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BUREAU OF
TRANSPORTATION



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October 15, 2012

Mark R. Kehrli
Director
Office of Transportation Operations, HOTO-1
1200 New Jersey Avenue, S.E., E86-201
Washington, DC 20590

RE: Progress Report: Request to Experiment "9-105(E)—Colored Bike Lanes and Bike Boxes—Portland, OR"

Dear Mr. Kehrli:

In his letter of June 16, 2008, Director Robert Arnold granted approval with conditions to the City of Portland to "experiment with colored pavement markings, 'bike boxes,' and special signs for bicycle lanes." On December 28, 2010 you approved our request to expand the experiment to 13 additional intersection approaches (Phase 2). Since that time we have installed approved treatments at 11 of the approved additional locations, collected before and after video for analysis at the Phase 2 locations, and continued to monitor the safety performance of the original 12 intersection approaches approved in 2008.

A formal research effort is underway to evaluate the performance of the Phase 2 locations, and update the findings from the evaluation that we provided FHWA for the Phase 1 locations (letter to Bruce E. Friedman of October 15, 2010). The research evaluation is being performed by Dr. Christopher M. Monsere at Portland State University under an Oregon Transportation Research and Education Consortium (OTREC) funded research grant (Evaluation of Bike Boxes at Signalized Intersections: Phase 2). The research evaluation is underway now and should be complete in early 2013.

Pending the outcome of this research we are monitoring safety performance at the treatment locations using reported crash data assembled from both the Oregon DMV crash data base as well as local police crash reports (which include valuable narratives). On May 16, 2012 a fatal truck vs. bicycle crash occurred at one of the treatment locations. I am enclosing the findings of our District Attorney regarding this crash for your information.

Crash Data Trends at Treatment Locations

Monitoring trends in bicycle crashes at the treatment locations is complicated by several factors including:

- Bicycle use and volumes have increased significantly since the treatments were installed.
- Police investigation and reporting practices have changed since the treatments were installed resulting in a higher rate of reporting for bicycle involved crashes.

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Despite these factors we believe that the crash data trend suggests that right-hook crashes are increasing at some of the treatment locations installed in the first phase. See attached crash data summary. During the four years prior to treatment there were a total of 16 bicycle involved right-hook crashes at the 11 intersection approaches that received treatment. During the four years after treatment there were a total of 32 right-hook crashes. A total of 26 of the 32 right-hook crashes (81%) occurred at four locations. A total of 9 of 16 (56%) right-hook crashes occurred at these four locations before the treatment. By comparison, at the remaining seven treatments locations there were 7 right-hook crashes before and 6 after. The attached crash data table provides a summary of the four year crash history before and after the treatment.

The four locations that were responsible for the increase in crashes are:

- SW Madison at SW 3rd Ave.
- SE Hawthorne at SE 7th Ave.
- SE Hawthorne at SE 11th Ave.
- NW Everett Street at NW 16th Ave.

This finding led us to focus our evaluation of safety performance on these four intersections. To gain an understanding of the factors contributing to crashes at these locations we analyzed police crash report narratives. One objective of the analysis was to determine when during the green signal cycle phase the crashes occurred. For crashes that had information available to make this determination we categorized the crashes as either:

- Crash occurred at start-up of green (both vehicles start from a stopped condition), or
- Crash occurred on 'stale' green—after the start-up but before the signal phase changes to yellow/red.

From this analysis we concluded that a high proportion (88%) of the crashes occurred during the 'stale' green condition. Furthermore, we made field observations of the roadway conditions, driver behavior, and cyclists operating behavior and found:

- All three locations have downhill grades on the treatment approach.
- The 85% speed for cyclists observed overtaking right-turning vehicles was approximately 18 mph, which we find to be fast speed for the condition.
- A high percentage of cyclists were overtaking right-turning vehicles during the peak-hour observation periods.
- A very high percentage of vehicles (98%) yield to cyclists over-taking on their right.

These observations suggest some preliminary conclusions regarding the treatments.

- The bicycle box treatments appear to be serving their primary function which is to mitigate the occurrence of right-hook crashes at the start of the green signal phase.
- The high rate of drivers yielding to cyclists over-taking on their right suggests that drivers generally understand their duty to yield to cyclists, and drivers are scanning for cyclists approaching from behind them on their right before executing right-turn movements.
- The speed of cyclists over-taking right turning vehicles is a likely contributing factor that may explain the safety performance of these treatment locations.

