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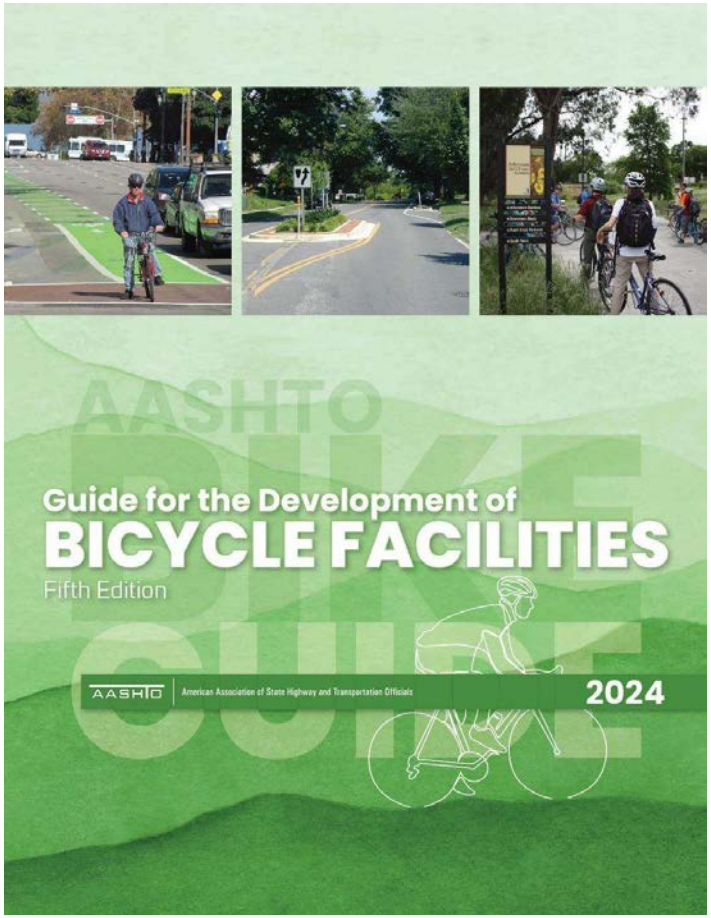
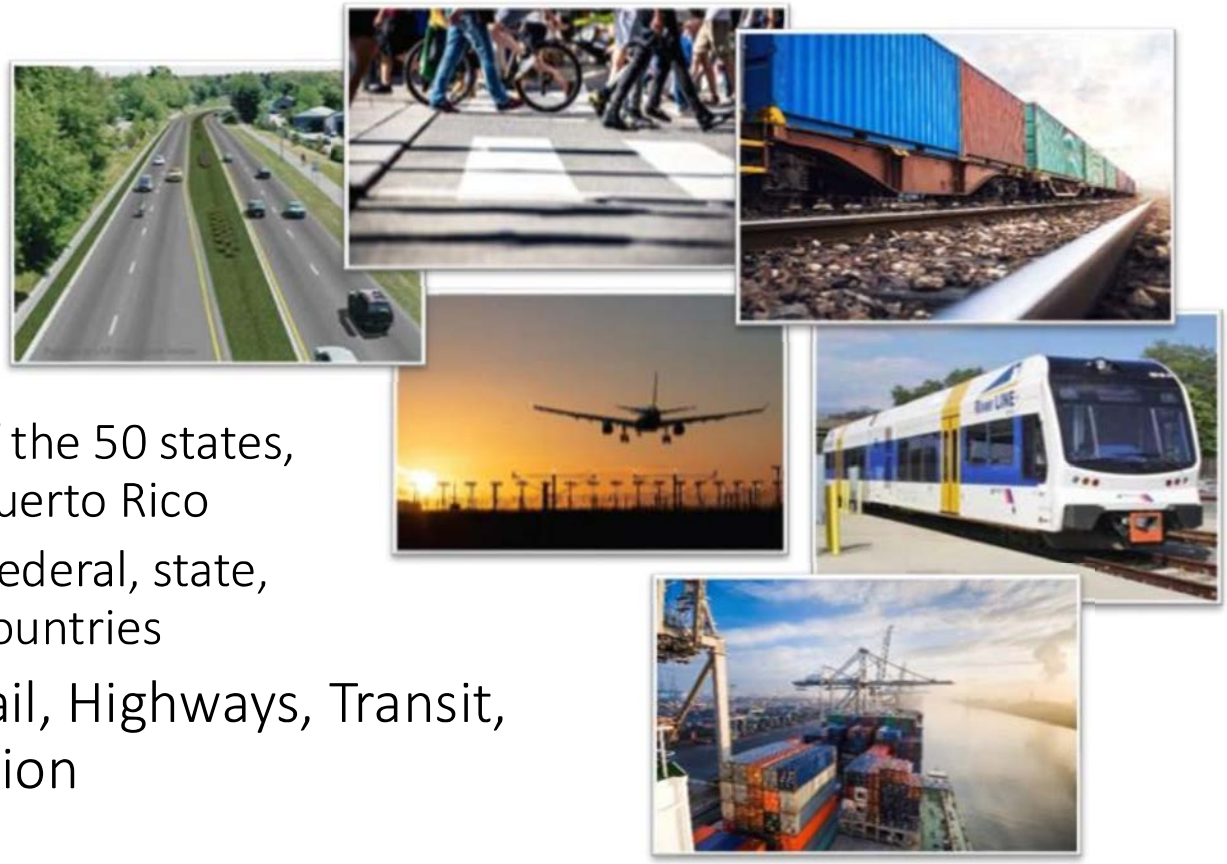


AASHTO Bike Guide

National Bike Summit
March 13, 2025

What Is AASHTO?

- Nonprofit association
- Founded in 1914
- Members include:
  - Transportation departments of the 50 states, the District of Columbia, and Puerto Rico
  - 50+ Associate Members from federal, state, and local agencies and other countries
- Covers *all* modes: Aviation, Rail, Highways, Transit, Water, and Active Transportation



2021-2026 Strategic Plan

https://www.aashtoplan.com/

Vision:

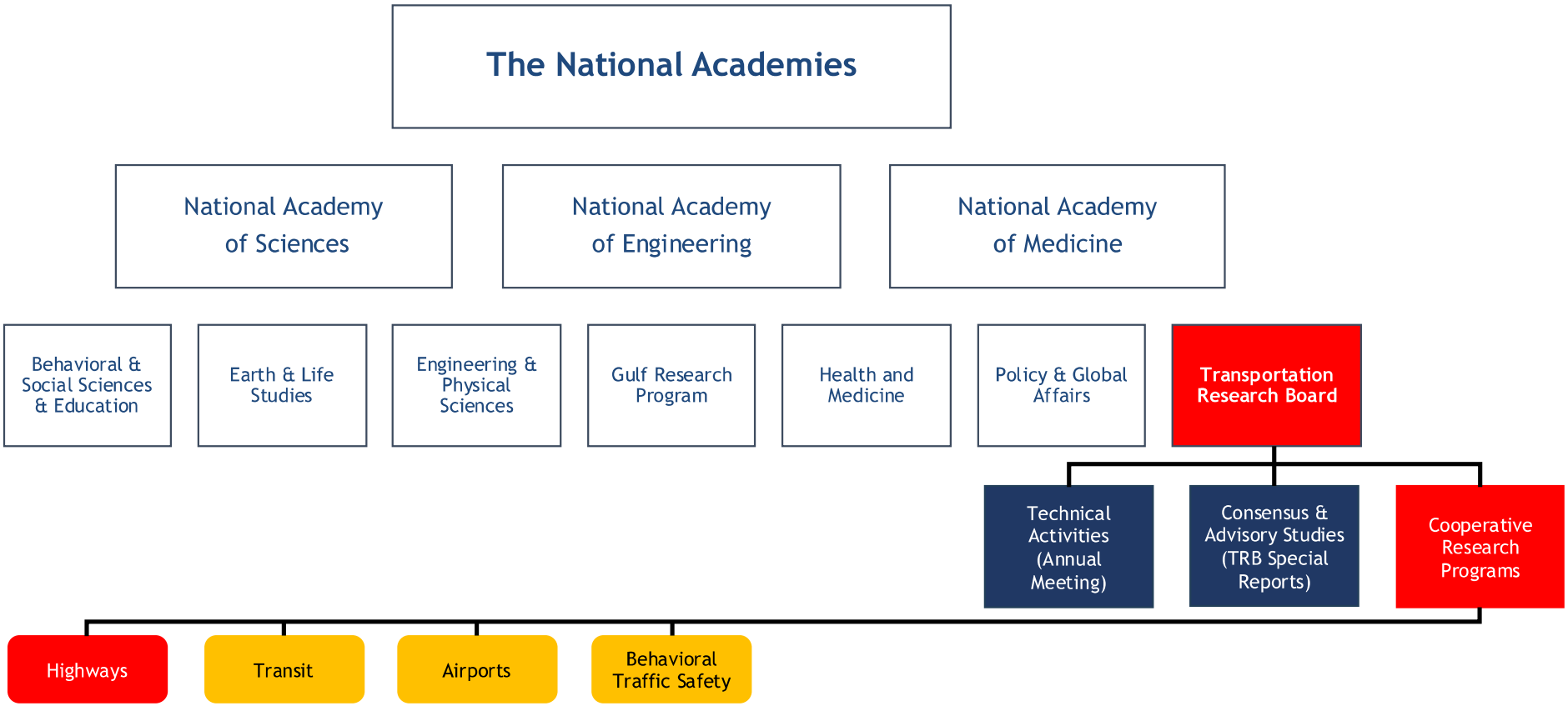
Providing improved quality of life through leadership in transportation

