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February 19, 2008

Federal Highway Administration
Office of Transportation Operations
400 Seventh Street, SW, HOTO
Washington, DC 20590

By email to MUTCDofficialrequest@dot.gov

Subject: Comments on City of Portland's Request for Permission to Experiment with a
Bicycle Box and Colored Bicycle Lane Intersection Treatment

Dear Sir or Madam:

This is to address a letter to you dated January 14, 2008, from Roger Geller, Bicycle Coordinator, Portland Office of Transportation, transmitting a Request for Permission to Experiment with a Bicycle Box and Colored Bicycle Lane Intersection Treatment, dated January 14, 2007 (sic).

The stated intent of the proposed traffic control device is "to improve bicycle traffic safety by reducing turning conflicts, particularly with motorists turning right, and making bicyclists more visible to motorists."

I submit that the proposed traffic control device cannot meet the intent of the application, particularly at locations without right turn only lanes. Furthermore, bicycle lane striping practices at such intersections in Oregon do not conform to the 2003 MUTCD. Oregon traffic law at such intersections does not conform to the guidance in the AASHTO Guide for the Development of Bicycle Facilities. Even though the proposed traffic control device would be installed at signalized intersections, signal operation is not part of the test. Neither applicant nor researchers are registered engineers. The proposed research study is not scientifically sound because the control locations are not randomly selected, the experimental treatment is confounded with no right turn on red, and the control treatment is inappropriate. The applicant has provided no legally binding statement concerning patent or copyright of the proposed traffic control device. The applicant has changed the color of the proposed pavement markings from blue to green. The applicant has provided no information on the material to be used to apply the color to the pavement.

Oregon's failure to follow bicycle lane guidance

The application points out the problems with right hook accidents at intersections in the City of Portland. The application states, "Two 'right hook' bicycle fatalities that occurred within the span of two weeks in October 2007 exposed the seriousness of the problem and urgent need for a solution." I believe that that PDOT has misdiagnosed the problem and proposed an inappropriate

solution. They attribute the problem to right turning motorists not yielding to through bicyclists in the bicycle lane, as required by Oregon traffic law. I attribute the problem to the State of Oregon's failure to follow the guidance in the AASHTO Guide for the Development of Bicycle Facilities and the MUTCD intended to avoid right hook accidents by preventing bicyclists from riding to the right of right turning motor vehicles in the first place.

The application states, "The presence of this treatment is intended to heighten the visibility of bicyclists at difficult crossings ... by allowing cyclists to move ahead of motor vehicle traffic, which is queuing behind an advanced stop line during the signal's 'red' phase." In other words, the City of Portland expects bicyclists to ride to the right of motor vehicles on the right at a traffic signal, even though some of those motor vehicles may be turning right.

This practice exposes bicyclists to right hook accidents during the signal's 'green' phase. The application states that this problem can be addressed "by striping colored bicycle lanes into the intersection and thus identifying the area of potential conflict during the signal's 'green' phase." Such an expectation is unrealistic and places a bicyclist in the bicycle lane in danger of being right hooked.

This problem is illustrated in a photograph on the cover of a report entitled *At the Frontiers of Cycling: Policy Innovations in the Netherlands, Denmark, and Germany* <<http://www.eco-logica.co.uk/pdf/wtpp13.3.pdf>>. I have reproduced the photograph here, but I have added annotation illustrating that the right hook problem still exists for bicycle boxes when the signal is green.

As a bicycling traffic engineer, I am very familiar with the problem of right hook accidents. Early in my cycling career, I was taught by knowledgeable cyclists to avoid right hooks by never riding to the right of a right turning car. When I became involved in efforts in the State of California in the early 1970's in the preparation of design guidance concerning bicycle lanes at intersections, I helped make sure that the guidance addressed the right hook problem. The guidance that was developed is contained in the SCR 47 Committee Report, published in

