SHA Bicycle Policy and Design Guidelines

May 2026

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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1 INTRODUCTION

1.1 PURPOSE

The purpose of the SHA Bicycle Policy and Design Guidelines is to provide guidance for planners and engineers to create a safe, connected, low-stress bicycle network in Maryland designed for users of all ages and abilities consistent with the *Maryland Department of Transportation (MDOT) Complete Streets Policy,* the *2050 Maryland Statewide Bicycle and Pedestrian Master Plan (BPMP)*, *the Maryland State Transportation Trails Strategic Plan (TTSP),* the *SHA Context Driven Guide: Access and Mobility for All Users (Context Guide),* and national best practices.

These guidelines represent a shift from the guidance in the 2015 *SHA Bicycle Policy and Design Guidelines* with a greater focus on providing bicycle facilities that are appropriate to the roadway and land-use context and accommodating people biking or rolling at all levels of experience and comfort. These guidelines are intended to create a framework for the selection and design of bicycle facilities on SHA roadways that are appropriate to their design use and context. Rather than provide extensive, state-specific design guidance, these guidelines leverage the comprehensive best practice design guidance found in the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities, Fifth Edition (AASHTO Bike Guide)* as SHA's primary source for bicycle facility design guidance.

1.2 POLICY

1.2.1 MDOT Complete Streets Policy

The *MDOT Complete Streets Policy* was adopted in 2024 to "facilitate the planning, design, and construction of transportation options that are safer and more accessible to all users of all ages and abilities who bike, walk, take transit, drive or use electric personal assistive mobility devices." Building on the foundation established in the *MDOT Complete Streets Policy*, users of these guidelines shall:

- Create a safe, comprehensive, integrated, and connected low-stress bicycle network to accommodate all users in a manner that is suitable to the existing and planned land use context as defined by the *Context Guide*;
- Provide safe and comfortable bicycle facilities designed for users of all ages and abilities; and,
- Apply these guidelines on all capital improvement projects within MDOT right-of-way during planning, design, construction, and reconstruction of any transportation facility within MDOT right-of-way where cycling is legally allowed.

As a matter of standard practice, all projects shall evaluate opportunities to improve bicycle accommodations where bicycle use is permitted. Bicycle accommodations refer to both on-road and off-road bicycle facilities. These accommodations shall be provided to the maximum extent feasible as part of all roadway projects based upon design guidance provided in this document.

Per the *MDOT Complete Streets Policy*, "permanent severance or elimination of an existing bicycle or pedestrian route shall not be considered unless the project provides for construction of a feasible alternative route, or such an alternative route already exists." No project or action shall reduce existing bicycle accommodations below the minimum requirements of these guidelines without an approved bicycle waiver, unless an alternative bicycle facility is provided.

The *MDOT Complete Streets Policy* can be found in the MDOT Policy Manual on the MDOT website.

1.2.2 MDOT Statewide Bicycle and Pedestrian Master Plan and Transportation Trails Strategic Plan

The *2050 BPMP*, adopted in 2024, identifies goals and strategies for improving active transportation access across the state and helps advance the MDOT vision to provide safe and convenient active transportation that supports equitable access for all. These guidelines have been updated to align with the goals of the *BPMP* and should be used to advance the objectives of the *BPMP*. The *TTSP*, adopted in 2025, establishes the importance of shared use paths for bicycling and encourages higher design values for trails of statewide or regional significance. These trails meet certain criteria, outlined in the plan, to be designated as "destination trails." These criteria and designation can guide decisions around estimating shared use path usages referenced in Table 3-2 when data is not available.

1.3 Design Guidelines and Resources

1.3.1 Context Driven Guide: Access and Mobility for All Users

The *Context Guide* is a planning and design resource that establishes SHA's context-based approach to providing safe and effective multimodal transportation systems that are appropriate for the surrounding roadway and land use environment. A Toolkit has been developed as part of the *Context Guide* that includes innovative and proactive design treatments to improve safety, accessibility, and mobility for pedestrians and bicyclists in different contexts. Designers should use the *Context Guide* and the *Toolkit* as part of the design development process, and in conjunction with the guidance in this guide and the *AASHTO Bike Guide*.

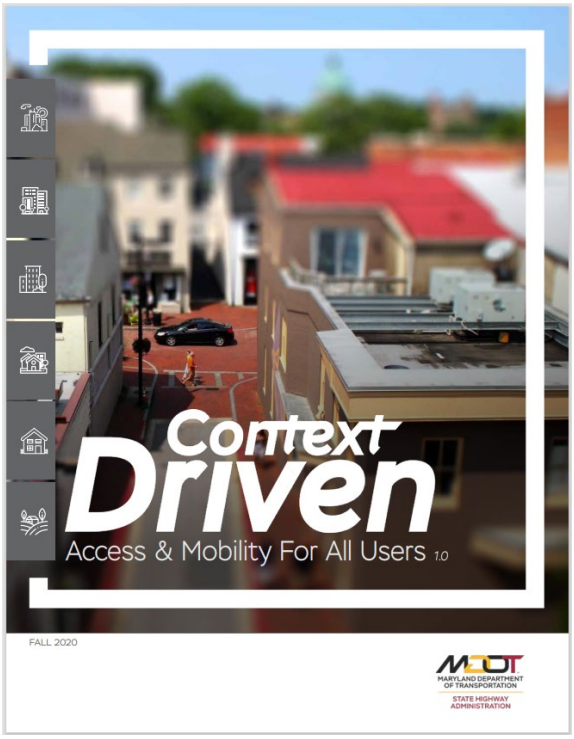

Figure 1-1 - Context Driven: Access and Mobility for All Users

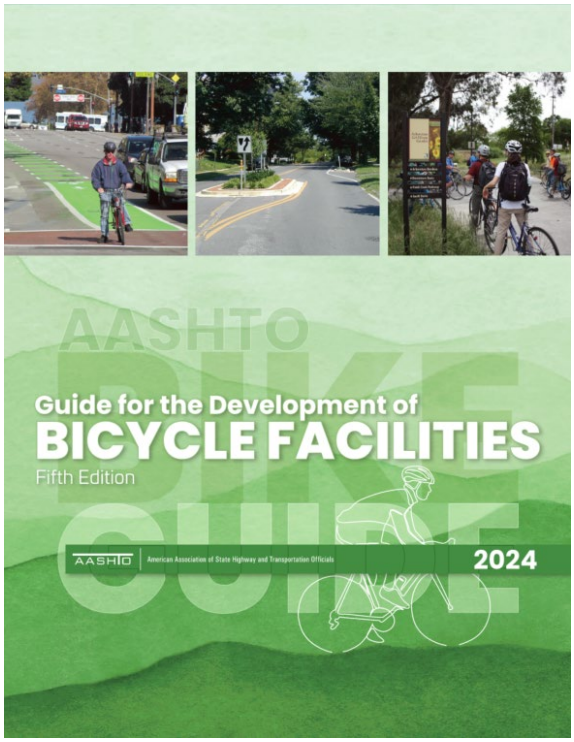

Figure 1-2 - AASHTO Guide for the Development of Bicycle Facilities, Fifth Edition

1.3.2 AASHTO Guide for the Development of Bicycle Facilities, Fifth Edition

In December 2024, AASHTO published the fifth edition of the *AASHTO Bike Guide*. The guide provides comprehensive guidance for the planning, design, and operation of bikeways along roadways in various contexts. The content in the guide was developed based on the latest research in the field of bicycle design and provides industry best practice guidance in the areas of bicycle planning and bicycle facility design.

SHA has adopted the *AASHTO Bike Guide* as its primary source for bicycle design guidance and minimum requirements. All projects subject to the requirements of these guidelines shall follow the guidance and design requirements included in the *AASHTO Bike Guide* and the SHA-specific bicycle design requirements included in these guidelines.