- The treatment is correlated with an overall decrease in crashes at 7 of the 11 approaches.

Based on these observations and conclusions we are developing concepts for modifying the design of the four locations. The design concepts include a range of treatments such as:

- Redesign of the cross-section to include a separate right turn lane by either removing a through travel lane or removing parking.
- Prohibit all vehicle right turns.
- Provide a signal phase for the through movement of bicycles exclusive of right-turn vehicle conflicts.
- Provide an active warning/regulatory sign that is activated by approaching bicycles to warn drivers of the potential conflict.

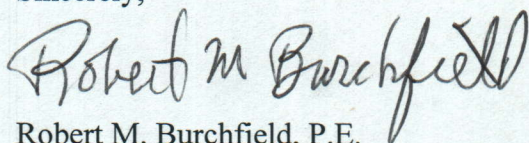
We expect to have final designs ready for implementation at these four locations during the 2013 construction season. In the interim we plan to implement additional warning messages for cyclists that are intended to increase the awareness of cyclists of the risk of right-hook conflicts. These modifications will include some or all of the following treatments as shown in the attached graphic for SW Madison Ave at SW 3rd:

- Update 'Right Turn Yield to Bicycles' sign to most current version approved for Experiment 9-105(E) and add a second sign for emphasis.
- Add supplemental pavement marking warning messages in the bike lane approaching the intersection. SLOW, and LOOK FOR RIGHT TURNS.
- Modify the green pavement marking within the bike lane extension to create a broken pattern that matches the cycle of the dotted bike lane lines. We believe that the broken green pattern might more clearly communicate that this is a conflict area to people riding bicycles.

We concluded from our reading of the 2009 MUTCD that all of these proposed changes are consistent with the Manual, or Interim Approval in the case of the Green Colored Pavement for Bike Lanes (IA-14). As such, they should not require formal modification of our approved experiment if you agree that the proposed traffic controls comply with existing regulations.

We will provide you with on-going Progress Reports as we proceed with our research and develop recommendations for changes to the design treatments at the problem locations referenced in this letter.

Sincerely,



Robert M. Burchfield, P.E.
City Traffic Engineer

RB/rg

Enclosures: 3

cc: Chris Monsere, Portland State University

Michael D. Schrunk, District Attorney

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Memorandum

To: FILE

From: DDA Glen Banfield

cc: SDDA Chuck Sparks

Date: September 26, 2012

Subject: Kathryn Rickson Death Investigation

Date and Time: May 16, 2012 at approximately 8:32 p.m.

Location: SW Madison and SW 3rd Avenue

Investigator: Peter Kurronen (Portland Police Bureau)

Victim: Kathryn Rickson, FW, DOB 6/16/83

Truck Driver: Dawayne Eacret, MW, DOB 03/17/63

Witnesses:

Josiah Reed, MW, DOB 1/15/75 (truck passenger)

Fuschia Sirois, FW, 05/25/61 (eye witness)

Deborah Ackerman, FW, 10/08/49 (eye witness)

On May 16, 2012 at approximately 8:32 p.m., Dawayne Eacret was driving his semi-trailer truck east bound on Madison Street approaching SW 3rd Avenue. As Eacret was making a right turn from Madison onto 3rd Avenue, Kathryn Rickson, who was traveling eastbound on Madison on her bicycle, collided with the right front fender of Eacret's truck. Ms. Rickson went down onto the pavement and was pinned under the truck's rear tires. AMR transported Ms. Rickson to OHSU where she died shortly after arrival.

SW Madison and SW 3rd are public streets in downtown Portland. The intersection is controlled by a traffic signal. SW Madison is a one way street traveling west to east. SW 3rd is a one way street traveling north to south. Madison has two traffic lanes. Between SW 4th and SW 3rd on Madison there is a marked bicycle lane on the south side. Between 4th and 3rd, on the south side, the bicycle lane is painted green starting 96 feet west of the SW 3rd west curb. At the crosswalk there is a green bicycle box. The box is painted across the entire lane.

There were scrape marks from the bicycle located on the right side of the truck's front fender and on the right side of the front tire of the truck. The locations of the marks indicate that the front of the truck was turned to the right facing south on 3rd Ave before the bicycle collided with the right side of the truck's front fender and tire. Witness statements and vehicle evidence indicate that the truck's right turn signal was on at the time of the collision.

