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29 March 2010

Alabama Department of Transportation  
Bureau of Transportation Planning and Modal Programs  
Robert J. Jilla, Multimodal Transportation Engineer  
1100 John Overton Drive  
Montgomery, Alabama 36110

Dear ALDOT:

I reviewed the Reference 1 draft state bike plan as a League Cycling Instructor and expert in bicycle safety. I provide the following comments, observations and recommendations for the state to include in the plan:

References:

1. Alabama Statewide Bicycle and Pedestrian Plan, Dated: 2009
2. *Effective Cycling* by John Forester, Sixth Edition, 1993
3. *Bicycle Transportation, A Handbook for Cycling Transportation Engineers* by John Forester, Second Edition, 1994
4. *Effective Cycling* video, Seidler Productions, 1993
5. *Characteristics of the Regular Adult bicycle User* by Jerrod Kaplan, Masters Thesis, University of Maryland, 1976
6. *Identifying Critical Behavior Leading to Collisions between Bicycles and Motor Vehicles* by Kenneth D. Cross, Anacapa Sciences, Inc. Santa Barbara, California [Presented to the California Statewide Bicycle Committee (established by Joint Resolution of the California Legislature), Sacramento, California, 19 June, 1974.]
7. *A Study of Bicycle/Motor-Vehicle Accidents: Identification of Problem Types and Countermeasures Approaches* by Kenneth Cross and Gary Fisher, National Highway Traffic Safety Administration, 1977
8. *Bicycle Accidents And Usage Among Young Adults: A Preliminary Study* by Stuart A. Schupack and Gerald J. Driessen, Report No. 051-7, Research Department National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611, Dated: July 1976
9. *Bicycle Accidents and Usage Among Elementary School Children in the United States* by T.W. Chalapcka et al, National Safety Council, 1975
10. Crash-Type Manual for Bicyclists by Carol Tan, FHWA-RD-96-104, University of North Carolina Highway Safety Research Center

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11. NHTSA Traffic Safety Facts 2008 Data Bicyclists and Other Cyclists, DOT HS 811 156
12. 1994 National Electronic Injury Surveillance System (NEISS) study by Gregory B. Rodgers, Ph.D
13. National Survey of Bicyclist and Pedestrian Attitudes and Behavior, Bureau of Transportation Statistics Reports DOT HS 810971, DOT HS 810972 & DOT HS 810973, Dated: August 2008
14. *Risk Factors for Bicycle-Motor Vehicle Collisions at Intersections* by Alan Wachtel and Diana Lewiston (This article originally appeared in ITE Journal, published by the Institute of Transportation Engineers, September 1994, pages 30-35.)
15. *The Dilemmas of Bicycle Planning* by Paul Schimek, Massachusetts Institute of Technology Department of Urban Studies and Planning, Revised: March 2, 1999
16. *Bicycling And Walking In The United States: 2010 Benchmarking Report* prepared by Alliance for Biking & Walking
17. *Bicycling Street Smarts* by John Allen
18. *The League Guide to Safe and Enjoyable Cycling* by the League of American Bicyclists
19. *Georgia BIKE SENSE A Guide for Cyclists & Motorists*, A Publication of the Georgia Department of Transportation

Comments:

1. This plan is a bicycle facilities and engineering plan. It is not a bicycle plan. The engineering aspects may meet the minimum requirements for a bike plan under federal law. However, to achieve the goal of increasing bicycling as a form of transportation, in addition to engineering, education, enforcement, encouragement, and evaluation must be addressed. Throughout my comments, the lack of provisions to address all five “E’s” will be made clear.
  - a. Since this is a state bike plan, not an ALDOT plan, it should reflect programs various state agencies will be involved in such as the Department of Public Safety and the Department of Public Health.
  - b. While I raise issues with particular facilities design, my comments should not be interpreted that I oppose these facilities. Without these facilities to encourage cycling, people will not be receptive to bicycle education to learn about the risks of these facilities. However, the plan must recognize and reconcile the differences between improving safety and promoting facilities, while popular and provide the perception of improved safety, that actually increase crash risks.
2. The extensive use of Federal Highway Administration guidance is a limitation for this plan. Other resources such as reference 3 analyze various FHWA reports and highlight numerous problems (pgs 26-37).
3. The plan lacks a fundamental understanding of what it means to drive a bicycle as required by state law.
  - a. What fundamental principles of traffic operations must be understood to assess the bicycle facilities proposed? Such concepts as “first come, first serve,” drive on the right, yield to crossing traffic, and yield when changing lanes need to be understood. Without understanding “drive on the right” how does the plan address the multitude of cyclists that insist on driving against traffic like pedestrians are encouraged to do? Cycling against traffic is the most common cause of bicycle/motor vehicle collisions.

