"Seeing and treating cyclists as an expected and respected part of traffic will undoubtedly be a new idea for many police officers and their administrators. Some have even exhibited a bias against cyclists in traffic, which is likely the result of conditioning that cyclists are neither a traditional nor legal part of the traffic mix. ... While educators have a lot of work to teach cyclists young and old to ride lawfully and responsibly, it is the role of law enforcement to reinforce those lessons with appropriate enforcement and mutual respect."

> — Kirby Beck, co-founder, International Police Mountain Bike Association



## metroplan orlando

## **Enforcement for Bicyclist Safety:** Understanding Roadway Standards, Defensive Bicycle Driving, and the Law



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### **Bicycle Law Enforcement:** ENFORCE LAWS WITH MUTUAL RESPECT

#### By Kirby Beck

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America's roads were first paved in the late-1800s after extensive lobbying by bicyclists, then known as "wheelmen." Horse-drawn wagons and early motorcars could function on the rutted dirt roads of the era. But cyclists, balanced on their large wheeled penny-farthings, had a difficult time functioning on the uneven surface. At that time, bicycles were often the fastest vehicles on the road.

As motorcar use increased, motorists found equitable, non-motorized use of the street to be a hindrance. While never codified, these perceptions regarding road use gradually came to be understood and accepted:

#### **ROAD USE PERCEPTIONS**

"Roads are for motor vehicles:" In fact, roads are still for moving people and motor vehicles are but one type of conveyance by which people move.

"Slow vehicles are unsafe:" Most enforcement officers know that speed kills; however, a perception has developed that vehicles that are slower than other traffic create a hazard; in truth, slower is still safer.

"The 'right' of speed:" Many people believe that you can't use the road if you can't keep up. If a heavily loaded truck is unable to accelerate from an intersection or up a hill, most motorists understand and merely tolerate it or pass it when they are able. Yet if the vehicle is a bicycle, intolerance and outrage develops in some drivers. As with all slow-moving vehicles, bikes must use the right lane unless they are preparing for a left turn, but despite common misconceptions, they still have a right to the roadway.



"It is safest for bicyclists to stay out of the way:" This myth has sadly contributed to the majority of crashes and near-misses cyclists experience. Hugging the edge of the road is actually dangerous for a number of reasons. Most traffic lanes are too narrow to safely accommodate a motor vehicle and cyclist side by side. Cyclists who keep right so motorists can pass them without changing lanes actually encourage close passes and sideswipes. Cyclists who ride farther left and control the lane report no such problems. Motorists pass them in an adjacent lane. If they have to slow down and wait for an opportunity to pass, that's OK. Empirical evidence shows that any delays motorists experience waiting to pass are usually 30 seconds or less.

"Cyclists riding in the middle of the traffic lane will impede traffic:" Where "impeding" laws exist, nearly all clearly state that only drivers of motor vehicles can illegally impede. In the six states where the law does not specifically exclude non-motorized vehicles, it provides for the reasonable speed of the vehicle in question, thus accommodating farm tractors, horse carriages and bicycles. Why is it cyclists are being cited for "impeding" when they are actually driving defensively and in a manner reasonable for their vehicle?

#### THE LAW

In every state, bicycles are either defined in statutes as vehicles or cyclists are given the same rights and responsibilities as other vehicle drivers. They have the right to use most roadways, which means the fog line to the centerline. The term "roadway" does not include the shoulder. In many non-snow states, paved shoulders may be non-existent or too narrow to be rideable.

While most states forbid bicycles on freeways, some western states with vast open space and fewer roads allow cyclists to ride the shoulder of controlled access highways. Only New York, Hawaii and Alaska mandate shoulder use if it is safely usable.

Most states require cyclists to ride "as far to the right (FTR) as practicable to the right-hand curb or edge of the roadway." This sentence is often misunderstood. For purposes of the statute language "practicable" means as close to the right edge as is safe and reasonable under existing or probable conditions. It does not mean as close as possible to the right-hand curb or edge of the roadway. Moreover, it is up to each cyclist to decide where he/ she believes is safest. After all, the cyclist not only has the least protection, but also is passed with the highest speed differential.

