



Accommodating Bicycles

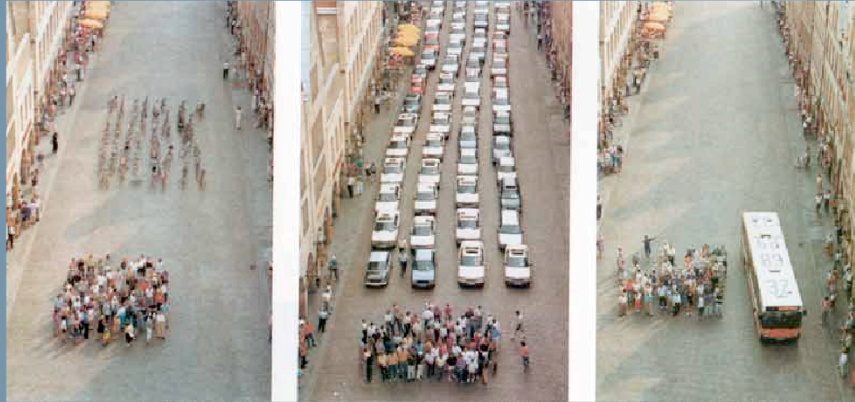
Presentation to 2010 WVDOT/MPO/FHWA
Transportation Planning Conference
October 27, 2010
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Objectives of This Presentation

As a result of this presentation, the Bicycle Board would like the participants to:

- Recognize bicycling as a valid means of transportation and an integral part of our transportation mix;
- Consider bicycling in any and all future transportation decisions;
- Look to the Bicycle Board as competent, valued and trusted bicycling consultants.

Congestion: Our Choices



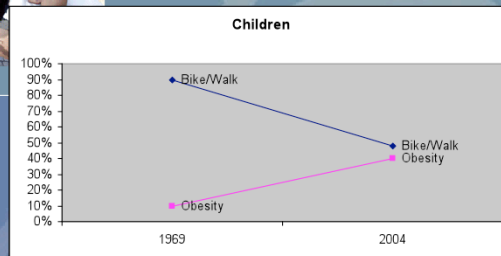
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- This picture shows the relative space required to transport approximately 72 people by foot, bicycle, car or bus.
- 1 car takes up the same space as 10 bicycles
- In terms of congestion reduction, the return on investment in accommodating bicycles for transportation is at least 10 times higher than the return on investment in accommodating single occupant motor vehicles.
- Considering that a car (say 4,000 lb) weighs more than 2 times as much as 10 people on bicycles (say 1,500 lb), the cost of building and maintaining the roadway for a car is at least 2-3 times what the cost would be for building and maintaining the roadway for 10 bicyclists so the congestion reduction ROI in accommodating bicycles goes up to 20-30 times that of accommodating motor vehicles.

Motivation



- \$2.6 Million/year: Mon Co. spends busing children to school
 - 8,500 children transported
 - 1 mile: average distance to school/child
 - 250,000 gallons fuel consumed
 - 89 buses on the road each day
- Source: Dominion Post Sep. 7, 2009 p.1-A



WV: most obese state in US
34% of West Virginians are obese

In 1969, about 90 percent of kids who lived within a mile of school walked or rode bikes to get there. In 2004, just 48 percent did that at least one day a week. In the same time obesity rates have gone from 10% to 40%.

Ref: <http://www.cdc.gov/Features/WalkToSchool/>

West Virginia has the highest obesity rate in the US according to August 4, 2010 gallup report: <http://www.gallup.com/poll/141734/One-Three-Adults-Obese-America-Three-Obese-States.aspx>

Bicyclist Equal Rights to the Road

“Every person riding a bicycle upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle by this chapter, except as to special regulations in this article and except as to those provisions of this chapter which by their nature can have no application.” WV Code 17C-11-2

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All 50 states laws have similar language.

