

AASHTO and Door Zone Bike Lanes

Wayne Pein wpein@nc.rr.com



May 2004

AASHTO and Door Zone Bike Lanes.

Introduction

The standards for bike lane placement next to on-street parking in both the AASHTO *Guide for the Development of Bicycle Facilities* and AASHTO's *A Policy on Geometric Design of Highways and Streets* are in error and create dangerous door zone bike lanes (DZBL).

Instructive is an excerpt from an article about DZBLs that mentions the infamous Dana Laird fatality that occurred in Cambridge, MA due to a "Dooring" incident:

"Of interest to people in the world of bureaucracy is that the Cambridge bike lane met the guidelines of the American Association of State Highway and Transportation Officials (AASHTO) with five inches to spare. The lesson there is that the AASHTO guidelines need some work with a red pen. Nowhere else in traffic engineering would someone dream of posting a traffic control device that road users would need to disobey to save their lives. When we stop crying, let's laugh this one off the table."

John Schubert, bicycling author and expert witness.

See: <http://www.bikexpert.com/massfacil/cambridge/doorzone/laird1.htm> for analysis of the Laird fatality and additional pictures of the DZBL at: <http://www.bikexpert.com/massfacil/cambridge/massave/massave.htm>

Background

The AASHTO *Guide for the Development of Bicycle Facilities*, the "Guide" says:

"For roadways with no curb and gutter, the minimum width of a bike lane should be 1.2 m (4 feet). If parking is permitted, as in Figure 6(1), the bike lane should be placed between the parking area and the travel lane and have a minimum width of 1.5 m (5 feet). Where parking is permitted but a parking stripe or stalls are not utilized, the shared area [parking plus bike lane] should be a minimum of 3.3 m (11 feet) without a curb face and 3.6 m (12 feet) adjacent to a curb face as shown in Figure 6(2). If the parking volume is substantial or turnover is high, an additional 0.3 to 0.6 m (1 to 2 feet) of width is desirable."

AASHTO's *A Policy on Geometric Design of Highways and Streets*, the "Green Book" says:

"...the desirable minimum width of a parking lane is 2.4 m [8 ft]. However to provide better clearance from the traveled way and to accommodate use of the parking lane during peak periods as a through-travel lane, a parking lane width of 3.0 to 3.6 m [10 to 12 ft] is desirable. This width is also sufficient to accommodate delivery vehicles and serve as a bicycle route, allowing a bicyclist to maneuver around an open door on a motor vehicle."

Discussion

The *Guide* specifies that the leftmost bike lane stripe be 12 feet from curb face, and the *Green Book* 10-12 feet. Parked vehicles with open doors occupy approximately 10 feet of space from curb face (trucks and some cars can be wider), leaving only 2 ft of operating clear zone. <http://www.bikexpert.com/bikepol/facilities/doorwidth.htm> provides vehicle parking widths. Bicycles are 2 feet wide, or wider with accessories. Thus, a bicyclist just to the right of the line as depicted in Figure 1 will not have any shy buffer to an extended door. A bicyclist further right is directly in the door zone. With such a bike lane placement, bicyclists should ride to the **left** of the line, not to its right as intended by design.

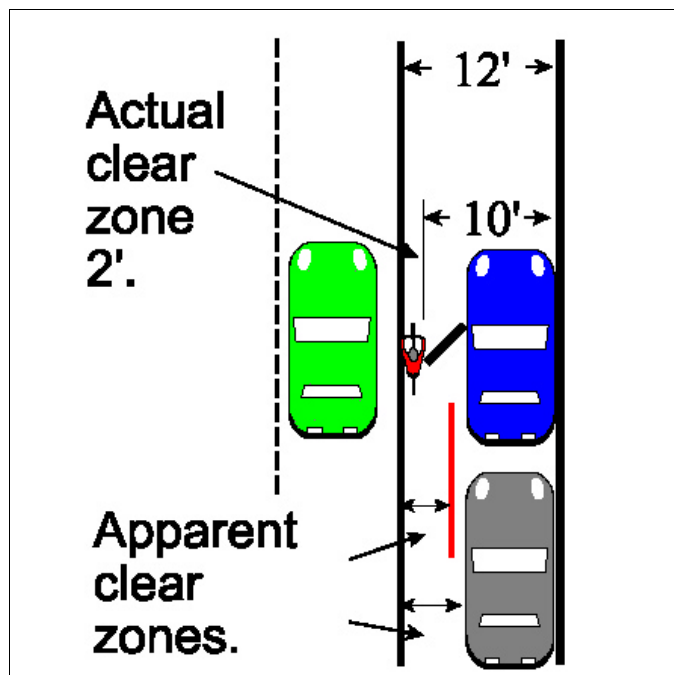


Figure 1. AASHTO's specifications are dangerous.

With an increase in lane placement to 13 or 14 feet as the *Guide* allows, the bicyclist would have a 3 or 4 foot wide operating clear zone (4 feet is the minimum width of no-parking type bike lanes), yet still without shy buffer from the door zone. A bicyclist tracking along the centerline of the *apparent* clear zone is at risk of a “Dooring” collision. In order to safely operate to the right of the line, bicyclists would need to use, and know that they needed to use, only the leftmost quarter of the apparent clear zone (side of vehicle, door closed).