Many statutes list specific reasons why cyclists need to ride farther left within a lane. These include avoiding road hazards, preparing for a left turn, passing another vehicle, or avoiding objects such as parked cars, pedestrians or animals. The most significant reason given is a "substandard width lane" within which a cyclist and motorist cannot pass safely side by side. This last reason is the most misunderstood, largely because it applies to the majority of traffic lanes on today's roadways making the exception the rule.

Anywhere bicyclists choose to ride in such a lane is legal. More experienced cyclists choose to "control the lane." By using a large portion of the lane, cyclists send a clear message to motorists that they must change lanes to pass when safe and legal to do so. Cyclists legally controlling a narrow lane cannot by definition "impede traffic" even though they are moving substantially slower than surrounding traffic. It is important to remember that a traffic lane is a public utility there for the purpose of moving people, not merely motor vehicles.

#### SUBSTANDARD WIDTH LANES

It may shock many to learn that a 12-foot-wide lane is considered a "substandard width" for the purpose of this statute. Federal roadway design standards suggest a cyclist needs a minimum of 4 feet of operating space. The typical cyclist is roughly 30 inches, but requires some lateral "wobble" space. Even 4-wheel vehicles don't track a perfectly straight line.

Realistically, many cyclists need 5 feet or more of space to operate safely, due to the type of bike and accessories or cyclist's inexperience.

All states require safe passing clearance between vehicles of any type. Some require a 3-foot minimum clearance for passing bicyclists. While nearly impossible to enforce unless a cyclist is struck, it does give the motorist a general idea that they need to move over. With the 3-foot minimum, the cyclist's operating space and the passing space have already accounted for more than half of a 12-foot lane.

Most passenger cars are roughly 6-feet wide, with mirrors adding another foot. As we'd expect a car takes up more than half of a 12-foot lane, too. The problem is many motorists don't realize how wide their cars are, or how close the right side is to something they are passing. This is why it is safest for a bicyclist to control the lane in a way that sends a clear message that overtaking motorists must pass them in an adjacent lane. This action by the bicyclist prevents crashes.

Today's traffic includes a high percentage of large vehicles like pickups and SUVs that are even wider than conventional passenger cars. Below is an



example of what happens if a truck attempts to pass a cyclist within a 12-foot lane. Would you want that truck to pass you at any speed that close? (see image on page 3)

## WHAT LAWS SHOULD YOU ENFORCE?

Traffic laws reflect the rules of safe and predictable movement. These apply to cyclists as they do to motorists. Traffic controls such as stop signs and traffic signals certainly apply. So do destination lanes such as turn-only lanes. Use of headlights, and in many states, taillights, is required at night.

Cyclists are required to travel the same direction as traffic, yet many cyclists are commonly seen riding facing traffic. Due to its unpredictable nature, this is a leading cause of motorist/bicycle crashes. Wrong way cycling is dangerous and illegal behavior in all 50 states.

The major violations, which cyclists should be stopped and ticketed for, are:

- 1) Riding against traffic;
- 2) Failure to yield right of way at stop or yield signs;
- 3) Running red lights; and
- 4) Riding without required nighttime lighting.

We need to stop cyclists for disobeying traffic controls. Many cyclists ride through red lights because they have no fear of being ticketed. This obvious lawlessness by some cyclists further increases the animosity felt by many motorists. If the police won't enforce traffic laws for bicyclists, who will? Isn't that part of the police role in enhancing traffic safety and promoting voluntary compliance with the law?

The major violations by motorists that endanger bicyclists are:

- 1) Failure to yield right of way;
- 2) Unsafe passing;
- 3) Harassment or assault; and
- 4) Inattentive or impaired driving.