Special regulations: far to the right as practicable; no more than two abreast; mandatory side path; number of passengers; clinging to vehicles; carrying articles; lamps, bells, brakes; helmet use under 15.

When a person is riding a bicycle off the roadway what rights and duties does he or she have?

Cyclists fare best when they act and are treated as drivers of vehicles.

We Must Make Bicycling Safer

- Cyclists fare best when they act and are treated as drivers of vehicles
- Visible + Predictable => Safe

WVDOT, MPO and FHWA decisions must enable bicyclists to operate their bicycles as vehicles and to maximize their visibility and predictability.

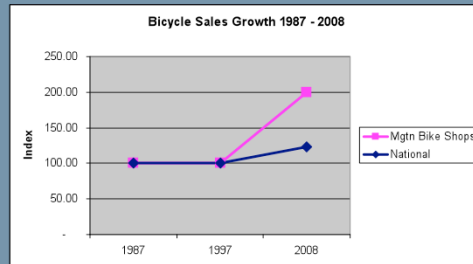
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When cyclists act as drivers of vehicles they are most visible and predictable. The law supports cyclists acting as drivers of vehicles. Cyclists must act as drivers of vehicles to be treated as drivers of vehicles. Motorists must also be educated that cyclists have the same rights and duties.

In October 2008, the City of Morgantown received a \$58K WV Transportation Enhancement Program grant to support an Effective Cycling Education Program. Education accomplishments as of August 2010:

1. Increased the number of League of American Bicyclists' League Certified Instructors in Morgantown from 2 to 5
2. Created website BikeMorgantown.com to provide educational information, course schedule and on-line registration
3. Taught 64 students the League of American Bicyclists Traffic Skills 101 course in 14 deliveries
4. Developed a 1-hour course including tests and for high school driver education instructors to conduct with their driver education students
5. Developed seven 15-second TV spots aired on networks Discovery, tbs, CNN, Comedy Central, CMT and Travel Channel
6. Published 5 monthly articles in the *Dominion Post* newspaper and on BikeMorgantown.com website. Topics include: National Bike Month; Pre-ride safety check; The law: bicyclist rights and duties; Driving around bicycles; Bicycling in Traffic
7. Developing billboards that will contain nominally 7 bicycle awareness and education messages
8. Achieved agreement with WVU to display billboard images on WVU information kiosks
9. Developed a plan for Shared Lane Markings and Bicycles May Use Full Lane

Pent up demand for accommodating bicyclists



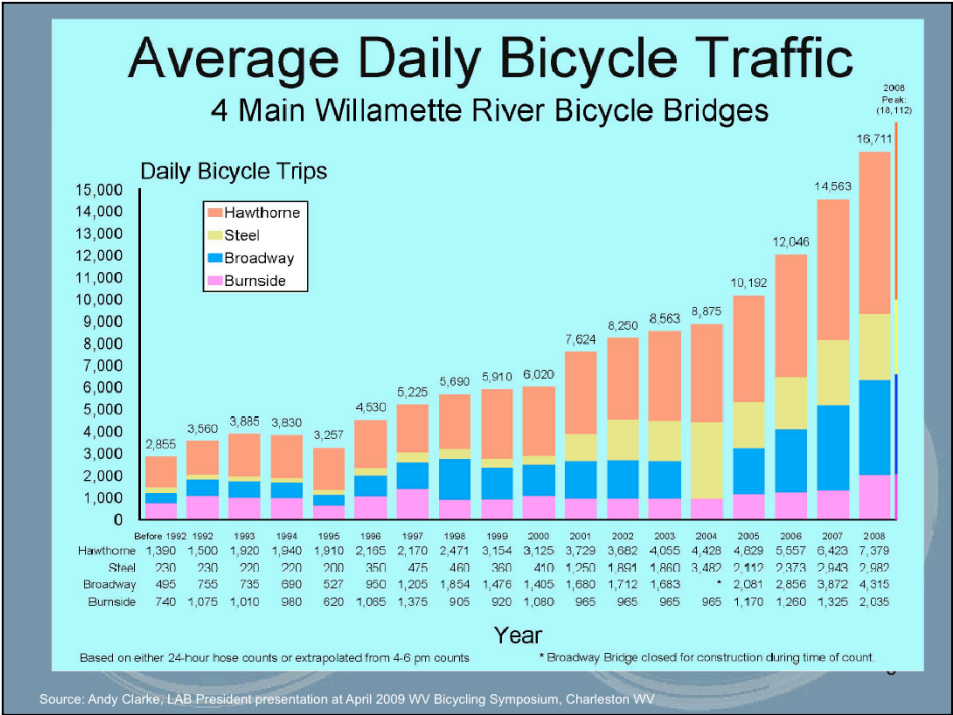
"We have sold more bikes for transportation in the last four years than in any period since 1970" – Chip Wamsley