Three people witnessed either the events preceding the collision and/or the collision itself. Two witnesses, Fuschia Sirois and Deborah Ackerman, were traveling in a car together eastbound on Madison directly behind Eacret's truck. The passenger in Eacret's truck, Josiah Reed, also witnessed the collision.

Fuschia Sirois reported that she was a passenger in Ackerman's vehicle on the night of the collision. Ms. Sirois told Officer Kurronen that they were directly behind the truck at the time of the crash. She said as the truck approached 3rd Ave it was making a right turn onto 3rd Ave. Ms. Sirois said that Ackerman came to a stop because the truck was making a right turn. She said the truck was barely moving as it was turning. Ms. Sirois said "I know for sure that the truck was already turning when the bicyclist went by us on our right at a good clip." She said the truck driver could not have done anything to avoid the crash. Ms. Sirois reported that the traffic light was green when the truck started to turn right.

Deborah Ackerman reported that she was the driver of the vehicle that was directly behind the truck at the time of the collision. Ms. Ackerman said that she remembered being directly behind the truck as it was turning onto 3rd Ave. She said that she knew the truck was turning right and described the truck as stopped and then barely moving as it started to turn. Ms. Ackerman said she believed the truck swung to the left before making the turn. She never saw the bicyclist go by her but knew the crash occurred because the truck stopped and Sirois screamed. Ms. Ackerman said the truck's right turn signal must have been on because she knew the truck was turning. Ms. Ackerman said she was 10 feet from the rear bumper of the truck. She said the truck driver could not have avoided the accident.

Josiah Reed, the passenger in the semi truck, reported that while they were driving eastbound on Madison he did not remember seeing a bicyclist in front of them. Mr. Reed said that the light was green as they approached the light on Madison and 3rd Ave. Mr. Reed explained that the truck started to make a right turn and was traveling slowly, approximately 5-10 mph. Mr. Reed could not recall with certainty but believed Mr. Eacret did not swing left before making the turn. Mr. Reed said as the truck made its turn, he saw the bicyclist out of his "peripheral" vision approach the right side of the truck. Mr. Reed then heard the impact from the bicyclist. When the bicyclist hit the truck, Mr. Eacret said "what was that." Mr. Reed reported that Mr. Eacret was not using a cell phone at the time.

Dawayne Eacret said that he has been a commercial truck driver since 1986. Mr. Eacret reported that he is currently employed by Quality Foods as a truck driver. Mr. Eacret said that he started his shift at 6:00 PM on the evening of the crash. Mr. Eacret said that all the lights and signals on his truck were checked at the beginning of his shift and that everything worked during the pre-inspection. He said when he came down Madison he never saw or passed a bicyclist. Mr. Eacret could not recall exactly when he activated his turn signal but said that it is his practice to activate it at least 100 feet before turning. Mr. Eacret said as he came to the intersection the light was green and he checked his mirrors before turning and did not see anyone in his mirrors. Mr. Eacret said as he was turning he continued to check his mirrors because he is cognizant of bicyclist and pedestrians. Mr. Eacret estimated his speed at approximately 2-3 mph at the time of the turn. He said that he had to go slow to set the turn, so the trailer would not hit the curb. Mr. Eacret was uncertain whether he turned his trailer slightly out to the left before turning or whether he went deeper into the intersection before turning. He said he started his turn and was into the intersection when he heard an impact against the truck and then heard Mr. Reed yell that he hit a bicyclist. Mr. Eacret immediately stopped the truck and got out. Witnesses were yelling for him to back up off of the cyclist so he got back in the truck and backed up. Mr. Eacret said he was not on the phone at the time of the collision. Company phone records and Mr. Reed's statement would later confirm that Mr. Eacret was not on the phone during the accident.

Mr. Eacret was cooperative throughout the investigation and gave consent for blood. Eacret also gave consent to search his truck. Officers on scene did not detect any signs of intoxication. Laboratory results later confirmed that Mr. Eacret's blood did not contain alcohol or controlled substances. After the crash PPB seized the truck with the consent of Quality Foods. Officer Kurronen did a complete inspection of the vehicle and found nothing mechanically or structurally wrong, so there was no known equipment malfunction that contributed to this collision. Officer Kurronen also conducted a visibility test to determine if Mr. Eacret could have seen Ms. Rickson during the time she was not riding her bicycle in the bicycle lane.

