AASHTO BIKE GUIDE

Guide for the Development of BICYCLE FACILITIES

Fifth Edition

AASHTO | American Association of State Highway and Transportation Officials

2024

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Foreword

The fifth edition of AASHTO's *Guide for the Development of Bicycle Facilities* (2024) is based on extensive research and represents a major rewrite of the previous edition.

The revised chapters include those on bicycle planning, bicyclist operation and safety, design of shared use paths, and maintenance and operations. The design of on-road facilities has been split into several new chapters to incorporate a variety of new design options. The chapter on bicycle parking facilities has been expanded to cover bike share siting and end-of-trip facilities.

The new chapters cover guidance for choosing a bikeway type; elements of design for all bikeway types; design of separated bike lanes and side paths; bicycle boulevard planning and design; design of shared lanes and bike lanes; traffic signals and pedestrian hybrid beacons; bicycle facility design at interchanges, alternative intersections, and roundabouts; rural area bikeways and roadways; structures; and wayfinding systems for bicyclists.

An Abbreviated Table of Contents with links has been added to make it easier for the reader to navigate this much-larger edition. Each chapter includes linked callouts to its own detailed reference list, many entries of which include weblinks to the source material.

—AASHTO Publications

Preface

Bicycle facility design has changed dramatically in the 12 years since the publication of the fourth edition of the *Guide for the Development of Bicycle Facilities,* and this new edition is intended to reflect this evolution. This Guide was developed with the recognition that people from a wide range of backgrounds are bicycling or interested in bicycling. A truly multimodal system will not just accommodate bicycle travel but will genuinely encourage it. Making bicycling a safe, useful, and attractive way to travel is also a key component to reducing transportation-related carbon emissions.

This fifth edition brings us back to our roots in focusing on bikeways that the average bicyclist will find comfortable. In 1974, the AASHTO Standing Committee on Engineering Operations published the *Guide for Bicycle Routes*. Fifty years ago, that document proposed many of the concepts—such as bike lanes that are physically separated from cars—that you'll find reintroduced in this edition. The story of how our industry moved away from separated facilities is too long for this preface, but you can find it in "A Historical Perspective on the AASHTO *Guide for the Development of Bicycle Facilities* and the Impact of the Vehicular Cycling Movement" (*Transportation Research Record* 2672, Issue 13). Suffice to say, the underlying vehicular cycling philosophy found in previous editions of this manual has been set aside, which is why this document is so much different—and longer—than the fourth edition.

The development of this Guide is based on extensive research into every aspect of bicycling. We took a data-driven approach that lays out the clear case for refocusing our efforts on bicycle facilities that are comfortable and usable for people of all ages and abilities. That wouldn't have been possible without the continued contributions of the ever-growing bicycle (and pedestrian) research community. The body of knowledge around these two modes of transportation has drastically expanded in the last 20 years, and we cannot thank them enough.

In the past, some may have believed that dedicated bicycle facilities were unsafe, but modern research has shown that this is not the case. Studies cited in this Guide clearly indicate that drivers and bicyclists both prefer clear delineation and a little extra space between these two modes. Chapter 2 synthesizes this research and illustrates that well-designed bikeways generally improve bicyclist safety and, according to the Federal Highway Administration (FHWA), "Bicycle Lanes align with the Safe System Approach principle of recognizing human vulnerability—where separating users in space can enhance safety for all road users."

While most bicyclists are primarily concerned with cars and trucks, they also frequently interact with pedestrians. This Guide complements the *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities* (2021). Although it is not the authoritative resource for guidance on the Americans with Disabilities Act (ADA), every chapter addresses accessible design of pedestrian facilities as they relate to and interact with bikeways.

