California Manual on Uniform Traffic Control Devices

FHWA's MUTCD 2009 Edition as amended for use in California

California MUTCD 2012 Changes Training

8:00 am – 5:00 PM

Thursday- July 12, 2012

Caltrans District 5
Manzanita Room, ATOLL Building
1150 Laural Lane,
San Luis Obispo, CA 93401

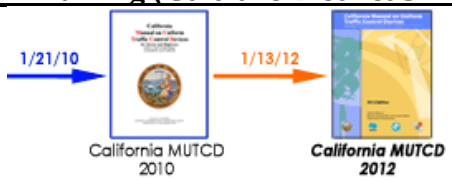
Instructors:
Ahmad Rastegarpour, Don Howe , Gordon Wang, Roberta McLaughlin & Johnny Bhullar, Caltrans HQ Traffic Operations

To register, please e-mail :
Mark.Bewley@dot.ca.gov

2012 Edition

PLEASE NOTE:
- **See attached agenda and detailed list of topics that will be covered.**
- **Class is free and open to Caltrans, local agencies & private practitioners.**
- **Registration is mandatory to ensure seats are available for everyone.**

California MUTCD 2012 Training (Caltrans District 5 – San Luis Obispo) Topics



AGENDA

8:00 – 9:30 AM	Overview (Introduction & Part 1 – General) - *Johnny Bhullar, Caltrans*
9:30 – 9:45 AM	***BREAK***
9:45 – 11:30 AM	Part 2 (Signs) - *Don Howe, Caltrans*
11:30 – 12:30 PM	***LUNCH***
12:30 – 1:15 PM	Part 3 (Markings) - *Roberta McLaughlin, Caltrans*
1:15 – 2:00 PM	Part 4 (Highway Traffic Signals) - *Ahmad Rastegarpour, Caltrans*
2:30 – 2:45 PM	***BREAK***
2:45 – 3:45 PM	Part 6 (Temporary Traffic Control) - *Gordon Wang, Caltrans*
3:45 – 4:15 PM	Part 7 (Traffic Control for School Areas) - *Roberta Mclaughlin, Caltrans*
4:15 – 4:45 PM	Part 9 (Traffic Control for Bicycle Facilites) - *Don Howe, Caltrans*
4:45 ~ 5:00 PM	***Summarize & Adjourn***

For questions on any topics covered in this training, please email mutcdsupp@dot.ca.gov

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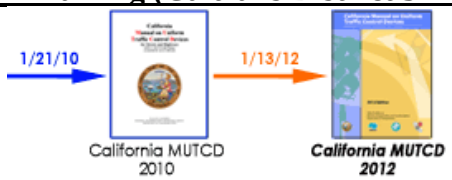

List of sample topics to be covered in this training

Introduction

- Federal and state legal requirements and references.
- Applicability on public roadways, local agencies and private property.
- Evolution and history of the manual.
- Relationship with other documents, such as National MUTCD, Caltrans Standard Plans, Standard Specifications and Standard Special Provisions.
- Meaning, format, interpretation and applicability of Standard, Guidance, Option, and Support text headings.
- Layout and description of manual parts, chapters, sections, figures and tables.
- Font, format, nomenclature for making distinction between National MUTCD and California added/modified contents.
- Compliance of new highway or bikeway construction or reconstruction projects.
- Compliance and flexibility allowed on projects in various phases from design through construction, for existing devices on roadway that have become non-compliant and for existing inventory of non-compliant devices.
- Compliance for devices identified with specific target compliance dates.

Part 1 - General

- Sections 1A.03 thru 1A.06: Responsibility for design, placement, operation, maintenance, and uniformity of traffic control devices.
- Section 1A.07: California MUTCD in "substantial conformance" with National MUTCD.
- Section 1A.07: Legal requirement providing Caltrans authority to issue California MUTCD after consultation with local agencies and public hearings.
- Section 1A.07: California MUTCD applicability to privately owned and maintained roads or commercial establishments.
- Section 1A.08: Authority for placement of traffic control devices.
- Section 1A.08: Unauthorized and prohibited traffic control devices.
- Section 1A.09: Engineering Study and Engineering Judgment.
- Section 1A.10: FHWA's requests for interpretations, permission to experiment, interim approvals, or changes.
- Section 1A.10: CTCDC requests for experimentation, interpretation, or changes relating to the California edited portion of the California MUTCD.
- Section 1A.12: Color code.
- Section 1A.13: Definitions of Headings, Words, and Phrases in the Manual.
- Section 1A.14: Meanings of Acronyms and Abbreviations in the Manual
- Section 1A.15: Abbreviations Used on Traffic Control Devices.