The truck and bicycle were captured on a video surveillance camera from City Hall. City Hall is located on Madison between 4th and 5th Ave. The City Hall camera captured the truck and bicycle as they approached 4th Ave from 5th Ave. In the video, the truck is seen in the right lane with no other vehicles in front or behind it.

The truck stopped at SW 4th Ave. When the truck departs from 4th Ave it disappears from the camera's view. Ms. Rickson's bicycle can be seen riding through 5th Ave four seconds after the truck departs from 4th Ave. Ms. Rickson takes nine seconds to arrive at the area where the back end of the truck was stopped on 4th Ave. This gives Eacret a 13 second head start from 4th Ave. A vehicle is seen passing Ms. Rickson on her left as they went through 5th Ave. The car cleared the block well before Ms. Rickson approached 4th Ave.

While riding down Madison, the surveillance footage shows Ms. Rickson riding in the middle of the right traffic lane (i.e. not in the bike lane), which is the lane Eacret was also traveling in. Officer Kurronen tested the visibility of the truck looking through the side mirrors and concluded that the driver of the truck could not see the cyclist at all unless the cyclist was riding at the side of the truck. In other words, the driver of the truck cannot see a cyclist if the cyclist is lined up directly behind the trailer. Officer Kurronen determined that when Ms. Rickson was riding in the middle of the lane on Madison between 4th and 5th Ave, Mr. Eacret could not see her. It should be noted that there is no bike lane between 4th and 5th Ave on Madison.

Based on Ms. Sorois' statement that the "bicyclist went by us on our right at a good clip," Ms. Rickson moved at some point from the middle of the right or south lane between 4th and 5th to the bicycle lane between 3rd and 4th. However, video surveillance does not capture the block between 3rd and 4th, so it is unknown when Ms. Rickson moved from the middle of the lane between 4th and 5th to the bicycle lane between 3rd and 4th.

Using the video surveillance evidence and roadway evidence, Officer Kurronen determined that Ms. Rickson was traveling between 12.5 and 16.6 mph before impact. The speed of the truck as it was turning can only be determined by statements from Mr. Eacret, Mr. Reed and the two witnesses. These speeds range from 0 mph start to 10 mph impact and 3 mph to 10 mph. Given these speed ranges, the truck would have been between 16.27 to 32.6 feet back from impact when it started its turn. These calculations put the truck tractor near or within the marked crosswalk on Madison when it initiated its turn.

To determine where Ms. Rickson was at the time the truck began turning, Kurronen used a speed range of 12.5 to 16.6 mph. If the speed range of the truck was 0 – 10 mph and Ms. Rickson was riding at 12.5 mph, she would have been back 83 feet from impact when the truck started its turn. If she was riding 16.6 mph she would have been back 110 feet from impact. These calculations are consistent with witness statements. The truck/trailer length is 54.6 feet. Ms. Ackerman's vehicle is 14 feet long and she put herself back 10 feet from the back of the trailer. The total distance is 78.6 feet. When adding the distance the truck was from impact (16.27 to 32.6) at the start of its turn, the rear end of Ms. Ackerman's vehicle was in the range of 94 to 111 feet back from the impact area. Ms. Sorois statement that the bicyclist went by her at a good clip after the truck started its turn is consistent with Officer Kurronen's distance calculations of 83 to 110 feet back from the time the truck began its turn.

For purposes of criminal prosecution the question becomes whether Mr. Eacret's actions were criminally negligent or even reckless under the circumstances. Criminal Negligence means that a person "fails to be aware of a substantial and unjustifiable risk that the result will occur or that the circumstance exists. The risk must be of such nature and degree that the failure to be aware of it constitutes a gross deviation from the standard of care that a reasonable person would observe in the situation." Recklessly means that a person is "aware of and consciously disregards a substantial and unjustifiable risk that the result will occur or that the circumstance exists."

In determining whether Mr. Eacret was criminally negligent or reckless several factors must be considered. First, Mr. Eacret never passed Ms. Rickson prior to initiating his turn but instead all indication is that she approached his truck from behind. From the visibility test Officer Kurronen conducted, he learned that the side view mirrors would not assist Mr. Eacret's visibility of Ms. Rickson when she was behind him in the middle of the right lane. The same test indicates that if Ms. Rickson was behind the trailer and to the right/in the bicycle lane, she would be visible in the standard flat side view mirror but would be very small and difficult to see in the truck's convex mirror. Evidence collected at the scene tells us that Ms. Rickson had a flashing white headlight on her bicycle which would increase her visibility. It is unknown when Ms. Rickson moved from out of Mr. Eacret's view in the middle of the right traffic lane to the bicycle lane. If Ms. Rickson moved over after the

truck was angled into the start of its turn, then the mirrors would have been useless for spotting her. We know that Mr. Eacret had a 13 second head start from 4th Ave, which put him at 3rd Ave some time ahead of Ms. Rickson. What we don't know and cannot know beyond a reasonable doubt is whether Ms. Rickson moved into the bicycle lane in time to become visible to Mr. Eacret before he made his turn.

