California Amendments to the AASHTO LRFD Bridge Design Specifications (Fourth Edition)

September 2010

DEPARTMENT OF TRANSPORTATION
STATE OF CALIFORNIA

Foreword

In 1993, the AASHTO Subcommittee on Bridge and Highway Structures (SCOBS) voted to accept the *AASHTO LRFD Bridge Design Specifications* as an alternate design specification. In 1999, SCOBS voted to no longer update the *Standard Specifications for Highway Bridges*, which was the basis for the *Caltrans Bridge Design Specifications (BDS)*, and to support Load and Resistance Factor Design as the primary design code. In June 2000, the Federal Highway Administration (FHWA) mandated that LRFD be used on all new bridge design commencing on or after October 1, 2007 and provided additional information in a clarification memorandum dated January 22, 2007.

In 1999, California Department of Transportation (Caltrans) began developing amendments to the *AASHTO LRFD Bridge Design Specifications* that were necessary to adopt the national code into California's bridge design practice. In December 2004, Richard D. Land, State Bridge Engineer, established April 2006 as the transition date to use the LRFD specifications for bridges designed by Caltrans. Similarly, October 2006 was established for using the LRFD specifications for bridges designed by local agencies or others located within state right-of-way.

In April 2006, Kevin J. Thompson, State Bridge Engineer, confirmed that all structural components for bridges designed by the State that had not received Type Selection approval, shall conform to the *AASHTO LRFD Bridge Design Specifications, Third Edition, with 2005 Interim Revisions, as amended by Caltrans.* Similarly, October 1, 2006 was confirmed for the LRFD structural design for bridges, without Type Selection approval, designed by local agencies or others located within state right-of-way. Full implementation of the complete *AASHTO LRFD Design Specifications* including the geotechnical design of foundations was set for April 1, 2007 for bridges designed by the State and October 1, 2007 for bridges designed by others.

In December 2008, Kevin J. Thompson, State Bridge Engineer, approved the *AASHTO LRFD Bridge Design Specifications, Fourth Edition with the California Amendments*, as the primary Caltrans bridge design specifications. In September 2010, Tony Marquez, Deputy Division Chief, approved updates to the California Amendments for earth retaining systems and buried structures in Sections 11 and 12 respectively. Further guidance on abutments will follow in 2011. The LRFD Specifications with the most current California Amendments shall be the basis for all advance planning studies, geotechnical investigation, bridge design, and other project supporting documentation and bridge design guidance material.

PREFACE
to
CALIFORNIA AMENDMENTS

CALTRANS STANDARD SPECIFICATIONS (CURRENT VERSION): Shall supercede all references to the *AASHTO LRFD Bridge* **Construction** *Specifications* within the *LRFD Bridge Design Specifications*. However, the AASHTO Construction Specifications are recommended as reference.

CALTRANS SEISMIC DESIGN CRITERIA (CURRENT VERSION): Shall supercede all provisions for seismic design, analysis, and detailing of bridges contained in the *AASHTO LRFD Bridge Design Specifications.* The Caltrans Seismic Design Criteria is used in conjunction with the Extreme Event I Load Combination specified in AASHTO LRFD.

The AASHTO Specifications shall be adhered to in areas where the California Specifications, design criteria, and/or the Contract Documents are silent.

THE GENERAL PLAN TITLE BLOCK SHALL SPECIFY THE DESIGN LIVE LOAD AS:

"Load and Resistance Factor Design", and "HL93 w/ 'Low-Boy' and Permit Design Vehicle"

THE GENERAL NOTES SHALL BE TITLED:

"Load and Resistance Factor Design" and list the "*AASHTO LRFD Bridge Design Specifications*, Fourth Edition with California Amendments".

