radius to height of rolled-on transverse deformations	r/h (5.5.3.2)	—
S	coefficient related to site conditions for use in determining seismic loads)	S (3.10.5)	—
S	surface area of concrete exposed to drying	—	—
S	shrinkage	—	S (3.22)
S	spacing of beams	—	S (3.23.3, 3.28.1)
S	effective span length of the deck slab	—	S (3.25.1.3)
S	width of precast member	—	S (3.23.4.3)
S_b	noncomposite section modulus for the extreme fiber of section where the tensile stress is caused by externally applied loads	—	S_b (9.18)
S_{bc}	composite section modulus for extreme bottom fiber of the precast beam, I_c/y_{bc}	—	—
S_c	composite section modulus for the extreme fiber of section where the tensile stress is caused by externally applied loads	—	S_c (9.18)
S_t	section modulus for the extreme top fiber of the non-composite precast beam	—	—
S_{tc}	composite section modulus for top fiber of the slab, $I_c/(n)(y_{tc})$	—	—
S_{tg}	composite section modulus for top fiber of the precast beam, I_c/y_{tg}	—	—
S_u	ultimate free shrinkage strain in the concrete adjusted for member size and relative humidity	—	—
$S(t,t_o)$	shrinkage strain at a concrete age of t days	—	—
SE	settlement	SE (3.3.2)	—
SF	stream flow pressure	—	SF (3.22)

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
SH	shrinkage	SH (3.3.2, 5.14.2.3.2)	S (3.22)
SR	fatigue stress range	—	—
s	spacing of shear reinforcement in direction parallel to the longitudinal reinforcement	s(5.8.4.1)	s (9.20)
s	effective deck span	—	s (3.25.1.3)
s	length of a side element	s (C4.6.2.2.1)	—
s	spacing of rows of ties	s (5.8.4.1)	—
T	collision force at deck slab level	—	—
T	mean daily air temperature	T (C3.9.2.2)	—
T_{burst}	the tensile force in the anchorage zone acting ahead of the anchorage device and transverse to the tendon axis	T_{burst} (5.10.9.6.3)	—
T_{cr}	torsional cracking resistance	T_{cr} (5.8.2.1)	—
T_n	nominal torsion resistance	T_n (5.8.2.1)	—
T_T	factored torsional resistance provided by circulatory shear flow	T_r (5.8.2.1)	—
T_u	factored torsional moment	T_u (C5.6.3.1)	—
TG	temperature gradient	TG (3.3.2, C4.6.6)	—
TU	uniform temperature	TU (3.3.2)	—
t	thickness of web	—	—
t	thickness of an element of the beam	—	—
t	time in days	t (5.4.2.3.2)	—
t	average thickness of the flange of a flanged member	—	t (9.17, 9.18)
t	deck thickness	—	t (3.25.1.3)
t_f	thickness of flange	—	—
t_i	age of concrete when load is initially applied	t_i (5.4.2.3.2)	—
t_{la}	loading ages in days	—	—
t_s	depth of concrete slab	t_s (4.6.2.2.1)	—
t_o	age of concrete in days at the end of the initial curing period	—	—
V	design shear force at section	—	V (8.15.5.1.1)

SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
V	variable spacing of truck axles	—	V (3.7.6)
V	volume of concrete	—	—
V_c	nominal shear resistance provided by tensile stresses in the concrete	V_c (5.8.2.4)	V_c (9.20, 8.16.6.1)
V_{ci}	nominal shear strength provided by concrete when diagonal cracking results from combined shear and moment	—	V_{ci} (9.20)
V_{cw}	nominal shear strength provided by concrete when diagonal cracking results from excessive principal tensile stress in web	—	V_{cw} (9.20)
V_d	shear force at section due to unfactored dead load	—	V_d (9.20)
V_i	factored shear force at section due to externally applied loads occurring simultaneously with M_{max}	—	V_i (9.20)
V_{LL}	unfactored shear force due to lane load per beam	—	—
V_{LL+I}	unfactored shear force due to live load plus impact	—	—
V_{LT}	unfactored shear force due to truck load with dynamic allowance per beam	—	—
V_{mu}	ultimate shear force occurring simultaneously with M_u	—	—
V_n	nominal shear resistance of the section considered	V_n (5.8.2.1)	V_n (8.16.6.1)
V_{nh}	nominal horizontal shear strength	—	V_{nh}(8.16.6.5.3, 9.20)
V_p	component in the direction of the applied shear of the effective pretensioning force, positive if resisting the applied shear	V_p (C5.8.2.3)	V_p (9.20)
V_s	shear resistance provided by shear reinforcement	V_s (5.8.3.3)	V_s (8.16.6.1, 9.20)
V_T	factored shear resistance	V_r (5.8.2.1)	—
V_u	factored shear force at section	V_u (C5.6.3.1)	V_u (8.16.6.1, 9.20)
V_{uh}	factored horizontal shear force per unit length of the beam	—	—
V_x	shear force at a distance (x) from the support	—	—
v	factored design shear stress	v (5.8.3.4.2)	v (8.15.5.1.1)
v	permissible horizontal shear stress	—	v (9.20)
v_c	permissible shear stress carried by concrete	—	v_c (8.15.5.2)
WS, W	wind load on structure	WS (3.3.2)	W (3.22)
W	overall width of bridge	—	W (3.23.4.3)

