

<b>Substantive Comments</b>		
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1	0.0	<p>This revision to the 2005 version of Maryland SHA Bicycle and Pedestrian Design Guidelines is a timely update, and will be very useful to state officials and citizens attempting to understand state policy. Noting that this draft only includes bicycles, we look forward to reviewing the companion guidelines for pedestrian facilities. We commend SHA for including policy as well as design guidance.</p> <p>The comments that follow focus on changes we think that the document needs. Addressing them will take some effort, but we think that they will make this good document even better. The frequency with which our comments address a particular issue are not necessarily in proportion to the importance of the issue, but rather in proportion to the number of places in the document where the issue arises. The state's goal is still for Maryland to be the nation's best state for bicycling, which implies that Maryland's design standards must often be better than what one finds in comparable AASHTO and NACTO guidelines. This draft is a step in that direction.</p>
2	0.0	<p>While the title indicates that the document is policy and design, most of its focus is on design. That is appropriate, yet some of the policies also need to be articulated, especially those regarding how the entire "highway" (which includes sidewalks, medians, and the general travel lanes) is managed to address cycling. This draft is mostly about how to include bike facilities in a new or existing highway with a pre-determined level of service for autos—the bikeway policy and designs discussed here focus on how to design a bike infrastructure that takes as its starting point the infrastructure for motor vehicles.</p> <p>But for most cyclists, the conditions of the entire highway matter as much or more than the trails and bike lanes on which this document focuses, because most cycling takes place on roads without trails or bike lanes. Transportation professionals in some jurisdictions are increasingly deciding that narrower lanes, for example, can do a lot to make cycling safer both by calming traffic and (sometimes) by making more space available for bike lanes. The actual bicycle policy, whether articulated or not, includes the design speeds, speed limits, lane widths, circuitry, sidewalks, and other factors that superficially are about automobiles or pedestrians, not bikes, but that--in reality--may be more important to bikeability than the facilities specifically listed as bike infrastructure. The readers of this report will need these policies articulated as much as possible.</p>
3	0	<p>A section on maintenance should be added. On trails, tree roots can be a very serious problem for all types of users. Snow removal is an issue that needs to be addressed for all types of facilities. The document should clarify whether cycle tracks inside the curb are considered to be within the area of state maintenance like shoulders and bike lanes (unlike most sidepaths and sidewalks). Because there are many bike lanes that are too narrow or otherwise fail to meet the standards set by any published guidance, such a section also needs to address how to correct or decertify substandard bike lanes.</p>

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4	0.0	The document needs to explicitly address the traffic and safety operations and issues, because often they can promote bicycle traffic and safety as effectively as the engineering projects on which this document focuses. Traffic and safety issues often lead to cyclist complaints and inquiries into the district offices. First and foremost would be the speed limits and design speed of highways. At the very least, an overview is needed on how the design speed and speed limits are set, the role that bikes and pedestrians play in the original design, and the circumstances (if any) in which the presence of bikes and pedestrians leads SHA to reduce a speed limit (and make changes in the road to calm traffic speeds), both for a new road, and years later when circumstances may be different than when the road was built.
5	0.0	A section should be added to address how to maintain direct routes for bicycles when intersections are reconfigured to be significantly more circuitous. Key examples include: Allowing cyclists (and pedestrians and wheelchairs) to proceed straight across an intersection when J-turn islands are installed that prevent cross traffic by motor vehicles; putting small cut-through for bikes, pedestrians, and wheelchairs when medians berms or guard rails are constructed to prevent motor vehicles from making a left turn. The document should also address how to ensure that structures requires for automobiles do not harm cycling, such as curb bumpouts. Within some portions of SHA, requests by cyclists to enable cyclists to follow a direct route rather than be forced to follow a detour, have been met with the response that cyclists must subjected to the same inconvenient detours that motorists must follow, on the grounds that cyclists have the same rights and responsibilities as motorists. This document needs to clearly explain that the fact that bikes are subject to the same rules of the road as motor vehicles does not imply that system maintenance efforts can disregard opportunities to maintain the most efficient bike route.
6	0.0	The issue of sidewalks, and their potential use as bikeways where there is limited pedestrian use, needs to be further explored. Sidewalks have the potential to provide critical links in places where there is limited opportunity to accommodate bicycles due to lack of space. Sidewalks are currently being used by cyclists in high-volume/high-speed traffic locations. The document should address the key issues related to sidewalk cycling, such as whether (and if so how) sidewalk design or the design of onroad facilities should be different if cyclists are likely to use them, and whether these factors depend (and if so how) on whether riding in the sidewalk is legal.
7	0.0	The chapter on paved shoulders that appeared in the previous edition of this document has been dropped. While needing some updates, that chapter was very useful with substantial good advice that regrettably was often ignored. Until every narrow shoulder has been widened into a bike lane or made part of a wide outside lane, and every wide shoulder has been restriped as a bike lane, that guidance will retain viability (though it does require some updating due to changes in the law since 2005).
8	0.0	Because this is a policy document as well as a guidance document, the policy on restriping shoulders to become bike lanes needs to be explained and articulated. The deletion of the chapter on shoulders might imply that SHA intends to convert virtually all wide shoulders into bike lanes. We think that would be a mistake. Many wide (10 to 12 foot) shoulders along high-speed roads are occasionally needed for parking, and lack sufficient width to create both a parking lane and a safe bike lane outside of the door zone. Door zone bike lanes are especially hazardous along high speed roads or downhill slopes.