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There is a growing pent-up demand for bicycle accommodations that include infrastructure, education, enforcement and encouragement.

National Data Source: National Bicycle Dealers Association

Local Data: Morgantown Bicycle Dealer



Increase in bicycle use in Portland OR that may be attributed to improvements in infrastructure, education, enforcement and encouragement.

Bicycling Economic Impact

- \$133 Billion/year revenue; 1.1 Million jobs – **U. S.**
- \$ 1 Billion/year revenue; 1,231 jobs – **Colorado**
- \$556 Million/ year revenue; 3,418 jobs – **Wisconsin**
- \$60 Million/year revenue; 1,440 jobs on \$6.7 Million investment – **OBX**
- \$181 Million/year revenue; 2,800 jobs from bike route; bike tourists spend 26% more than other tourists – **Quebec**
- 11% higher home value near bike facilities – **Indianapolis**

Source: Flusche, Darren, *The Economic Benefits of Bicycle Infrastructure Investments*, League of American Bicyclists, June 2009, http://www.bikeleague.org/resources/reports/report_economics.php



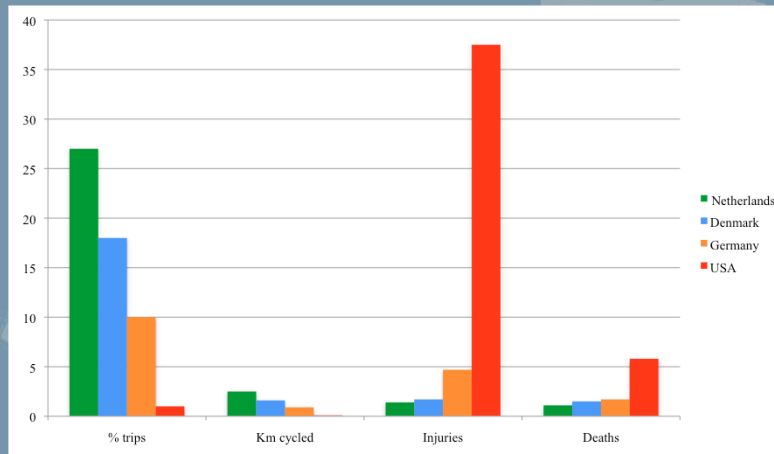
\$30 million

Source: Andy Clarke, LAB President presentation at April 2009 WV Bicycling Symposium, Charleston WV

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Economic impact of El Tour de Tucson to local economy. Tucson 2008 population: 543,959. El Tour de Tucson: 9,000 participants

Lessons from Netherlands, Denmark and Germany



* *Making Cycling Irresistible: Lessons from Netherlands, Denmark, Germany*; John Pucher and Ralph Buehler, *Transport Reviews*, Vol. 28, 2008

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Netherlands, Denmark and Germany have 10-25 times more bicycling than the US but 1/4 to 1/5 the cyclist fatalities and 1/8 to 1/25 the cyclist injuries. What are they doing differently to get so many more people bicycling while reducing injuries and fatalities?