NOTATION

SYMBOL	**DESCRIPTION**	**CORRESPONDING AASHTO LRFD SPECIFICATIONS**	**CORRESPONDING AASHTO STANDARD SPECIFICATIONS**
W	roadway width between curbs	—	W (3.28.1)
WA	water load and stream pressure	WA (3.3.2)	—
WL	wind load on live load	WL (3.3.2)	WL (3.22)
w	width of clear roadway	w (3.6.1.1.1)	—
w	a uniformly distributed load	—	—
w_b	weight of barriers	—	—
w_c	unit weight of concrete	w_c (5.4.2.4)	w_c (8.1.2)
w_g	beam self-weight	—	—
w_s	slab and haunch weights	—	—
w_{ws}	weight of future wearing surface	—	—
X	distance from load to point of support	—	X (3.24.5.1)
X_{ext}	horizontal distance from the center of gravity of the pattern of girders to the exterior girder	X_{ext} (C4.6.2.2.2d)	—
x	the distance from the support to the section under question	—	—
x	horizontal distance from the center of gravity of the pattern of girders to each girder	x (C4.6.2.2.2d)	—
x	length of prestressing steel element from jack end to point x	x (5.9.5.2.2b)	L (9.16)
y_b	distance from centroid to the extreme bottom fiber of the non-composite precast beam	—	—
y_{bc}	distance from the centroid of the composite section to extreme bottom fiber of the precast beam	—	—
y_{bs}	distance from the center of gravity of strands to the bottom fiber of the beam	—	—
y_t	distance from centroid to the extreme top fiber of the non-composite precast beam	—	—
y_t	distance from centroidal axis of gross section, neglecting reinforcement, to extreme fiber in tension	y_t (5.7.3.6.2)	y_t (8.13.3, 9.20)
y_{tc}	distance from the centroid of the composite section to extreme top fiber of the slab	—	—
y_{tg}	distance from the centroid of the composite section to extreme top fiber of the precast beam	—	—
Z	crack control parameter	Z (5.7.3.4)	—

NOTATION

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
Z	factor reflecting exposure conditions	—	—
α	angle of inclination of transverse reinforcement to longitudinal axis	α (5.8.3.3)	—
α	angle between inclined shear reinforcement and longitudinal axis of member	α (5.8.3.3)	α (8.1.2)
α	factor used in calculating elastic shortening loss	—	—
α	total angular change of prestressing steel path from jacking end to a point under investigation	α (5.9.5.2.2b)	α (9.16)
α	the angle of inclination of a tendon force, with respect to the centerline of the member	α (5.10.9.6.3)	—
α_h	total horizontal angular change of prestressing steel path from jacking end to a point under investigation	α_h (5.9.5.2.2b)	—
α_s	angle between compressive strut and adjoining tension tie	α_s (5.6.3.3.3)	—
α_v	total vertical angular change of prestressing steel path from jacking end to a point under investigation	α_v (5.9.5.2.2b)	—
β	factor indicating ability of diagonally cracked concrete to transmit tension (a value indicating concrete contribution)	β (5.8.3.3)	—
β	factor relating effect of longitudinal strain on the shear capacity of concrete, as indicated by the ability of diagonally cracked concrete to transmit tension	β (5.8.3.3)	—
β_b	ratio of area of reinforcement cut off to total area of reinforcement at the section	β_b (5.11.1.2.1)	β_b (8.24.1.4.2)
β_d	absolute value of ratio of maximum dead load moment to maximum total load moment, always positive	β_d (5.7.4.3)	β_d (8.1.2)
β_D	load combination coefficient for dead loads	—	β_D (3.22.1)
β_L	load combination coefficient for live loads	—	β_L (3.22.1)
β_1	ratio of depth of equivalent compression zone to depth	β_1 (5.7.2.2)	β_1(8.16.2.7,9.17-9.19)
Δ	deflection	—	—
Δ_{beam}	deflection due to beam self-weight	—	—
Δ_{b+ws}	deflection due to barrier and wearing surface weights	—	—
Δ_{fcdp}	change in concrete stress at c.g. of prestressing steel due to all dead loads, except dead load acting at the time the prestressing force is applied	Δ_{fcdp} (5.9.5.4.3)	—
Δf_{pA}	loss in prestressing steel stress due to anchorage set	Δf_{pA} (5.9.5.1)	—