Part 2 - Signs

2A – General

- Section 2A.12: Symbol used for a given category of signs not be used for a different category of signs.
- Section 2A.13: Word messages – use/non-use of different characters, symbols, fractions, upper-case, lower-case and mixed-case letters.
- Section 2A.15: Enhanced Conspicuity for Standard Signs.

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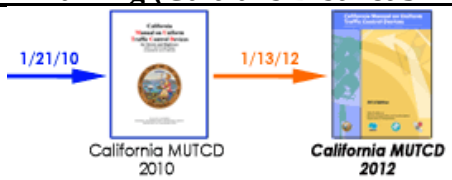


2B – Regulatory Signs

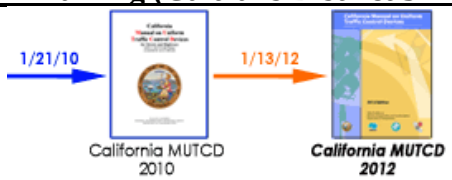
- Section 2B.13: Speed Limit changes and AB529 related changes.
- Section 2B.18: No Left Turn (R3-2) sign, the No U-Turn (R3-4) sign, and the combination No U-Turn/No Left Turn (R3-18) sign not be used at roundabouts.
- Section 2B.30: KEEP RIGHT EXCEPT TO PASS Sign.
- Section 2B.36: DO NOT DRIVE ON SHOULDER Sign and DO NOT PASS ON SHOULDER Sign
- Section 2B.40: ONE WAY Signs.
- Section 2B.42: Divided Highway Crossing Signs.
- Section 2B.43 thru 2B.45: Roundabout Directional Arrow Sign and Circular Plaque.
- Section 2B.52: Traffic Signal Pedestrian and Bicycle Actuation Signs.
- Section 2B.53: Traffic Signal Signs.

2C – Warning Signs

- Section 2C.04: Minimum size of diamond-shaped warning sign on multi-lane roads, when used on the left-hand side or facing traffic.
- Section 2C.06 thru 2C.15: Horizontal Alignment Warning Signs and Table 2C-5 indicating that a horizontal alignment sign is required, recommended, or allowed based on speed differentials.
- Section 2C.08: Advisory Speed Plaque and change in ball-bank criteria to 12, 14 and 16.
- Section 2C.09: Enhanced use of Chevron Alignment Signs and spacing per new Table 2C-6. Prohibited use of chevron signs.
- Section 2C.10: Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs.
- Section 2C.12: One-Direction Large Arrow Sign not to be used at Roundabouts.
- Section 2C.15: Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs.
- Section 2C.33: Warning Signs and Plaques for Motorcyclists
- Section 2C.40: Merge (W4-1) sign and Entering Roadway Merge (W4-5) sign with a NO MERGE AREA (W4-5P) supplemental plaque
- Section 2C.49: combined Bicycle/Pedestrian (W11-15) sign TRAIL X-ING (W11-15P) supplemental plaque
- Section 2C.52: NEW TRAFFIC PATTERN AHEAD Sign
- Section 2C.58: If two street names are used on the Advance Street Name plaque.
- Section 2C.60: SHARE THE ROAD Plaque.
- Section 2C.62: NEW Plaque.

2D & 2E – Guide Signs on Conventional Roads, Freeways and Expressways.

- Section 2D.08: Down arrows on overhead signs on conventional roads. Curved-stem arrows on signs at circular intersections. Type A through D directional arrows on guide signs.
- Section 2D.27: Lane Designation Auxiliary Signs
- Section 2D.33: Combination Lane-Use/Destination Overhead Guide Sign.
- Section 2D.45: Guide signs on multi-lane conventional roads approaching an interchange, to identify which direction of turn is to be made and/or which specific lane to use.
- Section 2D.50: Community Wayfinding Signs.
- Section 2E.19: Arrows for Interchange Guide Signs.
- Section 2E.20: Signing for Option Lanes at Splits and Multi-Lane Exits.
- Section 2E.21: Design of Overhead Arrow-per-Lane Guide Signs for Option Lanes.
- Section 2E.22: Design of Freeway and Expressway Diagrammatic Guide Signs for Option Lanes
- Section 2E.35: Use of pictographs on supplemental guide signs.