% trips = % trips by bicycle

Km cycled = Km cycled per inhabitant per day

Injuries = Cyclists injured per 100,000 km cycled

Deaths = Cyclists killed per 100,000 km cycled



The “problem”

- Bicycles are often slower than motor vehicles so they can delay motorists and increase congestion

A solution

- Enable cars to pass bicycles safely

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In WV, the problem is most acute on the climbing side of narrow curvy roads.

Classes of Cyclists

- **Novice**
 - Afraid of traffic
 - Primarily recreational
 - Favors separation and segregation facilities
 - Limited bicycle operating knowledge and skill
 - Majority of WV cyclists... today
- **Experienced**
 - Minority... today
 - Drives bicycle as a vehicle; obeys common traffic principles
 - Uses bicycle for transportation as well as recreation
 - Needs fair access to the roads
 - Needs enforcement of the law
 - Needs to be treated as the driver of a vehicle: not a pedestrian or a child

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MPO/DOT/FHWA actions must recognize and accommodate different needs of these two groups while facilitating movement from the novice group to the experienced group.

Alternative Bicycle Facilities

Roadways



Bike Lanes



Shoulders, Bike Paths/ Rail Trails, Sidewalks



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Roadway: **Integrates** bicyclist with traffic and treats bicycle as a vehicle.

Bike Lane: **Separates** cyclist from traffic but keeps cyclist on the roadway.

Bike Path: **Segregates** cyclists from other vehicles

Roadways

- **Blind curves and blind hill crests are dangerous on narrow high speed uphill lanes: Widen**
 - New DOH policy to stripe ~2 feet in from the edge mitigates, e.g. Rt. 7 from Kingwood to Scott Ford
 - 14 feet = minimum width for cyclists and motorists to travel safely side-by-side in the lane
- **Cyclists must learn proper lane positioning and signaling to maximize visibility and predictability**
- **Motorists must yield to cyclists as required by law**
- **Police must enforce the law**

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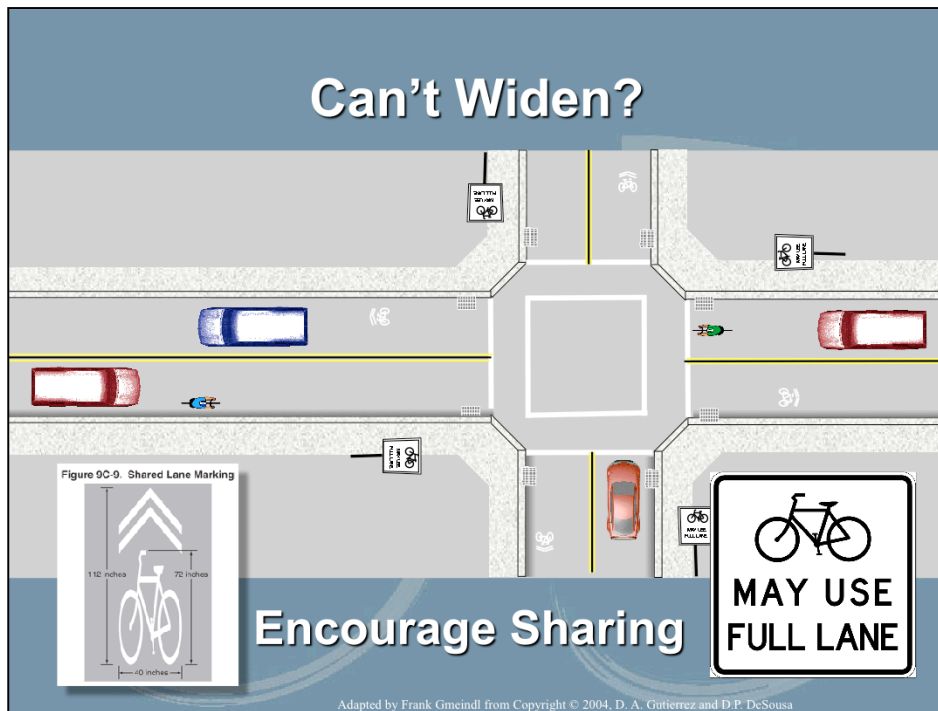
Novice cyclists will move as far to the right as **possible** when they perceive a motor vehicle behind them: whether or not it is safe to be passed. This movement invites the motorist to attempt to pass. The result is often on-coming vehicle leaving the roadway or overtaking vehicle forcing cyclist off the roadway.