PREFACE TO CALIFORNIA AMENDMENTS
AMENDED ARTICLES

AASHTO Page No.	Article No.	CA Amendments	Latest Edition
1-5, 1-6, 1-7	1.3.3, 1.3.4, 1.3.5	η = 1.0	December 2008
2-1, 2-2, 2-17, 2-18, 2-21 to 2-23	2.2, 2.6.1, C2.6.2, 2.6.4.3, 2.6.4.4.2	Comply with Caltrans scour policy described in MTD 1-23.	December 2008
3-2, 3-3, 3-5 to 3-9, 3-11, 3-12, 3-99, 3-100, 3-102	3.2, 3.3.1, 3.3.2, 3.4.1, C3.4.1, 3.12	Clarification of super-imposed deformations *CR, SH, PS,* and *TU*	December 2008
3-8, 3-13, 3-29, 4-46	3.4.1, 3.6.1.8, 3.6.2.1, C3.6.2.1, 4.6.2.2.5	Design permit vehicle (2 lanes)	December 2008
3-9, 3-38	C3.4.1, 3.7.5, C3.7.5	Structure configuration w/scour	December 2008
3-10, 3-11, 3-13, 3-27, 5-23, 5-24, 6-42 to 6-44, 6-112, 6-142, 6-206	3.4.1, C3.4.1, 3.6.1.4, 5.5.3, 6.6.1.2.5, C6.6.12.5, 6.10.5.3, 6.10.10.2, 6.10.10.3, 6.13.2.10.3	Fatigue: clarification and additional load group for P9's; load group for concrete design; steel resistance for infinite and finite life	December 2008
3-13, 3-14	3.4.1	No live load with seismic	December 2008
3-24	3.6.1.2.6, C3.6.1.2.6	Culverts	December 2008
3-25	3.6.1.3.1, C3.6.1.3.1	Dual tandem "low-boy", required	December 2008
3-26	C3.6.1.3.3	Deck loads	December 2008
3-28, 3-29	3.6.1.6, C3.6.1.6	Pedestrian bridge frequency check; maintenance vehicles	December 2008
3.29, 3-30	3.6.2.1,C3.6.2.1	Reduced *IM* for permit trucks	December 2008
3-40	3.8.1.2.2	Wind load application	December 2008
3-31, 3-32, 3-41	3.6.3, C3.6.3, 3.6.4, C3.6.4, 3.8.1.3, C3.8.1.3	Exceptions to load application 6-ft above deck	December 2008
3-51	3.10	Caltrans Seismic Design Criteria	December 2008
3-99, 3-100, 3-102	3.12.2	Uniform temperature *UT*	December 2008
3-104	C3.12.4, C3.12.5, 3.12.7, C3.12.7	Load factors for *CR* and *SH*; secondary forces due to *PS*	December 2008
4-7	4.3	Clarification of definition	December 2008
4-10	4.4	Software	December 2008
4-11	C4.5.2.2, C4.5.2.3	Cracked/gross moment of inertia for concrete columns	December 2008
4-27 to 4-29, 4-34, 4-36, 4-38, 4-40, 4-41, 4-44	4.6.2.2.1, C4.6.2.2.1, 4.6.2.2.2b-i, 4.6.2.2.2b-ii, C4.6.2.2.2b-ii, 4.6.2.2.2e, C4.6.2.2.2e, C4.6.2.2.3, 4.6.2.2.3a-i, 4.6.2.2.3a-ii, C4.6.2.2.3a-i, 4.6.2.2.3c, C4.6.2.2.3c	Rationale of using the interior girder distribution factor for whole-width design; skew factors	December 2008
4-46	4.6.2.2.6	Permanent load distribution	December 2008
4-48	4.6.2.5	Effective length factor	December 2008
4-52	4.6.2.6	Effective flange width for girders, integral bent caps	December 2008
4-66, 9-5	4.6.3.1, C9.4.3	Barriers	December 2008
4-67	4.6.3.2.1	No yield-line analysis for deck design	December 2008
4-86	References	New references	December 2008