2M – Recreational and Cultural Interest Area Signs.

- Section 2M.10: Memorial or Dedication Signing.

Part 3 - Markings

3B – Pavement and Curb Markings

- Section 3B.01: Single solid yellow line not to be used as a center line marking on a two-way roadway.
- Section 3B.02: Table 3B-1 is for operational use in marking no-passing zones, values are less than that suggested for geometric design by the AASHTO Policy on Geometric Design of Streets and Highways.
- Section 3B.04: Lane line markings for deceleration or acceleration lanes, through lane that becomes a mandatory exit or turn lane, auxiliary lane 2 miles or less in length between an entrance ramp and an exit ramp or auxiliary lane 1 mile or less in length between two adjacent intersections.
- Section 3B.04: Lane line markings for exit ramps with parallel or tapered deceleration lanes.
- Section 3B.04: Lane line markings for entrance ramps with parallel or tapered deceleration lanes.
- Section 3B.04: Lane line markings in advance of lane drops at exit ramps, in advance of freeway route splits with dedicated lanes, to separate a through lane that continues beyond an interchange from an adjacent auxiliary lane between an entrance ramp and an exit ramp, as a lane drop marking in advance of lane drops at intersections or to separate a through lane that continues beyond an intersection from an adjacent auxiliary lane between two intersections.
- Section 3B.05: Channelizing lines for all exit ramps and entrance ramps with parallel or tapered acceleration lanes.
- Section 3B.11: Retroreflective or internally illuminated (steadily illuminated) raised pavement markers can be used to mark curbed approach ends of raised medians and curbs of islands.
- Section 3B.13: To improve visibility of horizontal curves, center lines can be supplemented with retroreflective or internally illuminated raised pavement markers.
- Section 3B.17: Do Not Block Intersection Markings.
- Section 3B.18: Use of engineering study before installing a marked crosswalk.
- Section 3B.18: Detectable warning surfaces to mark boundaries between pedestrian and vehicular ways.
- Section 3B.20: Lane-use arrow and ONLY markings.
- Section 3B.22: Speed Reduction Markings.
- Section 3B.24: Chevron and Diagonal Crosshatch Markings.

3F – Delineators.

- Section 3F.03: Use of delineators on guardrail or other longitudinal barriers.

3G – Colored Pavements.

- Section 3G.01: When colored pavement is or is not a traffic control device.
- Interim Approval IA-14: Optional Use of Green Colored Pavement for Bike Lanes.

3J – Rumble Strip Markings.

- Entire Chapter is new.

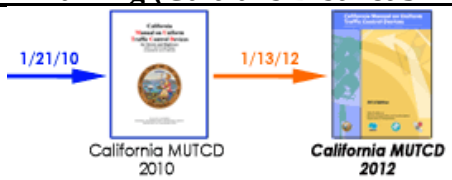
Part 4 – Highway Traffic Signals

4B – Traffic Control Signals - General

- Section 4B.02: Criteria for removal of a signal - Changed from option to guidance.

4C – Traffic Control Signal Needs Studies

- Section 4C.04: Warrant 3 – New guidance in Warrant 3 – Should be traffic actuated.
- Section 4C.05: Warrant 4 – Only one criteria needs to be met
- Section 4C.10: Warrant 9 – New Warrant - Intersection Near a Grade Crossing.
- Figure 4C.101: Warrant 9 Worksheet (Sheet 5 of 5)