As the American readoption of these concepts continues to evolve, we hope that the philosophy and concepts in this Guide will prove to be lasting. Practitioners should not let the perfect be the enemy of the good, however, and the Guide is written in recognition that most design elements have a range of potential values that may be appropriate or acceptable depending on context. Section 1.4 explains how to apply the design range concept, which is then incorporated throughout the Guide. Chapter 4 then builds on the guidance from FHWA's *Separated Bike Lane Planning and Design Guide* (2015) and provides strategies to apply flexibility and evaluate trade-offs between different types of facilities. The Guide recognizes that preferred bikeways that physically

separate bicyclists from motorists may not always be feasible. It is anticipated that shared lanes and bike lanes (Chapter 9) will remain a critical component of American bicycling infrastructure as we continue our iterative approach to retrofitting bicycle networks onto our streets and highways.

Bicycle facilities also exist in a unique place in our transportation system; they are often a mix of geometric design elements and traffic control devices. As a result, this Guide includes a substantial amount of information about signals, signs, and pavement markings used to designate or enhance bicycle facilities. This Guide is intended to be used in conjunction with the *Manual on Uniform Traffic Control Devices* (MUTCD; FHWA, 2023). FHWA released the 11th edition of the MUTCD while this Guide was already in the middle of publication and, as a result, a few traffic control devices shown in this document may not be fully consistent with current MUTCD guidance and standards.

The Committee on Design and the Technical Committee on Nonmotorized Transportation would like to extend a special thank you to Bill Schultheiss and the team at Toole Design Group for their tireless commitment to both this project and the advancement of bicycle facility design practices nationwide.

—AASHTO Committee on Design Technical Committee on Nonmotorized Transportation

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CHAPTER 1
INTRODUCTION

Chapter 1: Introduction

1.1. Design Imperative for Bicycle Facilities

A multimodal transportation system should provide safe mobility and accessibility to destinations for all people. As a component of a multimodal transportation system, bicycling can contribute to positive outcomes for community mobility, health, sustainability, and economic development goals. (See Chapter 1 References: Frank and Engelke, 2001; Pucher and Buehler, 2017; Krizek, 2007.) The provision of bicycle facilities can address transportation equity challenges in a community by expanding transportation options for people. (See Chapter 1 References: Morency et al., 2012.) Specifically, the bicycle provides a mobility option for people too young to drive a motor vehicle, people who cannot drive a motor vehicle, people who do not have the financial resources to own and maintain a motor vehicle, and people who choose not to drive (See Chapter 1 References: U.S. Department of Transportation [U.S. DOT], 2010.) Bicycle networks support transit, commuter and passenger rail, ferries, and other mass transport networks by effectively expanding catchment areas served by access points to these services.

Bicyclists should be expected on all streets, roads, and highways except where prohibited by law. A network of safe, comfortable, connected, and intuitive bikeways supports bicycling as a viable, convenient, and desirable mode of transportation for people of all ages and abilities. As discussed in Chapter 3, communities with higher rates of bicycling typically provide well-designed and maintained bicycle networks. These networks provide users with a comfortable place to ride over the course of their entire trip. In urban and suburban centers and rural towns, where a large share of trips are shorter than 3 mi, there is great opportunity for bicycling as a transportation mode to complement recreational bicycle activity.

1.2. Purpose

The purpose of *the Guide for the Development of Bicycle Facilities* (referred to herein as "the Bicycle Guide" or "the Guide") is to provide information on the planning, design, and operation of bikeways along streets, roads, and highways as well as on paths along independent alignments. It additionally provides guidance for the provision of supportive bicycle facilities, such as bike parking and wayfinding, and offers recommendations for the maintenance of bicycle facilities. This Guide provides information to assist the designer in choosing the appropriate combination of features, design values, and materials to create the design while considering the context of the project area and surrounding environment. The Guide is not intended to be a detailed design manual for every situation that may be encountered. It will be necessary to develop unique solutions specific to the local context based on informed design decision-making following the principles established in this Guide. Planners and designers should strive to provide a facility that minimizes the chances of severe injury and prevents loss of life for all users. This Guide should be used to supplement local and state guidance; they will take precedence where conflicts exist.