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9	0.0	Bike lanes should not be created or restriped within the door zone of parallel parked cars, unless the door zone is clearly marked. To make such markings administratively convenient, SHA should amend the Maryland MUTCD to explicitly include the door zone markings that have been experimentally tested or previously included in SHA's bikeway guidance.
10	0.0	All sharrows should be entirely outside of the door zone.
11	0.0	<p>The table of preferred bike lane widths provides a useful framework, but in some cases it leads to narrower—and less safe—lanes than the AASHTO guidelines or the previous SHA guidance. Most important, the longstanding practice of including 10-foot shoulders on new highways is giving way to a policy of building bike lanes in lieu of shoulders. While it is nice to see the explicit recognition of bicycles, few cyclists feel safer in a 5-foot bike lane than a 10-foot shoulder, especially during rush hour on a highway with a speed limit of 45mph and actual traffic speeds of 55mph. Therefore, as SHA shifts from wide shoulders to the narrower bike lanes, it is important that those new bike lanes not be too narrow. The 2005 edition of the bicycle design guidance added a foot based on average daily volume, or when actual traffic speeds (which are often higher than the speed limit) exceeded 35 mph. Moreover, now that even AASHTO has declared that bike lanes should be at least 5 feet wide where possible, we do not believe that a 4-foot bike lane should be viewed as the preferred minimum unless the actual traffic speed is less than 35 mph, which is rarely the case unless the speed limit is 25 mph. We would thus suggest that the table on bike lane widths be replaced with this simpler formula:</p> <ol style="list-style-type: none"> <li>a. Minimum: 4 feet</li> <li>b. Add one foot if there is a significant density of cross streets or driveways (e.g. at least 12 cross streets or commercial entrances per mile, 24 residential driveways per mile, or some combination).</li> <li>c. Add one foot on roads with either a significant frequency of trucks and buses or volume exceeding 10,000 average daily traffic.</li> <li>d. Add one foot if the speed limit is 35mph or greater, or two feet if the speed limit is 45mph or greater.</li> </ol>
12	0.0	<p>The document needs to clearly explain that it is generally illegal and unsafe for drivers to make right turns from a lane to the left of a bike lane, just as it is generally illegal to make a right turn from any lane to the left of a through lane, unless a traffic control device indicates otherwise. Either there will be a right turn lane to the right of the bike lane, or the bike lane itself is the right turn lane, that is, the absence of a pocket lane between the bike lane and the general travel lane does not mean that cars should make a right-hook across the bike lane. To help make this situation more obvious to drivers, the typical urban bike lane needs dashed striping so that drivers see where to properly merge right before the right turn.</p>

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13	1.1	The section on the reach of this document should be further clarified. The text appears to imply that it is meant for all transportation planners and engineers, not just those involved in roads managed by SHA. But some sections--such as the section on waivers--clearly seem to only apply to SHA. Additional clarity on which sections are SHA only, which apply to all state (but not local) roads, and which are generally applicable would be useful. One assumes--but SHA should state--that the document must be followed by SHA but is advisory for localities. While it may be prudent to avoid spelling that out in detail, a few questions have arisen that ought to be settled here: Would a trail that departs from (for example) the bollard guidance be ineligible (or less eligible) for funding from (or through) SHA. Is there any obligation for local roads that are partly funded by the state, or by federal funds whose allocation is determined by the state, to follow the guidance?
14	1.2	Line 4-5. A bit more clarity is needed on the distinction between “may” and “should.” For example, are “should” decisions entirely within the undocumented discretion of a given designer, or does “should” represent the practice that will be normally followed, unless there is a documented reason to not do so or a waiver is granted.
15	1.2	Par 2. Is this an exhaustive list of bikeways? It would be best to indicate whether it includes shoulders—many people assume those 2 or 3-ft shoulders are bikeways, not to mention the 8-12 foot shoulders that are not bike lanes. Also, this definition appears to include every roadway where bicycles are not prohibited—if that is the intent, then it would be best to state so explicitly.
16	1.2	Definition of “shared lane” should explicitly indicate that you are including both side-by-side and use-full-lane shared lanes.
17	1.2	Please change “pedestrians including skaters” to “pedestrians, skaters...” It is very much an open question whether skaters are vehicles or pedestrians—because skaters often travel at bicycle speeds, the suggestion that they are pedestrians and should hence travel on the left side of the roadway is very problematic. Suggested phrasing avoids taking a position on that question.
18	1.2	For definition of cycle track, please indicate that they may be either one-way or two-way.
19	1.3	The section on Design Certification and Waivers is outstanding!
20	1.3	Please change, "However, if it is determined that full bicycle accommodations as detailed in Section 2.1 cannot be provided, a design waiver shall be requested." to “However, if it is determined that the full bicycle accommodations that <i>should</i> be provided as detailed in this document cannot be provided, a design waiver shall be requested." We are assuming that the reference to "Section 2.1" is an artifact of a different incarnation of the waiver policy, and that the entirety of this document must be followed.
21	1.3	The end of Section 1.3 needs should explain the criteria for obtaining a waiver, and clearly state whether the waivers will be published once they are issued, and whether the public or MBPAC will be notified about proposed waivers before they are issued, after they are issued, or not at all.
22	1.4	First full paragraph. The text should state what the threshold is for justifying a waiver based on cost.