1.3.3 MUTCD and Traffic Control Device Design Guidance

The *AASHTO Bike Guide* was developed prior to the finalization and release of the *Manual on Uniform Traffic Control Devices (MUTCD), 11th Edition*. While much of the *AASHTO Bike Guide* is consistent with the *MUTCD* in terms of signing, markings, signals and other bicycle-related traffic control devices, there are instances where the guidance in the *AASHTO Bike Guide* deviates from the *MUTCD*. SHA Projects should be designed per the requirements of the latest adopted *MUTCD* or *MdMUTCD* as well as SHA Office of Traffic and Safety (OOTS) design guidance. Guidance in the *AASHTO Bike Guide* should be considered best practice and may be followed to the extent it complies with the requirements of the *MUTCD*, *MdMUTCD*, and SHA OOTS design guidance. Further information on the relationship between the *AASHTO Bike Guide* and the *MUTCD* can be found in Section 1.6 of the *AASHTO Bike Guide*.

1.3.4 SHA Roadways

All County, local jurisdiction, and private development projects along SHA owned roadways shall follow these bicycle design guidelines.

1.3.5 Non-SHA Roadways

Except where required by other policies, agreements, or program requirements, projects on County, local, or other non-SHA owned roadways may use bicycle design guidelines adopted by the County or local jurisdiction that owns the roadway. SHA projects that include work on County or local roadways should provide improvements on County and local roadways that follow the requirements of these guidelines or provide equivalent bicycle accommodations per County or local bicycle design guidelines. Where SHA right-of-way extends along a portion of a non-SHA roadway, the improvements should follow the requirements of these guidelines or provide equivalent bicycle accommodations per County or local bicycle design guidelines.

1.4 Compliance Certification

All proposed projects and activities which disturb the paved roadway area, disturb the adjacent curbline, adjust the line striping, or otherwise impact bicycle facilities or access on roadways where cycling is permitted shall be reviewed for bicycle accommodations. Prior to construction, the Assistant District Engineer for Traffic (ADE-T) will approve the activities and verify that bicycle accommodations have been provided as outlined in these guidelines.

For projects going through the project development process, the proposed bicycle facility design shall be documented in the Milestone Report at each stage of design. At each milestone, the project shall be reviewed by the Office of Highway Development (OHD) Americans with Disabilities Act (ADA)/Bicycle Compliance Team to ensure that the minimum requirements as outlined in these guidelines are met. The ADE-T will also evaluate the project at each milestone to ensure that the appropriate engineering solutions to provide bicycle accommodations as outlined in these guidelines are instituted.

Prior to advertisement, the lead design office shall request the ADE-T to certify that the bicycle accommodations meet the minimum requirements or any necessary bicycle waivers have been approved and that the appropriate engineering solutions, as outlined in these guidelines, have been provided as part of the project. The ADE-T shall provide a signed Compliance Certification form that shall accompany the Plans, Specifications, and Estimate (PS&E) Checklist in preparation of advertisement.

1.5 Definitions

The following definitions are taken directly from the definitions section of the *AASHTO Bike Guide* and are intended to clarify the meaning of the bicycle facility types and terminology referenced within this document.

Bike Facility – A general term denoting provisions to accommodate or encourage bicycling, including bikeways, bicycle boulevards, bicycle detection, in addition to parking and storage facilities.

Bikeway – Any road, path, or facility intended for bicycle travel which designates separate space for both bicyclists distinct from motor vehicle traffic or bicycle boulevard designed for bicyclist travel priority. A bikeway does not include shared lanes, sidewalks, signed routes, or shared lanes with shared lane markings.

Bicycle route (bike route) – A designation of streets, roads, or bikeways made by authority having jurisdiction with appropriate directional and informational route markers, with or without specific bicycle route numbers. Signs that provide directional, distance, and destination information for bicycles do not necessarily establish a bicycle route.

Bicycle boulevard - Streets designed to prioritize bicycle traffic by minimizing motor vehicle traffic volumes and operating speeds. They are also referred to as neighborhood greenways, slow streets, or bicycle priority streets. These are also referred to as bike boulevards.

Bicycle lane (bike lane) – A portion of a roadway that has been designated for preferential or exclusive use by bicyclists. A typical bicycle lane is delineated from the adjacent general-purpose lane(s) by longitudinal pavement markings and bicycle lane symbol or word markings and, if used, signs.

Buffered bicycle lane (buffered bike lane) – A bicycle lane that is separated from the adjacent general-purpose lane or parking lane by an area demarcated with pavement markings (which may include chevron or diagonal lines) to provide additional separation between the bicycle lane and parking or travel lane. These are also referred to as bike lanes.

Raised bicycle lane (raised bike lane) – A one-way separated bike lane, without a street buffer, which is elevated above the adjacent motor vehicle travel lane.

Separated bicycle lane (separated bike lane, protected bike lane, cycle track) – A one-way or two-way bicycle lane that is physically separated from motor vehicle traffic by vertical elements. These may also be referred to as protected bike lanes or cycle tracks. On-street parallel or angled motor vehicle parking can serve as the vertical elements.

Shared lane – A lane where motor vehicles and bicycles share operating space.

Shared lane marking (sharrow) – A bicycle pavement marking symbol indicating a preferred bicyclist operating position in a shared lane.

Shared use path (transportation trail) - A bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space, buffer or barrier and either within the highway right-of-way (also referred to as a side path) or within an independent alignment. Shared use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users and therefore must meet pedestrian accessibility surface requirements.

Shoulder – A longitudinal area contiguous with the traveled way that is used for accommodation of stopped vehicles for emergency use and for lateral support of base and surface courses and that is graded for emergency stopping. A shoulder might be paved or unpaved. A paved shoulder might be opened to part-time travel by some or all vehicles and might also be available for use by pedestrians, bicycles, or both in the absence of other pedestrian or bicycle facilities.

Side path – A shared use path located within highway right-of-way that is adjacent and parallel to a roadway.

2 PROJECT SCOPING AND BICYCLE FACILITY SELECTION

SHA projects should strive to provide safe, connected, comfortable, and accessible low-stress bikeways that are appropriate to the context, the roadway, and the target bicycle design user. All projects shall be evaluated for opportunities to provide bicycle facilities where bicycle use is permitted.

The scope of bicycle improvements on a project should be selected based on the bicycle-related performance measures established in the project's Objective Statement or equivalent statement of project intent. Per the *MDOT Complete Streets Policy*, "where bicycle use is planned or existing, the objective statement shall identify a target for an improved or maintained Bicycle Level of Traffic Stress (LTS) score via the latest available Statewide LTS model." The target LTS should be determined based on the context zone, the target design user, and the goals of the project.

Projects should be designed to connect bicycle facilities to each other and to destinations including schools, transit, workplaces, commercial centers, population centers, and public-use facilities to provide a comprehensive, connected network of bicycle facilities that can be used for transportation purposes. Bicycle facilities on SHA roadways should not only be continuous and connected to each other but should also connect to bicycle facility networks on adjacent county and local roadways and off-road trail systems, as well as provide safe access to overcome barriers that restrict active transportation movement. SHA bicycle facilities should be designed to extend to logical termini.

In addition to linear bicycle facilities, particular attention should be paid to the design of bicycle facilities at intersections. Intersections present a higher safety risk for cyclists and have more potential conflicts between cyclists, motor vehicles, and pedestrians. Bicycle facilities should not end abruptly or in a location that leaves users in an unsafe situation such as ending midblock, ending at an intersection with no obvious place for cyclists to go, or near an access-controlled roadway.

The *AASHTO Bike Guide* provides additional guidance on establishing the scope and limits of bicycle improvements.