If it is unsafe to pass, for example narrow road with on-coming traffic, blind curve ahead or blind crest of hill ahead, **competent** cyclists will maintain position to the right of the center of the lane to discourage motorist from attempting pass until it is safe to do so.

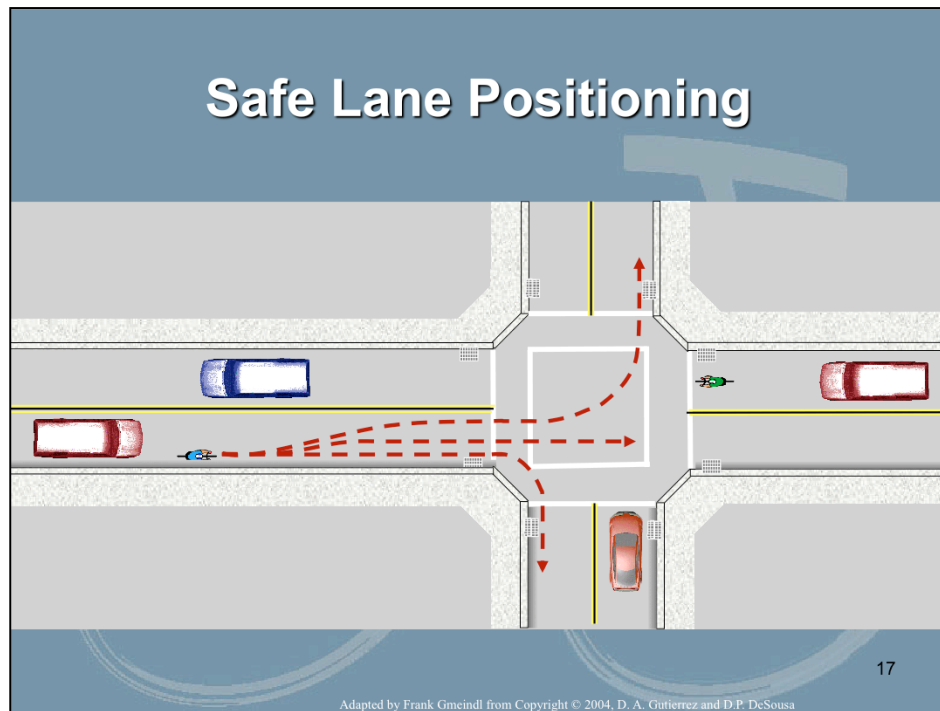
Widening the climbing lane to 14 feet enable motorist to pass bicyclist without crossing double yellow line.

Crossing the double yellow line is only permitted when directed to do so by a law officer or traffic official.

If MPO/WVDOH/FHWA would focus on enabling motor vehicles to safely pass bicycles on the roadway, all WV's roadways would be bikeways.



Shared lane markings and shared lane signs, 1) signify that bicycles belong on the roadway; 2) encourage bicyclists to use the roadway; 3) encourage bicyclists to adopt proper lane positioning; 4) discourage motorists from attempting unsafe passing. This new marking and sign are in the 2009 FHWA approved MUTCD that remains to be adopted by WVDOT but are in wide use in many other states.