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23	2.1	Line 4. Change “Provide exclusive space for bicyclists” to “Provide dedicated space for bicyclists”. Under Maryland law, bike lanes are part of the roadway, meaning that pedestrians are allowed to walk in them, and automobiles are required to use the bike lane as a right-turn lane when there is no right turn lane to the right of the bike lane. Scooters or EPAMD's are often allowed to use them as well. So bike lanes are often not for the exclusive use of bicyclists.
24	2.1	“Encourage bicyclists to ride farther away from parked vehicles”. This statement is true as long as one does not stripe bike lanes in the door zone, but if we do have bike lanes in the door zone, then bike lanes may encourage cyclists to ride in the door zone. The document makes the opposite point later, but it would be clearer to simply state that bike lanes can encourage or discourage riding close to parked cars, depending on where and how the bike lane is striped.
25	2.1	We also suggest adding another bullet: “Increase passing distance for motor vehicles overtaking a bike by guiding motor vehicles farther to the left”.
26	2.2	Buffered bike lanes or cycle tracks should be considered as an alternative to bike lanes on roadways with high traffic volumes and speeds greater than 35 mph. Especially in urbanized or suburbanized areas where bikeshare is planned or being implemented, bike lanes with barrier protection measures should be considered. Under some circumstances, the flexible posts of a cycle track may provide useful buffering on new roads built with bike lanes, which are much narrower than the wide shoulders common on many state highways.
27	2.2	<p>Table 2.1 provides a useful conceptual framework, but the bike lane widths provided in the table are too narrow in some cases, representing a step backward compared with both AASHTO and the 2005 SHA guidelines. Although it retained 4 feet as the minimum width for a bike lane, the new AASHTO guidelines state that the preferred width is at least 5 feet. This table is supposed to represent preferred, not minimum, so including 4-foot bike lanes is less bicycle friendly than AASHTO. Moreover, the 2005 SHA guideline specified 5 feet if either the “operating speed” exceeded 34mph or the road had 10,000 ADT. Along most state highways, a speed limit of 30 mph would leave operating speeds above 35 mph, so under the old guideline the extra foot would be added for roads with a speed limit of 30 mph, while under the proposal that extra foot is not added until the speed limit reaches 40 mph.</p> <p>Two other problems with the new guideline: The volume of trucks and buses is important, but the percentage of vehicles that happen to be trucks or buses is not important. That is, if 8 trucks pass every 10 minutes, it makes no sense to say that the lane should be narrower if 200 cars also pass than if only 50 cars pass, yet that is the implication of the 8% standard.</p> <p>A second problem is that safe bike lane width depends on both the hazards to the right and the hazards to the left. We think that a 4-foot (plus gutter) bike lane is sufficient only if all of the following are true: the actual speed of 85% of the traffic is less than 35 mph, there are few trucks and buses, there are no driveways and few cross streets. We think that an additional foot should also be added for each of those conditions, and that an extra foot should be added if 15% of the actual traffic speeds exceed 50 mph. Thus, if all of those factors are present, the preferred bike lane should be at least 8 feet (in an area where parking is prohibited).</p>

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28	2.2	<p>We think it is reasonable to state that an 8-foot bike lane is needed if there are significant cross streets, and lots of trucks traveling at 50 mph. Regular engineering standards would put a sharrow 4 feet from the curb, that is, 3 feet from the edge of the pavement. Given the width of bicycle and some wobble, the cyclist's left shoulder would be 5 feet from the curb, that is, 3 feet from the line separating the bike lane from the general travel lane. A ten-foot truck in the center of the right travel lane would be 6 inches from that same line. At speeds greater than 50 mph, a 3.5 foot clearance between the bike and a truck is not excessive. While we recognize that some drivers are occasionally tempted to treat wide shoulders as travel lanes, the state already has many 10-foot shoulders and cyclists generally prefer those wide shoulders to narrow bike lanes.</p>
29	2.2	<p>The continued guidance to stripe bike lanes within the door zone is an unjustified hazard. The practice should be discontinued, except for when the door zone is marked, and even then, only if the speed limit is no greater than 30mph. There are two problems with door zone bike lanes. First, novice cyclists who do not recognize the hazard are encouraged to ride in the door zone by the illusion of safety promoted by a bike lane. Second, experienced cyclists who ride along the left edge of the bike lane to avoid the hazard, are behaving unpredictably from the perspective of a driver who is expecting them to be in the bike lane, and as a result, sideswiping sometimes occurs. The swing of a door from an SUV can easily reach 10-1/2 feet from the curb, so that a cyclist in the middle of a bike lane can be struck even if the parking lane extends 9 feet from the curb. Along low-speed roads, door-zone markings can mitigate both of these hazards by encouraging cyclists to ride farther to the left and making it clear to drivers why they are doing so; as speeds increase, however, the risks from cyclists partially to the left of the bike lane can increase the risk of sideswiping. (Also applies to p 2.7).</p>
30	2.2	<p>There will rarely be sufficient space for a 5-foot bike lane entirely outside the door zone. SHA should not have to choose between a hazardous door-zone bike lane and no bike lane at all. Instead, SHA should clearly mark the door zone to warn novice cyclists and also to make it clear to drivers why a cyclist might be straddling the left edge of the bike lane. Sufficient experience with door-zone markings is available to include them in the Maryland MUTCD, and we recommend that this be done. We think that some or all of the approaches for safety markings would be allowed under the existing MUTCD but clarification would be useful. If SHA believes that the markings must first be adopted into the Maryland MUTCD, then additional creation of bike lanes within door zones should be suspended until that occurs.</p>
31	2.2	<p>Where parking is permitted, a cyclist is generally advised to ride with the tires about 12 feet to the left of the curb, to remain beyond the door zone, placing the cyclist's left shoulder about 13 feet from the curb. Assuming modest speeds of 30 mph, the left stripe should be approximately 14.5 feet from the curb, as recommended by NACTO. As speeds increase, additional buffering is needed to the left. The actual width of the bike lane is less critical than the distance of the left stripe of the bike lane from the curb, since the portion of the bike lane within 10.5 feet of the curb is within the potential door zone.</p>



