

Innovative and Emerging Bicycle Treatments

Charlie Alexander

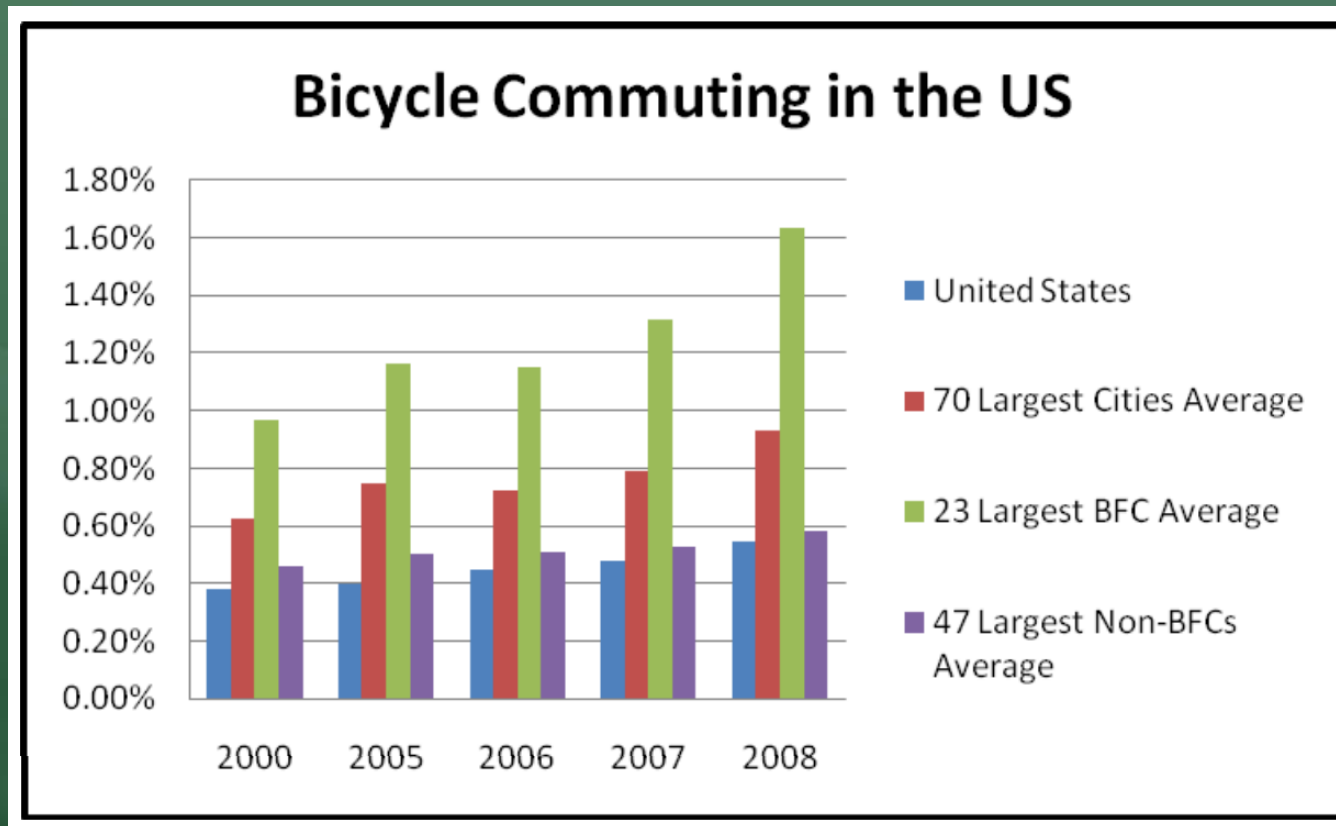
Fehr & Peers

Institute of Transportation Engineers, Northern California Section

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Why Are Innovative Bikeways Important?