Mission:

Supporting State DOTs to connect America with the transportation system of today and tomorrow

Strategic Plan Goals

- Safety, Mobility, and Access for Everyone
- National Transportation Policy Leadership
- Organizational Excellence with World Class Services


The National Academies
National Academy of Sciences
National Academy of Engineering
National Academy of Medicine
Behavioral & Social Sciences & Education
Earth & Life Studies
Engineering & Physical Sciences
Gulf Research Program
Health and Medicine
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Cooperative Research Programs
Highways
Transit
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Behavioral Traffic Safety

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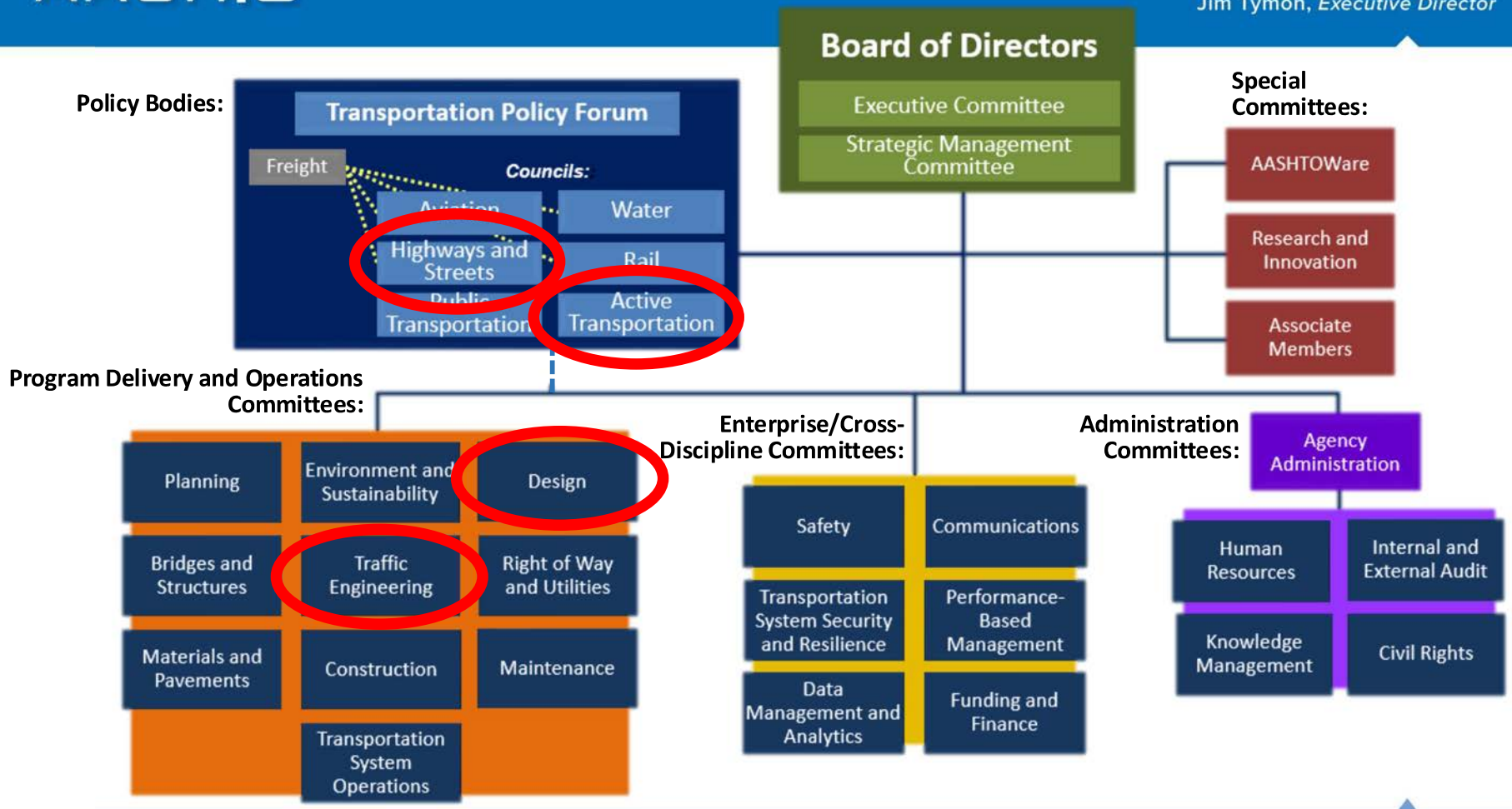

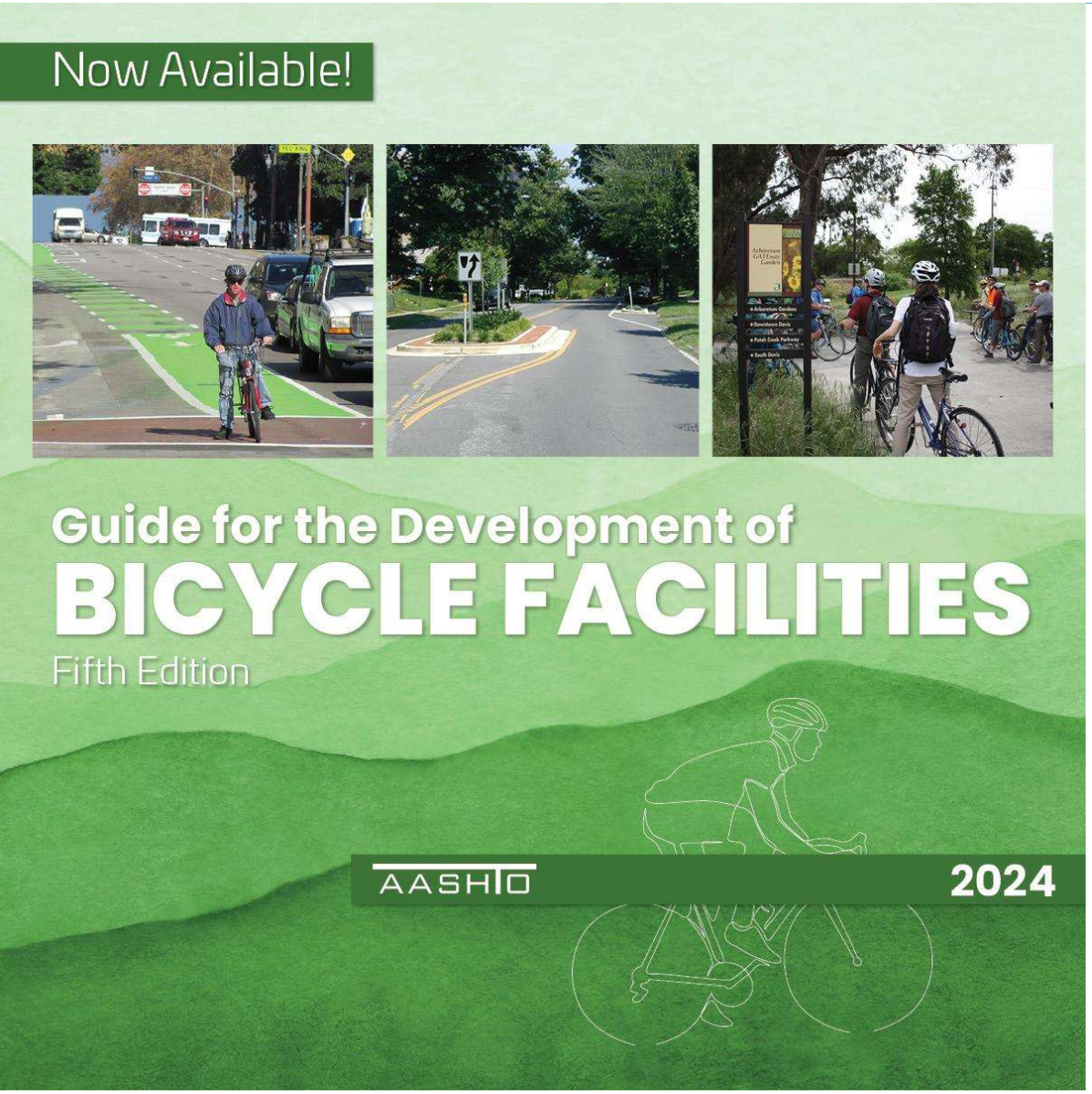

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National Bike Summit
Bike Guide Overview