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<http://www.youtube.com/watch?v=qApM5F0tMuc>

- b. To these you must add principles unique to driving a bicycle such as intersection positioning and speed positioning.
- c. No assessment of the definition of as “safe as practicable” is provided in the plan. The one I teach to my students is it means what is safe and reasonable. Therefore a cyclist in the left hand portion of the left-most-lane is as far right as practicable for particular circumstances. How do the facilities proposed in the plan reinforce this principle or do they support the misunderstanding of the law that it means as “far right as possible,” which greatly increases crash risks? The following video illustrates this problem:

<http://www.youtube.com/watch?v=-Ilz5XP8xWA>

- d. The plan also does not address the layers of safety that bicycle education programs like *Smart Cycling* provide. First it teaches to control the bike, addressing falls that account for 50% of bicycle crashes (reference 2, pg 268). Then it teaches cyclists to follow the rules of the road. Crash statistics show that 50% of bicycle/motor vehicle collisions are caused by the cyclist. It then teaches how to prevent motorist mistakes. Since many of the collisions from motorists overtaking cyclists are not caused by the front bumper, but by the right side mirror or the right rear quarter panel, teaching cyclists to use the full lane reduces this crash risk by forcing motorists to pass like they would any other vehicle, in the next lane. What is the cost benefit of teaching cyclists to use the full lane, thus preventing this type of crash, vs. building bike lanes that result in increased risks?
  - e. While it is common to put bicycles and pedestrians into a common group, the modes of operation are totally different (reference 3, pgs 79-80). By including them in a common document, it reinforces the misperception that bicycles are not vehicles and is why the concept of how to drive a bicycle is so important to explain.
4. Page 1 – The first paragraph calls for accommodating bicycles in the overall transportation system. Using the term “accommodation” is incorrect. Bicycles have been accommodated in the transportation system for over 100 years. By stating that cyclists require accommodation implies that without changes to the transportation system, cycling is impossible to undertake. An example of an accommodation is wheelchair ramps on sidewalks. People in wheelchairs cannot use sidewalks without this accommodation. Cyclists have been using the existing roads quite successfully long before automobiles were. The intent of this plan is to encourage cycling and make it more popular. No accommodation is needed.

This first paragraph on this page, page 6 and page 71 emphasizes that more needs to be done to enhance cyclist safety. As I detail in further comments, this plan has not provided or proposed any means to determine how cycling is unsafe, what causes bicycle crashes, how this plan will reduce those crash types, or what assessment will be

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accomplished after implementation of this plan to see whether provisions of this plan have reduced bicycle crashes.

5. Page 5 – The first paragraph under heading “B. Bicycle and Pedestrian Planning” states that “all users including vehicles, bicyclists, transit vehicles and pedestrians.” This statement is contrary to Alabama law and principles of bicycle operation that defines bicycles as vehicles. In fact, bicyclists follow vehicular rules and should be included with planning for all vehicle types including motor vehicles than separated out and lumped with pedestrians that do not follow vehicular operating principles. Forester in reference 2 states that “cyclists fare best when they act and are treated as drivers of vehicles.” This plan needs to keep this simple principle as the center of all recommendations. The crash statistics I reference later back up this simple principle. It provides the most opportunities for cyclists to use the bicycle for transportation and reduce the risks of a crash.
6. Page 6 –
  - a. What metrics will be used to evaluate bicycling as a safe and viable mode of transportation as detailed in the first paragraph?
  - b. How is bicycling unsafe and how will this plan make it safer?
  - c. How does this plan address the risks of cycling at night, the cause of 43% of bicycle fatalities (U.S. DOT NHTSA, Fatal Accident Reporting System, 2002, and tabulations from 1998-2002 compiled for law enforcement training)? Where is a program to supply low cost headlights and taillights that law enforcement, municipal governments and cycling advocacy organizations can give out so cyclists meet the legal requirement of a headlight and make cyclists more visible? An analysis of crash statistics shows that 85-90% of bicycle crashes involve crossing traffic (reference 2, pg 265); either the bicycle pulls in front of the motorist or the motorist pulls in front of the cyclist. With the federally mandated reflectors, the headlights of the motor vehicle only illuminate the reflectors a fraction of a second before a collision occurs. This is an example of why visibility is essential to bicycle safety.