2.1 BICYCLE FACILITY SELECTION GUIDANCE

The bicycle facility selection guidance below is adapted from the *MDOT 2050 Statewide Bicycle and Pedestrian Master Plan* bicycle facility selection guidance which includes recommended bicycle facilities based on context, design user, and LTS. This section is intended to provide guidance to assist in the selection of an appropriate bicycle facility and is not intended to be prescriptive. See Chapter 4 of the *AASHTO Bike Guide* for additional guidance on the selection of a bicycle facility.

2.1.1 Bicycle Facility Selection Process

The following guidance leverages the *Context Guide*, *FHWA's Bikeway Selection Guide*, and Maryland's comprehensive Level of Traffic Stress (LTS) dataset to provide guidance to practitioners on low-stress bike network planning and appropriate bicycle facility selection. The selection of an appropriate bicycle facility is based on a design process that answers the key questions:

- Who is the user we are trying to design for given the context of the roadway?
- What is the best bicycle facility for that user based on the target Level of Traffic Stress?

The Bicycle Facility Selection Process outlined in Figure 2-1 answers these questions using the *Context Guide* and LTS database.

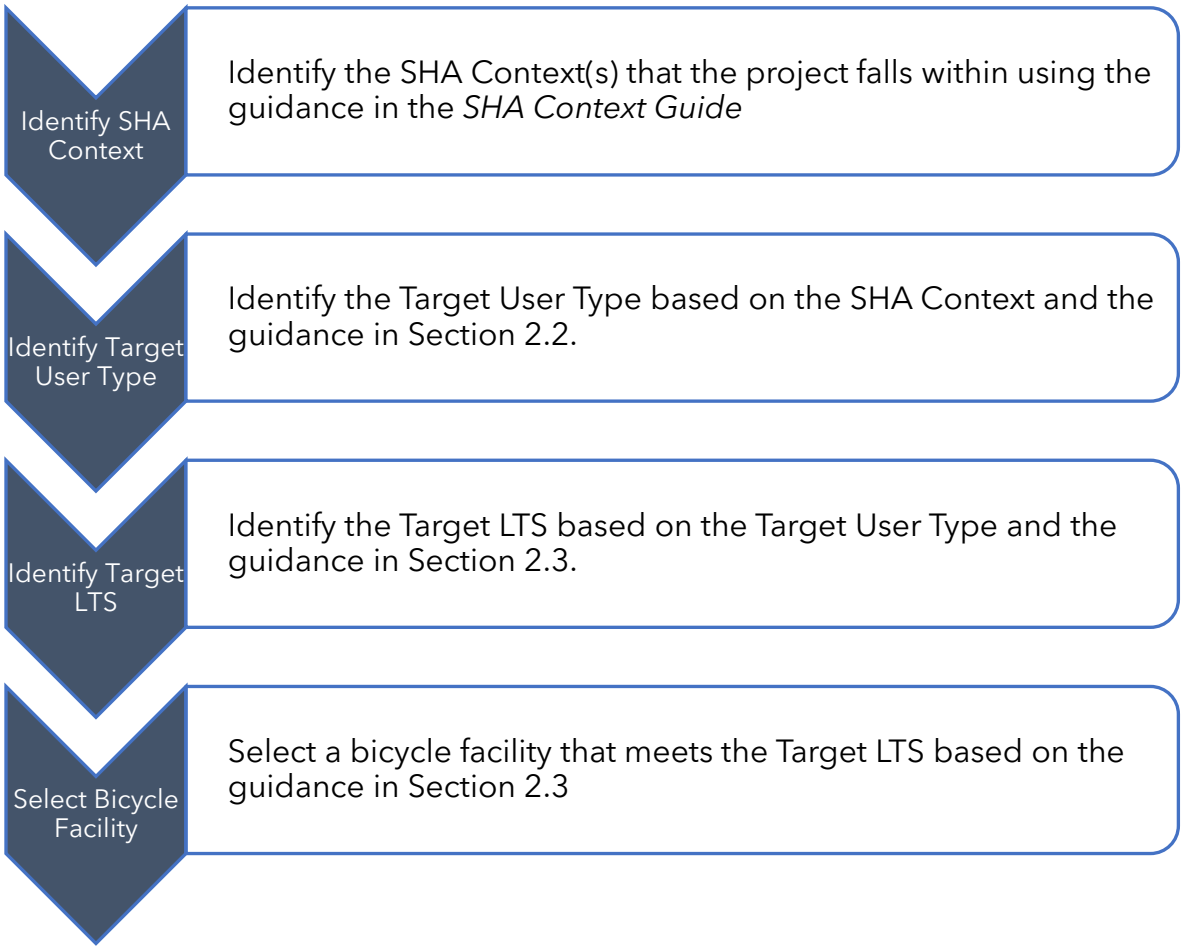

Figure 2-1- Bicycle Facility Selection Process

2.2 Bicycle User Types

People riding bikes have varying degrees of tolerance for roadway conditions, whether based on age, bicycling experience, or sense of safety from motor vehicle traffic. Most people open to bicycling are willing to ride a bike on low-stress corridors. Smaller portions of the population are composed of enthused and confident riders and strong and fearless riders; these groups have higher stress tolerance. The final group of the population is not interested in or able to bike, regardless of the route quality. Figure 2-2 describes the characteristics and infrastructure needs for each Bicycle User Type. See Chapter 2 of the *AASHTO Bike Guide* for additional information on Bicycle Design User Profiles.

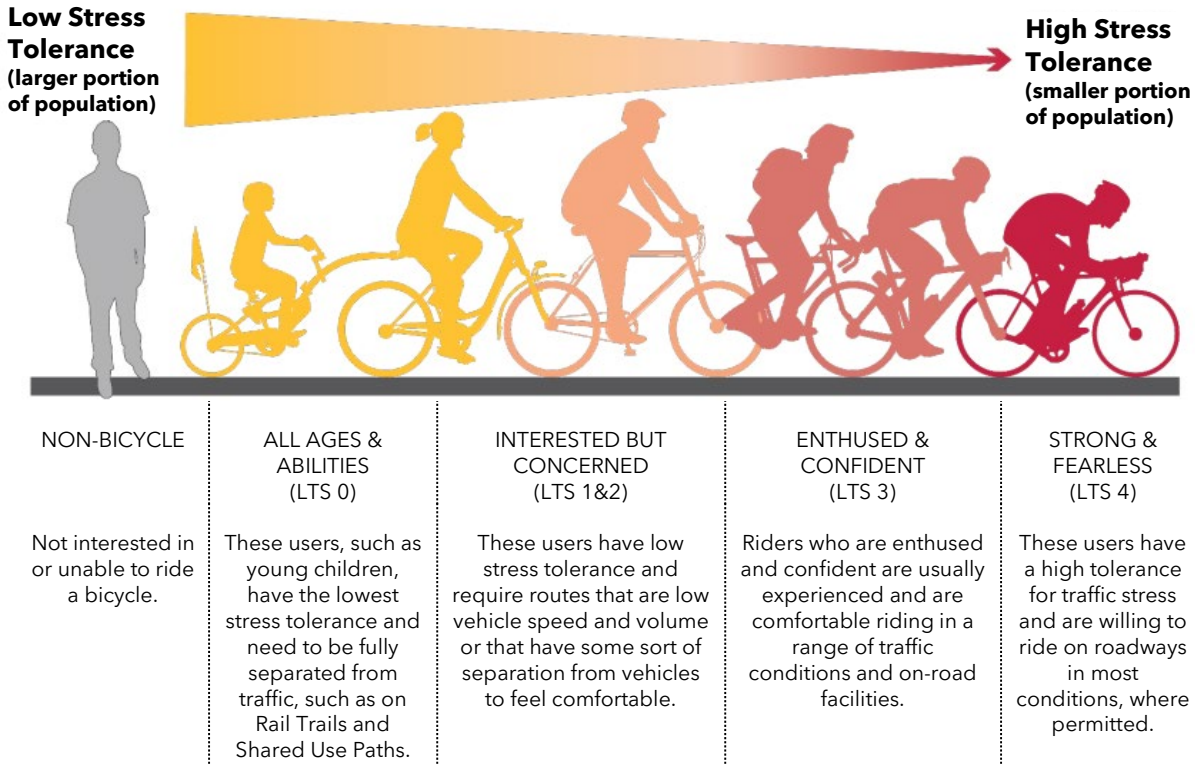

Figure 2-2 - Bicycle User Types. Source: Maryland Bicycle and Pedestrian Master Plan.