Source: American Community Survey Bicycle Commuting Trends, 200 to 2008; League of American Bicyclists

Traditional Bikeways



Bike lane in Fresno, CA
Source: Bryan Jones



Sharrows in Sacramento, CA

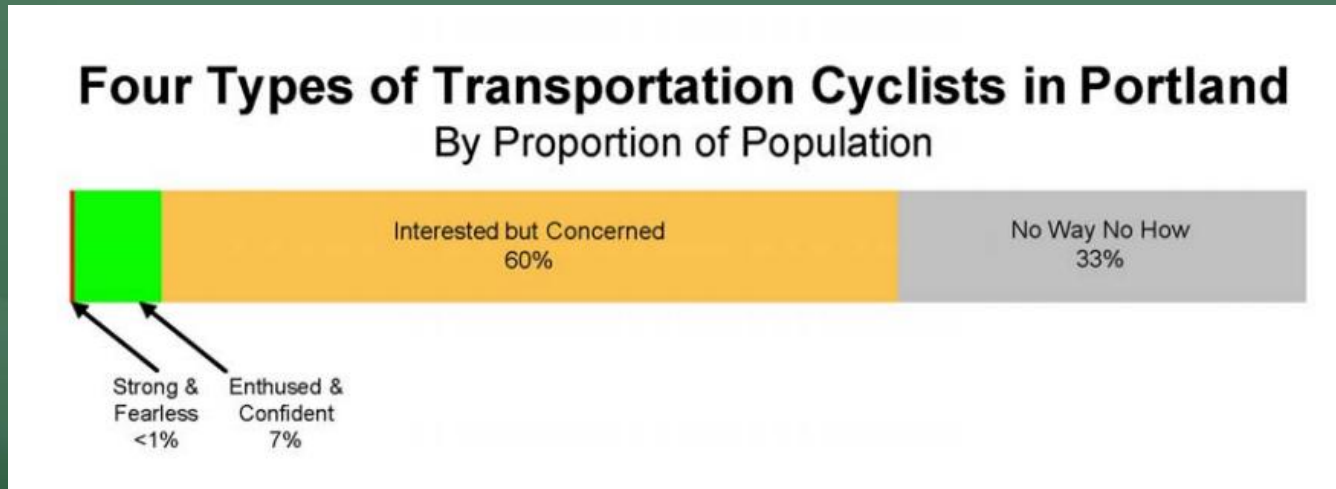
Low Hanging Fruit and Theoretical Maximum Mode Share



Sad giraffes

Source: www.iStockPhoto.com / Michael Zysman

What Types of Bicyclist Are We Trying to Serve?



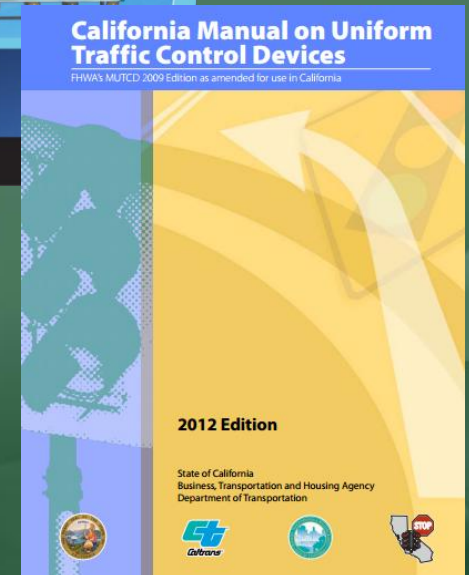
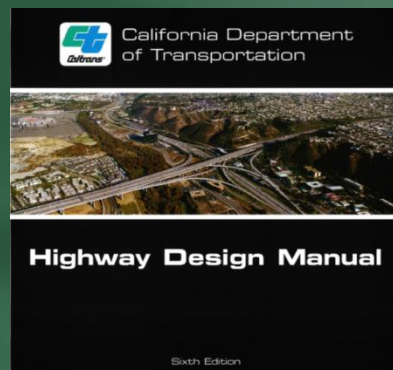
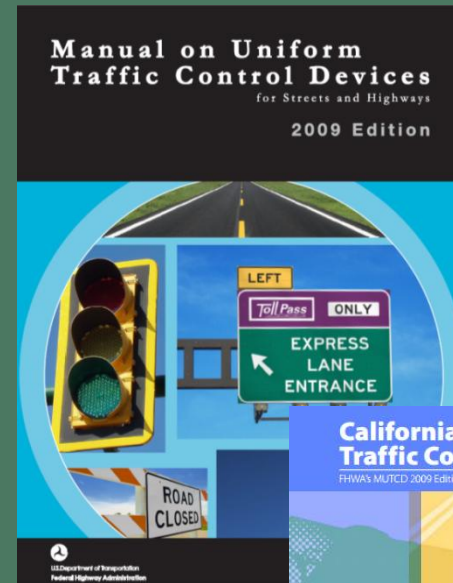
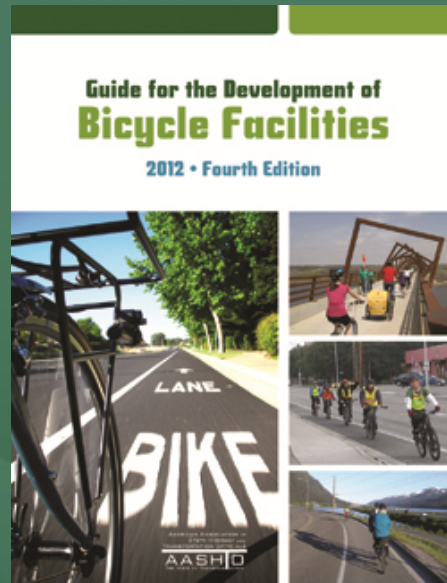
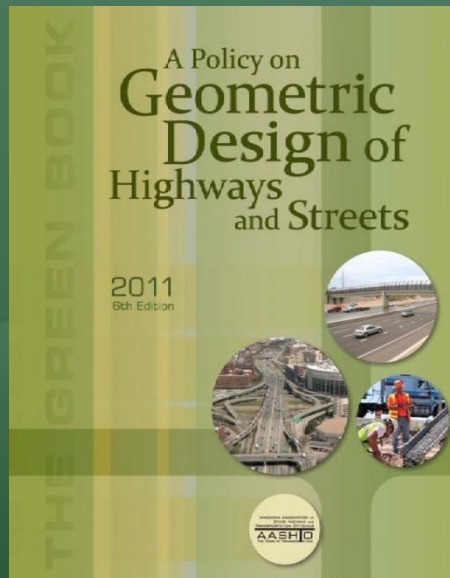
Source: Four Types of Cyclists, Roger Geller