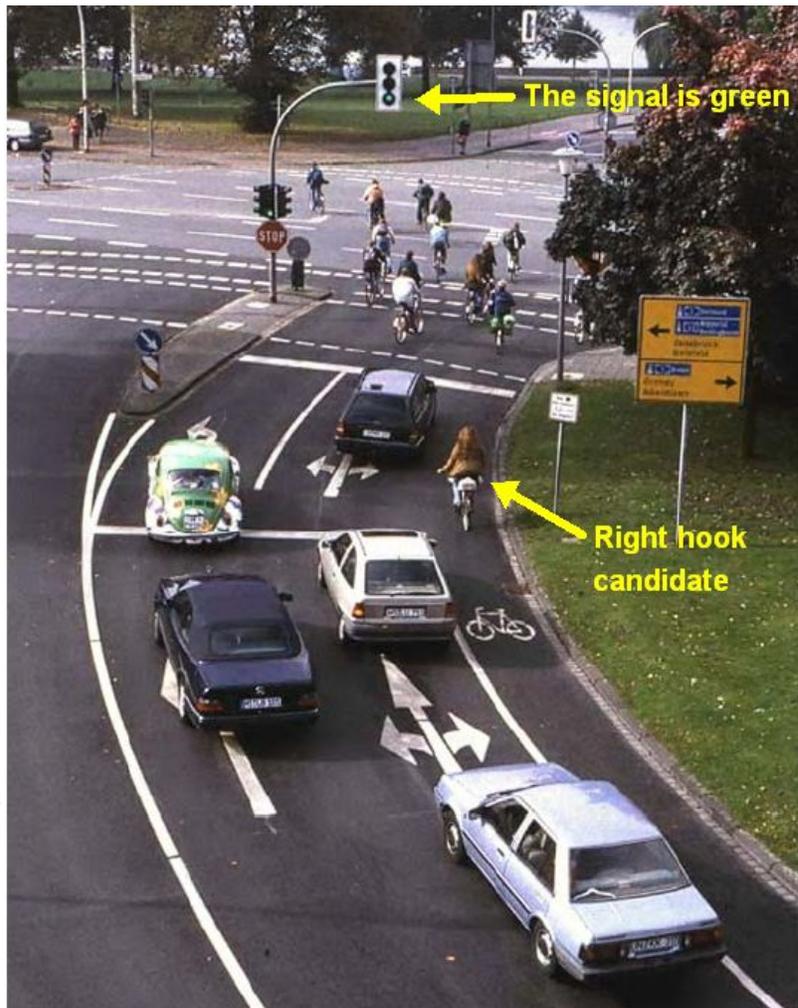


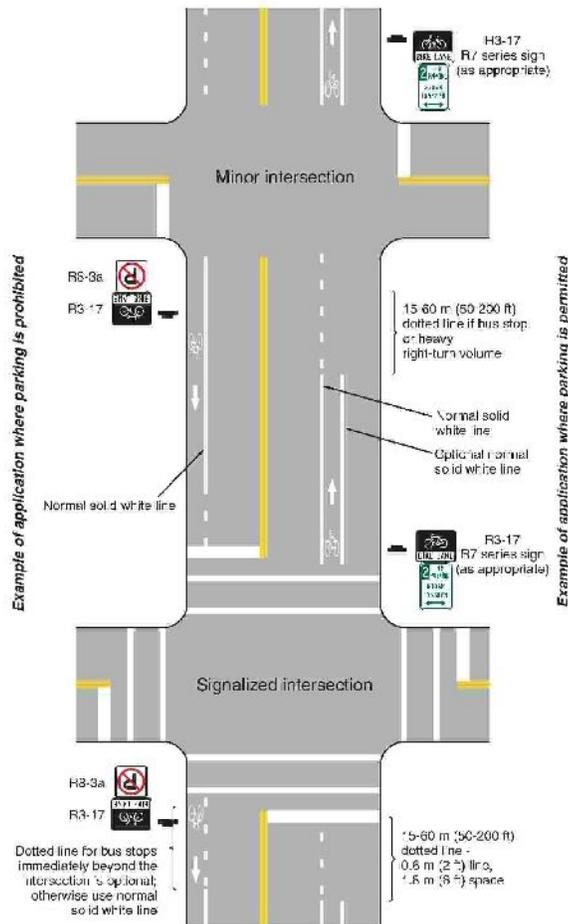
Photo: At the Frontiers of Cycling: Policy Innovations in the Netherlands, Denmark, and Germany; Annotation: Robert M Shanteau

1975 and available online at <http://rmshant.googlepages.com/SCR47Report.pdf>. The SCR 47 Committee report recommended that motorists be required to merge into bicycle lanes before turning right. Shortly thereafter, I and others recommended that bicycle lane stripes be broken before intersections in order to

encourage turning motorists to make the merge. This guidance was subsequently incorporated into the Caltrans Highway Design Manual, the AASHTO Guide for the Development of Bicycle Facilities and now Figure 9C-5 of the MUTCD, shown at right.