If a bike lane right-side/parking lane stripe is used (shown as a red line in Figure 1), the apparent clear zone is the width of the channelized bike lane. With this design, a bicyclist is strongly lured into tracking along the centerline of the bike lane. To provide adequate clearance, the bike lane right-side stripe should be at 12 feet from curb face.

It is abundantly clear that the AASHTO specifications are misleadingly hazardous. Simply put, the provisions of AASHTO design manuals place bicyclists where they are at risk of collision with suddenly opening parked vehicle doors. How are bicyclists expected to “maneuver around,” as the *Green Book* states, a door that may abruptly open, affording near zero reaction time and stopping distance? Motorists are not expected to be able to stop or swerve under similar conditions, and it is unfathomable to expect this of bicycle drivers. “Dooring” has long been a recognized hazard to bicyclists. For statistics on the incidence see: <http://www.bikexpert.com/bikepol/facilities/lanes/dooring.htm>

Typical bicycling education programs, whether taught formally or briefly described on maps or elsewhere, have long instructed bicyclists to ride more than a door's width from parked cars. Bicyclists should be instructed and lead to track a minimum of 5 feet from the side of parked vehicles to provide minimal clearance from potentially opening doors; additional clearance is desirable, particularly as bicyclist speed increases. Wider bicyclists should track further left. Moreover, ample spacing from parked vehicles improves sight triangles, and increases bicyclists' conspicuousness, reducing the likelihood of other collision types, including, counterintuitively, Overtaking type collisions.

“Parking Cross” obstruction marking can be used to mark a parking lane, delineate individual stalls if desired, and visually and tactically communicate to bicyclists, and motorists, the necessary 5 feet of clearance from parked vehicles. If thermoplastic is used, the 5 foot lateral extensions create a rumble strip effect, further deterring operation in the Door Zone. For a paper discussing on-street parking, door widths, and “Parking Crosses” see: http://www.humantransport.org/bicycledriving/library/door_zone.pdf

An emerging treatment that enables full flexibility in bicyclist lateral position, in contrast to a restrictive bike lane, is a bicycle chevron stencil on pavement, which has been shown to improve bicyclist lateral position next to parking. In contrast to the San Francisco study placement of 11 feet from curb face, the chevron should be placed 13 ft from curb face to ensure that those bicyclists who may ride to its immediate right adequately clear potentially opening doors.

See: <http://www.bicycle.sfgov.org>

[/site/uploadedfiles/dpt/bike/Bike_Plan/SF_SharedLaneMarkingReport-Feb04.pdf](http://www.bicycle.sfgov.org/site/uploadedfiles/dpt/bike/Bike_Plan/SF_SharedLaneMarkingReport-Feb04.pdf)

Conclusions

AASHTO’s standards for bike lanes with on-street parking are poorly conceived pseudoscience, are at odds with its own lateral clearance specifications for vehicles, result in benighted policies regarding bicycling, and should be abolished. The specifications are misleading and dangerous even at their most liberal width. They fail the principle of First Do No Harm. Prudent practice and the Engineers Code of Ethics require maintaining a margin for safety: “Engineers shall hold paramount the safety, health, and welfare of the public.”

Bicycle drivers should expect an obstacle-free travel way, as do motor vehicle operators. Bike Lanes that invite and constrain bicyclists to ride in the Door Zone create an unacceptable hazard with a potentially suddenly-appearing fixed object. Bicyclist safety is more important than motorist overtaking convenience.

Marking BLs within the Door Zone is either a breach of safety by the unaware, or a negligent act by those who are mindful of the hazard. Educational interventions and engineering practice must be targeted in concert to result in bicyclists operating outside of the Door Zone.

It must again be strongly emphasized that bike lanes are non-standard structures that are inconsistent with standard roadway design practice and traffic theory for drivers of vehicles. Attempting to draw lines between motorized and non-motorized traffic simply based on the type of engine used is guaranteed to result in operational, logistical, fiscal, educational, and social difficulties.

Listing of Links.

1. Width occupied by parked motor vehicles.

<http://www.bikexprt.com/bikepol/facil/lanes/doorwidth.htm>

2. Analysis of Dana Laird fatality in DZBL.

<http://www.bikexprt.com/massfacil/cambridge/doorzone/laird1.htm>

3. Pictures of Massachusetts Ave., Cambridge, MA DZBL.

<http://www.bikexprt.com/massfacil/cambridge/massave/massave.htm>

4. Dooring statistics.

<http://www.bikexprt.com/bikepol/facil/lanes/dooring.htm>

5. Discussion of bicycling with on-street parking, Dooring, and “Parking Crosses.”

http://www.humantransport.org/bicycledriving/library/door_zone.pdf

6. Report of bicycle chevron stencil for use on roads with on-street parking. The San Francisco Department of Parking and Traffic also found that the 85th percentile of cars doors observed opened to 9'6" from the curb.

<http://www.bicycle.sfgov.org>

[/site/uploadedfiles/dpt/bike/Bike_Plan/SF_SharedLaneMarkingReport-Feb04.pdf](http://www.bicycle.sfgov.org/site/uploadedfiles/dpt/bike/Bike_Plan/SF_SharedLaneMarkingReport-Feb04.pdf)

Article Excerpt.

Quote by John Schubert taken from, “Pretending to accommodate bicyclists is no solution. Don’t sweep known safety hazards under the rug.” This article first appeared in Southwest Cycling News of Austin Texas. Copyright 2002 by John Schubert.