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32	2.4	Figure 2.7 is a bike lane with parking but the note at the bottom is for bike lanes without parking. This would be a good place to remind the reader that to avoid the door hazard, cyclists must ride to the extreme left of the bike lane whenever cars are parked flush against the bike lane line.
33	2.7	Section 2.4, Bike Lanes Adjacent to Angled Parking. The text should address the extent to which some vehicles exceed the length of the “typical design vehicle” assumed when sizing parking spaces and adjacent bicycle lanes.
34	2.7	The continued guidance to stripe bike lanes within the door zone is an unjustified hazard. The practice should be discontinued, except for when the door zone is striped. (See similar comment on page 2.2)
35	2.7	In urban areas, there will rarely be sufficient space for a 5-foot bike lane entirely outside the door zone. SHA should not have to choose between a hazardous door-zone bike lane and no bike lane at all. Instead, SHA should clearly mark the door zone to warn novice cyclists and also to make it clear to drivers why a cyclist might be strandline the left edge of the bike lane. Sufficient experience with door-zone markings is available to include them in the Maryland MUTCD, and we recommend that this be done. We think that some or all of the approaches for safety markings would be allowed under the existing MUTCD but clarification would be useful. If SHA believes that the markings must first be adopted into the Maryland MUTCD than additional creation of bike lanes within door zones should be suspended until that occurs. (Similar comment for page 2.2)
36	2.7	The entire content of page 3-9 and top half of 3-10 from the 2005 version should be re-instated. This is critical information for addressing the door zone hazard. But instead of being advisory, those warning markings should be the general practice. The Maryland MUTCD should be modified to include those markings.
37	2.7	The organization, with bike lane intersection in chapter 8, is counterintuitive. Bike lane intersections should probably be relocated to the bike lane chapter.
38	2.7	Bike Lanes next to angled parking: The guideline proposed is unsafe, except for back-in parking. Particularly problematic is that this approach allows larger-than-typical vehicles to extend into the bike lane. Moreover, widening the bike lane from 5 feet to 6 feet hardly allows for a sufficient swerve. So as a general rule, where there is angled parking, bicycles should ride in the main travel lane. We suggest changing “Bike lanes may be considered between the travel lane and the parking area.” To “Bike lanes should not be considered between the travel lane and angled parking, except possibly for back-in angled parking.”
39	2.7	In section 2.6, a 14-foot lane is too narrow for a bus to pass a bike with 3 feet of clearance. Assuming that the left shoulder of the cyclist is 4 feet from the pavement edge, the right side of the bus must be 7 feet from the pavement edge to pass with the legally required 3-foot passing clearance. Thus a 14-foot lane would be sufficient for a 7-foot SUV, but a 9-foot bus would require a 16-foot lane. Cyclists may be able to pull off to the extreme right to let a bus pass, but otherwise, 14-foot lanes mean “use full lane”.

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40	3.1	Change “between 13 to 15 feet” to “from 13 to 16 feet”. Clearly 16 feet is too little space for a bike lane when a roadway has 10-foot trucks, or if the lane is next to parallel parking. So sharrows might be needed even with 16 foot lanes.
41	3.1	<p>“Help bicyclists position themselves in lanes that are between 13 and 15 feet wide, resulting in a lane too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane.” This passage needs to be clarified, because it is unclear whether the text here envisions (a) sharrows being placed to the right or (b) in the center of the lane. If (a), then how is that "too narrow...to travel side by side"? The sharrow would be promoting side-by-side. If (b), why focus on a 13- to 15-foot lane, as opposed to a 10-foot lane? It is true that 13 to 15 feet are sometimes too narrow to share side-by-side, but in this context, the reference to “13 to 15 feet” (we also suggest 13 to 16 feet) seems to be intended for cases where the lane is barely wide enough for side-by-side sharing but is still narrower than the official cutoff for “use full lane”.</p> <p>We suggest a table be added here, showing the width for (a) “use full lane possibly with sharrows in center of lane,” (b) sharrows on the right side of the lane, and (c) bike lane. That cutoff is not a simple matter of 13 feet and 16 feet, because speed and presence of trucks (and in our view volume of traffic and right-side hazard) affect the minimum width of a bike lane in chapter 2. For the same reasons, they affect the lane width needed to share side-by-side.</p>
42	3.1	Please change “Sharrows shall not be installed on roadways where the speed limit is higher than 35 mph” to “Sharrows generally should not be installed on roadways where the speed limit is higher than 35 mph.” It is well known that the NCUTCD subcommittee conducted no analysis to justify the 35mph speed limit for sharrows. According to two members of the bicycle subcommittee of the National Committee on Uniform Traffic Control Devices, 35 mph was a compromise between people who opposed sharrows and those who favored them. Sharrows could be especially useful even on somewhat faster roads to help guide cyclists through right-turn lanes or acceleration lanes, or through short stretches of roadway where a bike lane gives way to a wide outside curb lane.