How to Significantly Affect Mode Share

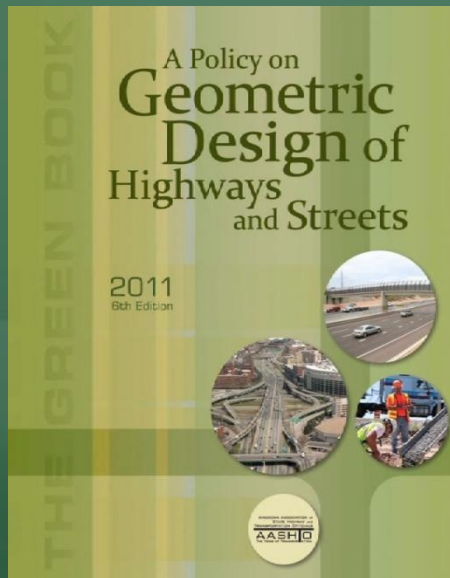


Bike paths at UC Davis
Source; UC Davis

Traditional Design Standards and Guidance

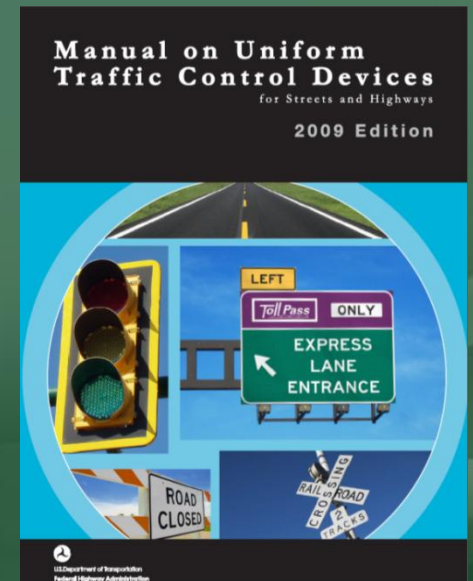


Traditional Design Standards and Guidance

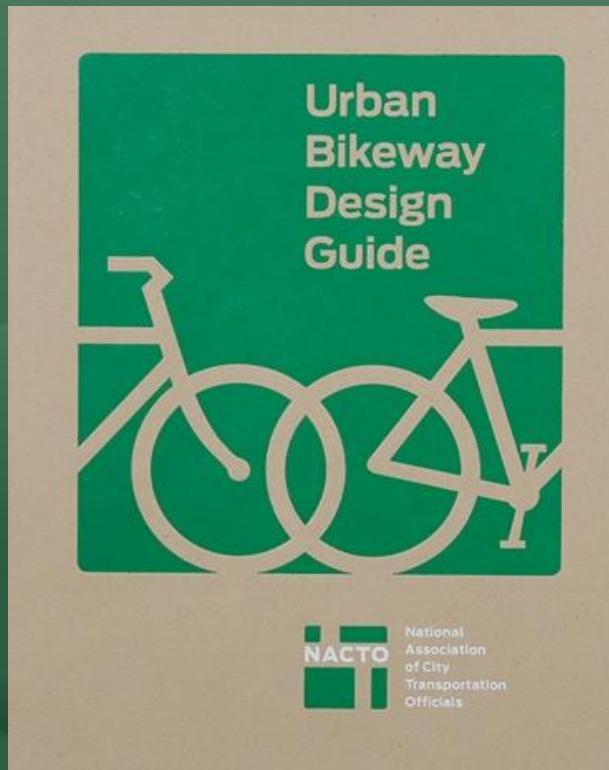


The American Association of State Highway and Transportation Officials

Federal Highway Administration



NACTO Urban Bikeway Design Guide



The National Association of City Transportation Officials

- Based on innovative design practices around the world
- Concern that AASHTO, FHWA don't sufficiently address urban transportation needs
- Impatience with MUTCD experimentation process
- Has received both praise and criticism
- Not all treatments consistent with AASHTO/HDM/MUTCD/CVC

Using the Urban Bikeway Design Guide Today

Bicycle Facilities and the Manual on Uniform Traffic Control Devices

Background

The Federal Highway Administration receives occasional inquiries about what bicycle facilities, signs, and markings are permitted in the [Manual on Uniform Traffic Control Devices](#) (MUTCD). The table below lists various bicycle-related signs, markings, signals, and other treatments and identifies their status (e.g., can be implemented, currently experimental) in the 2009 version of the MUTCD.

If you have MUTCD-related questions, please contact: [Kevin Dunn](#), MUTCD Team.

Description of Bicycle Facilities	Status in the FHWA's Manual on Uniform Traffic Control Devices (MUTCD)	Are FHWA Experiments in Progress?
Updated Status Information		
Buffered bike lanes	Can still be implemented at present time if pavement markings and/or crashworthy channelizing devices for bicycles that are compliant with the MUTCD are used. Buffered bike lanes are not experimental. "Yes" is shown in the "Are FHWA Experiments in Progress?" column below because the buffered bike lane(s) in these experiments are testing non-compliant pavement markings.	
Green colored pavement limited to behind the shared lane marking	The FHWA has discontinued the approval of new experiments using this treatment. Agencies that have received prior approval to experiment may continue to operate under the terms of the original experimental approval for the duration of the agreed upon timeframe.	