<http://www.youtube.com/watch?v=IR-RzgaR87g>

<http://www.youtube.com/watch?v=FQDRrsHpae0>

Relying on reflectors at night should raise an issue with the current Alabama law that only requires a red rear reflector. Reference 2 illustrate that current red bicycle reflectors are insufficient to alert overtaking motorists (pg 342). Reference 4 shows a comparison of detection distance of traditional bicycle reflectors compared with taillights and SAE amber reflectors. A red taillight or SAE amber reflector are more visible but do not meet the legal requirement to cycle at night in Alabama. Numerous crashes in Alabama where only bicycle reflectors were involved illustrate these risks.

- d. How does this plan address the 37% of bicycle fatalities that involve alcohol, either by the cyclist or the motorist (reference 11)? Does it address the intoxicated driver that killed Ken Kifer in Scottsboro in 2003 or the driver that killed three cyclists in Baldwin County in separate crashes in 2005 and 2007?

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- e. How does this plan address distract driving that killed two cyclists in North Alabama in less than 12 months between 2008 and 2009?
  - f. The plan needs to look at the crash statistics over the past ten years in Alabama to determine how many fatalities were reported and what are the predominate causes. 73 bicycle fatalities were reported by NHSTA in Alabama between 2000 and 2008?
  - g. How does this plan reflect that less than 20% of bicycle crashes are collisions with motor vehicles and less than 5% of collisions involve a motorist overtaking from behind (reference 2, pg 265, and reference 3, pg 97)? One of the plan authors during the Huntsville public meeting expressed a common misperception that 80-90% of bicycle crashes involve motor vehicles and 80-90% involve getting hit from behind by a driver overtaking. If the facilities included in the plan such as multi-use paths are only to address cyclists getting hit from behind, they only will affect less than 1% of bicycle crashes but put cyclists in positions that cause 30% of collisions (reference 2, pg 547). Other studies such as the reference 13 reports show only 25% of cyclists that had a crash involved a motor vehicle. Another study presented at the 2007 Bike Ed conference in Austin, TX showed that only about 10% of cyclists 18-25 had a collision with a motor vehicle.
  - h. How does this plan address the 20% of bicycle crashes with other bicycles (reference 2, pg 261)? This is another reason multi-use trails with uncontrolled bicycle traffic have such high crash risks.
  - i. How does this plan address the crashes caused by animals, primarily dogs? Approximately 8% of bicycle crashes involve animals (reference 2, pg 261). The plan does not mention or assess the need for consistent leash laws across the state to address this issue.
7. Page 9 and Page 76 – Share Use Path (Off Street): The plan does not address the available data from reference 13 that states why cyclists do not use shared paths:

The majority of nonusers said they do not use bicycle paths (58%) or bicycle lanes (51%) because of the lack of convenience, meaning they were either not available or did not go where the bicyclist wanted to go. (Vol. 1, pg 10)

8. Page 13 –
- a. Bicycle route criteria does not address the road configuration, the number of intersections, or the number of lanes. It does not address sight lines or distance due to sharp hills or curves on the roads. An assessment of crash statistics on rural roads would show that sharp hills & curves increase the risks of being hit by a motorist traveling in the same direction due to the motorist not being able to seeing the cyclist. The critical factor in preventing bicycle/motor vehicle collisions is visibility.
  - b. Since the vast majority of bicycle/motor vehicle collisions involve crossing traffic, the number of intersections is an important factor. An example of how intersections must be considered is the comparison of several smooth paved shoulders in Huntsville. The shoulders on Martin Road East and Cecil Ashburn are great facilities for cyclists because they do not have intersections. On the other hand, the westbound shoulder on the Eastern Bypass through Hampton Cove has 5 right-turn-only lanes in about a mile from Old Big Cove Road to the entrance to Hampton Cove. Cyclists