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43	3.1	<p>The section on sharrows needs to be revised to emphasize the three separate situations in which they are used: (a) the center of the lane, generally with an R4-11 sign, on low speed roads that are too narrow to share side-by-side; (b) along the right side of roads with wide lanes; and (c) as warning to motorists where cyclists need to cross lanes or briefly share a lane, where there is no bike lane or pocket lane, possibly with a W16-1(3) sign. (a) The mid-lane sharrow: Unlike the R4-11 sign, which says the cyclist <i>may</i> use the full lane, a mid-lane sharrow is positive and noticeable guidance to ride in the center of the lane, and hence less appropriate at high speeds than R4-11. It is reasonable to say that the mid-lane sharrows <i>should not</i> be used on high volume roads with speed limits higher than 25mph or mid-volume roads faster than 30mph and <i>shall not</i> be used on any roads faster than 35mph, the MUTCD guidance. (b) Where sharrows are along the right side of a wide outside lane, the MUTCD speed limit is inapplicable. Whatever the hazards of riding along an outside lane, the sharrow adds safety without putting people in harm's way because they are along the right side of the road. There was no analysis to support the MUTCD speed limit, and it is clear that sharrows could be very useful on a low-volume road with wide outside lanes, possibly as an alternative to a door-zone bike lane which would be dangerous at high speeds. Rather than "shall not" the phrasing should be that approval by SHA's bike-ped coordinator is needed for sharrows about 35 mph.</p>
44	3.2	<p>As a general rule, shared lane pavement markings (sharrows) are particularly appropriate where design speeds or observed speeds are no greater than 25 mph, or to fill short gaps in bicycle facilities. At these speeds, the sharrows should usually be placed in the center of the lane unless the lane is at least 15 feet wide, i.e., wide enough so that a vehicle can pass a bicyclist, traveling directly over the chevron, with at least the three foot buffer required by law.</p>
45	3.2	<p>The sentence suggesting sharrows 11 feet from the curb is problematic. A sharrow 11 feet from the curb is comparable to a bike lane that extends 12 feet from the curb, which is to say, almost entirely in the door zone. An SUV's door can reach 3 feet beyond the parking line, which would be 11 feet with the 8-foot parking lane. Therefore, sharrows should be placed at least 5 feet to the left of the parking line, if there is one, or at least 13 feet from the curb. In many cases, however, lanes with parking to the right are not wide enough for a bike and car to share side-by-side. Assuming a 3-foot door zone and a 13-foot minimum for side-by-side sharing, lanes with less than 16 feet to the left of the parking line should have sharrows placed in the center of the lane.</p>
46	3.2	<p>Lower part of figure 3-3: This is a useful figure, but text and caption are needed to explain that this illustrates how roads should <u>not</u> be designed. The figure shows why encouraging a cyclist to ride with the tire 11 feet from the curb could result in a serious accident. In this case, the sharrow is clearly within the door zone even of this small car, which seems to be 6 feet wide. The cyclist is about to hit or barely miss the opening door, and therefore may swerve left and hit the end of a car that passed with about 6 inches of clearance. Because an SUV door would reach 11 feet from the curb, and the sharrow ought not be in the door zone at all, a second figure is needed showing that 13 feet is needed. Except the car squeezing by to the left could sideswipe the bicycle, so the sharrow needs to be in the center of the lane, given the width of the roadway depicted.</p>

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47	3.2	Some discussion is needed here—as well as in the bike lane chapter—about the effect of other right-side hazards on sharrow placement. Driveways, bushes, and cross streets all make it less safe to ride close to the right edge of the pavement; so where they are present a sharrow might need to be farther from the curb than where they are not present.
48	3.3	The guidance for the R4-11 signs should be revised in two respects. First, it needs to recognize the door zone hazard in areas with parked cars, by specifying that the signs will be used if the width of the travel lane is 16 feet or less. Cyclists should ride with their right shoulders at least 3 feet to the left of the parking lane, and allowing 3 feet for the width of the cyclist and some wobble, and the 3-foot legal passing clearance, means that a motor vehicle passing side-by-side must be 9 feet from the parking line. An 8-foot van would thus extend 1 foot beyond the line even with a 16-foot lane.
49	3.3	Secondly, for similar reasons, on roads where trucks are allowed, the 13-foot standard for R4-11 signs should be increased to 14 feet. While 14-foot lanes are rare, there was a period of time when 3-foot shoulders and 11-foot lanes were common. This does not leave enough room for a bus or truck to pass with 3 feet of clearance unless the cyclist is almost in the gutter.
50	4.2	After " Initial research indicates that a minimum opening of 12 ft should be considered to allow bicyclists to cross, without.... Please add the following sentence:  " Feedback from cyclists, however, suggests that cyclists traveling faster than 15mph sometimes have difficulty crossing rumble strips with a gap of 12 ft."
51	4.2	The section on rumble strips needs an additional paragraph explaining the limitations of rumble strips, and the possible consequences. It also should explicitly address how rumble strips are handled at intersections.
52	5.1	The section correctly emphasizes the hazards from bollards. But some additional text should be added addressing flexible bollards, which communicate that the motor vehicles should not enter without creating as much of a hazard.
53	5.1	Change " (1999 or latest edition)" to "(2012)". At the end of this paragraph, add ("The 1999 version of AASHTO's Guide for the Development of Bicycle Facilities is obsolete in many respects.") Elsewhere in this chapter, all references to the 1999 version should be replaced with references to the 2012 version.
54	5.1	The repeated reference to AASHTO (1999) concerns us, because it implies that SHA's guidelines may not have been updated to reflect improvements in AASHTO's guidelines. In many cases, SHA's 2005 guidelines were superior to AASHTO (1999) but that does not automatically mean that they were superior to AASHTO (2012). The authors should cross-compare all guidelines based on AASHTO (1999) in this document and verify whether those guidelines were improved in the 2012 version, and where so, SHA should adopt the improved version.