Green colored pavement to communicate a longitudinal direction in conjunction with shared lane markings where no bike lane markings are used	The FHWA has discontinued the approval of new experiments using this treatment. Agencies that have received prior approval to experiment may continue to operate under the terms of the original experimental approval for the duration of the agreed upon timeframe.	
Two-stage left turn queue box in any use other than for a jughandle turn at a T-intersection	Previous versions of this Table stated that two-stage left turn queue boxes could be implemented at the present time if signs and markings that are compliant with the MUTCD are used. This was an incorrect entry in the Table. The installation of two-stage left turn queue boxes is experimental except for those that facilitate a jughandle turn at a T-intersection. In order to consider the two-stage left turn queue box for adoption into a future edition of the MUTCD, agencies that may have already implemented a two-stage left turn queue box are requested to contact their FHWA Division Office with any information, observations, or data that might be useful in determining future provisions regarding its design or use. Examples of these metrics could include compliance with the no turn on red prohibition(s), user comprehension, vehicle encroachment, crash data, etc. Agencies that desire to install two-stage left turn queue boxes at new locations require approval to experiment.	Yes
Two-stage left turn queue box to facilitate a jughandle turn at a T-intersection	Can be implemented at present time if signs and pavement markings that are compliant with the MUTCD are used	

Caltrans Endorses Urban Bikeway Design Guide

- April 10, 2014 – Caltrans' Director announces endorsement of NACTO Urban Bikeway Design Guide
- Division of Design issues memorandum "Design Flexibility in Multimodal Design"

"Caltrans is currently analyzing these guides to identify areas of improvement in our own standards and guidance"

- What will make it into the HDM/CAMUTCD?
- California Streets and Highways Code Section 891?