4D – Traffic Control Signal Features

- Sections in 4D: Optional use of flashing yellow arrow for permissive turns.
- Section 4D.03: Use of signs to prohibit pedestrian crossing
- Section 4D.06: Prohibition of flashing green, vehicular countdown display, strobes, etc.
- Section 4D.06: Optional use of U-turn signal.
- Section 4D.07: 12-inch indication required for all new traffic control signal faces.
- Section 4D.08 & 4D.09: Optional red indication cluster.
- Section 4D.11: Minimum two signal faces for straight- through movements.
- Section 4D.11: Use of single section green arrow signal face.
- Section 4D.11: Recommended number, location, and design of signal faces where approach speed is >= 45 mph.
- Section 4D.13: Location of green signal indications for permissive left turns.
- Section 4D.17 and 4D.21: Protected only mode shall not be used without exclusive turn lane.
- Section 4D.19: Use of red arrow for protected left turn phase.
- Section 4D.17 thru 4D.24: Sections and Figures for various modes of LT and RT signal operation.
- Section 4D.25: Signal displays for shared LT/RT lanes with no through movement.
- Section 4D.26: Yellow change intervals and red clearance intervals.
- Section 4D.28: Optional use of flashing mode on a schedule basis.
- Section 4D.34: Use of overhead lane control signs.

4E –Pedestrian Control Features

- Section 4E.04: Use of overlaid pedestrian symbols.
- Section 4E.06: Pedestrian intervals and signal phases.
- Section 4E.06: Walking speed for calculating pedestrian clearance interval.
- Section 4E.06: Optional use of pedestrian leading interval.
- Section 4E.07: Countdown pedestrian displays.
- Section 4E.08: Guidance for location of pedestrian pushbuttons for variety of conditions.
- Section 4E.08: Positioning of pedestrian pushbuttons and legends.
- Section 4E.09: Accessible Pedestrian Signals (APS).
- Section 4E.09 thru 4E.13: APS revised provisions.

4F – New Pedestrian Hybrid Beacon

- Entire Chapter is new.

4G – New Emergency Vehicle Hybrid Beacon

- Entire Chapter is new.

4L – Flashing Beacons

- Interim Approval IA-11: Optional Use of Rectangular Rapid Flashing Beacons

Part 6 – Temporary Traffic Control

6A – General

- Section 6A.01: Use of ITS in work zones for operational improvements.

6C – Temporary Traffic Control Elements

- Section 6C.04: Table 6C-1 sign spacing distances are approximate, should be adjusted for field conditions, to provide additional reaction time or in order to place a sign immediately downstream of an intersection.
- Section 6C.05: Use of more dominant devices in mobile operations.
- Section 6C.10: Traffic control can be self-regulating on low-volume roadways if road users from both directions are able to see the traffic through and beyond the worksite.

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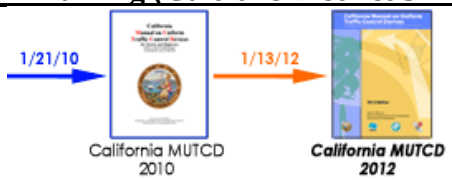


6D – General

- Section 6D.01: If establishing or maintaining an alternate pedestrian route is not feasible, an alternate means for pedestrians, such as adding free bus service or assigning someone the responsibility to assist pedestrians with disabilities, may be used.

6E – Flagger Control

- Section 6E.03: The bottom of the STOP/SLOW sign portion of the paddle should be a minimum of 6 feet above the pavement when mounted on a rigid staff.
- Section 6E.03: Use of traffic baton made of a flashlight with a red glow cone when flagging in an emergency situation at night in a non-illuminated flagger station.
- Section 6E.04 thru 6E.06: Automated Flagger Assistance Devices.
- Section 6E.07: Flaggers prohibited to use of hand movements alone without a paddle, flag, or AFAD to control road users.
- Section 6E.08: Flaggers should identify an escape route.