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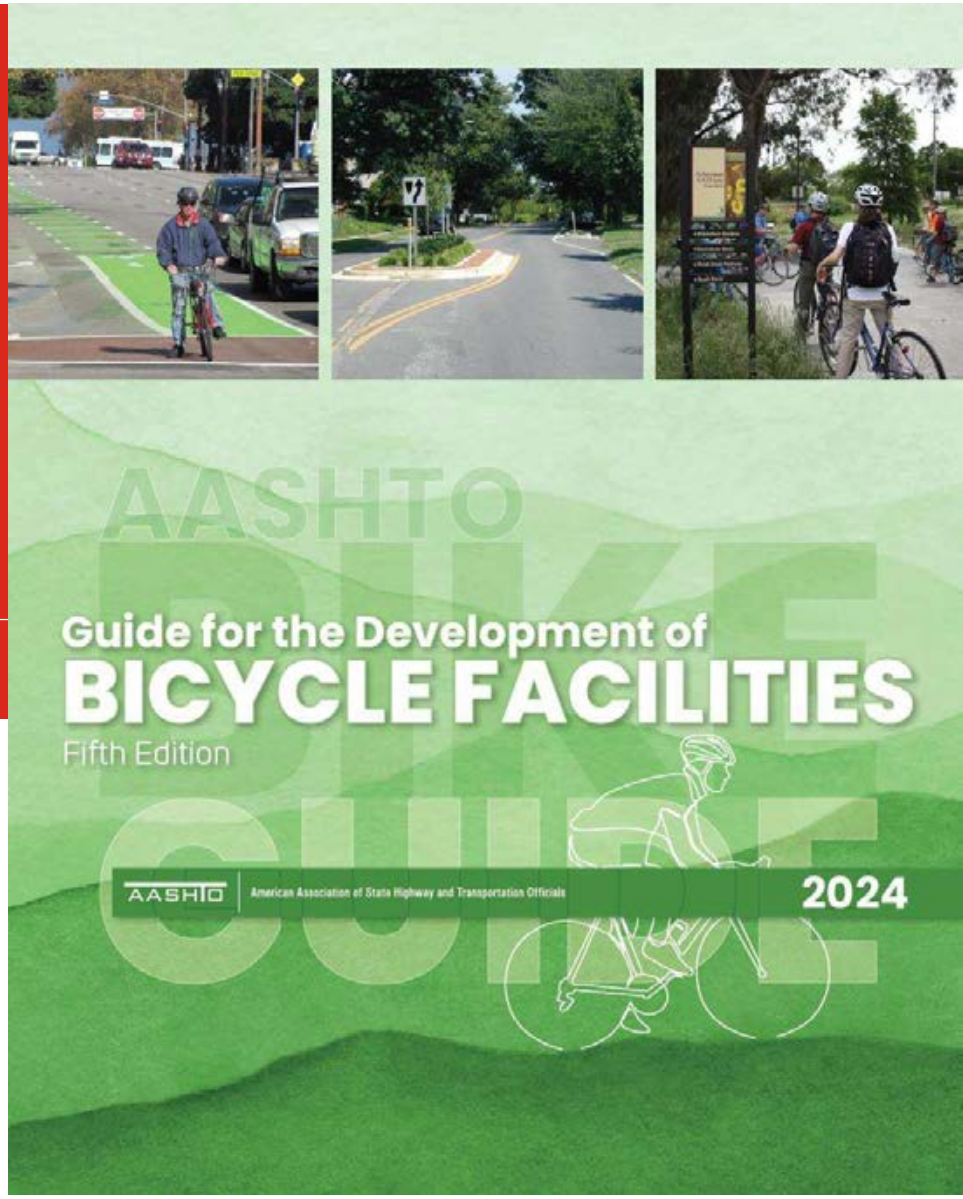

Your presenters

Kevin Marshia, PE
Director of Engineering
AASHTO

Bill Schultheiss, PE
Director of Design and Engineering
Toole Design Group

Megan McCarty Graham, P.E.
Senior Transportation Design Engineer
Arlington County, VA

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Better Bike Facilities: AASHTO Bike Guide

- What is the AASHTO Bike Guide and how did we get here?
- Who is this guide for?
- What is in the guide?
- Why is it important for your community?
- What is the role for advocates?

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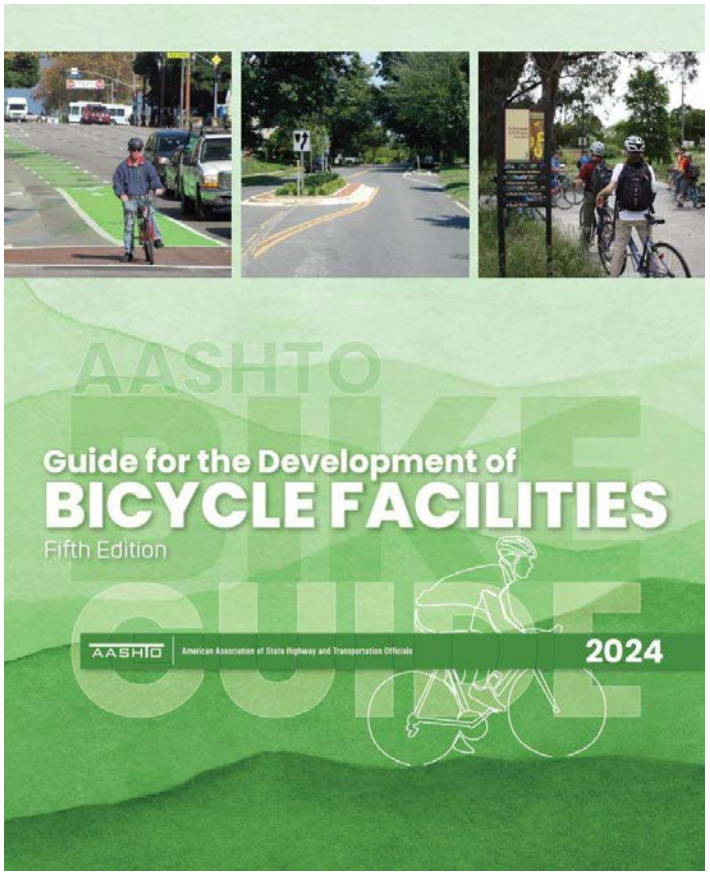
AASHTO Bike Guide, 5th Edition, 2024

- Major expansion of content from 2012
- Driven by 15+ years of research
- Supports both rural and urban bikeways
- Purpose to give designers & engineers tools to deliver all ages & abilities bikeways
- Published December 2024



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Bike Guide Core Principles

Safety

Comfort

Connectivity

Legibility

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2012 Guide compared to 2024 Guide

2012 Guide	2024 Guide	Notable Changes of 2024 compared to 2012
Chapter 1. Introduction	1. Introduction	REWRITE with new discussion of design range concept
Chapter 3. Bicycle Operation and Safety	2. Bicycle Operation & Safety	REWRITE of former Chapter 3
Chapter 2. Bicycle Planning	3. Bicycle Planning	REWRITE and NEW CONTENT added to former Chapter 2
	4. Facility Selection	NEW CHAPTER with a few items carried from Chapter 2
	5. Elements of Design	NEW CHAPTER with some content pulled from Chapters 4 and 5
Chapter 5. Design of Shared Use Paths	6. Shared Use Paths	REVISION of Chapter 5
	7. Separated Bike Lanes	NEW CHAPTER with new content
	8. Bicycle Boulevards	NEW CHAPTER with new content
Chapter 4. Design of On-Road Facilities	9. Bike Lanes & Shared Lanes	REVISION of Chapter 4
	10. Traffic Signals and Active Warning Devices	NEW CHAPTER with new content
	11. Roundabouts, Interchanges, and Alternative Intersections	NEW CHAPTER with new content
	12. Rural Area Bikeways	NEW CHAPTER with some content pulled from Chapter 4
	13. Structures	NEW CHAPTER with some content pulled from Chapter 5
	14. Wayfinding	NEW CHAPTER with some content pulled from Chapter 4
Chapter 7. Maintenance and Operations	15. Maintenance & Operations	REVISION of chapter 7
Chapter 6. Bicycle Parking Facilities	16. Parking, Bike Share, & End of Trip Facilities	REVISION of chapter 6