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- continue straight on the shoulder as it turns into a right-turn-only lane, violating traffic law, confusing motorists by not following expected traffic patterns, and increasing their crash risks. These cyclists should be using the right-most-through lane instead of the shoulder.
- c. The paragraph on traffic volume does not account for the time of day in the determination of an acceptable route. Many roads that are heavily traveled during morning or afternoon rush hour are perfectly usable other times of the day. This paragraph also does not address why truck traffic is undesirable. Since other municipalities will likely use these criteria to determine bicycle routes, explaining why truck traffic is undesirable due to the wind blast hazard large trucks present is necessary.
9. Page 14 & 15 – What defines “good alternative local roads?” If cyclists are treated as drivers of vehicles, any road for driving can be safely used.
  10. Page 16 – Explain why a weaving movement on Al 9 is unacceptable through Piedmont? Cyclists fare best if they act and are treated drivers of vehicles. If motorists can safely negotiate this intersection, cyclists can as well by following expected traffic patterns.
  11. Page 24 – This section does not recognize the Martin Rails to Trails that runs through Elkmont.
  12. Page 39 – This section does not recognize that Auburn is the only Bicycle Friendly Community (BFC) in Alabama. The BFC criteria should be explained and promoted.

<http://www.bikeleague.org/programs/bicycelfriendlyamerica/>

13. Page 71 – Bicycle Facilities
  - a. The plan does not recognize the role of cyclist’s speed for efficient transportation. Forester in reference 3 explains why cyclist’s speed is a critical factor in making cycling a viable form of transportation (pg 72). Facilities that reduce the speed, such as multi-use trails or excessive stop signs make those routes undesirable. Many multi-use trails, due to diverse and unpredictable users are many times limited to 10 mph or even 5 mph when crowded (reference 2, pg 547, and reference 4). These make poor choices when cyclists prefer to travel at 15-18 mph to make cycling a viable form of transportation.
  - b. This section does not explain the definition of a bicycle from Appendix A. Facility design standards are unfortunately centered on a two-wheel diamond frame bicycle designs. Other types of bicycles include recumbents and recumbent tricycles. These designs are lower to the ground, wider and have different sight lines that can be obscured by landscaping and berms in poor facility designs. The importance of sight lines as it pertains to bicycle safety is discussed earlier. The draft AASHTO 2010 bicycle design manual includes more on different types of bicycles. This section should explain the impacts of the type of bicycle have on the facility design.
  - c. The AASHTO definition for a type B cyclist creates increased safety risks for cyclists. This is an example of where relying on only engineering guidance and not cycling references results in a poor document. Forester in reference 3 explains how Type B cyclists are the least experienced but require the greatest skill to safely use

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multi-use paths and bike lanes (pg 136). An example of the conflicts caused by bike lanes can be seen in the following video:

<http://www.youtube.com/watch?v=atMouGGXmmc>

The cyclist in this video only avoids a collision by executing a “quick turn” evasive maneuver. Even type A cyclists are not familiar with this maneuver unless they have taken a *Smart Cycling* course.

Other problems with bike lanes can be seen in the following video:

<http://www.youtube.com/watch?v=E6-kXOexy3s>

14. Page 72 –

- a. Define what makes a street as “bicycle friendly?” Are the facilities based on crash statistics? What defines a safe paved shoulder? Is it just the design? Is it educated cyclists and drivers that know how to use that roadway? Is it trained law enforcement who understand bicycle law, how to enforce bicycle law and investigate bicycle crashes on that roadway? Also in this paragraph is a proper use of the term “accommodation” for shared use of a lane by both cyclists and motorists. Sharing a lane cannot be accomplished without the accommodation since in narrow lanes the cyclist will use the full lane. Using the full lane is illustrated in the following video:

<http://www.youtube.com/watch?v=-Ilz5XP8xWA>

- b. Explain how those roads which bicycles are permitted are bicycle facilities “to some degree?” What “degree” makes roads unusable by bicycles? An educated cyclist can safely negotiate all roads, even if it is uncomfortable.