The application states, "The proposed device deviates (sic) from standards contained in the MUTCD, principally through the use of color to highlight potential conflict areas between motor vehicles and bikes, and through the application of color and markings in the area between the advanced stop line of back of crosswalk as an exclusive waiting area for cyclists." Actually, the proposed device deviate from the MUTCD in far more significant ways. In particular, although bicycle lanes are contained in the MUTCD, it was never envisioned that they would be used to encourage bicyclists to ride to the right of stopped motor vehicles at signalized intersections or to prohibit right turning motorists from merging into the bicycle lane before turning right.

Figure 9C-5. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street



In Oregon, motorists are prohibited from merging into bicycle lanes (ORS 811.435, 814.210, and 811.440) and bicycle lanes are striped solid all the way to the intersection. This striping practice is documented in the Oregon Bicycle and Pedestrian Plan http://egov.oregon.gov/ODOT/HWY/BIKEPED/docs/or_bicycle_ped_plan.pdf, which is apparently contained by reference in the 2003 Oregon Supplement to the MUTCD http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/docs/pdf/Oregon_Supplement_MUTCD_2003_Edition.pdf by way of this statement in section 9B.04, "The Oregon Bicycle and Pedestrian Plan gives statewide practices and recommendations for providing signs and bicycle lane markings." The problem of striping bicycle lanes solid to the intersection is shown, but not recognized, in Figures 39 (page 85) and 95 (page 126) of the Oregon Bicycle and Pedestrian Plan.

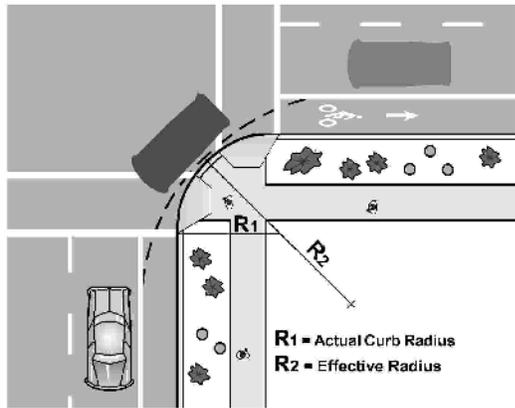


Figure 39: Effective radius at intersections is increased with bike lanes
 Source: Oregon Bicycle and Pedestrian Plan

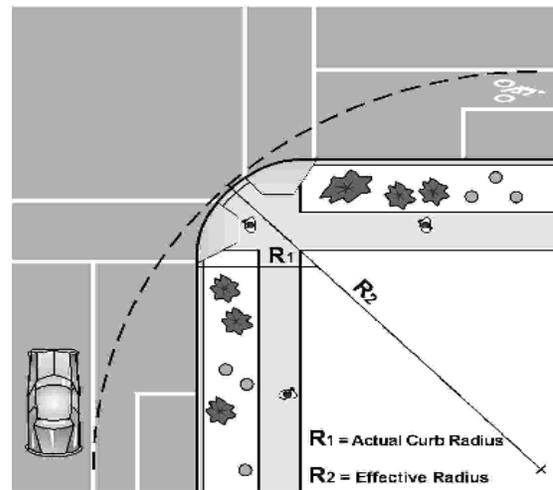


Figure 95 : Effective radius with bike lanes and parking
 Source: Oregon Bicycle and Pedestrian Plan

Section 9C.02 of the MUTCD states, "Bikeway design guides should be used when designing markings for bicycle facilities (see Section 9A.05)." The first reference listed in Section 9A.05 is the AASHTO Guide for the Development of Bicycle Facilities. The AASHTO Guide addresses bicycle lane striping at intersections on page 25. It states, "At signalized or stop-controlled intersections with right-turning motor vehicles, the solid striping to the approach should be replaced with a broken line with 0.6-m (2-foot) dots and 1.8-m (6-foot) spaces." It goes on to state, "Bike lanes sometimes complicate bicycle and motor vehicle turning movements at intersections. Because they encourage bicyclists to keep to the right and motorists to keep to the left, both operators are somewhat discouraged from merging in advance of turns. Thus, some bicyclists may begin left turns from the right-side bike lane and some motorists may begin right turns from the left of the bike lane. Both maneuvers are contrary to established rules of the road and may result in conflicts; however, these can be lessened by signing and striping. At intersections, bicyclists proceeding straight through and motorists turning right must cross paths. Striping and signing configurations which encourage crossings in advance of the intersection, in a merging fashion, are preferable to those that force the crossing in the immediate vicinity of the intersection." This guidance is illustrated in Figure 10 of the AASHTO Guide. Thus, the Oregon