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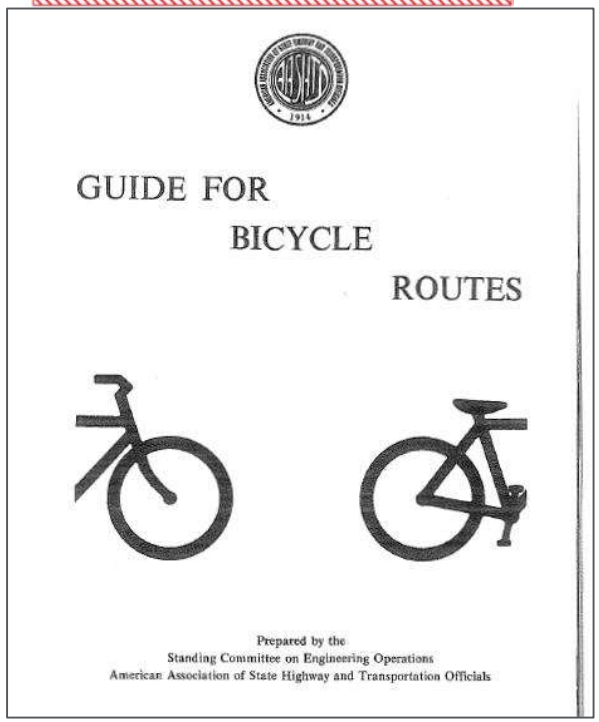
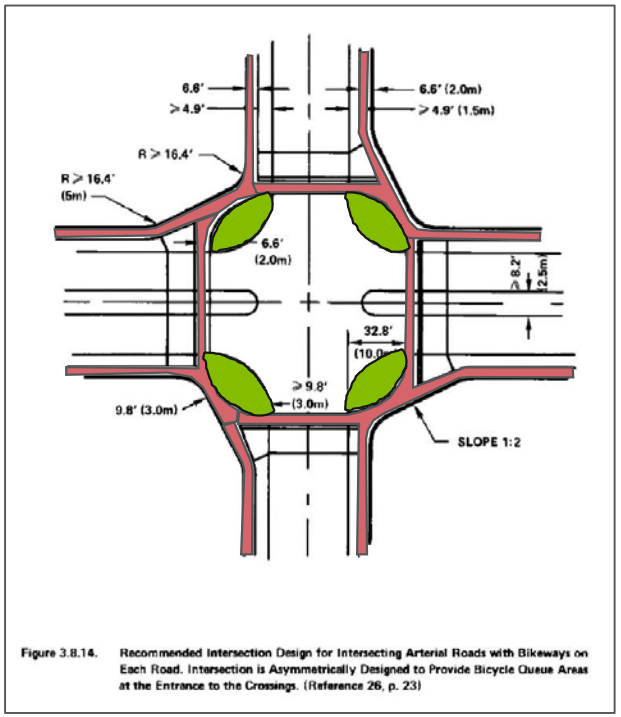
1974 AASHTO Bike Guide





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Protected Bike Lanes & Intersections

Davis, California 1967

1974 AASHTO Bike Guide

1) Don't drop bike lanes at intersections

2) Mark bike crossing

3) mark 2-stage queue box

4) use protected intersection design to mitigate "right hooks"

Intersections and Crossings

Because the number and severity of conflicts between motorists, bicyclists, and pedestrians are greatest at intersections and crossings, utmost care must be taken in designing intersection which are to accommodate bicycle traffic. The safest and most effective way of eliminating conflicts where a bicycle route crosses another roadway is to provide a grade separation. This may be feasible in some cases, as discussed under grade separation structures. However, a grade separation usually cannot be provided because of lack of available space, especially where bicycle lanes or shared roadways cross at or near existing at-grade street intersections. Even where space is available, there seldom is warrant for the high cost of the structure. Therefore, a design which utilizes existing at-grade street intersections usually must be provided.

Wherever a bicycle lane is carried across an at-grade street intersection, some form of channelization with specific routings for bicycles should be provided to minimize the number of possible conflict points between bicycles, motor vehicles, and pedestrians within the intersection. Such channelization would not normally be necessary when shared roadways intersect a cross street, except where bicycle and motor vehicle traffic is heavy, motor vehicle speeds are in excess of 30 mph, or where there is a heavy percentage of motor vehicles making right turns out of the shared roadway.

Channelization usually consists of some form of striping or marking which clearly delineates the path which bicycles must take in crossing the intersection. In most cases the crossing should be adjacent to—but striped separately from—the pedestrian crosswalk. Bicyclists who wish to turn left should be encouraged to cross the cross street first and then proceed to the left within a marked path provided for the second street. The undesirable effect of the conflict between right-turning motorists and straight-through bicyclists can be reduced to some extent by offsetting the bicycle crossing of the cross street away from the intersection.

Examples of channelization arrangements to accommodate bicyclists at intersections are illustrated in Figure 7. Figure 7(a) depicts a pair of bicycle lanes which are carried straight through the intersection.with this arrangement, the bicycle route is a part of the street, directly aligned with the bicycle lane both upstream and downstream. The arrangement in Figure 7(b) likewise carries the bicycle lane through the intersection, but the bicycle crossing is offset from the

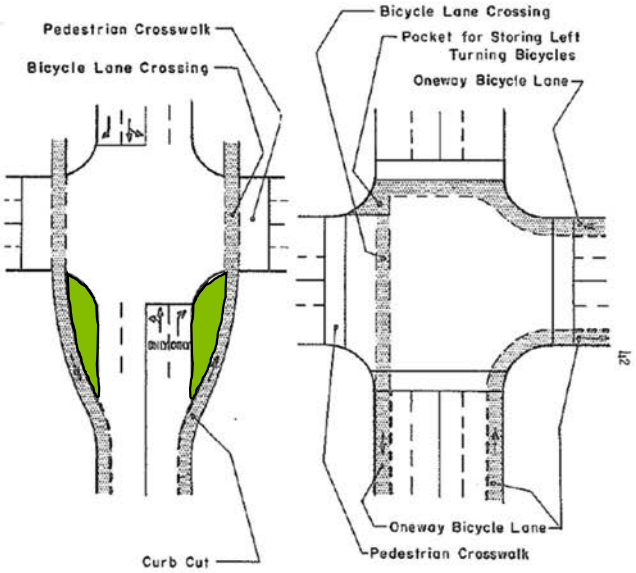

Figure 7
Bicycle Channelization Arrangements At Street Intersections

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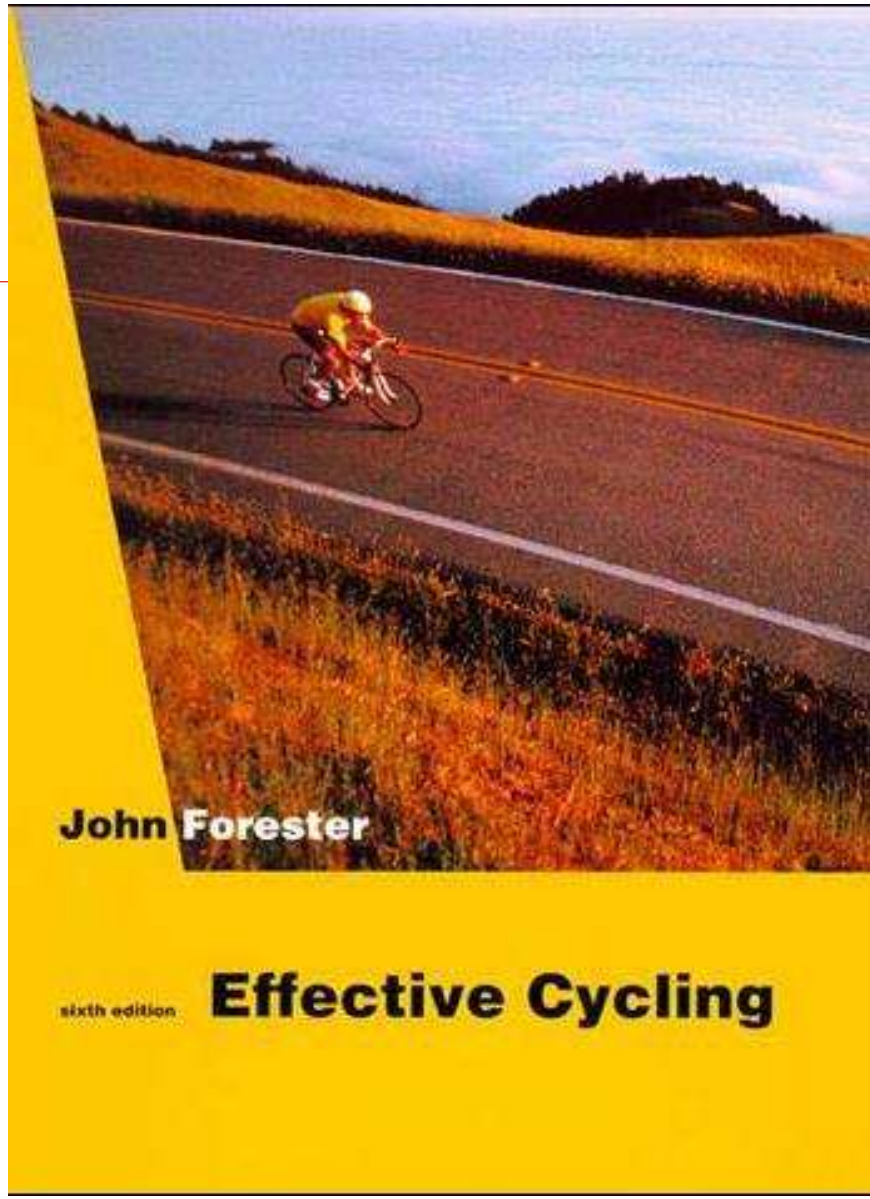
1975 Effective Cycling

"Cyclists fare best when they act and are treated as drivers of vehicles"