15. Page 73

- a. 3<sup>rd</sup> bullet – define what makes a crossing safe? According to Forester’s analysis, multi-use paths increase the risks of a collision an average of 2.6 times, with up to 1000 times depending on the design (reference 2, pg 547, and reference 3, pg 101). When is a crossing considered safe when you put high-speed vehicular traffic outside the expected traffic pattern, especially traveling against traffic? This is another example of why visibility is so critical to bicycle safety. Cyclists driving where motorists are looking for traffic makes cyclists safer.
- b. The paragraph in the middle of the page again misuses the term accommodation.

16. Page 74 – Because this is only a facilities/engineering guide and does not address education, the plan cannot recognize lane positioning techniques taught in *Smart Cycling* classes that make shared lanes usable by all educated cyclists.

17. Page 75 –

- a. No explanation is provided on why a 5 ft bike lane is necessary next to an adjacent parking lane or with heavy truck traffic. The reason for the extra space next to parking lane is to avoid the “door zone.” An example of the risks a door zone can pose is in the following video:

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<http://www.youtube.com/watch?v=yEaR7q09AUI>

- b. The third paragraph does not explain the risks of bike lanes. These risks are why type B/C cyclists are the most at risk using these facilities. The following video illustrates these risks:

<http://www.youtube.com/watch?v=atMouGGXmmc>

The reason bike lanes pose increased risks and thus the need for education programs to accompany any facilities is that motorists are not taught that they are expected to merge into the bike lane and turn right from the bike lane. Instead they perform a “right hook” across the bike lane. This is the second most bicycle/motor vehicle collision caused by the motorist. The video shows that the cyclist only avoids a collision by executing a “quick turn.” This maneuver is taught in *Smart Cycling* classes and most type A cyclists do not know how to execute one unless they have taken a course. The other problem with bike lanes is uneducated cyclists do not know that they are expected to merge into traffic and make a left turn like all other vehicles – from the left side of the lanes. The following video shows how to do this properly which is not common knowledge:

<http://www.youtube.com/watch?v=EV2rFMzgKwU>

18. Page 77 –

- a. Why is debris a problem for bicyclists? What types of crashes does it cause (falls - the most common type) and why (they can either divert the front wheel, cause a loss of traction or cause a flat tire, resulting in the cyclist losing control). By explaining the risk these hazards present, local governments using this guidance can mitigate this hazard.
- b. The plan does not explain why rumble strips are dangerous to bicycles. What types of crashes do they cause (again - falls) and why (they divert the front wheel, causing the cyclist to lose control)?
- c. The FHWA technical advisory does not understand how to drive a bicycle. The last sentence of the second bullet suggests a wider shoulder for long steep descents. On a long descent, the cyclist can be traveling at 50 mph or higher, making shoulders unusable. *Smart Cycling* classes teach cyclists speed positioning. That is, the cyclist uses the full lane when they are traveling at or nearly the same speed as other vehicles. When cyclists understand speed positioning, they use the full lane that will be necessary to make the turns at those speeds and are not delaying motorists since they are traveling the same speed. As for rumble strips, no shoulder should ever have rumble strips on a long steep descent or cyclists that hit them will lose control and crash.

19. Pg 78 –

- a. The plan does not explain why drainage grates with longitudinal slots are dangerous. These are dangerous because they seize the front wheel, causing a crash which sends

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the cyclist over the handle bars as depicted in the following picture:



Drainage grates are not the only longitudinal road hazard that can cause this type of crash. By explaining the risk these hazards cause, local governments using this guidance can assess the various roadways for similar hazards.