2.2.1 Identifying A Target User Type

The Target User Type is the expected typical rider that designers should strive to accommodate through facility selection that meets their needs and tolerance level. The Target User Type is informed by the land use context, as defined in SHA's *Context Guide*, which aligns roadway design with adjacent land use context, and is not to be based on an evaluation of existing users. The Target User Type may vary according to additional context factors along the corridor. There are many different roadway and land use contexts in Maryland, and these contexts often change along the same corridor.

The contexts included in SHA's *Context Guide* are shown in Figure 2-3. Denser contexts with multiple land uses, such as Urban Core and Urban Center, readily enable short walking and biking trips, allowing people to get to work, school, community services, or any number of other trips. Bicycle facilities in these contexts should be designed with slower roadway speeds and low-stress biking facilities to accommodate a larger cross-section of user types.

As contexts become less dense (as in Suburban and Rural), roadways typically have higher speeds and longer distances between destinations, resulting in fewer riders in the All Ages and Abilities and Interested but Concerned categories and a higher threshold of infrastructure needed to accommodate these types of riders. The Bicycle Facility Selection Guidance focuses on roadway corridors and is intended to be supplemented with concurrent build-out of Maryland's State Trail Network for off-street connections that cater to All Ages and Abilities riders in suburban and rural contexts. The contexts defined in the *Context Guide* are:

Figure 2-3 - SHA Contexts. Source: SHA Context Guide.

Table 2-1 highlights the minimum Target User Type that should be considered in each SHA context zone. Once the context is identified and confirmed, additional context factors (see Section 2.2.2) should be reviewed before finalizing the Target User Type.

Table 2-1 - Target User Type by SHA Context. Source: Maryland Bicycle and Pedestrian Master Plan.

SHA Context	Minimum Target User Type
Urban Core	All ages and abilities
Urban Center	All ages and abilities
Traditional Town Center	Interested but concerned
Suburban Activity Center	Interested but concerned
Suburban	Interested but concerned
Rural	Enthused and confident

2.2.2 Additional Context Factors

Additional Context Factors, such as adjacent land uses, local demographics, the proximity of schools or transit, presence of a Short Trip Opportunity Area (STOA), or connections to the state transportation trail network, should be considered. The presence of Additional Context Factors may indicate that it is appropriate to design for a more inclusive user type (e.g., from Interested but Concerned to All Ages and Abilities).

Because roadway conditions and land use contexts in Maryland can vary along the length of a corridor, the Target User Type may also change. For example, a corridor in a rural context may pass through a small town or an industrial area. Accordingly, context-based planning requires an understanding of existing land uses and potential development to ensure infrastructure meets existing needs and promotes the development of a comprehensive network of safe and comfortable active transportation facilities.

As another example, the streets surrounding a public elementary school may be classified as a Rural context. However, the Enthused and Confident rider is an inappropriate Target User Type for any facility near the school due to the potentially high latent demand of school-aged riders who would make use of the facility.

Planners and designers must take into consideration any prevailing context factors that warrant the selection of a Target User Type other than those suggested in Table 2-1. Providing access for the most users will require a systems-based approach, combining the local network with the more direct and connected arterial routes.

In summary, the Target User Type is generally defined by the SHA Contexts. However, within a context area, it may be desirable to design bicycle facilities for riders with lower stress tolerance (e.g., a more inclusive subset of the total population) based on the following considerations.

Local demographics: Characteristics of the local population should be taken into consideration, including the proportion of population that are children, seniors, people with disabilities, low-income, or zero car households.

Adjacent land uses: The types of adjacent land uses should be considered, especially those that are frequented by vulnerable populations such as health care centers, playgrounds and parks, or community centers, or those that generate higher volumes of local trips, such as grocery stores or high-frequency transit stops.

Short Trip Opportunity Area: Corridors that are within a Short Trip Opportunity Area may merit designing for a more inclusive user group. While the SHA Contexts largely capture the existing land use characteristics, STOAs add another layer of nuance and help reflect areas of latent demand.

Statewide Transportation Trail Network: A corridor on or connecting to the Statewide Transportation Trail Network should be designed for a more inclusive user group like all ages and abilities or interested but concerned.

Local Policies, Plans, or Standards: Any relevant policies, planning documents, or design standards of the local jurisdiction should be considered when selecting the Target User Type and facility type.

2.3 Level of Traffic Stress

The decision to ride a bike is strongly dependent on how comfortable someone will feel making the trip by bike. Generally, individuals only choose to bike when they feel safe doing so. MDOT has developed a statewide Bicycle Level of Traffic Stress (LTS) dataset that represents a high-level assessment of how a person biking is likely to experience any roadway in Maryland. Each roadway and shared-use path in Maryland are given an LTS score from 0 to 5 that reflects its relative suitability for bicyclists of varying levels of skill and experience. The lower the LTS score, the more inviting the bicycle facility is to a broad cross section of the population.

The LTS method is a "weakest link" approach, meaning that a route, including intersections and crossings, must be fully low-stress to be a feasible route for a low-stress tolerance rider. As state roads tend to have higher vehicular volumes and speeds than local roadways, they frequently function as high-stress barriers to low-stress network connectivity. Providing low-stress crossings of state roads can close small gaps, connecting islands of low-stress streets and expanding the low-stress network.

Because bicyclists travel a given bike route based on their personal stress tolerance, establishing demand based on bicycle counts is not an appropriate measure to use when deciding whether to provide a bicycle facility or for bicycle facility type selection. Instead, LTS can be used to inform bicycle network design and bicycle facility selection as further explained below.

2.3.1 Level of Traffic Stress Methodology

MDOT's methodology for establishing the statewide LTS dataset can be found here: MDOT LTS Metadata Methodology

The LTS Methodology in this section has been adapted from the MDOT LTS Methodology for use in determining the LTS of existing roadways and proposed bicycle facilities. Once the SHA Context and the appropriate Target User Type have been identified, a Target LTS can be selected for the corridor. Table 2-2 describes the LTS rating in terms of the corresponding target user type. Depending on the

roadway characteristics including speed, volume and number of lanes, there may be more than one bicycle facility type that provides a suitable LTS for the target user type.

Table 2-3 through Table 2-7 explain how to evaluate LTS for different bicycle facility types and mixed-traffic conditions. These tables can be used to evaluate the existing roadway as well as proposed bicycle facilities or alternatives.

Table 2-2 - MDOT Level of Traffic Stress and Bicycle User Types. Source: MDOT LTS Methodology.

LTS	Bicycle User Type
0	All ages and abilities
1	Interested but concerned
2	
3	Enthused and confident
4	Strong and fearless
5	Bicycle Access Prohibited

The next step in the Bicycle Facility Selection Process is to identify the type or types of facilities and design strategies that will allow the Target User Type to ride a bike safely and comfortably on the corridor. Use Table 2-3 through Table 2-7 to select an appropriate bicycle facility type or types for a project based on the Target LTS identified in the Objective Statement.

Shared-Use Paths and Side Paths

Shared-Use Paths are assigned an LTS score of "0" to indicate minimal interaction with motor vehicle traffic.

Side Paths are a shared-use path that runs parallel to an adjacent roadway. Side Paths are not as low-stress as shared-use paths on an independent alignment due to the proximity of motor vehicle traffic in addition to greater likelihood of intersections with more roadways and driveways. Side Paths are assigned an LTS score of "1".