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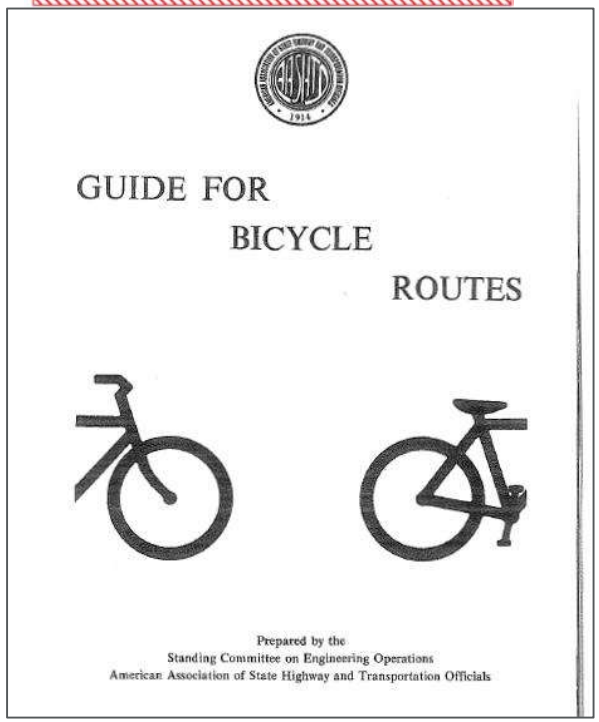
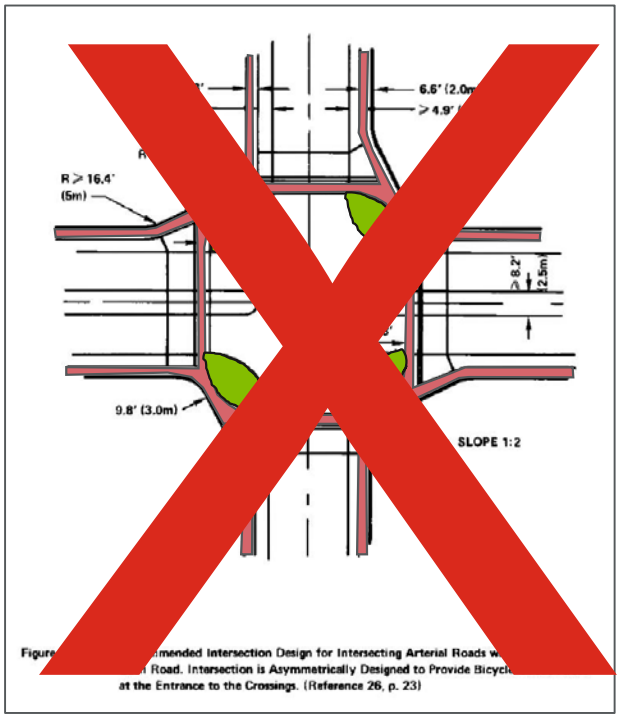
1974 AASHTO Bike Guide





Davis, California 1967

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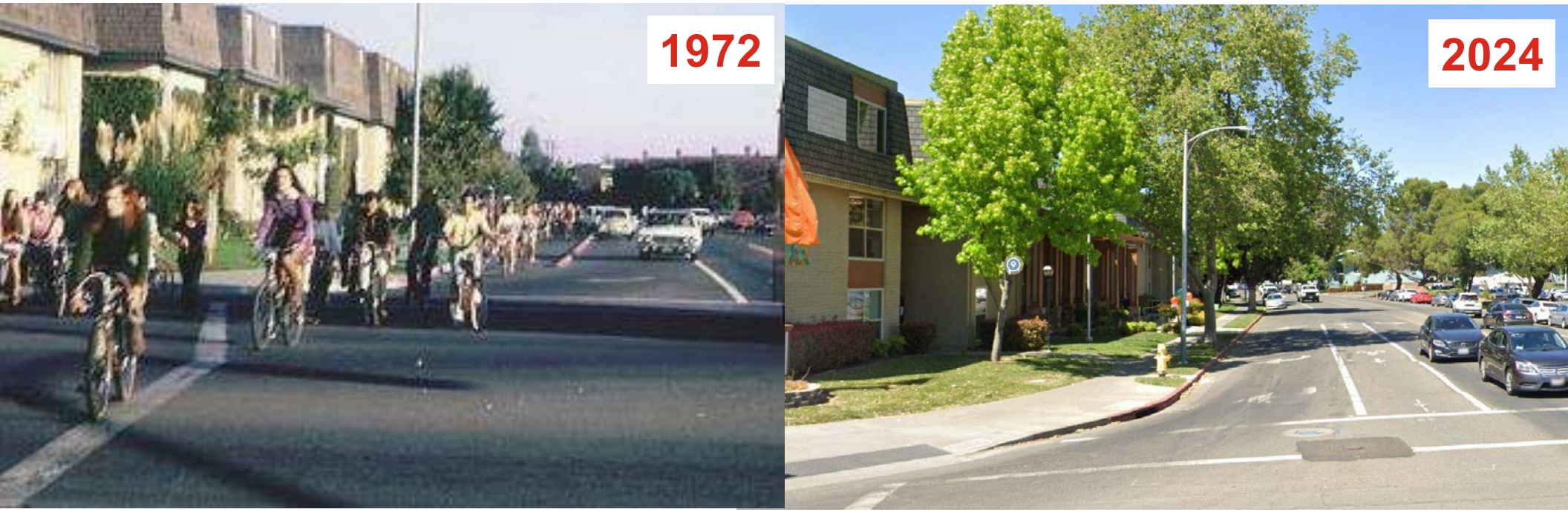
Protected Bike Lanes
& Intersections

A Historical Perspective on the AASHTO Guide and the Impact of the Vehicular Cycling Movement

Authored by Bill Schultheiss, Rebecca Sanders, and Jennifer Toole

Sycamore Lane at Russell Boulevard, Davis, California



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“Communities across the country are all different, but the AASHTO Bike Guide allows each of those communities to learn how to grow, maintain, and operate their bicycle infrastructure – allowing for more transportation options for those who cannot or choose not to drive”

- AASHTO Executive Director Jim Tymon

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2.2.1. Relationship between Perceived Comfort and Substantive Safety

Crashes and near-crash experiences influence perceived bicycling safety and comfort

(Lee et al., 2015; Sanders, 2015; Aldred & Crossweller, 2015)

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2.3. Bicyclist Design User Profiles

Comfort Typology of Bicyclists

Design User Profile	Non-Bicyclist	Interested but Concerned	Somewhat Confident	Highly Confident
Bicycling Preferences	Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes; may bike on sidewalks even if bike lanes are provided. Prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but comfortable riding in bicycle lanes or on paved shoulders if need be.	Comfortable riding with traffic; will use roads without bike lanes.
Percent of Population	31–37%	51–56%	5–9%	4–7%

Figure 2-2: Comfort Typology of Bicyclists (See Chapter 2 References: Dill and McNeill, 2016)

Experienced & Confident Bicyclist

AASHTO 1981 - 2012

Interested but Concerned Bicyclist

AASHTO 2024

Who should the <u>default design user</u> be?

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Who is the AASHTO Bike Guide for?

How does the AASHTO Bike Guide impact local projects?

Transitioning the practice of bikeway design from "what can we squeeze into the margins" to "what can we intentionally design to deliver an all ages and abilities network."

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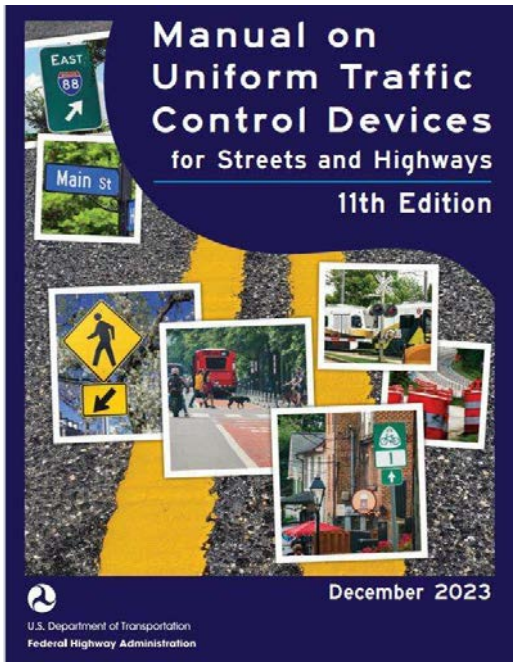
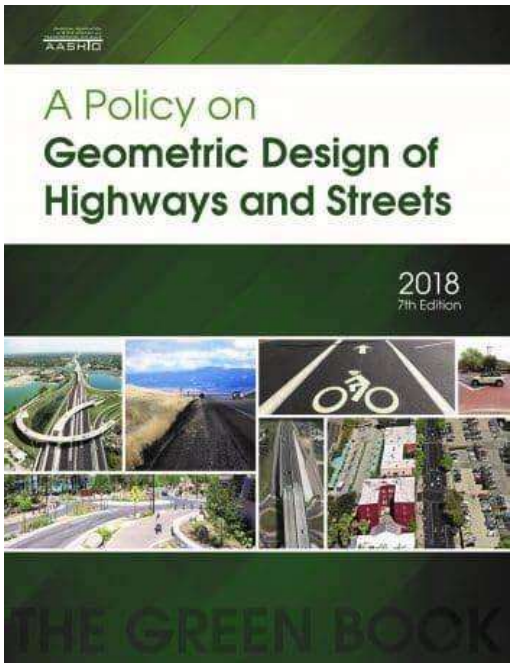
Relationship to Other Guidelines

Public Right-of-Way
Accessibility Guidelines (PROWAG)





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1.6.1. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

MUTCD defines design and application of traffic control devices (TCDs)