AASHTO Page No.	Article No.	CA Amendments	Latest Edition
5-12	5.4.2.1	Specified compressive strength	December 2008
5-25, 5-26, 5-28	5.5.4.2.1, 5.5.5	Resistance factors for concrete	December 2008
5-37	5.7.2.1, C5.7.2.1	Check for over-reinforcement and compression steel	December 2008
5-47	5.7.3.4	Crack control in decks d_c=2.5	December 2008
5-48, 5-49	5.7.3.6.2, C5.7.3.6.2	Deflection and camber	December 2008
5-60, 5-61, 5-62	5.8.2.1, C5.8.2.1	Shear-torsion clarifications	December 2008
5-66	5.8.2.9, C5.8.2.9	No duct-diameter deduction	December 2008
5-75, 5-80, 5-82, 5-84, 5-87, 5-92	5.8.3.4.2, C5.8.3.4.2, 5.8.3.4.3, C5.8.3. 5, 5.8.3.6.1, C5.8.3.6.1, C5.8.3.6.2, 5.8.4.1, 5.8.6	Shear and torsion design	December 2008
5-102, 5-107	5.9.3, 5.9.4.2.2	Stress limits	December 2008
5-111, 5-113	5.9.5.2.2b, C5.9.5.2.2b, 5.9.5.2.3b, C5.9.5.2.3b	Wobble and friction coefficients; removal of iteration	December 2008
5-114	5.9.5.3	25 ksi losses for post-tensioned members	December 2008
5-182	5.11.4.3	Debonding	December 2008
5-188, 5-189	5.12.3 to 5.12.5	Bar cover and corrosion protection	December 2008
5-215	5.14.1.4.1, C5.14.1.4.1	Simple span girder made continuous	December 2008
6-23,6-24, 6-28, 6-194, 6-200	6.4.3.1, C6.4.3.1, 6.4.3.2, 6.5.4.2, 6.13.2.1, 6.13.2.7	Anchor blot design	December 2008
6-80, 6-115, 6-120, 6-146, 6-148	C6.10.1, 6.10.6.2.2, 6.10.7.1.2, C6.10.6.7.1.2, 6.10.11.1.1, 6.10.11.2.1	Steel I-members in flexure	December 2008
6-193, 6-216, 6-217, 6-220 to 6-225	6.13.1, 6.13.6.1.4b, C6.13.6.1.4b, 6.13.6.1.4c, C6.13.6.1.4c, 6.13.6.2	Steel connections and splices	December 2008
6-230	6.14.2.8	Gusset plate	December 2008
9-5, 9-7 to 9-9,	C9.4.3, 9.5.2, 9.7.1.1, C9.7.1.1, 9.7.1.4, 9.7.2.2 C9.7.2.2	Concrete decks	December 2008
9-22, 9-24, 9-37	9.8.3.6.2, C9.8.3.6.2, 9.8.3.7.4	Orthotropic deck fatigue design	December 2008
9-37	References	References	December 2008
10-27 to 10-44	10.5	Resistance factors for foundations amended to past practice and LRFD superstructure design	December 2008
10-44 to 10-76	10.6	Spread footing modifications	December 2008
10-77 to 10-114	10.7	Spread footing modifications	December 2008
10-123, 10-130, 10-136, 10-143	10.5	Drilled shaft modifications	December 2008
11-6, 11-10, , 11-14	11.5, 11.5.2, 11.6	Refers to Section 10.5 for abutments. Eccentricity limits for spread footings	September 2010
11-11	11.5.6	Resistance factor table	September 2010
11-15	C11.6.2.3	Overall stability check resistance factors	September 2010
11-18	11.6.3.3, C11.6.3.3	Bearing resistance	September 2010
11-49, 11-50, 11-51	11.10.6.2.1, C11.10.6.2.1,	Simplified or Coherent Gravity Methods	September 2010
11-58	11.10.6.4.2a, C11.10.6.4.2a	MSE backfill design parameters	September 2010
11-87	References	Add new references	September 2010
11-90	A11.1.1.1	Total soil pressure from seismic effects	September 2010

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12-18, 12-19	12.6.6.1, 12.6.6.3	Minimum trench width and soil cover	December 2008
12-43, 12-44, 12-46, 12-59	12.10.2, 12.10.4	No Type 4 Trench Installation	December 2008
12-47, 12-57	12.10.2.1, 12.10.4.3.1	Non-standard installation of reinforced concrete pipe	September 2010
12-86	References	Add new references	September 2010
13-2, 13-20, 13-24 to 13-27	13.3, A13.3.2, A13.4.2, CA13.4.2, A13.4.3.1, CA 13.4.3.1, A13.4.3.1 A13.4.3.2	Notation clarification, railing design, deck overhang design	December 2008
14-1 to 14-86	14	Adopt 2008 Interim with modification	December 2008