By law, cyclists always have the right of first come, first served in the lane that they are occupying. Vehicles can't legally intrude into their path, or pass them, unless it is safe to do so. Most right-of-way



*This bicyclist is avoiding a right hook conflict at Edgewater Drive & Princeton Street in Orlando.* 

conflicts occur at intersections. There, motorists pull out or make turns across the path of cyclists. Violations also occur when a motorist passes a cyclist just prior to turning right and then turns across the cyclist's path. This can happen if the cyclist is riding too far right or is in a bike lane, sidewalk or path. These right-of-way violations account for many collisions between motorists and bicyclists. Officers should be watchful to cite these violators and understand them when working crashes.

Seeing and treating cyclists as an expected and respected part of traffic will undoubtedly be a new idea for many police officers and their administrators. Some have even exhibited a bias against cyclists in traffic, which is likely the result of conditioning that cyclists are neither a traditional nor legal part of the traffic mix. Both of those assumptions are historically and legally wrong. While educators have a lot of work to teach cyclists young and old to ride lawfully and responsibly, it is the role of law enforcement to reinforce those lessons with appropriate enforcement and mutual respect.

Kirby Beck is retired after 28 years with the Coon Rapids, Minn. Police. He is a co-founder, former board president, and certified police cyclist instructor trainer for the International Police Mountain Bike Association. He is an expert witness in bicycle crash cases. He can be reached at kirby@kbeckconsulting.com.

## **Lane Width & Definitions**

## How Wide is Wide Enough to Share?

In its Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (commonly referred to as the "Florida Greenbook") the Florida Department of Transportation describes the widths of bike lanes and general use lanes as they pertain to use by bicyclists. Wider outside lanes are one strategy for providing sharable roadway space. The Greenbook states: "Wide outside lanes are through lanes which provide a minimum of 14 feet in width. This width allows most motor vehicles to pass cyclists within the travel lane, which is not possible on more typical 10-foot to 12-foot wide lanes."

"Most motor vehicles" however, does not include large trucks, buses, trailers, and other wider vehicles. These vehicles can be as wide as 8.5 feet; even wider for trailers.



Source: AASHTO Guide for the Development of Bicycle Facilities, 4th Edition (2012)

Travel lanes are intended for vehicles to be operated in the center. While drivers can move to one side of the lane or the other to avoid transient hazards, lanes are not designed to require this behavior with respect to other road users in adjacent lanes.



This is a typical utility trailer in a 15 foot lane.

As you can see in the diagram on page 5, when we add up the minimum vehicle widths and passing clearance, the minimum shareable lane width for a passenger car and a bicyclist is 14ft. Considerably more is needed for a large SUV or truck.

On higher speed roadways with significant truck traffic, still more width is necessary. Large vehicles

generate strong wind blasts when traveling above 40 mph. The first phase of such a blast can shove a bicyclist into the curb or off the roadway. In the second phase, the "suction" created as the vehicle passes can also

towards the center of the lane. These wind effects drop off around five to six feet away from the side of the vehicle. Any lane that did not provide space for the bicyclist to escape such conditions would not be wide enough to share. Thus, it would not be *practicable* to ride on the far right and share it.

Some human-powered vehicles are wider than standard bicycles and consequently need greater operating space. Examples include "velocars" (three-wheeled vehicles surrounded with aerodynamic bodies), cargo bicycles, and bicycles with trailers (see diagram below).

#### **VANTAGE & VISIBILITY**

Recumbent bikes, trikes and hand cycles position their drivers lower than an upright bicycle. Edge obstructions that an upright bicycle driver might be able to see over may require a recumbent driver to move farther left for vantage.



#### **CRASHES AND LANE WIDTHS**

Based on a 2006 study of bicyclist crashes with motorists (using long form crash reports from Orange, Seminole and Osceola Counties from 2003 and 2004), there were 61 crashes involving overtaking motorists. Twenty-six of these occurred at night, and in nine of those cases the bicyclist was confirmed as not having a headlight or tail-light. Another 6 crashes occurred at dawn and dusk. Of the remaining 29 crashes during normal daylight hours, 19 (66%) occurred in lanes less than 14 feet wide, five (17%) in lanes 14-feet or wider, two (7%) on streets with on-street parking, and two on roads with paved shoulders. Five of the 29 daytime overtaking crashes involved buses or large trucks.