2024 Bike Guide conforms to 2023 MUTCD

> Includes some TCDs that require experimental approval by FHWA (located at the end of their respective section)

AASHTO expands upon the application of TCDs

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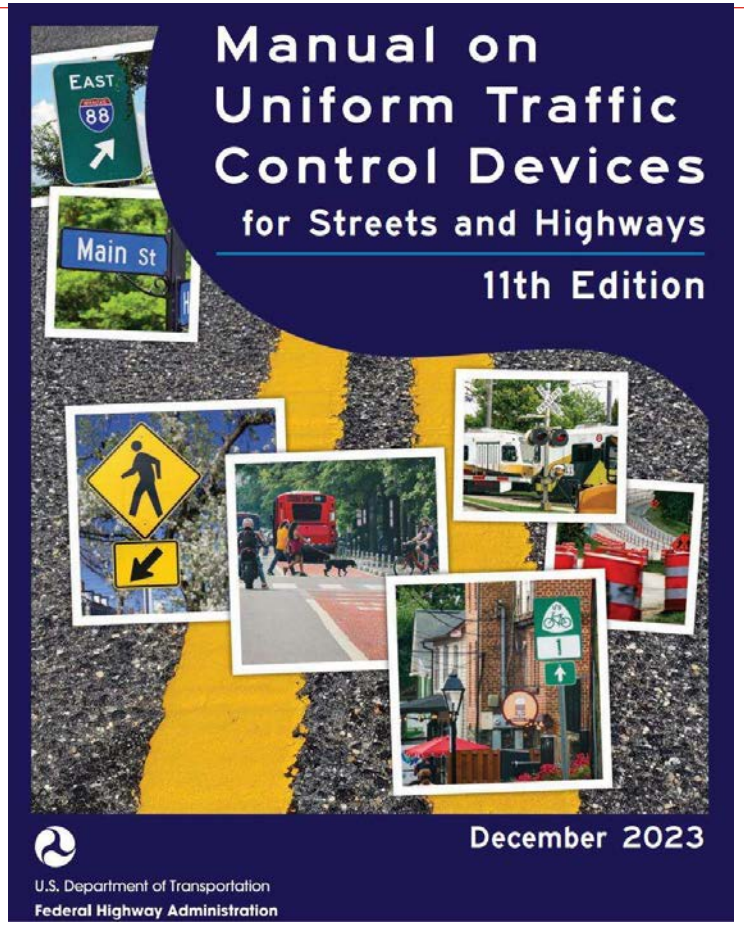


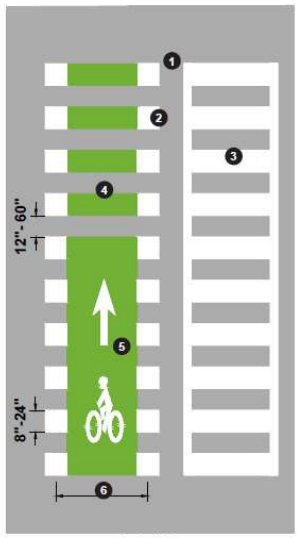
1.6.1. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

R1-5d

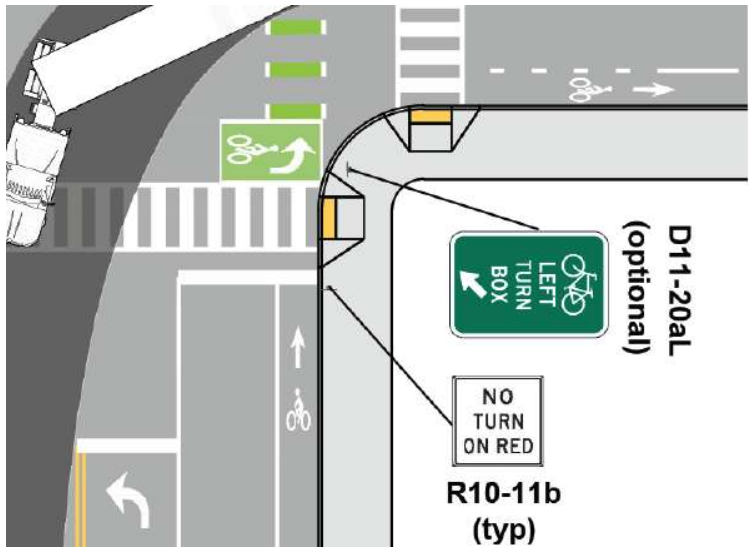
R4-19

W9-5a

R1-6e



Detail 1
One-Way
Bicycle Crossing
with 1-ft Min Offset from
Marked Crosswalk



Bicycle Signal
Face

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Experimental Treatments in AASHTO Bike Guide

Regulatory Sign

EXPERIMENTAL

Detection Confirmation Light

Green Back Shared Lane Markings

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9.8. Advisory Bicycle Lanes (Experimental)

Advisory bicycle lanes are continuously-dotted bicycle lanes which permit motorists to temporarily enter the bicycle lane, allowing opposing motor vehicle traffic sufficient space to pass (see Figures 9-15 and 9-16). They are an experimental design treatment for streets with lower traffic speeds and volumes where it is not feasible to provide standard-width travel lanes and bicycle lanes. They are designed to improve bicyclist comfort while also providing a traffic calming benefit. This is the same procedure for motorists operating on yield streets where motorists must move to the right side of the road, into unoccupied parking spaces or driveways, to permit oncoming traffic to pass (see Section 8.4.1).

Figure 9-15: Example of an Advisory Bicycle Lane in Alexandria, VA

Where advisory bicycle lanes are installed, they should include bicycle lane signs (R3-17) and bicycle lane symbol pavement markings. The placement of the signs and bicycle lane symbols should follow guidance for bicycle lanes. Experimental approval from FHWA is required to use this traffic control treatment. See Section 1.6.1 for guidance on requests to experiment.

Advisory shoulders are a similar treatment used in locations where sidewalks are not provided. Bicycle symbols are omitted to allow pedestrians to share the shoulder space with bicyclists. Chapter 12 provides design guidance for advisory shoulders.

12.4.4. Advisory Shoulders (Experimental)

Similar to advisory bike lanes (see Section 9.8), advisory shoulders are an experimental design treatment for roads with lower traffic speeds and volumes where it is not feasible to provide standard bike lanes or shoulders for bicycle travel. When motor vehicles traveling in opposite directions meet, motorists may need to enter the advisory shoulder to create sufficient space to pass (see Figure 12-7). Experimental approval from FHWA is required to use this traffic control treatment. Where sidewalks are not present and it is desired for pedestrians to walk within the advisory shoulders, the advisory shoulder should be accessible to and usable by individuals with disabilities (see Section 1.6.3). See Section 1.6.1 for guidance on requests to experiment. See Section 9.8 and the FHWA Small Town and Rural Multimodal Networks Guide (see Chapter 12 References: FHWA, 2016b) for additional design guidance.

Note: The use of this treatment requires a Request to Experiment from FHWA. (See Section 1.6.1)

Figure 12-7: Example of Advisory Shoulders in Hanover, NH

From urban to rural and everything in between...

- Bike lane and shared use path widths
- Protected intersections
- Truck aprons
- Highway and major roadway crossings
- Rural bikeways

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Bike Lane and Shared Use Path Widths

to support socialization and human nature

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6.4. Path Width Considerations

6.4.1. Social Function of Shared Use Paths

The appropriate paved width for a shared use path is dependent on the context, volume, and mix of users. When determining an appropriate shared use path width, it is also important to consider the natural behavior of people operating on paths. People traveling want the ability to have conversations with companions, thus they will walk and bicycle side-by-side regardless of the width provided (see Figure 6-1). Path widths less than 11 ft do not allow for two people traveling side-by-side to be passed by a person approaching from the opposite direction without increasing the potential for conflicts. An additional consideration for determining an appropriate path width is ensuring the inherent speed differential between wheeled users and people walking does not result in uncomfortable or unsafe conditions. To mitigate safety and discomfort issues between wheeled users and people walking, it may be necessary to consider paths wider than 11 ft. Paths where conflicts are routine can result in people avoiding the facility altogether.

Chapter 6
SUP Width (Two-way)

6.4.3. Recommended Shared Use Path Widths

Table 6-3: Recommended Shared Use Path Widths* to Achieve SUP LOS "C"

Shared Use Path Operating Widths and Operational Lanes*					
SUPLOS "C" Peak Hour Volumes	**Recommended Operational Lanes**	**Practical Minimum**	**Recommended Lower Limit**	**Recommended Upper Limit**	**Practical Maximum**
150 to 300	2	8 ft	10 ft	12 ft	13 ft
300 to 500	3	11 ft	12 ft	15 ft	16 ft
500 to >600	4	15 ft	16 ft	20 ft	None

*Typical Mode Split is 55% adult bicyclists, 20% pedestrians, 10% runners, 10% in-line skaters, and 5% child bicyclists

11' – 15' width provides three (3) operational lanes

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6.4.2. Shared Use Path Level of Service

Table 6-1: Shared Use Path Operating Conditions Based on Level of Service Criteria

Shared Use Path Level of Service (SUPLOS) and Operating Conditions	
SUPLOS	**Peak Operating Conditions**
A. Excellent	A significant ability to absorb more users across all modes is available.
B. Good	A moderate ability to absorb more users across all modes is available.
C. Fair	Path is close to functional capacity with minimal ability to absorb more users.
D. Poor	Path is at its functional capacity. Additional users will create operational and safety problems.
E. Very Poor	Path operating beyond its functional capacity resulting in conflicts and people avoiding the path.
F. Failing	Path operating beyond functional capacity resulting in significant conflicts and people avoiding the path.