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55	5.3	On line 5 please add to the end of the sentence "and the conflicts produced by driveways and cross streets are not present. Such sidepaths must be carefully routed around highway entrance and exit ramps, presence of an existing or proposed sidepath should be considered in design of interchanges."
56	5.4	<p>Section 5.5. The section on surfaces should address stone dust trails and crushed stone. Stone dust trails are substantially less expensive than asphalt trails. The Maryland Department of Disabilities points out that these trails must not only be designed to ADA standards, they must also be maintained to that standard. The Department of Natural Resources views the Torrey C. Brown Trail from northern Baltimore to York, PA, as an example of a stone dust trail that is designed to industry-accepted compaction standards, is ADA compatible, has not eroded significantly, and meets multi-use objectives. The Federal Highway Administration has funded numerous stone dust trails throughout the nation, based on their interpretation that they comply with the Americans with Disabilities Act, as long as the stone dust trails have been designed to meet specific grade, slope and compaction standards.</p> <p>Crushed stone disturbs hydrology less than asphalt and is less expensive. The Access Board has approved its use, on the grounds that the relatively rough surface is unlikely to substantially impair access for those who are able to travel substantial distances, provided that the trail is well maintained. We suggest that crushed stone is an acceptable alternative to asphalt on trail sections that are more than 2 miles from an access point with transit or automobile parking access. An example is the Great Allegheny Passage heading northwest out of Cumberland, where the trail within the city is paved with asphalt, but becomes crushed stone beyond the city limits.</p>
57	5.7	In addition to the discussion of traffic control signs, a section on wayfinding signs is needed. Many trails have virtually no signs providing trail users information about destinations, directions, or distances. Conversely, the proliferation of signage is becoming a real problem in our parks. A hiker or biker begins their journey on the Blue Trail in a park, then comes to a junction and discovers they are now on the Star Spangled Banner Trail. At the next junction they are informed that they are now on the East Coast Greenway Trail. The user, no doubt unfamiliar with these regional and national trails, is left wondering: what happened to the Blue Trail? Finding the right balance for signage overload needs to be addressed as we develop more trails, many of which are part of a broader network.
58	5.7	"Keep in mind that the road is not necessarily the predominant legs of the intersection." . For readers who may overlook the meaning, we suggest you add: "It may be most appropriate for the roadway to have a stop sign or yield to the trail." The grammar of this sentence should also be fixed.
59	5.7	"As always, the least control is the best control." This idea should be given a separate bullet with additional text. We suggest: "When crossing lightly traveled roadways to which the trail should yield, the trail should have a yield sign rather than a stop sign unless the site line is seriously restricted. The excessive use of unnecessary stop signs on trails often encourages cyclists to incorrectly assume that all stop signs on a given trail are unnecessary." The document references Section 9B.03 of Md. MUTCD which provides greater detail. Perhaps Section 9B.03 of the Md. MUTCD should be reprinted in its entirety in this document.

<b>Substantive Comments</b>		
	<b>Page</b>	<b>Comment</b>
60	5.9	The document should recognize that bollards are used in most large trails to allow emergency and maintenance vehicles to access trails, while closing the trail to non-designated vehicular traffic. Also, please change “Bollards should never be placed in the center of the travel lane.” to “Bollards should never be placed in the center of the bicycle travel lane.”
61	6.3	Pages 6.3-6.21 The figures showing the bike lane narrowing to oblivion depicts a very poor design. This is not how one would stripe a highway where two lanes narrow to one, which is a far better model. What we need here instead is for the solid bike lane line to give way to dashed lines for 100 feet, and then remove the lane entirely 100 feet before the narrowing stops. As soon as the bike lane line vanishes, the sharrows can start, even though this lane may be 17 feet wide, as you are depicting a transition.
62	6.7	Pages 6.7-6.21 The bike lane widening from zero to five feet is not as bad as the narrowing, but it would be better to show a sharrow instead, and simply not stripe the bike lane until it reaches the design width. Usually, vehicles are not advised to drive across solid white lines, so why make this part of the design?
63	6.14	There is a scale mismatch in the diagram. The diagram either (a) requires a caption explaining that it is an unusual situation because there is a 7-foot parking lane, assuming that the sharrow point is 11 feet from the parking lane as indicated; or (b) the measurement showing the sharrow to be 11 feet from the curb needs to be relabeled as 13 feet, or (c) the figure needs to be redrawn to scale. In case (a) the travel lane only has 11 feet to the left of the parking lane, which is too narrow to share side-by-side. In case (b) the travel lane is 13 feet wide, which is still too narrow to share side-by-side, because only 10 feet are outside the door zone. Since both of these situations arise, it would probably be best to provide both (a) and (b). (If the parking lane is only 6.5 feet, then 11-foot sharrows would be ok, but the figure needs to make clear that this is a 6.5-foot to curb parking lane for compact cars.)
64	8.0	The Maryland Modified T Intersection is not addressed in Chapter 8. We recommend adding The Maryland Modified T Intersection and changing the design to include a refuge in the wide portion of the "T". We also suggest the document include mountable curbs to allow cyclists to enter and leave the refuge when traffic permits. We say this because the MMT intersection requires a cyclist to merge across two or more lanes of traffic to arrive at the far shoulder or bike lane. Using a refuge in the center of the "T" would allow cyclists to make a perpendicular crossing when clear. See Photo at right.
65	8.1	Chapter 8 seems incomplete. The title suggests that it is about intersection design, but it only addresses bike lanes at intersections. That is certainly an important topic, but there are some other facilities that have critical problems at intersections. Some are covered elsewhere, such as trails. But the design of intersections where cyclists ride on the shoulder is omitted, consistent with the deletion of the entire chapter on shoulders. This leaves us with an inconsistent organization: Intersections for trails are in the trail chapter, while bike lane intersections are in the intersection chapter. Either all intersections (including shoulders) should be addressed in chapter 8, or all intersections should be addressed within the chapters where particular facility types are addressed. This counterintuitive organization appears to have be a consequence of removing the pedestrian material from the previous edition.