Urban Bikeway Design Guide - Organization


**NACTO**
National Association of City Transportation Officials


Member City Login


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NACTO Urban Bikeway Design Guide

The purpose of the NACTO Urban Bikeway Design Guide (part of the Cities for Cycling initiative) is to provide cities with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists.


**Bike Lanes**

**Cycle Tracks**

**Intersections**

**Signals**

**Signs & Markings**

**Bicycle Boulevards**

NACTO Urban Bikeway Design Guide

Bike Lanes

Cycle Tracks

Intersections

Signals

Signing & Marking

Bicycle Boulevards

Master Reference Matrix

City Projects

Second Edition Change List

Design Guide Project Teams

Sponsors

<http://nacto.org/cities-for-cycling/design-guide/>

Bicycle Boulevards

Collection of treatments:

- Wayfinding
- Route planning
- Traffic calming
- Crossing treatments
- Traffic control adjustments

FHWA Status: depends on treatment



Source: DavidBaker+Partners.com

Advisory Bike Lanes

For narrow, low speed, low volume roadways

- 5'/14'/5' minimum
- 7'/18'/7' preferred

FHWA Status: experimental



Source: bikewalktwincities.org

Contra-Flow Bike Lanes

Allow bicyclists to ride in the opposite direction of motor vehicle traffic

- Separate opposing traffic with yellow pavement markings
- CAMUTCD minimum widths apply

FHWA Status: can be implemented at present time



Source: NACTO

Buffered Bike Lanes

Uses pavement markings to separate bicycle lane/travel lane or bicycle lane/on-street parking

- Buffer width: 18" minimum, 3' preferred
- Bike lane width: 5' minimum, 7' preferred
- Preferred to keep bike lane out of door zone

FHWA Status: can be implemented at present time



Green Bike Lanes

Increases visibility

- Can be used in marked bicycle lanes and extensions of bicycle lanes through intersections
- Anti-slip materials should be used

FHWA Status: can be implemented at present time



One-Way Cycle Tracks

Physically separates bicyclist space from travel lanes via vertical devices

- Delineator posts, planters, on-street parking
- Buffer width*: 3' minimum, 4' preferred
- Clear width for bicyclists: 5' minimum, 7' preferred

FHWA Status: "Not a traffic control device"

*Depends on configuration



Source: Chicago DOT

One-Way Raised Cycle Tracks

Elevates cycle track to curb level

- Requires separation from parked cars
- Requires separation from pedestrian space

FHWA Status: "Not a traffic control device"



Source: NACTO

Two-Way Cycle Tracks

Similar to one-way cycle tracks, except two-way

- Can be in street or raised
- Driveways, pedestrian conflicts, intersections, sight lines all challenges to implementation

FHWA Status: "Not a traffic control device"



Source: Chicago DOT

Combined Bike Lane/Turn Lane

When there isn't enough space for a bike lane and a right-turn pocket

- Minimum bike lane width: 4'
- Maximum total width: 13'

FHWA Status: *Can be implemented at present time if sharrows are used instead of bike lane markings*



Source: NACTO

Bike Box

Allows bicyclists to get ahead of traffic during the red signal phase

- 10-16' deep
- Requires no right-turn on red
- Green pavement optional

FHWA Status: experimental



Source: NACTO

Two-Stage Turn Queue Box

Allows bicyclists to make a left-turn across multi-lane intersections from the right side

- Requires arrow and bike stencil
- Requires no right-turn on red
- Green pavement optional



Source: NACTO

FHWA Status: experimental

Intersection Crossing Markings

Indicate intended path of bicyclists

- Several marking options available

FHWA Status: Can be implemented at present time



Source: NACTO

In Conclusion...

Bikeway design is constantly evolving...

- Stay informed
- Check for consistency with design guidance/standards
- Detailed courses available through ASCE, APBP

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