Being narrower, bicyclists must choose the safest line that serves their destination. When proceeding straight through an intersection, driving in the center of the lane 1) discourages motorists from overtaking and turning right into the cyclist; 2) signals crossing and oncoming motorists that the cyclist does not intend to turn right; 3) increased cyclist visibility to crossing and oncoming vehicles. When turning left, driving on the left side of the lane 1) signals following, on-coming and crossing traffic that the cyclist intends to turn left; 2) discourages motorists from trying to pass the cyclist and cutting off the cyclist's path into the intersection. Bike lanes can discourage cyclists from taking proper lane position and can mislead motorists to believe that the bicyclist will stay in the bike lane.

Correct Bike Lane Design, Construction and Maintenance

- ≥ 5 feet wide
- Outside the “door zone”
- Travel in direction of traffic flow
- Terminate far enough before intersection to enable cyclists to merge
- Maintained clear of debris and parked cars

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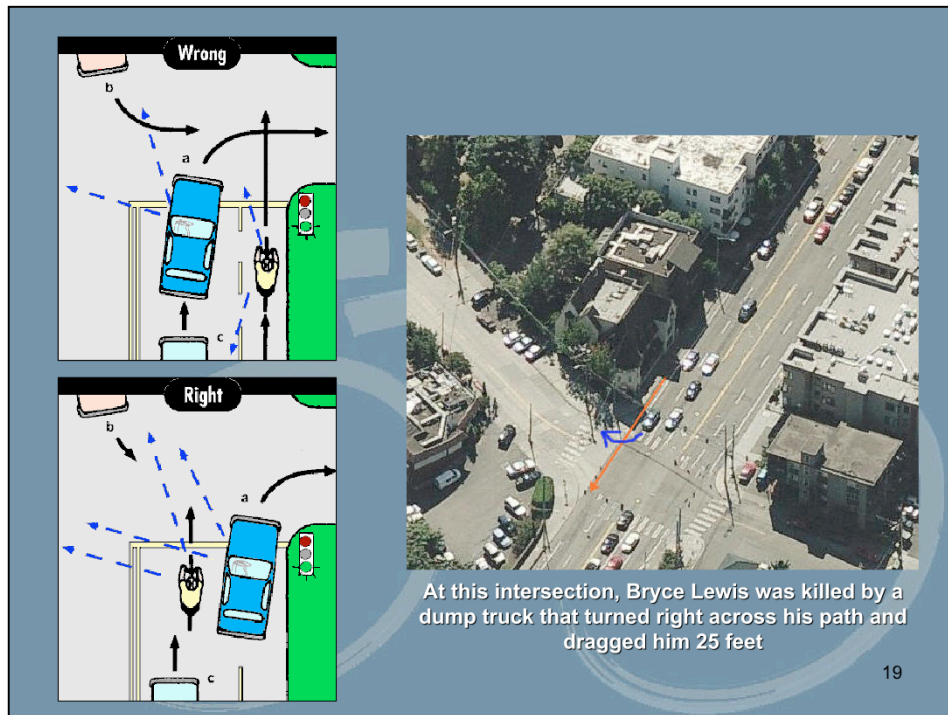
Bicycles are approximately 2 feet wide and 3 feet is a minimum safe passing distance.

Car doors can protrude 4 feet from the side of a parked car. Cyclists driving less than 4 feet from parked cars risk collision with an unexpected opening door.

Bike lanes that allow cyclists to travel opposite the flow of traffic set them up for head on collisions at speeds = car speed plus bike speed: severe injury and death.

Bike lane must end early enough for cyclist to be able to scan, signal and negotiate change of lane position. The higher the speed, the more distance is required.

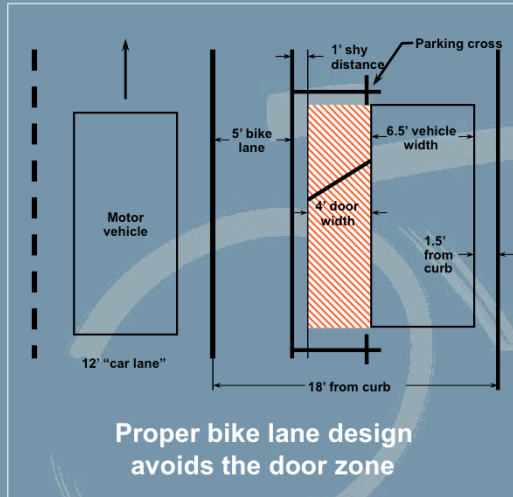
On the roadway, motor vehicles remove glass in the tire path. If motor vehicles don't drive on bike lanes, glass collects increasing punctures.