In crashes involving clear, daytime conditions the vast majority of overtaking crashes involve motorists who saw the bicyclists but attempted to pass within the lane.

#### How Far Right is Practicable?

Practicable means something can reasonably be done within the means and circumstances available and present at that place and time. It may be



President of the Law Enforcement Bicycle Association and retired Orlando Police Department Officer, Bill Edgar, demonstrates lane choice to avoid conflict with diverging traffic at Princeton St. & I-4.

possible to bicycle within a foot of the edge, but it may not be practicable. Who gets to decide what is practicable? The bicyclist should be the person presumed to understand this best. The bicyclist is more likely to understand the effects of traffic on his or her safety based on roadway position and other relevant factors. Most bicyclists have far more experience being passed by motorists than motorists have with passing bicyclists.

Other factors come into play besides lane width: pavement quality and debris, curves and hills, weather and lighting conditions, and sightlines near intersections and driveways. In some circumstances an early lane change is preferable for a bicyclist preparing for a left turn. Controlling the space around one's vehicle is an important strategy for any defensive driver—it's essential for the driver of a narrow vehicle. Motorcycles and bicycles – are often overlooked. This extra space is essential for vulnerable roadway users to compensate for the lack of a steel cage and energy-absorbing safety devices. In spite of the obvious vulnerability, bicyclists are the only vehicle drivers required by law to share a lane.

Once any of the exceptions are met that release the bicyclist from the requirement to keep right, the law is silent on how far into the lane the bicyclist may operate. The decision on how far left to drive within the lane will depend on the existing conditions and judgment of the cyclist.

## **Bike Lanes & Shoulders**



*Alafaya Trail (SR 434) has a shoulder. This is not a bike lane and bicyclists are not required to use it.* 

#### WHAT IS A LEGAL BIKE LANE?

In order to meet the statutory language, the paved area in question must be marked with a bicycle symbol and a directional arrow. There are numerous spaces on area roads that do not meet minimum width standards and other characteristics of correct bike lane design. Bicyclists are permitted to use such spaces, but are not required to. The width of the adjacent lane then determines whether or not the bicyclist is required to share that lane.

The minimum standard width for a bicycle lane is five feet from the lane stripe to the curb face, and a minimum of four feet of asphalt beyond the gutter pan. For state roadways with design speeds 50 mph and higher, the minimum width is 6.5 feet.

#### WHAT ARE BIKE LANES FOR?

A bicycle lane is a part of the roadway intended to provide bicyclists with a more "comfortable" experience. Feeling safe does not equate to being safe. Research into the relative safety of bike lanes and shared lanes is inconclusive. The Federal Highway Administration does not have a crash reduction factor for bicycle lanes. Bicycle lanes are intended as "preferential use" lanes, not mandatory use lanes (although Florida law now makes their use mandatory, with exceptions for unsafe conditions and situations).

The primary concern amongst untrained or novice bicyclists is the overtaking motorist, and many believe bike lanes mitigate such crashes. However, overtaking motorists account for a relatively low proportion of crashes. In MetroPlan Orlando's crash study only 7% of all cyclist crashes involved overtaking motorists. Bike lanes may reduce overtaking crashes, but they do not prevent them; there have been at least 20 motorist-caused overtaking crashes involving cyclists in bike lanes since 2006 (these account for 16% of bike lane crashes).

Wrong-way driving by bicyclists is a major cause of crashes. 42% of all crashes involved cyclists facing traffic while either on a sidewalk or the roadway. 24% of roadway cyclist crashes involved wrong-way cyclists. It was assumed that bike lanes would reduce this behavior, but 32% of bike lane crashes since 2006 in the metro area involved wrong-way cyclists, and facing-traffic sidewalk crashes are still common on roads with bike lanes.