<b>Substantive Comments</b>		
	<b>Page</b>	<b>Comment</b>
66	8.3	Figures 8.2 and 8.3: In order to facilitate safe left turns from right-side bike lanes, bike boxes or two-stage queue boxes may be considered, and they should be considered in the case of cycle tracks and buffered bike lanes.
67	8.7	<p>The guidance on J-turns is useful, though additional elaboration is needed. A figure is needed to illustrate the required design.</p> <p>We question the notion that cyclists will walk their bikes across 5 lanes of traffic; more likely they will ride their bikes. Thus, the design should reflect that reality. Moreover, the design must explicitly recognize that drivers on multi-lane highways neither stop nor yield to pedestrians in crosswalks. Therefore, a safe crossing requires pedestrians to wait until all lanes of traffic in a given direction are clear. A path from one side, to the median, to the J-turn island, to the other side, may be safer than simply crossing to the median because in the former case one need not wait until both through traffic and left-turning traffic are clear at the same time.</p>
68	8.7	<p>Change "If a bicyclists wishes...." to "In theory, if a bicyclist wishes..." Then add: "A more common practice is for cyclists to proceed straight through the intersection by navigating around or carrying their bikes over the part of the island that separates through traffic from left-turning traffic on the main highway. Cyclists then make the design left turn from the main highway to the cross street. Cyclists have asked District offices to provide a cut through the J turn island perpendicular to the main highway, wide enough for a bike but not a motor vehicle." Then explain where this may or may not be a viable alternative.</p> <p>That explanation should recognize that the common cycling practice, for practical purposes, allows the cyclist two places of refuge so that the cyclist need not simultaneously cross through traffic and left-turning traffic, unlike a crosswalk from the roadside to the median. That is: First the cyclist crosses when the through traffic from the left is clear, then the cyclist enters the left-turn lane when the left-turning traffic coming from the left is clear, and finally the cyclist makes a left turn when the through traffic coming from the right is clear. By contrast, a pedestrian crossing the median must wait until both the through traffic and left turning is traffic is clear.</p>
69	8.7	The section on J turns should either drop the suggestion that bikes will follow the right-U-right routing, or add guidance to facilitate it. Such guidance should include bike lanes along the left side of the highway up to the U-turn, and perhaps for some distance in the other direction after the U-turn, as well as some W16-1(3) signs to warn drivers of the crossing bicycles. A direct accommodation of cyclists through the J-turn islands seems more reasonable, in most cases.
70	9.1	Table 2 and 9.1. The preferred shoulder widths should be based not on the posted speed limit but the design speed or average observed speed of the roadway. It's the speed at which traffic <i>actually moves</i> that matters, not the posted limit.
71	B-3	The definitions of many terms are based on the MUTCD rather than the Maryland code. Where the two are different, the Maryland code should be used. For example, the definition of shoulder is incorrect, because shoulders are not part of the roadway. We suggest that the authors use the definitions in the Maryland Code except for terms that have no such definition.

<b>Substantive Comments</b>		
	<b>Page</b>	<b>Comment</b>
72	Chapters 5,6,7, 8	<p>The order of Chapters 5-8 these chapters is disjointed, and helps create confusion about the content. Chapters 2,3 &amp; 4 discuss on-road bicycle facilities. Chapter 5 discusses off-road multi-use trails. Chapters 6 and 8 discuss on-road bike facilities. Chapter 7 discusses bike routes.</p> <p>Assuming that Chapter 8 is broadened to include all types of intersections, one approach would be to re-order the chapters as follows: Chapters 1-4 remain unchanged. Move chapter 6 to become chapter 5. Move chapter 8 to become chapter 6. Chapter 7 (bike routes) remains unchanged. Move chapter 5 (shared use paths) to chapter 8.</p> <p>If Chapter 8 remains entirely focused on bike lanes, however, then it should be folded into the bike lane chapter, with chapter numbers in the preceding paragraph adjusted accordingly.</p>

<b>Editorial Comments</b>				
	<b>Page</b>	<b>Comment (or Current Content)</b>	<b>Recommended Change</b>	<b>Rationale</b>
75	0.0	Photographs	Increase the size of photographs to at least triple the current size. Photographs play a vital role in this document and much larger photographs would serve the document, SHA and document users well.	Current photographs are much too small to determine details that will help illustrate the features of bicycle facility design.
76	0.0	Photographs and illustrations are located on multiple locations throughout the document	Locate all photographs that are smaller than the entire width of the page on the same side (preferable the right) side of the page.	This format will be easier to follow and provide improved consistency in the document
77	1.0	lacks page numbers	These pages, with the Table of contents, list of tables and list of figures need page numbers. Since they are technically before the body of the document, these pages should be numbered, starting at the Table of Contents as "ii, iii, iv . . ." (First 6 pages)	proper numbering of pages
78	1.1	". . .to provide transportation planners and engineer guidance.. ."	". . . to provide transportation planners and engineers guidance . . ."	plural reference to planners should also be reflected in plural reference to engineers



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79	1.3	". . .be evaluated by the ADE for Traffic and the Office . . ."	". . .be evaluated by the ADE for Traffic (ADE-T) and the Office . . ."	This is the first time the title ADE for Traffic is used and the abbreviation is used several times in the future. This is the proper place to insert the acronym ADE-T, and except for when ADE-T starts a sentence, should be used in all future references to this position.
80	1.4	"The ADE for Traffic reviews the project . . ."	The ADE-T reviews the project . . ."	Use the previously defined acronym.
81	1.5	Please add "and predestrians" at the end of the final sentence		
82	2.1	Please change "as they:" to "as they may:" at the end of the two sentence that introduce positive and negative features of bike lanes.		
83	2.3	2nd paragraph under BIKE LANE Signs: ". . .where the bike lane is unexpected, where there is a history of . . ."	. . .where the bike lane is unexpected, or where there is a history of . . .	proper grammar
84	2.3	Please add a picture or illustraton to illustrate the configuration of the parking T's, which are often improperly placed.		
85	2.3	Please change "A NO PARKING sign (R8-3) may be used in conjunction with the R3-17 in areas where parking in the bicycle lane is problematic" to "A NO PARKING sign (R8-3) may be used in conjunction with the R3-17 in		