Table 6-2: Shared Use Path Level of Service Look-Up Table, Typical Mode Split

Shared Use Path Level of Service Look-Up Table, Typical Mode Split*										
Shared Use Path Peak Hour Volume	**Shared Use Path Width (ft)**									
	8	**10**	**11**	**12**	**14**	**15**	**16**	**18**	**20**	**≤ 25**
50	B	B	B	B	B	A	A	A	A	A
100	D	C	B	B	B	A	A	A	A	A
150	D	C	B	B	B	A	B	A	A	A
200	D	D	C	B	B	A	B	A	A	A
300	E	D	C	C	C	B	B	B	B	A
400	F	E	D	D	C	C	C	B	B	A
500	F	F	D	D	D	C	C	C	C	A
600	F	F	E	E	E	D	D	C	C	A
800	F	F	F	F	F	E	E	E	E	A
1,000	F	F	F	F	F	E	F	F	F	A
≥ 1,200	F	F	F	F	F	F	F	F	F	A

*Assumptions:

1. Mode split is 55 percent adult bicyclists, 20 percent pedestrians, 10 percent runners, 10 percent in-line skaters, and 5 percent child bicyclists.
2. An equal number of trail users travel in each direction (the model uses a 50 percent–50 percent directional split).
3. Trail volume represents the actual number of users counted in the field (the model adjusts this volume based on a peak hour factor of 0.85).
4. Trail has a centerline.

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6.4.4. Separation of Pedestrians and Bicyclists

6.4.4.1 Land Use Considerations Where Separation is Desirable

6.4.4.2 Volume Thresholds Where Separation is Desirable

Should be considered when:

- Level of Service is projected to be at or below level “C.”
- Pedestrians can reasonably be anticipated to be 30% or more of the volume

6.4.4.3 Separation Strategies

6.4.4.4 Accessibility Considerations

Figure 6-3: Burke-Gilman Shared Use Path (2008) and Separated Paths (2021), Seattle, WA

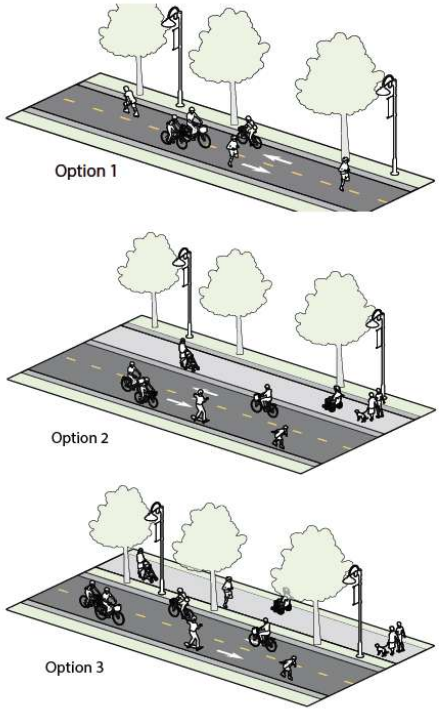

Figure 6-4: Options for Separating Bicyclists and Other Wheeled Users from Pedestrians

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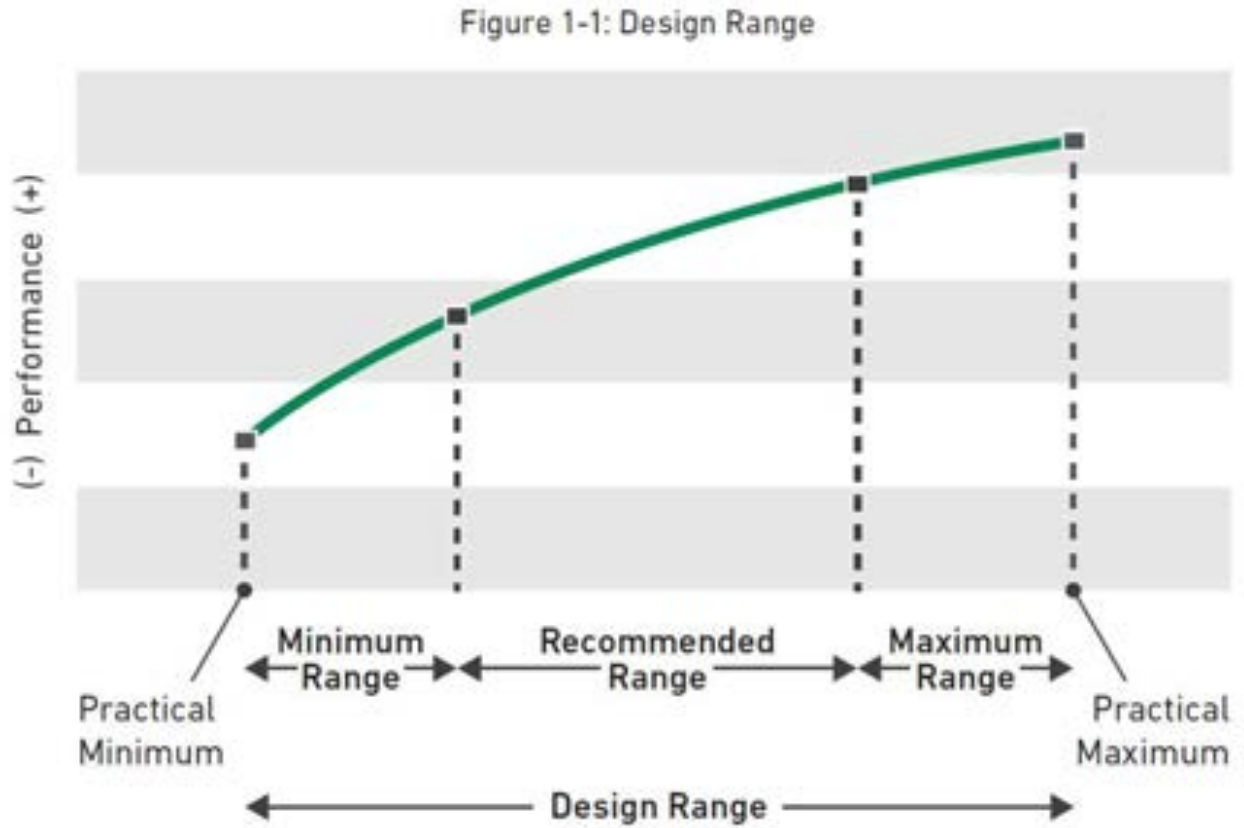

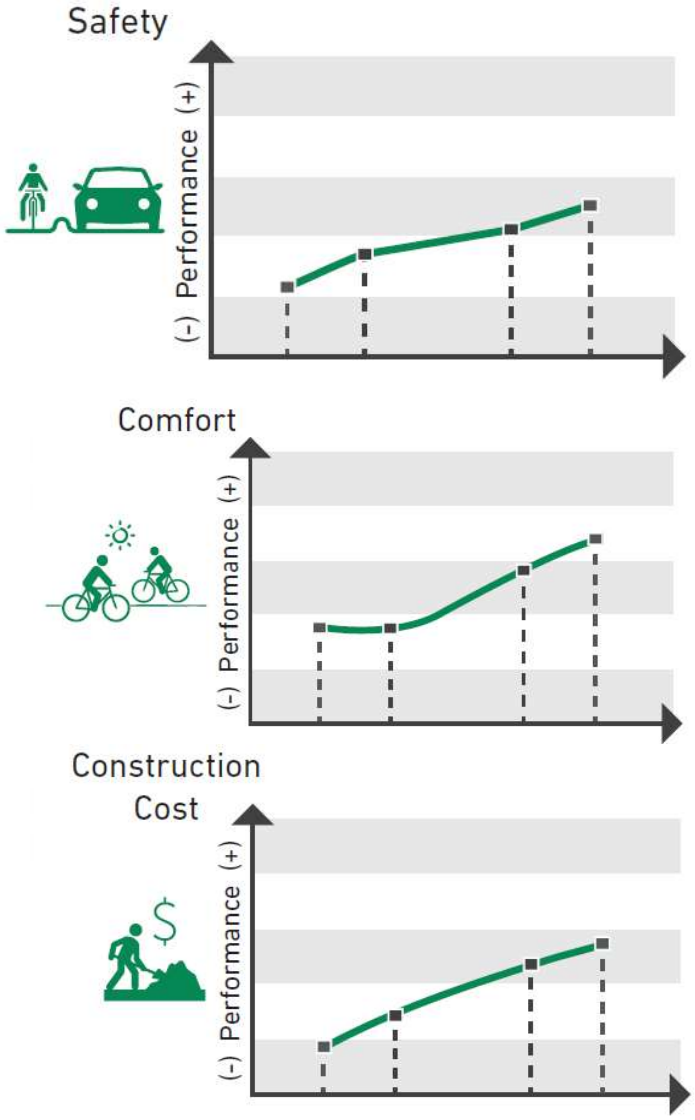

Section 1.4 – Use of Values in the Guide

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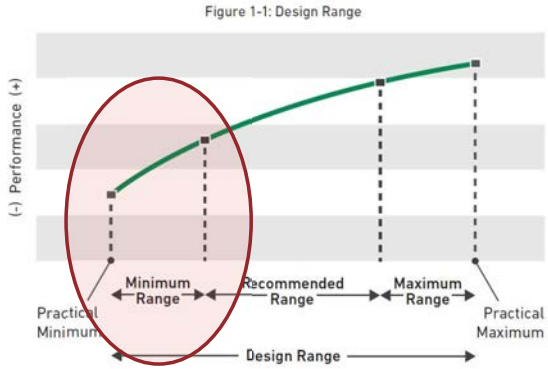
Section 1.4 – Use of Values in the Guide