On 7-Sep-2007 a [cyclist named Bryce Lewis was killed](#) in Seattle at the intersection of Eastlake and Furhman (heading north on Eastlake just before the University Bridge). The cyclist was going straight and a dump truck turned right across his path, dragging the cyclist for 25 feet.

Motorists look left when turning right to look for on-coming traffic. Same as problem with pedestrians getting hit in the cross walk at Spruce and Walnut and at High and Walnut in Morgantown.

Avoiding the “Door Zone”



Proper bike lane design avoids the door zone

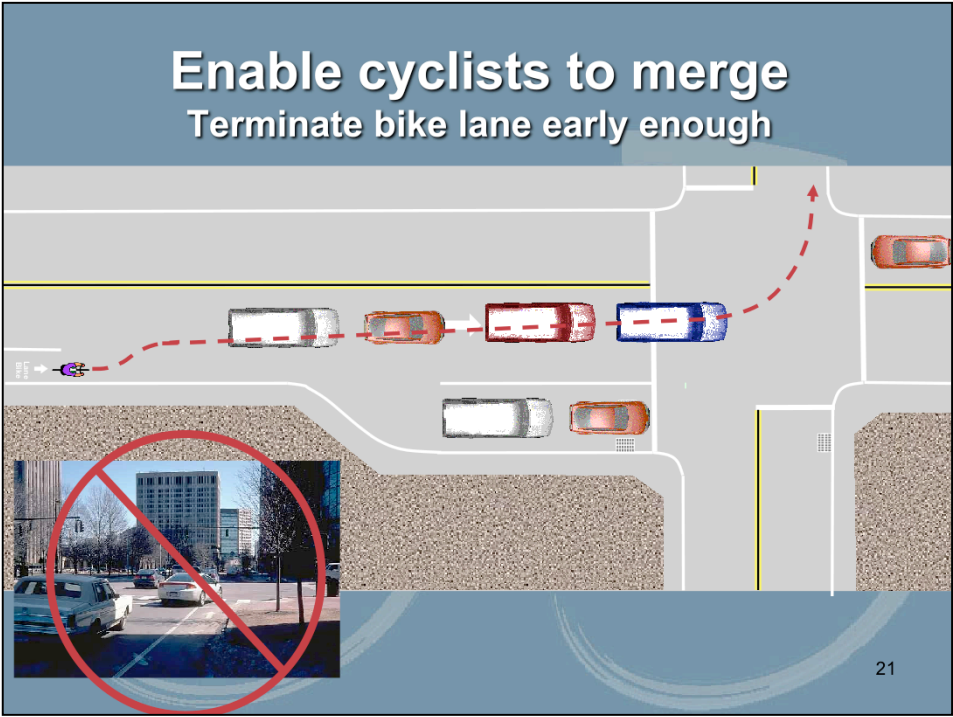


Fatality, Jul 2, 2002
www.rwinters.com/
Bike lane in the door zone

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Adapted by Frank Gmeindl from Fred Oswald *Roadway and Bikeway Safety Issues* April 2007

A 30-foot curb lane width is required to place a bike lane on a roadway with motor vehicle parking.



In the lower left picture, the bike lane continues to the intersection. Although the arrow in the bike lane points straight, the only safe cyclist move from where the arrow is positioned is a right turn. To go straight, the cyclist should be driving between or behind the pictured cars. To turn left, the cyclist should be in the left side of the lane. The bike lane instructs the cyclist to proceed straight when the only movement he or she can execute safely would be a right turn.