- b. The plan does not address the hazards of bollards on multi-use trails. These are a significant hazard to cyclists on trails (reference 4) and expose government to liability for installing them without evidence that they are needed to keep motor vehicles off the trail. No large immovable object would be placed in the middle of a road for high-speed vehicles to hit. The same principle applies to trails. In addition, bollard spacing has caused problems due to different types of bicycles. I had a set of bollards removed in Huntsville because of the 1/4 inch clearance with my recumbent tricycle. This width problem also applies to wheelchairs.
- c. The plan does not address other road hazards such as railroad tracks, paint lines, manhole covers, speed cushions (and similar speed reduction techniques for neighborhood streets), road reflectors and metal road surfaces. These all cause falls, the most common type of bicycle crash, especially when wet.
- d. The plan appropriately references the AASHTO guidance on sidewalks not being bicycle facilities. However, since the plan only addresses facilities, it misses vital aspects of the problem with sidewalks. Why does the plan not identify training for law enforcement that harass cyclists for not being on the sidewalks? How do cyclists get educated on the risks of sidewalks? What are these risks? Reference 14 quoted by reference 15 states:

Bicycling against traffic increases accident risk by 360%, bicycling on the sidewalk increases accident risk by 180%, and bicycling the wrong way on the sidewalk increases accident risk by 430% (Wachtel and Lewiston 1994)

Reference 10 from the FHWA shows similar crash rates for sidewalks versus cycling

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in the roadway with traffic.

The plan does not recognize that Alabama is one of only eight states according to reference 16 that still have the mandatory sidepath law that causes these problems (pg 70). The uniform vehicle code has removed the sidepath law as well. It may be inappropriate for ALDOT to recommend legislation to repeal this law, but the plan should recognize that most of the country already has.

20. Pg 79 –

- a. This section of the document is missing any discussion on traffic signals. If cyclists are drivers of vehicles by law, why are traffic signal requirements not listed here so the signals will respond to our vehicles? Since many existing signals will not respond to a bicycle, education is also necessary to work around the deficiencies of engineering. There are various methods I teach students on how to trip an unresponsive signal.
- b. Any discussion of facilities must include guidelines for bike parking. There is little utility to build roads with special features to encourage cycling when there is no requirement to have parking at the destination.

21. Page 85 – Table 2 describes sources of funding that can be used for education enforcement and encouragement activities. Why are no programs for those types of funding listed in the plan? Safety/education position, police patrol, helmet promotion, safety brochure/book, and training are all programs that ALDOT can fund.

- a. Reference 17, *Bicycling Street Smarts* by John Allen, has been adopted by 5 states as a bicycle drivers manual. These books can be purchased for \$1 per copy at: <http://www.bikexpert.com/streetsmarts/index.htm>. The League of American Bicyclists has a good book, reference 18. The Georgia Department of Transportation funded their own manual, reference 19. It can be found at:

[http://www.dot.state.ga.us/travelingingeorgia/bikepedestrian/Documents/bike\\_manual\\_032305.pdf](http://www.dot.state.ga.us/travelingingeorgia/bikepedestrian/Documents/bike_manual_032305.pdf)

- b. Why is there not a program in this plan to fund free helmets for organizations to provide to children? I have heard of members of the community buying secondhand helmets to give to disadvantaged children. Those helmets may be damaged and not provide the necessary protection in a crash.
- c. Why does the plan not propose a public awareness campaign similar to what was proposed in the Huntsville CARS grant?
- d. The plan needs to recognize that Alabama has certified League Cycling Instructors but not enough to cover the entire state and resources need to be allocated to train instructors and bring the costs down so more people can take a course.

22. Page 87 –

- a. Why are AASHTO and FHWA references the only references listed? Why are John Forester's publications, references 2 and 3, NHTSA fatality statistics, reference 11, the NEISS study, reference 12, the Bureau of Transportation studies, reference 13, or the 1994 FHWA report by the University of North Carolina, reference 10, not listed? Forester provides a thorough analysis and compiles the results the crash studies in references 5 to 9 in his books.

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- b. Why is the League of American Bicyclists website not listed here? It contains considerable tips for driving a bicycle and an established, nationally recognized curriculum for cycling education that has been taught for over 30 years.

<http://www.bikeleague.org>

- c. The website for the Massachusetts Bicycle Coalition should also be listed. The law enforcement training curriculum they developed is an excellent resource for applying to Alabama. They developed the videos I linked here with various police departments around the country for a police training curriculum funded by a NHTSA grant:

<http://www.massbike.org/projectsnew/law-officer-training/>

If you have any questions on these comments, please do not hesitate to ask.

Respectfully,

A handwritten signature in blue ink that reads "David Stone". The signature is written in a cursive, flowing style.