Table 2-3 - LTS for Shared-Use Paths and Side Paths. Source: MDOT LTS Methodology.

Facility Type	Level of Traffic Stress
Shared-Use Path	0
Side Path	1

Separated Bike Lanes

Separated Bike Lanes are bike lanes located within the roadway but are separated from motor vehicle travel lanes by a vertical element, such as concrete medians or flex posts. The presence of a vertical separation provides a physical barrier between bicycle and motor vehicle traffic. This separation reduces the likelihood and severity of crashes between motor vehicles and bikes, thus creating a more inviting bicycle experience. See Chapter 7 of the *AASHTO Bike Guide* for guidance on appropriate vertical and horizontal separation for separated bikeways.

Table 2-4 - LTS for Separated Bike Lanes. Source: MDOT LTS Methodology.

Number of Lanes	Vertical Separation	≤25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
1 through lane per direction or unlaned	Yes	1	1	1	1	2	3
2 through lanes per direction	Yes	1	1	1	2	3	3
3+ through lanes per direction	Yes	1	1	2	2	3	4

Standard Bike Lanes and Bikeable Shoulders

Standard Bike lanes may be located against the curb or between a parking lane and a motor vehicle travel lane. Buffered bike lanes without vertical separation from motor vehicle traffic are included in this category.

Roadways with shoulders open to bicycle traffic are rated for LTS in relation to adjacent traffic speeds and volumes as well as the shoulder width.

Table 2-5 - LTS for Bike Lanes and Shoulders Not Adjacent to Parking. Source: MDOT LTS Methodology.

Number of Lanes	Bike Lane/ Shoulder Width	25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
1 through lane per direction or unlaned	6′+	1	2	2	3	3	3
	4′-5′	2	2	2	3	3	4
2 through lanes per direction	6′+	2	2	2	3	3	3
	4′-5′	2	2	2	3	3	4
3+ through lanes per direction	Minimum	3	3	3	4	4	4

Notes:

1. Qualifying bike lane/shoulder should extend at least 4′ from a curb and at least 3.5′ from a pavement edge or discontinuous gutter pan seam.
2. Bike lane width includes any marked buffer next to the bike lane.

Table 2-6 - LTS for Bike Lanes and Shoulders Adjacent to Parking. Source: MDOT LTS Methodology.

Number of Lanes	Bike Lane Reach = Bike + Parking Lane Width	25 mph	30 mph	35 mph
1 lane per direction	15′+	1	2	3
	12′-14′	2	2	3
2 lanes per direction (2-way) 2-3 lanes per direction (1-way)	15′+	2	3	3
Other multi-lanes		3	3	3

Notes:

1. Qualifying bike lane reach must be at least 12′
2. Bike lane width includes any marked buffer next to the bike lane.

Shared Lanes

Shared lanes, whether sharrows, bike boulevards or signed routes are treated as mixed traffic for LTS analysis. This table is also used for streets, or segments of streets, with no bicycle facilities.

Table 2-7 - LTS for Mixed Traffic. Source: MDOT LTS Methodology.

Number of Lanes	Effective ADT	Prevailing Speed						
		<20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
Unlaned 2-way street (No centerline)	0-750	1	1	2	2	3	3	3
	751-1500	1	1	2	3	3	3	4
	1501-3000	2	2	2	3	4	4	4
	3000+	2	3	3	3	4	4	4
1 through lane per direction (1-way, 1 lane street or 2-way street with Centerline)	0-750	1	1	2	2	3	3	3
	751-1500	2	2	2	3	3	3	4
	1501-3000	2	3	3	3	4	4	4
	3000+	3	3	3	4	4	4	4
2 through lanes per direction	0-8000	3	3	3	3	4	4	4
	8001+	3	3	4	4	4	4	4
3+ through lanes per direction	Any	3	3	4	4	4	4	4

Effective ADT = ADT for two-way roads. Effective ADT – 1.5′ ADT for one-way roads

Prohibited Routes

Bicycles are prohibited from using all interstates and most limited-access roadways in the State of Maryland. A list of prohibited routes is available on SHA's website. In addition to these routes, SHA District Offices have designated additional roadways prohibited for bicycle access, typically on higher speed roadways without shoulders.

2.4 Considerations for Various Project Types

The following guidance should be considered when scoping bicycle improvements for various project types.

Widening and Reconstruction

Roadway widening projects should maintain existing bicycle facilities at a minimum and should improve upon existing bicycle facilities, where possible. If roadway widening results in a higher stress facility for bicyclists, adequate bikeway width and separation from motor vehicle travel lanes should be provided to ensure bicycle level of traffic stress does not increase.

Road Reconfiguration/Narrowing

If roadway lanes or pavement are narrowed, bicycle facilities should be considered as part of the proposed typical section. Existing bicycle facilities should not be removed unless they are replaced.

Bridge

If a bridge is newly constructed, reconstructed, widened, or the use of roadway space is reconfigured on or approaching the bridge, adequate bicycle facilities should be incorporated into the proposed improvements. If a bridge is reconstructed on a roadway that does not currently have bicycle facilities on the approaches to the bridge, but there is the potential for bicycle facilities to be constructed as part of a future roadway improvement project, bicycle facilities or space for future bicycle facilities should be provided on the bridge as part of the bridge project. The proposed bridge should not preclude the inclusion of future bicycle facilities on the roadway.

Intersection Improvements

If there are existing bicycle facilities along one or both of the corridors approaching the intersection, the intersection improvement project should maintain or improve the bicycle facilities through the intersection. If there are not continuous bicycle facilities along the corridor approaching the intersection but there is the potential for bicycle facilities to be added along the corridor in the future, channelizing islands, medians, and curbs should be placed to accommodate future bicycle facilities through the intersection so that major reconstruction of the intersection is not needed to add the bicycle facilities in the future. Every effort should be made to improve bicyclist safety, accessibility, and comfort at intersections. See the guidance on intersection design in Chapters 5-11 of the *AASHTO Bike Guide*.

Resurfacing

Per the Complete Streets Policy, proactive engineering safety countermeasures should be applied as part of resurfacing projects when there is an opportunity to improve safety for all users. Resurfacing projects shall be examined to determine if the existing lane or shoulder widths may be modified to provide additional space for bicycle facilities, or if additional signing or markings are appropriate to increase driver awareness of cyclists. Resurfacing projects should be viewed as opportunities to improve bicycle level of traffic stress, where feasible, particularly where there are existing or planned bicycle facilities nearby and in contexts with existing or anticipated demand for cycling.

3 Design Guidelines and Requirements

The design of bicycle facilities shall follow the guidance and design requirements included in the *AASHTO Bike Guide* and the SHA specific design requirements included in these guidelines.

SHA promotes flexibility in design to ensure the best solution can be implemented to address the needs and goals of the project within the unique constraints and opportunities that each project presents. The *AASHTO Bike Guide* provides a range of different bikeway types and treatments and a range of acceptable design values to allow for flexibility in design. Many of the design values in the *AASHTO Bike Guide* are presented as a range of acceptable values, called the design range, based on specific conditions such as volume, speed, and level of service. See section 1.4 of the *AASHTO Bike Guide* for additional information on the design range and the use of design values within the guide.

3.1 SHA Minimum Design Requirements

Table 3-1 identifies the specific tables in the *AASHTO Bike Guide* that establish the SHA minimum design requirements for various bicycle facility types. In general, bicycle facilities should fall within the Recommended Range of values and meet or exceed the Lower Limit of the Recommended Range for width of shared-use paths, separated bike lanes, raised bike lanes, standard bike lanes, and paved shoulders.

