

Rick Walker

The issues that I heard raised at the November 17, 2011 City Council meeting regarding bicycle traffic on 83rd Street between Kill Creek Road and the east city limit were all generally focused around safety, a lack of safety, or school bus traffic and issues associated with a school bus overtaking a slower moving vehicle (not allowed to cross double yellow).

To fully understand and consider these concerns I consulted with nationally recognized expert in traffic engineering, roadway design, and bicycle safety and bicycle facility design, Theodore Petritsch, PE of Sprinkle Consulting in Tampa Florida. While I am an experienced civil engineer, with 28 years experience, and the last 23 specializing transportation projects, I thought it was important that I also consult with others in my field that may be more knowledgeable and experienced in bicycle facility design and safety related issues. I asked Mr. Petritsch two questions.

1. Under what set of circumstances (ie, traffic volumes, highway geometry, truck volumes, etc.) would you consider removing bicycle traffic from a given segment of road?
2. Are you aware of any other locations in the US that have banned bicycle traffic? If so, what were the circumstances that precipitated the action?

In response to the first question Mr. Petritsch responded:

- Accident History – Is there a history of bicycle-automobile accidents, and if so what types of accidents were these? (ie, Turn into bike, struck from behind, run off road)
- High Speeds (interstate speeds)
- High Volumes (roadway at or near lane capacity)
- Availability of reasonable alternative route

In response to my second question, Mr. Petritsch posted the question on a national Listserve for bicycle facility designers to see what kind of response we might receive. To date I have received a total of 5 responses that documented 3 separate bike bans.

1. Olympia Washington – An I-5 freeway exit that immediately becomes a 14TH Avenue SE, the principal access road the Washing Sate Capital where it passes through a tunnel under a state parking garage. Justification: Traffic is still moving at interstate speeds and there is no room in the tunnel for passing.
2. Manor Texas – Enacted a temporary ban on a section of Blake-Manor Road due to hazardous road conditions. (Large longitudinal cracks in roadway) Presumably the ban will be rescinded when the road is repaired.
3. Caloosahatchee River Bridge on US 41/SR-45, Lee County, Florida. This is a narrow 4-lane bridge in Fort Meyers Florida with high traffic volumes. Bans bikes and pedestrians.

I have also spent time with Google on the internet and I came up with one other current bike ban. The city of Black Hawk Colorado bans bikes from a section of Colorado 279. Bicyclists riding in on Colorado 279, a main route through the city, have to dismount and walk about a quarter mile. This ordinance is has been challenged in the Colorado courts.

The concerns raised here in De Soto

“It’s not safe”

This was the stated justification for the original ban in 1999. Quoting former Councilman Neland from 1999 De Soto Journal Herald newspaper story “I don’t feel personally that it’s safe for bicyclists.”, and in an article for the Kansas City Star, “My concern is for the safety of bicyclists or motorist coming up over the hill and making a decision to swerve and miss them and possible have a head on collision...”.

These comments allude to the issues that most directly affect the safety of a give roadway, **Speed** and **Sight Distance**. Speed we all can easily understand, it simply how fast a vehicle is traveling. Sight distance is how much of the road ahead of your vehicle is visible; how far up the road can I see.

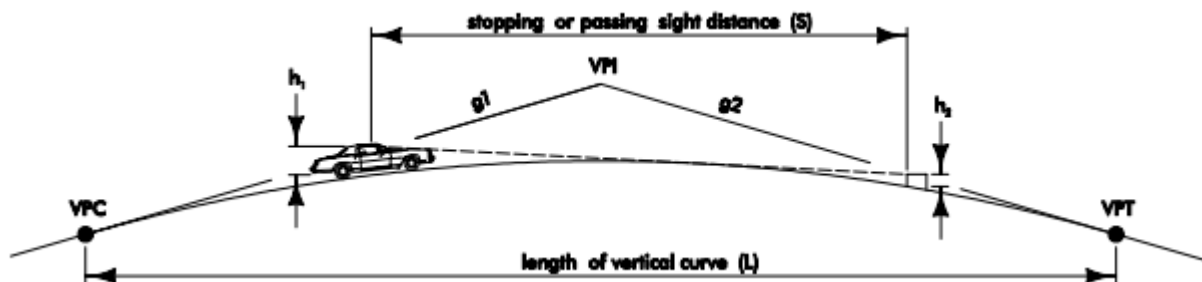
For every speed there is a corresponding **stopping sight distance** which is the distance a vehicle travels once the driver recognizes and reacts to a situation that requires the driver to stop. This distance is based on the driver’s reaction time and the braking characteristics of the car. For a 45 mph design speed this stopping sight distance is **360 feet** based on the AASHTO Green Book.

The AASHTO Green book is the design “Bible” for roadway design. The official title is *A Policy on Geometric Design of Highways and Streets*. It is published by the American Association of State Highway and Transportation Officials (AASHTO), and the current version was released in 2004.

What are the sight distances along 83RD Street?

There are two conditions to consider when looking a the sight distance of a road. First we need to look at the vertical design, the hills and valleys, and second we need to look at the horizontal design, how sharp are the curves.