Other crash types relevant to bike lanes are opposing left turns by motorists, overtaking right turns by motorists, and bicyclists overtaking on the right into the paths of right-turning motorists. Ten percent of roadway cyclist crashes involved motorists making unsafe opposing left turns and same direction right turns. 23% of bike lane crashes since 2006 in the metro area involved those crash types.



*These bicyclists in Orlando are illegally riding against traffic in the bike lane — they are endangering themselves and other bicyclists.* 



**STRIKE ZONE:** Direct hit from door.

#### **STARTLE ZONE:**

Door will startle bicyclist into swerving.

#### **MINIMUM CLEARANCE:**

Passing clearance required by statute.

#### **EFFECTIVE LANE:**

This is where a bicyclist must operate to encourage motorists to change lanes.

Bicyclists have been killed as a result of this bike lane design. Either a door strike or startle swerve can put a bicyclist immediately into the path of overtaking traffic. ALL bicycle education programs teach bicyclists to avoid these bike lanes.



Where bike lanes are installed next to on-street parking, some additional problems can be present. A car door can open at any moment, and attempting to identify such hazards while cycling is not only extremely difficult and unreliable, it also distracts the cyclist from other important conflicts. The only certain strategy for avoiding door crashes is to keep at least 5 feet from parallel-parked vehicles. Parked cars on the street can also limit sight lines for motorists exiting from driveways.

- **1 DOOR ZONE:** At risk of being struck by a door and hidden from drivers entering the road
  - **BLIND SPOT:** Vulnerable to right-hook
- **3** SCREENED AREA: Invisible to drivers in the opposing left-turn lane
- **SAFE POSITION:** Where drivers of 2-wheeled vehicles (motorcycles and bicycles) should be at an intersection
  - **5 SAFE POSITION:** Away from the door zone and visible to drivers entering the road



*This bike lane is to the right of an interstate on-ramp. The bicyclist is in the best position to avoid conflict.* 

In some locations bike lanes have been installed incorrectly, directing bicyclists to keep to the right of right-turning motorists. Intersection and interchange installations can send bicyclists into converging paths with motorists. Trained bicyclists use strategies to reduce converging paths and increase diverging paths. Debris can also be a significant problem. Since motor vehicles don't use that portion of the roadway, debris such as broken glass and nails tends to collect in the bike lane.

#### BIKE LANES AND CYCLING GROUPS

Bike lanes are designed for solo bicyclists; they can pose serious problems for larger groups of cyclists. Debris in the bike lane becomes a much more serious problem. Motorists attempting to pass the group then turn right can easily misjudge the distance needed to do so safely. A long, single-file line of cyclists in a bike lane can cause more delay than a shorter two-abreast group in the general use lane when there is significant right turn traffic.

### **Other Considerations** FOR BICYCLIST ROADWAY AND LANE POSITION

Florida statute 316.2065 (1) states: "Every person propelling a vehicle by human power has all of the rights and all of the duties applicable to the driver of any other vehicle under this chapter, except as to special regulations in this chapter, and except as to provisions of this chapter which by their nature can have no application." *In any situations in which the rest of the statute allows for interpretation (such as how far right is practicable), officers should err towards assuming the bicyclist has the same rights and duties as any other driver.* 

Other situations in which the bicyclist is not required to keep as close as practicable to right edge or use a bike lane include:

- When the bicyclist is traveling at or near the speed of other traffic on the roadway at that particular time and location
- When passing another vehicle moving in the same direction
- When preparing for a left turn
- When reasonably necessary to avoid any

condition or potential conflict including, but not limited to, a fixed or moving object, parked or moving vehicle, pedestrian, animal, surface hazard, or turn lane

A bicyclist operating on a one-way street with two or more marked traffic lanes may ride as close to the left-hand edge of the roadway as practicable, or control that entire lane, again, depending on the width.