Table 3-1 - Summary of SHA Minimum Design Requirements in the AASHTO Bike Guide

AASHTO Bike Guide Table	Required Design Values
Table 6-3 Recommended Shared Use Path Widths to Achieve SUP LOS "C"	Must meet Recommended Lower Limit for peak hour volumes of 150 to 300 bicycles.
Table 7-3 One-Way Separated Bike Lane Widths Based on Existing or Anticipated Volumes	Must meet minimum recommended values for <150 Peak Hour Directional Bicyclist Volume based on curb type.
Table 7-4 Two-Way Separated Bike Lane Widths based on Existing or Anticipated Volumes	Must meet minimum recommended values for <150 Peak Hour Directional Bicyclist Volume based on curb type.
Table 7-5 Raised Bike Lane Widths	Must meet minimum Recommended Lower Limit.
Table 9-1 One-Way Standard Bicycle Lane Widths	Must meet Recommended Lower Limit based on Bicycle Lane Context.
Table 12-1 Paved Shoulder Widths for Bicycling	Recommended Lower Limit based on ADT and Posted Speed.

Where recommended values are based on peak volumes for bikeway users, every effort should be made to meet the recommended lower limit for the peak hour design volume when that data is available.

A bicycle waiver will be required for any proposed bicycle facility that does not meet the minimum requirements defined in this section. Facilities with waivers must be designed to meet or exceed requirements to the maximum extent feasible and a bicycle facility should not be designed under the practical minimum width established in the *AASHTO Bike Guide* except in rare circumstances or when technically infeasible.

All other geometric design guidance in the *AASHTO Bike Guide* should be followed. Where guidance cannot be met, it should be documented in a bicycle waiver.

3.1.1 Shared Use Paths

Shared-Use Paths shall follow the design guidance and requirements in Chapter 6 of the *AASHTO Bike Guide*. Table 3-2 provides design guidance for the width of shared-use paths. SHA's minimum width for a shared use path is 10 feet which is based on the Recommended Lower Limit for a shared use path with peak hour volumes of 150 to 300 users per hour. Any shared use path which has potential to be designated as a Maryland Destination Trail, as defined in the 2025 TTSP, should be designed to minimum widths for shared use paths with 300 to 500 users per hour.

Table 3-2 - Recommended Shared Use Path Widths to Achieve SUP LOS C.

Source: AASHTO Bike Guide Table 6-3.

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

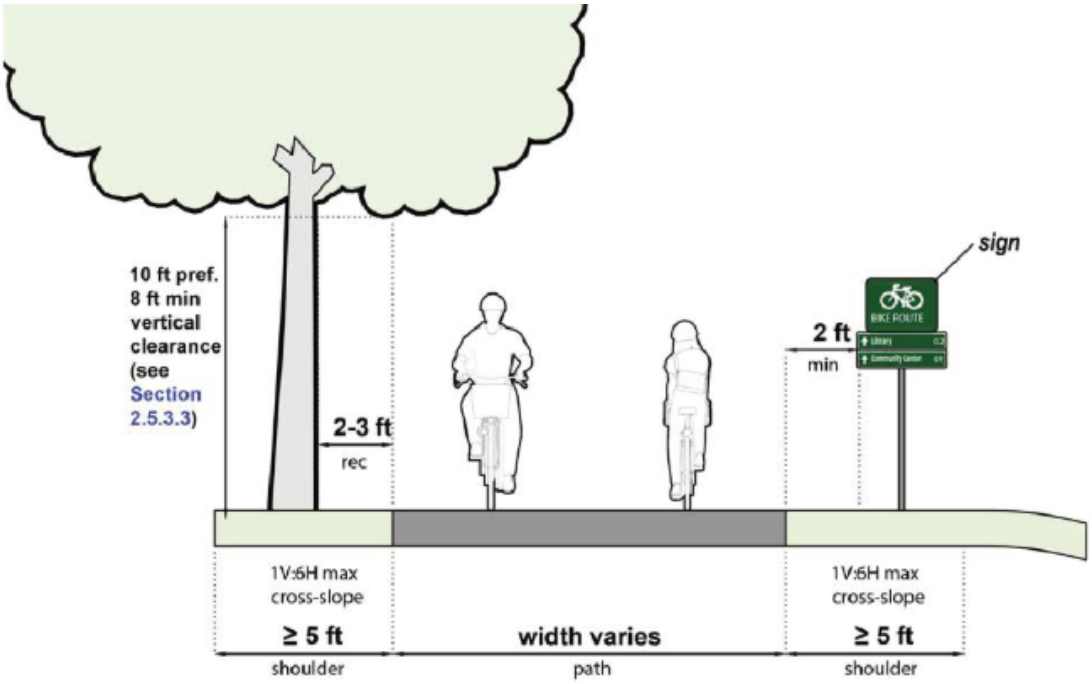

Figure 6-5: Shoulders and Shy Distance on Shared Use Paths

Figure 3-1- Shoulders and Shy Distance on Shared Use Paths. Source: AASHTO Bike Guide Figure 6-5.

3.1.2 Separated Bike Lanes

Separated Bike Lanes shall follow the design guidance and requirements in Chapter 7 of the *AASHTO Bike Guide*. Table 3-3 provides design guidance for the width of One-Way Separated Bike Lanes. One-Way Separated Bike Lane widths must meet minimum recommended values for <150 Peak Hour Directional Bicyclist Volume based on curb type.

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

Source: AASHTO Bike Guide Table 7-3.

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

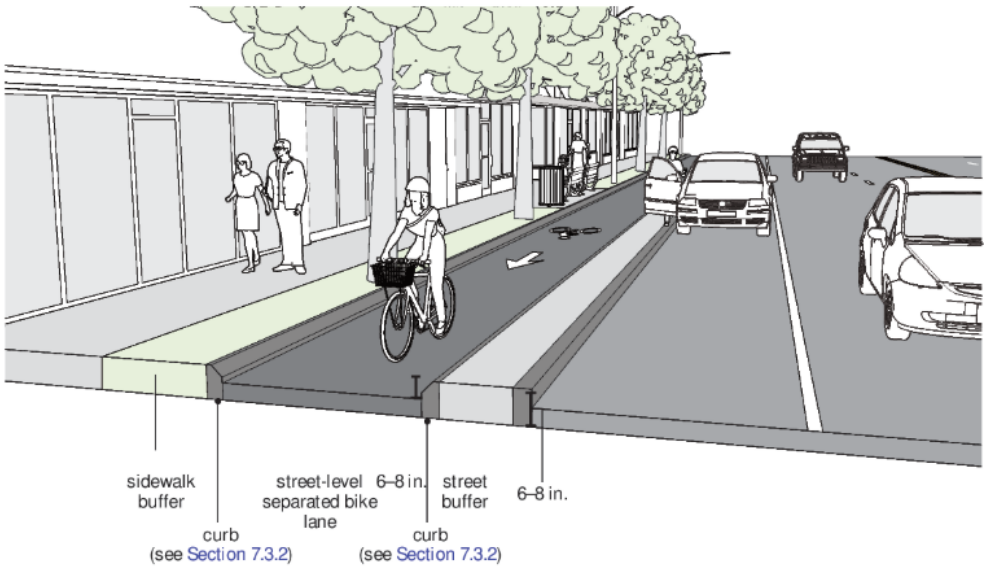

Figure 3-2- Street-Level Separated Bike Lane. Source: AASHTO Bike Guide Figure 7-3

Table 3-4 provides design guidance for the width of Two-Way Separated Bike Lanes. Two-Way Separated Bike Lane widths must meet minimum recommended values for <150 Peak Hour Directional Bicyclist Volume based on curb type.

Table 3-4 - Two-Way Separated Bike Lane Widths Based on Existing or Anticipated Volumes.
Source: AASHTO Bike Guide Table 7-4.