First let’s look at the vertical design. The factors that affect the sight distance of a crest vertical curve or hill top are the slope on each side of the hill, the length of the vertical curve, the height of the driver’s eye (3.5’), and the height of the object to be seen (2’).



There are a total of 7 crest vertical curves between Kill Creek Road and the east city limit.

Location 1 - The first hill crest is approximately 1000 feet east of 82ND/Valley Spring Drive. The speed limit here is 35 mph and the available sight distance is **380 feet**.

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Location 2 – Waverly Road - The speed limit is in transition from 35 mph to the west to 45 mph to the east. The available sight distance at this location is **432 feet**.

Location 3 – Approximately 1500 feet east of Waverly - The speed limit is 45 mph and the available stopping sight distance is **386 feet**.

Location 4 - Approximately 800 feet west of Corliss – The speed limit is 45 mph and the available stopping sight distance is **365 feet**.

Location 5 - Approximately 275 feet east of Corliss – The speed limit is 45 mph and the available stopping sight distance is **412 feet**.

Location 6 - Approximately 150 feet east of Caress – The speed limit is 45 mph and the available stopping sight distance is **379 feet**.

Location 7 – Just East of Ravenswood – The speed limit is 45 mph and the available stopping sight distance is **409 feet**.

The following table is a summary of the locations, curve lengths and sight distances. The stationing is based on the 2009 83RD Street CARS project.

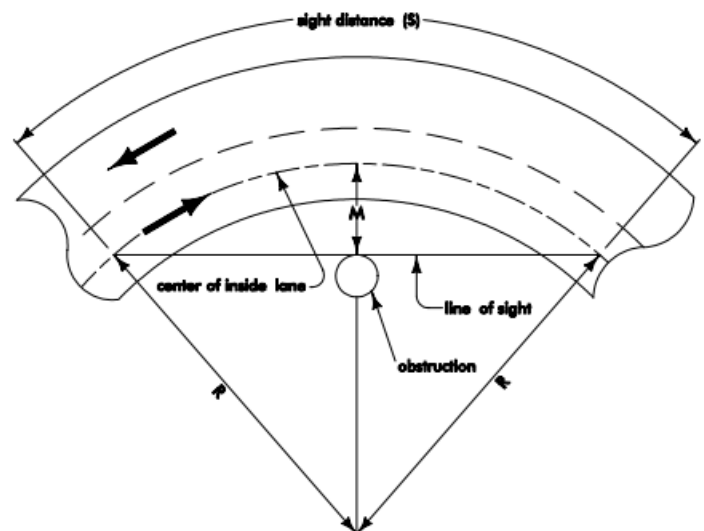
	Curve Location	A	L	SSD
1	382+12.50	12.73	850	380
2	395+00.00	6.35	550	432
3	409+75.00	4.57	300	386
4	414+00.00	6.49	400	365
5	424+75.00	3.76	250	412
6	430+00.00	7.51	500	379
7	494+75.00	8.4	650	409

Sight Distance at Horizontal Curves

Objects such as cut slopes (like west of Leland Penner's house), trees or buildings can create a sight obstruction or visual barrier on the inside of horizontal curves. The available sight distance is a function of the radius of the curve and how far the obstruction is located from the roadway.

Generally there is at least 4 feet clear beyond the road with the exception of the cut slope east of Penner's where there is a minimum of 3 feet clear. The curve radii vary from 1665 feet to 1966 feet.

The available sight distance for the shortest radius curve is 365 feet. This distance is based on a minimum of 4 feet clear of obstructions beyond the road.



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The horizontal curve east of Penner's has a radius of 1966 feet. The available sight distance taking into account the cut slope at 3 feet from the edge of the roadway is 376 feet. The sight distance based on the horizontal characteristics of the road for all the other curves will be greater than what exists at these two locations. The following table is a summary of the horizontal curves between Kill Creek Road and their corresponding sight distance.

Radius	Min. Offset to Obstruction	Sight Distance
1665	4	365
1966	3	376
1905	4	390
1955	4	396
1875	4	387
1700	4	369

Based on a sight distance analysis for the horizontal and vertical configuration of 83RD Street between Kill Creek Road and the east city limit there is **adequate stopping sight distance** for a vehicle traveling at the speed limit in either direction to **safely** stop and avoid a collision with an obstruction, be that a bicycle, a tractor, a disabled vehicle, or patrolman with vehicle stopped at the side of the road.

What about speeders? Are people speeding and will they be able to avoid a bicycle if they are speeding? Good questions. It is very possible that there are people exceeding the posted speed limit. The stopping sight distance for a vehicle traveling 55 mph is 495 feet. But, then the average speed of a cyclist is 12.5 mph so the closing velocity (the difference in speed between the two vehicles) is 43 mph so the 360 foot sight distance is more than adequate.

"There is too much traffic"

Based on current KDOT traffic counts the Average Daily Traffic (ADT) on 83RD Street is 4830 vehicle per day at Mize Road, and 4125 vpd east of Kill Creek Road. To confirm these counts I conducted a traffic count during the morning of November 27, 2011 between 7:00 AM and 9:00 AM. The peak hour volume observed was 448 vehicles which correspond to an ADT of approximately 4500 VPD.