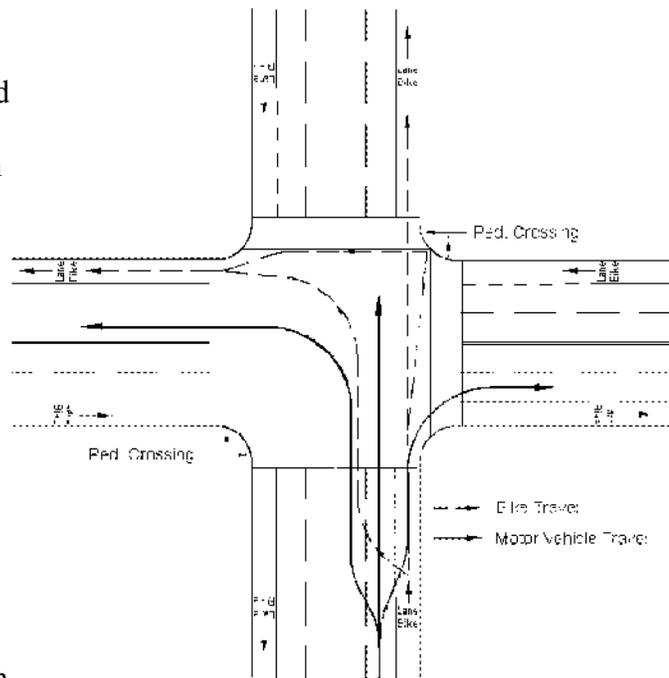


Figure 10. Typical Bicycle and Auto Movements at Major Intersections

Source: AASHTO Guide for the Development of Bicycle Facilities

practice of forcing the crossing in the immediate vicinity of the intersection by prohibiting motorists from merging into the bicycle lane before turning and striping the bicycle lane solid to the intersection violates the guidance in the AASHTO Guide.

The safety issues that the City of Portland's application is intended to address were created by the failure of the State of Oregon to follow the MUTCD and the AASHTO Guide. The appropriate response by FHWA should be to encourage the State of Oregon to change their traffic laws and bicycle lane design practices, not to experiment with a new traffic control device.

Signal operation is not part of the test

The application does not state whether the signal timing at locations where the proposed treatment is applied will be adjusted. In particular, an advanced stop line would increase the clearance distance across the intersection, necessitating a corresponding increase in the length of the all-red interval.

The application also does not state how bicyclists would be warned not to enter the bicycle box just before the green indication is shown. In Copenhagen, for example, a pre-green is used to allow bicyclists or pedestrians to enter the intersection before motor vehicles. A pre-green would also warn bicyclists that the vehicular signal is about to turn green and not to enter the bicycle box. The subject application contains no such provision.

Neither applicant nor researchers are registered engineers

Oregon engineering registration law requires that persons performing traffic engineering in the state be registered as traffic engineers (OAR 820-040-0030). According to the web site for the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) <<http://www.osbeels.org>>, Roger Geller, who signed the application, is not a registered engineer in the state. The OAR states, "Traffic engineering embraces studies and activities in connection with roads, streets, and highway traffic controls, which include signs, signals, lighting, pavement markings." By this definition, the subject application falls under the practice of traffic engineering and, since it was not signed by a registered engineer, the application is an invalid engineering document. Therefore it would not be ethical for FHWA to accept the application.

The letter from Roger Geller states, "PDOT is partnering with the Initiative for Bicycle and Pedestrian Innovation (IBPI) of Portland State University to conduct a detailed evaluation of before and after conditions at both 'test' and 'control' locations." According to its web site, <<http://www.ibpi.usp.pdx.edu>>, IBPI is located at the Nohad A. Toulan School of Urban Studies and Planning. The IBPI research team includes Lynn Weigand, Jennifer Dill, Marc Schlossberg, and Karen Dixon. According to the OSBEELS web site, none of these persons is a registered engineer in the state. The OAR states, "'Traffic engineering research' includes the investigation of theoretical and applied aspects of all areas of traffic engineering for the purpose of developing new knowledge, new interpretations, and new applications. Traffic research may include hypothetical testing; impact studies; development of traffic hardware; theory formulation; methods of analysis, synthesis, and evaluation of existing phenomena and knowledge; and development of objectivity and thoroughness so that the validity of research findings can be demonstrated." By this definition, the evaluation of the experiment with a traffic control device falls under the practice of traffic engineering and must be performed by a registered traffic engineer. No such provision is made in the application. If the experimental report were to be

prepared under the responsible charge of a person who is not registered in the State of Oregon, then it would not be a valid engineering document and it would not be ethical for FHWA to accept it.