Peak Hour Directional Bicyclist Volume	Two-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	10 - 12	9.5 – 11.5	9 - 11
150 - 350	12 - 16	11.5 – 15.5	11 - 15
>350	≥16	≥15.5	≥15
Practical Minimum*	8.5	8	7.5

*Peak Hour Directional Bicyclist Volume not applicable

3.1.3 Raised Bike Lanes

Raised Bike Lanes shall follow the design guidance and requirements in Chapter 7 of the *AASHTO Bike Guide*. Table 3-5 provides design guidance for the width of Raised Bike Lanes. Raised Bike Lane widths must meet or exceed the Recommended Lower Limit for intermediate level or sidewalk level raised bike lanes as defined in Table 3-5.

Table 3-5 - Raised Bike Lane Widths. Source: AASHTO Bike Guide Table 7-5.

Raised Bike Lane Widths				
Bike Lane Context	**Practical Minimum (ft)**	**Recommended Lower Limit (ft)**	**Recommended Upper Limit (ft)[2]**	**Practical Maximum (ft)[2]**
Intermediate level or sidewalk level raised bike lane[1]	5	6.5	8	10

1. Raised bike lane widths are exclusive of the gutter unless the gutter is integrated into the full widths of the bike lane.
2. Separated bike lane with a street buffer may be preferable to a curb-attached, wide raised bike lane.

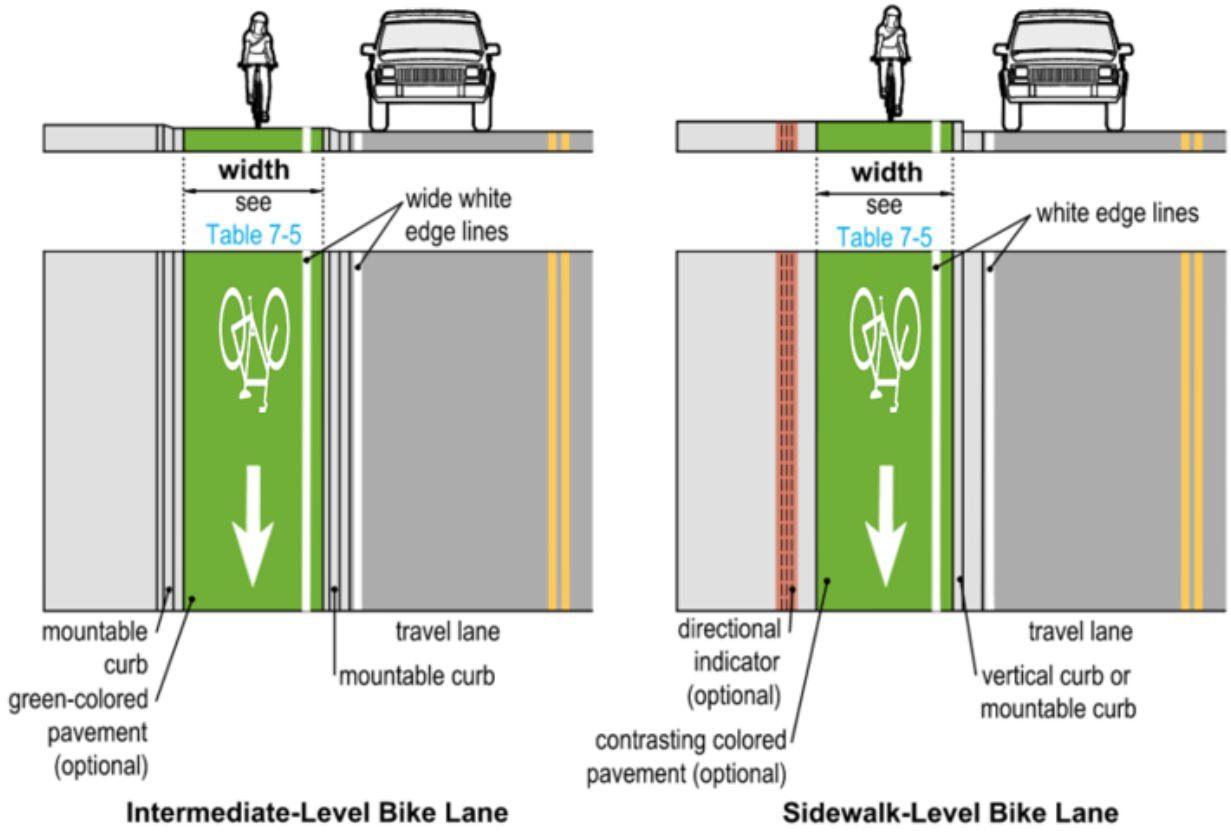

Figure 3-3- Intermediate-Level and Sidewalk-Level Raised Bike Lane.
Source: AASHTO Bike Guide Figure 7-39.

3.1.4 One-Way Standard Bike Lanes

One-Way Standard Bike Lanes shall follow the design guidance and requirements in Chapter 9 of the *AASHTO Bike Guide*. Table 3-6 provides design guidance for the width of One-Way Standard Bike Lanes. One-Way Standard Bike Lane widths must meet or exceed the Recommended Lower Limit based on Bike Lane Context.

Table 3-6 - One Way Standard Bicycle Lane Widths. Source: AASHTO Bike Guide Table 9-1.

One Way Standard Bike Lane Widths				
Bike Lane Context	**Practical Minimum (ft)**	**Recommended Lower Limit (ft)**	**Recommended Upper Limit (ft)**	**Practical Maximum (ft)**
Adjacent to edge of pavement	4 [1]	5	7	8 [3]
Adjacent to curb (exclusive of gutter)	5 [1]	6	7	8 [3]
Between through lanes and turn lanes [2]	5 [1]	6	7	8 [3]
Between buffers	4	5	7	8 [3]
Adjacent to parking	5	6	7	8 [3]
To allow occasional passing or side-by-side bicycling [4]	6.5	8 [3]	10 [3]	11 [3]

1. Shoulders should be provided in lieu of narrow bicycle lanes to avoid confusion below the practical minimum width.
2. Buffers are desirable where bicycle lanes are located between through lanes and turn lanes, especially as motorist speeds exceed 30 mph.
3. Buffered Bike Lanes or Separated Bike Lanes Should be considered in lieu of wider bicycle lanes to avoid confusion with a parking or travel lane.
4. A minimum of 6.5 feet is necessary for occasional passing and 8 fet or more for comfortable side-by-side bicycling.

3.1.5 Paved Shoulders for Bicycling

Paved Shoulders for Bicycling shall follow the design guidance and requirements in Chapter 12 of the *AASHTO Bike Guide*. Table 3-7 provides design guidance for the width of Paved Shoulders for Bicycling. Paved Shoulder widths must meet or exceed the Recommended Lower Limit for Paved Shoulder Widths for Bicycling as defined in Table 3-7.

Table 3-7 - Paved Shoulder Widths for Bicycling. Source: AASHTO Bike Guide Table 12-1.

Paved Shoulder Widths Exclusive of Rumble Strips [i] for Bicycling				
Design Year Average Daily Traffic (ADT) and Posted Speed (MPH) Thresholds	**Practical Minimum [ii]**	**Recommended Range**		**Practical Maximum**
		Lower Limit [ii]	**Upper Limit**	
< 2,000; all speeds	2 ft	3 ft	5 ft [ii]	10 ft
2,000 – 6,000; all speeds	2 ft	4 ft	6 ft [ii]	10 ft
6,000 – 10,000; all speeds	4 ft	6 ft	8 ft [ii]	10 ft
> 10,000; ≤ 35 mph	5 ft	6 ft	8 ft [iii]	12 ft [iii]
> 10,000; ≤ 40 mph [iv]	5 ft	6 ft	10 ft [iii]	12 ft [iii]

i. See Section 12.5.1 for rumble strip design considerations.
ii. Where roadside barriers, walls, or other vertical elements are present, they should be offset a minimum of 2 ft from the outer edge of the rideable shoulder to provide minimum shy distance to bicyclists (see Section 2.5.3.2.).
iii. Where >10 percent of traffic consists of trucks.
iv. Shared use paths are preferred.