I work with traffic and road design daily, and in my work 4500 to 4800 vehicles per day is not considered a high volume of traffic. In the peak hour we observed 448 vehicles. Based on this volume we could expect approximately 33 vehicles to occupy some part of the 2.5 miles of roadway between Kill Creek Road and the east city limit. This traffic would be split between eastbound and westbound traffic with approximately 15-16 in one direction and 17-18 in the other. If we assume the average car length is 20 feet and that vehicles are observing the state recommended 2 second following distance we have approximately 20% of the available roadway capacity in use at any given time during the **peak** hour.

Why is this important? If 20% of the roadway is in use it means that 80% of the roadway is unused and open to provide opportunities to pass a slow moving vehicle.

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PASSING SIGHT DISTANCE

Kansas recently adopted a new law that requires vehicles to maintain a 3 clearance when passing a bicycle traveling in the same direction. One key provision of this legislation is that it allows for vehicles to cross a solid double yellow line (no passing zone) to pass a bicycle when they can safely do so.

In order to safely pass a drive needs to be able to see far enough ahead so he/she can –

- Recognize and react to a passing opportunity
- Accelerate and overtake the slower vehicle
- Merge back into the right hand lane
- Leave a safe distance between him and oncoming traffic

If we assume a car length of 20 feet, a bicycle length of 10 feet, a clearance distance behind and ahead of the bicycle of 20 feet, and a clear distance to oncoming traffic of 100 feet, and a speed limit of 45 mph, the distance required to overtake a bicycle traveling at 12.5mph is 544 feet when the car starts at the same speed as the bike. When the speed limit is 35 mph the required distance is reduced to 512 feet. For bikes that are climbing a hill the distances are significantly shorter. For a bike climbing speed of 6 mph the required passing sight distance is 470 feet for a 45 mph speed limit and 429 feet for a 35 mph speed limit.

Are there locations along 83RD Street that do not have adequate passing sight distance? To answer that the process is the same as for stopping sight distance except the height of the driver's eye and the height of the object are both set to 3.5 feet. The table shows that there not adequate passing sight distance at the crest curves. However, these curves represent about 25 percent of the overall distance. Many opportunities exist to pass a slower vehicle outside of these hill crest locations. I have highlighted in green highlighter the limits of available passing based on a passing sight distance of 550 feet.

	Curve Location	A	L	PSD
1	382+12.50	12.73	850	432
2	395+00.00	6.35	550	492
3	409+75.00	4.57	300	456
4	414+00.00	6.49	400	416
5	424+75.00	3.76	250	497
6	430+00.00	7.51	500	432
7	494+75.00	8.4	650	465

What about School Busses?

Based on our observations and on information provided by USD 232, school busses operate on this section of road between 7:00 AM and 9:00 AM, 11:30 AM-1:00PM, and between 2:30 PM to 4:30 PM. Even though it is not likely that a bus would encounter a cyclist during these time periods, and if they did

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it would most likely be a single rider commuting, we could easily restrict bicycles from using the road during these time frames, similar to a school zone speed limit

Ideas to minimize Delays to Automobiles

The thing that we could do that would make the biggest difference and satisfy all concerns is to construct a shoulder along 83rd Street. Current city budgets and economic outlooks do not make this feasible at this time so what I think we really need to do is look at the area where a small investment would make the most difference. In my opinion that is along eastbound 83rd Street , east of Cedar Creek climbing to the top of the hill. We could install a 4' paved shoulder over the existing asphalt millings and eliminate most of the delays that may occur. This would require about 3350 feet of 4' wide by 6" thick asphalt shoulder and would cost about \$35,000. I think if we expend our energy in finding solutions and dealing with this issue in a positive manor we can create a solution that we all can live with.

Closing Thoughts

In the interest of complete disclosure I found this on a bicycling advocacy web page, but it summarizes my thoughts .

Swift v. City of Topeka, 43 Kan 671, 23 P 1075, 8 LRA 772 (Kan 1890).

Public streets are highways, and every citizen has a right to use them. Both the sidewalks and roadways must remain unobstructed, so that people can walk along one without interruption or danger, or drive along the other without delay or apprehension. One of the most imperative duties of city governments in this country is to keep their public streets in such a condition that citizens can travel along them with safety, and without any unnecessary delay. Each citizen has the absolute right to choose for himself the mode of conveyance he desires, whether it be by wagon or carriage, by horse, motor or electric car, or by bicycle, or astride of a horse, subject to the sole condition that he will observe all those requirements that are known as the 'law of the road.' This right of the people to the use of the public streets of a city is so well established and so universally recognized in this country that it has become a part of the alphabet of fundamental rights of the citizen.

The citation is from an 1890 Kansas Supreme Court Decision. The opinion is over 100 years old, but its as much a part of our American Values today as ever. Freedom and mobility are timeless values. Freedom is mobility and mobility is freedom. Don't take them lightly.