Experimental design is flawed

In his letter, Mr. Geller states, "This experiment is being proposed at fourteen intersections identified as difficult crossings by local bicyclists and bicycle planners." The evaluation plan states, "We will install treatments at the 14 experimental locations... There will be no treatment provided at the seven control intersections." In other words, none of the 14 intersections identified as difficult crossings is included in the control group. A valid experimental design would randomly select the intersections to receive the experimental treatment from the 14 identified intersections. Therefore the experimental design is flawed and would provide no quantitative data enabling a scientifically-sound evaluation of the performance of the proposed traffic control device.

The application states, "Motor vehicles will no longer be permitted to 'turn on red' at the improved intersections." The federal government made right turn on red a requirement of receiving federal funds in about 1979 as an energy conservation measure. Instead of adding the prohibition of right turn on red as a separate treatment, the application proposes to confound the results by including right turn on red as part of the experimental measure. Thus there will be no way to separate the positive effects on bicycle safety of the colored bicycle boxes from the possibly greater positive effects of prohibiting right turn on red. In fact, prohibiting right turn on red by itself would probably go a long way toward preventing many right hook accidents.

The application states, "The advanced stop line, no turn on red, extended bicycle lane lines through intersections are all standard treatments." Although the MUTCD allows some flexibility in the location of the stop line, such as at skew intersections, there is no mention of the stop line being located differently for a bicycle lane than for the adjacent travel lane. In fact locating the stop line of a bicycle lane closer to the intersection than for the adjacent travel lane means that bicyclists, instead of passing right turning motor vehicles on the left, are expected to pass right turning motor vehicles on the right, which, as noted in the AASHTO Guide, is contrary to established rules of the road and may result in right hook accidents.

The application states, "There will be no treatment provided at the seven control intersections." That is, the control locations will continue to have the bicycle lane striped solid all the way to the intersection. More appropriate choices for control measures would include no bicycle lane at all or a bicycle lane that conforms to the MUTCD. By not including appropriate test measures, the experimental design will produce invalid results that cannot be applied at locations where the bicycle lane striping guidance in the MUTCD is followed.

The application states, "Should the results of this experiment conclude that the bicycle box treatments have been effective and successful in improving bicycle safety, the FHWA should consider standardization of the device in the MUTCD." But because Oregon traffic law differs from the guidance in the AASHTO Guide and its bicycle lane striping practices differ from the MUTCD, the results of the proposed experiment would in no way support standardization of bicycle boxes in the MUTCD.

No legally binding statement concerning patent or copyright

Section 1A.10 of the MUTCD states, "The request for permission to experiment should contain the following: E. A legally binding statement certifying that the concept of the traffic control device is not protected by a patent or copyright." The subject request contained no such statement.

Conclusion

For these reasons, FHWA should reject the subject request for experimentation.

Note that as announced on February 12, the applicant has changed the proposed color of the bicycle lanes and bicycle boxes from blue to green <<http://bikeportland.org/2008/02/12/pdot-unveils-bike-box-marketing-slogan-graphics>>. Since the application shows the color to be blue, I would expect that the application would need to be revised.

Also note that neither the letter nor the application mentions how the colored treatment will be applied. As a bicyclist for more than 30 years, I have personally fallen and know of other cyclists who have fallen on wet pavement markings. I hope that any pavement marking installed as part of the proposed experiment would have a wet coefficient of friction at least as high as the surrounding pavement.

Please keep me apprised of the progress of the request, any further correspondence between FHWA and PDOT, and of any further opportunities to provide input.

Sincerely,



Robert M. Shanteau

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Carolyn Allen-Newman <Carolyn.Allen-Newman@dot.gov>
Hari Kalla <Hari.Kalla@dot.gov>
Richard C Moeur <rcmoeur@aol.com>