6F – Traffic Control Zone Devices

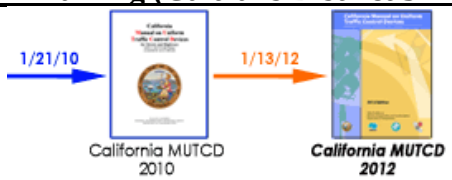
- Section 6F.01: MUTCD crashworthiness provisions apply to all public roadways in California.
- Section 6F.02: The minimum sizes column shall only be used where the 85th-percentile speed or posted speed limit is less than 35 mph.
- Section 6F.03: Signs mounted on portable sign supports not meet the minimum 5 and 7 feet mounting heights provided should not be used for a duration of more than 3 days.
- Section 6F.12: Work Zone and Higher Fines Signs and Plaques.
- Section 6F.29: EXIT ONLY Sign (E5-3).
- Section 6F.30: NEW TRAFFIC PATTERN AHEAD Sign (W23-2).
- Section 6F.46: STEEL PLATE AHEAD Sign (W8-24).
- Section 6F.48: Reverse Curve Signs (W1-4 Series).
- Section 6F.54: Motorcycle Plaque (W8-15P).
- Section 6F.61: Use of alternating diamond mode.
- Section 6F.63 & 6F.83: Use of a series of sequential flashing warning lights to increase driver detection and recognition of the merging taper.
- Section 6F.65: Distinction between non-cylindrical tubular marker or channelizer (CA) and portable delinerators.
- Section 6F.72: Temporary Lane Separators.
- Section 6F.79: Use of retroreflective or internally illuminated raised pavement markers.
- Section 6F.79: Color and pattern of the raised pavement markers shall simulate the color and pattern of the markings they substitute.
- Section 6F.84: Temporary traffic control signals shall not be located within 200 feet of a grade crossing unless it is provided with preemption, or unless a uniformed officer or flagger is provided at the crossing to prevent vehicles from stopping within the crossing.

6G – Type of Temporary Traffic Control Zone Activities

- Section 6G.01: TTC plan is needed for any planned special event that will have an impact on traffic.
- Section 6G.12: If operating speeds are 40 mph or less and space approaching the work area does not permit moving traffic over one lane at a time, a single continuous taper can be used.

6H – Typical Applications

- TA 101(CA): (New) Shoulder Closure on Urban (Low Speed) Locations to Accommodate Bicyclists.
- TA 102(CA): (New) Lane Closure on Freeway, Expressway, Rural and Urban (High Speed) Locations to Accommodate Bicyclists.
- TA 103(CA): (New) Detour for Bike Lane on Roads with Closure of One Travel Direction.



- TA 104(CA): (New) Right Lane and Bike Lane Closure on Far Side of Intersection.
- TA 105(CA): (New) Lane Shift on Road with Low Traffic Volumes.

6I – Traffic Control Through Traffic Incident Management Areas

- Section 6I.02 & 6I.03: Use of light sticks.

Part 7 – Traffic Control for School Areas

7B – Signs

- Section 7B.01: Use of Oversized column for sign sizes on roadways that have four or more lanes with posted speed limits of 40 mph or higher.
- Section 7B.07: FYG color background required on school warning signs.
- Section 7B.08, 7B.09, 7B.11, 7B.12 & 7B.15: Revised School Assembles A(CA) thru E(CA).
- Section 7B.15: END SCHOOL SPEED LIMIT (S5-3) sign.
- Section 7B.15: EXTENDED 25 MPH AND/OR REDUCED SPEEDS IN SCHOOL ZONES.
- Section 7B.16: Use of Reduced School Speed Limit Ahead (S4-5, S4-5a) sign where the speed limit is being reduced by more than 10 mph.

7C – Markings

- Section 7C.02: Warning signs should be installed for all marked school crosswalks at non-intersection locations.

Part 9 – Traffic Control for Bicycle Facilities

9B – Signs

- Section 9B.01: Lateral offset, vertical clearance and mounting heights on shared-use paths.
- Section 9B.02: Minimum plaque sizes.
- Section 9B.06: Bicycles May Use Full Lane Sign (R4-11).
- Section 9B.09: Selective Exclusion Signs. R9-13 & R9-14 signs are new.
- Section 9B.11: R10-3 sign is deleted. R10-4, R10-24, R10-25 and R10-26 signs are new.
- Section 9B.18: Combined Bicycle/Pedestrian (W11-15) sign and TRAIL X-ING (W11-15P) supplemental plaque are new.
- Section 9B.20: Bicycle Guide Signs (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c, D11-1, D11-1c).
- Section 9B.21: Bicycle Route (M1-8a) sign is new.
- Section 9B.22: Bicycle Route Sign Auxiliary Plaques.
- Section 9B.24: Reference Location Signs (D10-1 through D10-3) and Intermediate Reference Location Signs (D10-1a through D10-3a).
- Section 9B.25: Mode-Specific Guide Signs for Shared-Use Paths (D11-1a, D11-2, D11-3, D11-4).
- Section 9B.26: Smaller sized object markers on shared-use paths.

9C – Markings

- Section 9C.04: A through bicycle lane shall not be positioned to the left of a left turn only lane.
- Section 9C.07: Shared Lane Marking.