NOTATION

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
Δf_{pCR}	loss in prestressing steel stress due to creep	Δf_{pCR} (5.9.5.1)	CR_c (9.16)
Δf_{pES}	loss in prestressing steel stress due to elastic shortening	Δf_{pES} (5.9.5.1)	ES (9.16)
Δf_{pF}	loss in prestressing steel stress due to friction	Δf_{pF} (5.9.5.1)	—
Δf_{pi}	total loss in pretensioning steel stress immediately after transfer	—	—
Δf_{pR}	total loss in prestressing steel stress due to relaxation of steel	Δf_{pR} (5.9.5.1)	CR_s (9.16)
Δf_{pR1}	loss in prestressing steel stress due to relaxation of steel at transfer	Δf_{pR1} (5.9.5.4.4b)	—
Δf_{pR2}	loss in prestressing steel stress due to relaxation of steel after transfer	Δf_{pR2} (5.9.5.4.4c)	—
Δf_{pSR}	loss in prestressing steel stress due to shrinkage	Δf_{pSR} (5.9.5.1)	SH (9.16)
Δf_{pT}	total loss in prestressing steel stress	Δf_{pT} (5.9.5.1)	—
Δf_s	total prestress loss, excluding friction	—	Δf_s (9.16)
Δ_D	deflection due to diaphragm weight	—	—
Δ_L	deflection due to specified live load	—	—
Δ_{LL+I}	deflection due to live load and impact	—	—
Δ_{LL}	deflection due to lane load	—	—
Δ_{LT}	deflection due to design truck load and impact	—	—
Δ_{max}	maximum allowable live load deflection	—	—
Δ_p	camber due pretension force at transfer	—	—
Δ_{SDL}	deflection due to barrier and wearing surface weights	—	—
Δ_{slab}	deflection due to the weights of slab and haunch	—	—
ε	strain	—	—
ε_{cu}	the failure strain of concrete in compression	ε_{cu} (5.7.3.1.2)	—
ε_{ps}	strain in prestressing steel	—	—
ε_s	tensile strain in cracked concrete in direction of tension tie	ε_s (5.6.3.3.3)	—
ε_{sh}	concrete shrinkage strain at a given time	ε_{sh} (5.4.2.3.3)	—
ε_{si}	strain in tendons corresponding to initial effective pretension stress	—	—
ε_x	longitudinal strain in the web reinforcement on the flexural tension side of the member	ε_x (5.8.3.4.2)	—

SYMBOL	***DESCRIPTION***	***CORRESPONDING AASHTO LRFD SPECIFICATIONS***	***CORRESPONDING AASHTO STANDARD SPECIFICATIONS***
ε_1	principal tensile strain in cracked concrete due to factored loads	ε_1 (5.6.3.3.3)	—
ϕ	resistance factor	ϕ (5.5.4.2.1)	ϕ (8.16.1.2)
ϕ_c	curvature at midspan	—	—
ϕ_0	curvature at support	—	—
γ	load factor	—	γ (3.22)
γ^*	factor for type of prestressing steel = 0.28 for low-relaxation steel = 0.40 for stress-relieved steel = 0.55 for bars	—	γ^* (9.17)
γ_i	load factor	γ_i (3.4.1)	—
γ_p	load factor for permanent loading	γ_p (3.4.1)	—
η	variable load modifier which depends on ductility, redundancy and operational importance	η (3.4.1)	—
κ	a correction factor for closely spaced anchorages	κ (5.10.9.6.2)	—
λ	parameter used to determine friction coefficient and it is related to unit weight for concrete	λ (5.8.4.2)	λ (8.15.5.4, 8.16.6.4)
μ	coefficient of friction	μ (5.8.4.1)	μ (8.15.5.4.3)
μ	Poisson's ratio	—	μ (3.23.4.3)
θ	skew angle	—	—
θ	angle of inclination of diagonal compressive stresses	θ (5.8.3.3)	—
θ_s	angle between compression strut and longitudinal axis of the member in a shear truss model of a beam	θ_s (5.6.3.3.2)	—
ρ	tension reinforcement ratio - A_s/b_wd, A_s/bd	—	ρ (8.1.2)
ρ'	compression reinforcement ratio = A_s'/bd	—	ρ' (8.1.2)
ρ^*	$\frac{A_s^*}{bd}$, ratio of pretensioning reinforcement	—	ρ^* (9.17, 9.19)
ρ_{actual}	actual ratio of nonpretensioned reinforcement	—	—
ρ_b	reinforcement ratio producing balanced strain conditions	—	ρ_b (8.16.3.1.1)
ρ_{min}	minimum ratio of tension reinforcement to effective concrete area	ρ_{min} (5.7.3.3.2)	—
ρ_v	ratio of area of vertical shear reinforcement to area of gross concrete area of a horizontal section	ρ_v (5.10.11.4.2)	—

NOTATION

SYMBOL	DESCRIPTION	CORRESPONDING AASHTO LRFD SPECIFICATIONS	CORRESPONDING AASHTO STANDARD SPECIFICATIONS
ψ	a factor reflects the fact that the actual relaxation is less than the intrinsic relaxation	—	—
ψ	angle of harped pretensioned reinforcement	—	—
$\psi_{(t,ti)}$	creep coefficient - the ratio of the strain which exists t days after casting to the elastic strain caused when load p_i is applied t_i days after casting	$\psi_{(t,ti)}$ (5.4.2.3.2)	—
χ	aging coefficient	—	—