Where Bike Lanes Make Sense

(Increased sprawl may negate these)

- **Arterials with few collectors and collectors have little traffic**
- **Right-hand side of up hills and flats**
 - Monongahela Blvd. between Eighth and Evansdale
 - Rt. 19 north of Star City bridge
 - Rt. 7 west of Pursglove
 - Rt. 19 south of Morgantown Mall
 - Rt. 73 south of diverge from Rt. 119
 - Rt. 119 south of Wal-Mart
 - Rt. 119 north of Easton

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Bike lanes have been shown to increase collisions between motor vehicles and bicycles at intersections. Bike lanes only make sense where there are no intersections or where measures to prevent crossing of paths are implemented.

Bike Paths/Rail Trails₁



- **Benefits**
 - Can provide some transportation links
 - Serve pedestrians, roller bladers, dog walkers, baby strollers, etc.
 - Linear parks, primarily recreational

Bike Paths/Rail Trails₂

- **Potential problems**
 - Serve limited destinations
 - Trails crossing roadways are more dangerous than roadways crossing roadways
 - No established enforced rules
 - No authoritative enforcement body
 - Conflicts / crashes between user types
 - Force cyclists to behave as pedestrians instead of drivers of vehicles

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Trail-roadway intersections 1) are usually not built with sight lines typical of roadway intersections; 2) sometimes aren't controlled, e.g. red lights, stop signs; 3) merge onto roadways at angles and locations that surprise motorists.

Cyclists have the capability of travelling well over 20 mph on paved level surfaces. Having to travel at low speeds to avoid collisions with other trail users diminishes the feasibility of trails for bicycling as transportation.

Bike Paths/Rail Trails₃



- **Some solutions**
 - Design and build trails to minimize crashes at crossings with roadways, e.g. square up alignment, elevate crossings (speed table), cyclist activated signals
 - Green Bag Rd.
 - Deckers Creek Blvd.
 - Carnegie St.
 - Stripe trail to encourage keeping to the right
 - Establish and enforce standard trail-use laws

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Sidewalks

- Sidewalks are for pedestrians
- Bicycling on sidewalks is dangerous for pedestrians and bicyclists
- Transition from sidewalk to roadway presents highest risk and severe consequences to bicyclist and motorist

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Cyclists traveling faster than walking speeds on sidewalks present danger to pedestrians.

Motorists do not attend to activity on the sidewalk. Motorists crossing sidewalks, e.g. driveways, watch for traffic on the roadway, not the sidewalk. Curbs present maneuverability challenge: high crash potential. Speed and travel direction differences increase crash severity.

Summary₁

Do...

- Treat bicyclists as drivers of vehicles
- Widen curb lanes to enable cars to pass bikes safely
- Encourage sharing

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Widen curb lanes especially on up hills. 5-feet is ideal but even 3-feet helps.

Summary₂

Don't...

- Force bicyclists to drive in an unexpected, unpredictable, unsafe or unlawful manner
- Expect bike lanes and bike paths to suffice for bicycle transportation

Summary₃

- **Traffic law gives bicyclists driving on the roadway the same rights as motorists and subjects them to the same duties**
- **Cyclists fare best when they act and are treated as drivers of vehicles**
- **Visible + Predictable => Safe**

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The majority of cyclists are incompetent: riding on sidewalks; riding against traffic; disobeying signs and signals; swerving, making turns and sideways movements without signaling and obtaining right of way. The laws need to be enforced. High quality education must be available. The infrastructure must encourage cyclists to obey the rules and drive their bicycles as vehicles: signage, wide climbing lanes.

Motorists may not be aware that bicyclists have the same rights to the road and are subject to the same rules. Enforce the laws, particularly with regard to safe passing and yielding right of way especially at crossings. Educate motorists of their duties to cyclists beginning with the WV Driver Licensing Handbook and license test.