1.4.1. Minimum Range

The use of **values within the minimum range should be minimized** because they are likely to diminish mobility, safety, and comfort



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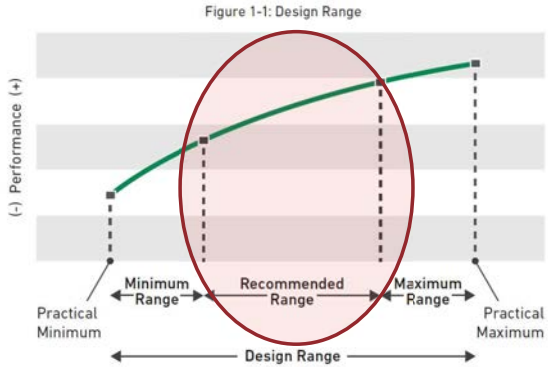
Section 1.4 – Use of Values in the Guide

1.4.2. Recommended Values Range

The use of **values within the recommended range should be chosen** to maximize mobility, safety and comfort benefits for bicyclists as well as other users.

These values were determined by research or established best practice.



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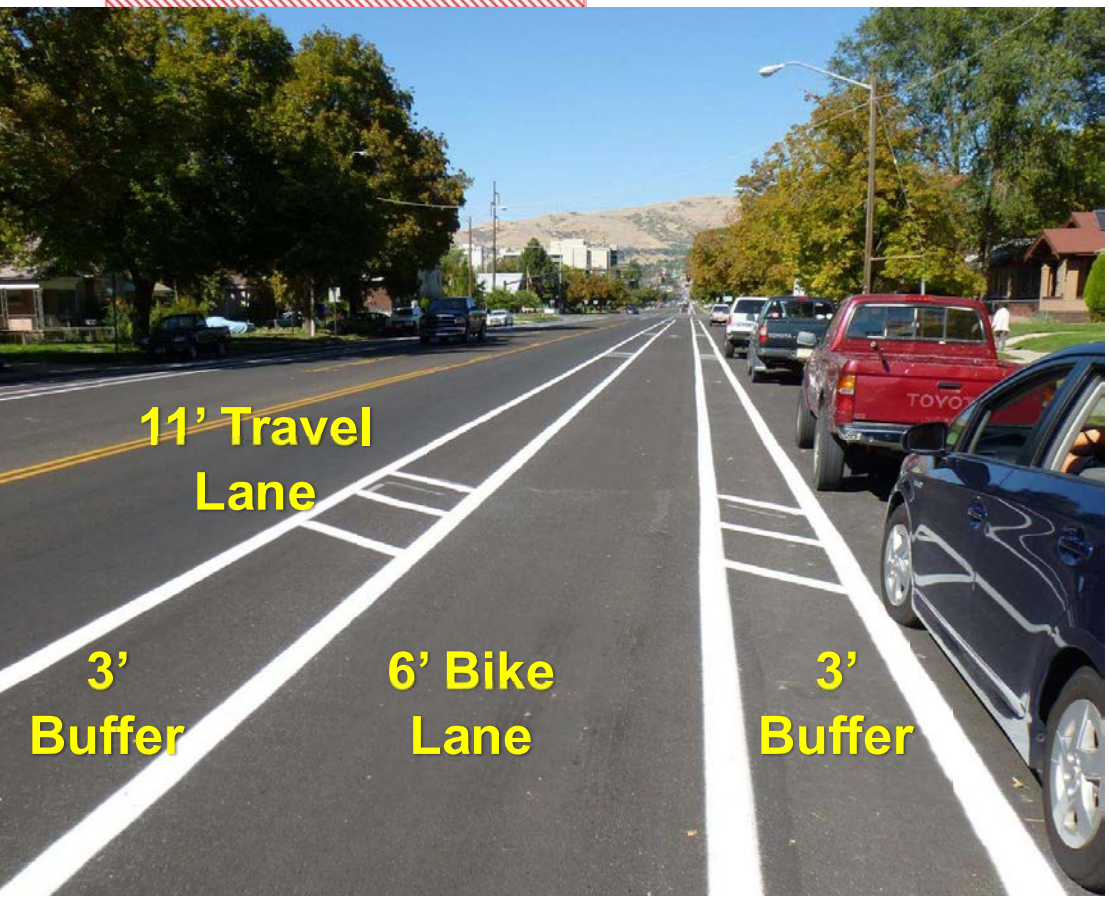
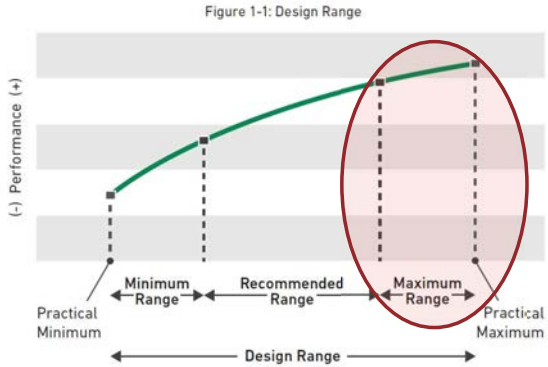
Section 1.4 – Use of Values in the Guide



1.4.3. Maximum Range

The use of **values within the practical maximum range should only be considered when:**

- there are clear benefits to all users and
- bicyclist volumes are high.



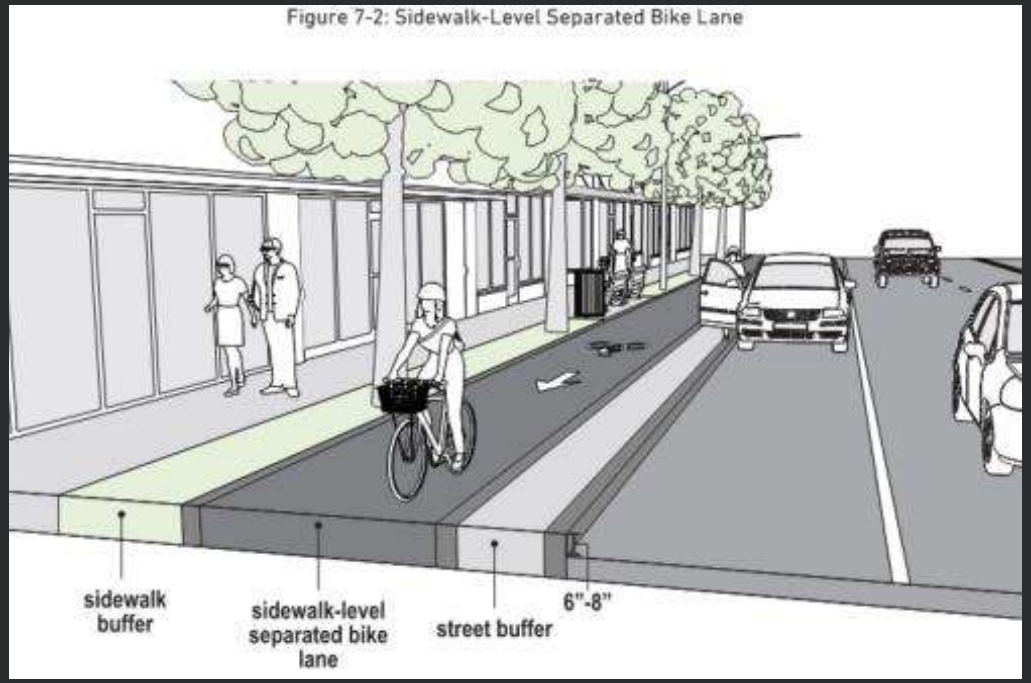
AASHTO in use

Table 7-3: One-Way Separated Bike Lane Widths Based on Existing or Anticipated Volumes

Peak Hour Directional Bicyclist Volume	One-Way Separated Bike Lane Width (ft) Recommended Values		
	Between Vertical Curbs without Gutter	Adjacent to One Vertical Curb	Between Sloped Curb, at Sidewalk Level, or Adjacent to Curb with Gutter
<150	6.5 - 8.5	6 - 8	5.5 - 7.5
150-750	8.5 - 10	8 - 9.5	7.5 - 9
>750	≥10	≥9.5	≥9
Practical Minimum*	4.5	4	4

*Peak Hour Directional Bicyclist Volume not applicable

Figure 7-2: Sidewalk-Level Separated Bike Lane



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