3.2 Bicycle Waivers

All proposed bicycle facilities that do not meet the minimum requirements set forth in these guidelines and the *AASHTO Bike Guide* will require an approved bicycle waiver for each element that does not meet the requirements. Bicycle waiver requests shall be prepared by the lead design office and approved by the Director or District Engineer of the lead design office. Waiver requests for local public agency projects subject to the requirements of these guidelines shall be prepared by the local public agency and approved by the Director of the Office of Highway Development except when a separate approving authority is defined in program-specific guidance. The following items should be considered prior to requesting a bicycle waiver:

- Ability to acquire right-of-way
- Ability to relocate utilities
- Impact to existing structures
- Impact to environmentally or historically sensitive features

A project can only proceed to advertisement or construction (construction includes maintenance activities) if the project meets the minimum requirements set forth in these guidelines or has been granted a bicycle waiver for each element that does not meet minimum requirements. No blanket bicycle waivers will be granted on a project-wide or program-wide basis. To avoid schedule disruptions late in a project's development, the need for a bicycle waiver should be identified as early in the design process as possible, and the documentation should be submitted by the first milestone. If during construction, it is found that a project element cannot be constructed to meet the minimum requirements (due to an unforeseen field condition or change of condition), a bicycle waiver shall be obtained prior to completing work on that element.

A bicycle waiver may be considered for such things as impacts to right-of-way, utilities, structures (such as bridges, retaining walls, and drainage structures), environmentally or historically sensitive areas, or due to excessive cost. A bicycle waiver shall not be requested until all reasonable alternatives to meet the minimum requirements have been exhausted and documented. The significance of the impacts created by these alternatives will be considered in the waiver decision. The documentation of these alternatives (design memorandums, concept alternatives, etc.) will be required to support the bicycle waiver request.

Bicycle waivers are not intended to exclude the implementation of bicycle facilities as part of a project. Even with the bicycle waiver, a project shall still be designed to the maximum extent feasible to provide bicycle accommodations. Projects that do not meet the bicycle-related performance measures identified in the project's Objective Statement will require a Complete Streets Waiver. A Complete Streets Waiver does not constitute an exemption from meeting the requirements of these guidelines when new bicycle facilities or alterations to existing bicycle facilities are proposed.

Every effort shall be made to submit bicycle waivers by the first milestone review. Documentation within the first milestone report and subsequent reports shall note the status of the proposed bicycle waivers, as well as coordination efforts with the OHD ADA/Bicycle Compliance Team; however, milestone reports will not be considered a substitute for a written waiver request.

Design Waiver Process:

1. The Lead Project Manager, with input from all support divisions, determines the minimum requirements outlined within these guidelines that cannot be met.
2. The Lead Project Manager will coordinate with the Office of Planning and Preliminary Engineering (OPPE) Bicycle/Pedestrian Coordinator to determine if the bicycle waiver will significantly impact established or proposed bicycle routes or master plans. The team will also coordinate with the ADE-T to determine if the design element requiring a waiver would significantly impact travel patterns and safety to ensure the appropriate engineering solution is proposed to mitigate the waiver condition. A summary of existing facilities and the potential impact of a waiver will be attached to the waiver request.
3. If it is determined that there will be no significant effect upon established or proposed bicycle routes, master plans or travel patterns, the Lead Project Manager shall make a formal request in writing to the Director or District Engineer of the lead design office, through the ADE-T, for consideration. The formal waiver request shall include, at a minimum, the following information:

    - Project description and typical sections (existing and proposed);
    - Length/Scope/Cost of the project;
    - Description of the design required to meet the minimum requirements;
    - Written findings regarding the inability to meet the minimum requirements. This written assessment shall evaluate all available data in reaching a recommendation, for example:
        - existing and proposed bicycle level of traffic stress;
        - target bicycle level of traffic stress identified in the Objective Statement;
        - existing and proposed posted speed limit;
        - percentage of truck traffic;
        - details of cost exposure;
        - crash data for the project area including crash data involving bicyclists.
    - Description of any mitigating strategies to provide the appropriate engineering solution for the accommodation of bicyclists.

4 Accommodating Bicyclists Through Work Zones

4.1 Bicycle Access

The *MDOT Complete Streets Policy* states, "when construction activities necessitate, temporary closures of bicycle and pedestrian routes shall be coordinated with local jurisdictions and pertinent partners to avoid unnecessary impacts to access to the extent practicable."

In an effort to maintain accessibility for bicyclists, SHA has developed the following guidelines for accommodating bicyclists through work zones. Closing or detouring a roadway for construction impacts more bicyclists in urban areas; however, there are typically more options available in these areas to provide alternate routes. In rural areas there may not be a large population of bicyclists; however, because of the open space and separation between communities, fully closing a roadway may increase the length of a rider's route significantly. Consequently, all projects should be reviewed and evaluated to determine the best way to maintain bicycle access.

Bicyclists are roadway users; therefore, if detours are provided for roadway users, bicyclists must be accommodated. If an adjacent path through the construction zone, suitable for bicyclists is available, bicyclists may be detoured on the pathway. If no such path exists, a detour must accommodate bicyclists. However, if bicyclists cannot be accommodated through the detour that is designed for motor vehicles, a separate detour shall be signed to route bicyclists around the construction zone and back to the road which has been closed.

The requirements for providing bicycle access through work zones shall be applied during the planning, design, construction and maintenance phases of all projects where applicable. All proposed road closings and detours should be reviewed with SHA's Bicycle and Pedestrian Coordinator and District Traffic engineering staff. The road closings should also be coordinated with county and/or local jurisdictions if their road serves as the proposed bike detour.

4.2 Bicycle Accommodations

It is preferred that a minimum 5 foot shoulder width (4 foot minimum may be acceptable) should be maintained through work zones to accommodate bicycles. Care should be taken to ensure that obstacles such as bridge abutments, equipment, construction materials, traffic control devices, etc. do not encroach into the bicycle travel-width.

Where the posted speed limit is 50 mph or lower and a minimum 4 foot shoulder width cannot be maintained, bicyclists will typically be required to share the road with motorists. In this case, the right-most lane should be made as wide as feasible to minimize friction between the two user groups. Install appropriate signage for shared-lane conditions per the MdMUTCD and Office of Traffic and Safety guidance.

In Maryland, where the posted speed limit is more than 50 mph, bicycles may use the shoulder adjacent to a roadway and enter the roadway only if making or attempting to make a left turn; crossing through an intersection; or the shoulder is overlaid with a right turn lane, a merge lane, a bypass lane, or any other marking that breaks the continuity of the shoulder. Consequently, it is imperative to maintain a minimum 6 foot bikeway on roadways where the posted speed limit is higher than 50 mph. Where a minimum 6 foot bikeway cannot be maintained during construction, the affected segment of the roadway shall be posted with appropriate signing to prohibit bicyclists and a detour shall be identified.

When alternate routes are laid out for motor vehicles, it will be necessary for SHA to lay out and sign a reasonable alternate route for bicyclists to bypass construction. For projects of short length (1/4 mile) and/or short duration (24 hours) and where the posted speed limit is 50 mph or less, bicycles may be required to share the road with motorized vehicles. All proposed road closings and proposed detours should be reviewed with the ADE-T.

No accommodations will be considered for bicycle access through work zones on roadways where bicycles are designated as prohibited by signing. This includes all interstate highways and some controlled access highways. For specific information regarding what roadways are prohibited to bicycle access, consult SHA's Bicycle and Pedestrian Coordinator.

See Section 15.5 of the *AASHTO Bike Guide* for additional guidance on Temporary Traffic Control for Bicyclists.

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