Editorial Comments				
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		areas where parking is likely or has occurred."		
86	3.3	Text on page 3.3 refers to Figure 3.5b. Text on page 3.4 refers to Figure 3.5a.	<p>Page 3.3: Change "BICYCLES MAY USE FULL LANE sign (R4-11, see Figure 3.5b)" to "BICYCLES MAY USE FULL LANE sign (R4-11, see Figure 3.5a)".</p> <p>Page 3.4, last bullet before figures: Change, ". . . a standard R4-11 sign (see Figure 3.5a)." to: ". . . a standard R4-11 sign (see Figure 3.5b)."</p> <p>Page 3.4: Re-label Figure 3.5b to 3.5a and move to left side of page. Re-label Figure 3.5a to Figure 3.5b and move to right side of page.</p>	Accepted practice is to refer to photographs/figures in sequential order. Text in this section refers first to Figure 3.5b, then Figure 3.5a. Recommended changes put both text and figures in proper sequential order.
87	3.3	Typo on page 3.3, the last paragraph before the bullet points, the last sentence. "The sign <del>is</del> should be used in the following circumstances."		
88	3.4	last bullet before figures 3.5a & 3.5b: "Where major routes where cross major . . ."	Delete 2nd "where": Where major routes cross major . . ."	Delete the un-need word in the sentence.
89	3.4	Typo on page 3.4, the third bullet point: "Where major routes <del>where</del> cross major jurisdictional boundaries;.."		

<b>Editorial Comments</b>				
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90	4.1	3rd paragraph refers to W10-12 warning signs. There are no figures illustrating this sign	Insert an illustration of warning sign W10-12. Re-number the subsequent figures in the chapter and make necessary changes in the text to refer to re-numbered figures.	Consistency. Elsewhere in the document there are figures to illustrate signs discussed in the document.
91	4.2	2nd paragraph: ". . .should be a minimum of 4 or 6 feet of smooth . . ."	". . . should be a minimum of 4 to 6 feet of smooth . . ."	As written, the bike lane would be either 4 or 6 feet. With the change it can be any width in between 4 ft and 6 ft.
92	4.2	Change "considered" to "provided" in the 4th line from the bottom		
93	5.3	". . .and not conflict with the overhead clearance restrictions nor create a safety . . ."	"and not conflict with the overhead clearance restrictions or create a safety . . ."	Current use of "nor" is incorrect. "nor" is properly used subsequent to the word "neither."
94	5.3	There is no discussion in the body of the document referring to Figure 5.2.	Insert text in the body that refers to and points out the features of this multi-use trail	Every figure should have referring text that adds details and value to the illustration.
95	5.4	Second bullet, "Sharp kinks created to curve. . ."	"Sharp bends in a trail to curve . . ."	Recommended usage is more descriptive and uses a more common word for this situation.
96	5.4	There is no discussion in the body of the document referring to Figure 5.3.	Insert text in the body that refers to and points out the features of this multi-use trail	Every figure should have referring text that adds details and value to the illustration.
97	5.5	There is no discussion in the body of the document referring to Figure 5.3.		The text should explicitly refer to Figure 5.4
98	5.5	Caption	Move the caption to a point centered below the figure	Consistency with all other captions for photographs and illustrations.

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99	5.5	" . . . Can be found by the following formula: R=0.067V <sup>2</sup> /Tan Θ"	" . . .can be found by using equation (1) $R = 0.067 V^2 / \text{Tan } \Theta$ (1) where R=Minimum . . ." Place the (1) near the right margin	Standard practice in technical documents is to dedicate the entire width of the document to the equation and assign a number to the equation. Put the text "where R= . . ." below the equation. This allows you to refer to equation (1) very clearly anywhere else in the document.
100	5.5		Use the same technique and refer to this equation as (2) and place the (2) vertically aligned beneath (1)	Standard practice in technical documents is to dedicate the entire width of the document to the equation and assign a number to the equation. Put the text "where R= . . ." below the equation. This allows you to refer to equation (1) very clearly anywhere else in the document.
101	5.5	"f = Coefficient of friction (see table below)"	"f = Coefficient of friction (See Table 5.1, below)	Standard practice in technical documents is to dedicate the entire width of the document to the equation and assign a number to the equation. Put the text "where R= . . ." below the equation. This allows you to refer to equation (1) very clearly anywhere else in the document.
102	5.5	This is truly a table and should be treated as such	Put the data in the two columns in a boxed table. Add a caption, "Table 5.1 Friction Factor on Pavement"	Proper treatment of data in a table format. Add this to the list of tables.

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103	5.6		Treat this equation like the discussion about equations above label this (3)	Standard practice in technical documents is to dedicate the entire width of the document to the equation and assign a number to the equation. Put the text "where R= . . ." below the equation. This allows you to refer to equation (1) very clearly anywhere else in the document.
104	5.9	Change "more than 4 lanes" to "at least 4 lanes"		
105	7.1	(Rockville and Frederick so far)	(Rockville, Hagerstown and Frederick so far)	Hagerstown approved its Bicycle Master Plan in March 2010, and is implementing it.
106	8.7	The first bullet point indicates Figure 8.X. Please update Figure number with correct photo.		