The edge of the roadway presents numerous hazards for bicyclists, including poor pavement, the lateral seam between the asphalt and the concrete gutter pan, sand and debris, and standing water during rainstorms. Such hazards can cause crashes for solo or group cyclists, and while these injuries are not recorded with crash reports, they are recorded by hospital emergency rooms.

Two-thirds of bicyclist hospital admissions do not involve a motor vehicle, and a significant portion of those injuries are due to roadway (or sidewalk) conditions. Lane control is the most effective strategy for bicyclists to defend themselves against common motorist mistakes (see diagram on page 10):

- "Drive-outs" motorists are less likely to pull out into the roadway into the path a cyclist who is farther left in the lane
- "Right hooks" motorists are prevented from turning right across a cyclist's path if the cyclist controls the lane
- "Left crosses" bicyclists hugging the edge or using a bike lane can be hidden from view for motorists making opposing left turns. Lane control gives a cyclist an improved vantage, enabling him or her to see (and be seen by) such motorists.

• "Sideswipes" – the vast majority of overtaking crashes involve a motorist attempting to squeeze past a bicyclist within the same lane. Lane control encourages motorists to wait and pass when there is truly enough space to do so.

#### BICYCLISTS, SIDEWALKS AND SIDEPATHS

Under Florida law, bicyclists are permitted but never required to use sidewalks. Municipalities may prohibit bicyclist use of sidewalks, but not of roadways (as such a prohibition would contradict state law). A bicyclist traveling on a sidewalk has the same rights and duties as a pedestrian.

# Common Car vs Bike Crashes All of these crashes are the motorist's fault. But a bicyclist with the freedom to drive defensively can avoid them. DRIVE OUT LEFT CROSS RIGHT HOOK SID



**DEFENSIVE DRIVING:** Ride farther left to maintain vantage and visibility around sight obstructions.

**DEFENSIVE DRIVING:** Ride farther left to increase vantage and visibility to opposing left turn lane.

**DEFENSIVE DRIVING:** Ride farther left to discourage motorists from passing before turning right.

**DEFENSIVE DRIVING:** Ride farther left to discourage motorists from trying to squeeze past.

Bicyclists traveling on sidewalks, or on paths adjacent to roadways designated for bicycling, are subject to higher frequencies and types of hazards and conflicts than those who drive on roadways. Sidewalks are designed for pedestrian speeds of up to 4 mph, while sidewalk bicyclists routinely travel at 10 to 15 mph, placing them outside the normal scanning ranges of motorists. Almost half (43%) of long form report bicyclist crashes involve sidewalk cyclists (the rate is the same for adults and children), and 73% of sidewalk crashes involve cyclists traveling against the flow of normal vehicular movement. Sidewalks also present many hazards, such as poles, posts, street furniture, and drop-offs. Shared use paths (often referred to as trails) built adjacent to roadways encourage half of the users to travel against the flow of traffic. Traffic controls on such paths often require bicyclists to stop at intersections and driveways, while the bicyclist on the adjacent roadway would usually not face a stop sign. For these and other reasons, bicyclists with higher levels of training and experience often prefer to use the roadway.

# **Enforcement & Education Working Together**

MetroPlan Orlando works with the Florida Bicycle Association to provide a traffic cycling course called CyclingSavvy. This course shows bicyclists not only how to obey the laws that apply to them, but also how to drive their vehicles defensively and to reduce stress, conflicts and crashes. Lane control is the key strategy in defensive bicycle driving. Students are also taught to balance lane control for their own safety with strategies to minimize delay for other road users. It is essential that law enforcement officers support these defensive driving skills if we are to reduce the numbers of bicyclist injuries and fatalities.



metroplanorlando.com 315 E. Robinson Street, Suite 355 Orlando, FL 32801 (407) 481-5672





CyclingSavvy.org

A program of the American Bicycling Education Association, Inc. P.O. Box 2466, Orlando, FL 32802-2466 (321) 209-5260 - info@abea.bike