Applying the standard of criminal negligence, the state cannot prove beyond a reasonable doubt that Mr. Eacret committed the crime of criminal negligent homicide by failing to be aware of Ms. Rickson's presence under the circumstances. Based on the evidence before us, Mr. Eacret followed the proper procedure and rules of the road as he approached 3rd Ave and before he made his turn. He did what he was supposed to do in his situation. He slowed to almost a stop, checked his mirrors and slowly made his turn while continuing to check his mirrors. According to Ms. Sirois who was in the car directly behind Mr. Eacret's truck, the first time anyone ever noticed Ms. Rickson was after Mr. Eacret had already started his turn. Witnesses also indicate that Mr. Eacret was traveling slowly at the time and there was nothing he could have done to avoid the collision with Ms. Rickson.

Applying the evidence to the standard of recklessness the state cannot prove beyond a reasonable doubt that Mr. Eacret was aware that Ms. Rickson was behind him before he started to turn. If we cannot prove that Mr. Eacret was aware of her presence it cannot be said that he then consciously disregarded the risk of hitting her.

Finally, officers on scene did not detect any signs of intoxication. Laboratory results later confirmed that Mr. Eacret's blood did not contain alcohol or controlled substances. The Medical Examiner's report concluded that Ms. Rickson had no alcohol in her system at the time of her death. Officer Kurrnen did a complete inspection of the vehicle and found nothing mechanically or structurally wrong with the vehicle. This tragic event was an accident and is not chargeable as a felony homicide or other traffic crime. Accordingly this case is declined for criminal prosecution.

Bicycle-involved Right Hook Crashes at Colored Bike Lane and Bike Box Locations (Phase I)

Total Right Hook Crashes (Data from 2004-2011 includes DMV and police records)

Year▶	Pre-Treatment					Post-Treatment					Annual Average	
	2004	2005	2006	2007	Total	2008	2009	2010	2011	Total	2004-2007	2008-2011
▼ Treatment Locations												
1 SW 3rd & Madison	1	1	1	1	4	1	2	3	3	9	1.00	2.25
2 NW 16th & Everett	0	0	1	1	2	1	3	2	1	7	0.50	1.75
3 SE 7th & Hawthorne	0	0	0	0	0	1	2	0	1	4	0.00	1.00
4 SE 11th & Hawthorne	2	1	0	0	3	2	0	3	1	6	0.75	1.50
5 NW Broadway & Hoyt	0	0	0	3	3	0	2	0	0	2	0.75	0.50
6 SW 6th & Broadway	0	0	0	2	2	1	0	1	1	3	0.50	0.75
7 SW 14th & Burnside	0	0	0	1	1	0	0	0	0	0	0.25	0.00
8 SW Broadway & Clay	0	0	0	0	0	0	0	0	0	0	0.00	0.00
9 SW Broadway & Taylor*	0	0	0	0	0	0	0	0	0	0	0.00	0.00
10 SW Terwilliger NB & Taylors Ferry	0	1	0	0	1	1	0	0	0	1	0.25	0.25
11 SW Terwilliger SB & Taylors Ferry	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total	3	3	2	8	16	7	9	9	7	32	4.0	8.0
* - Denotes DMV records only												
Total Locations 1-4	3	2	2	2	9	5	7	8	6	26	2.25	6.5
Total Locations 5-11	0	1	0	6	7	2	2	1	1	6	1.75	1.5

Other Factors that May be Influencing Crash Numbers

1) Increase in reported crashes correlated with Police Bureau directive to create crash reports for less serious injuries (2008)

Average increase: 55%

Year▶	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2007	Average 2008-2011
Citywide Bicycle Crashes (DMV)	176	189	203	186	265	287	321	297	188.5	292.5

2) Increase in crashes resulting from increased exposure due to significant increase in number of bicycle riders

Average increase: 50%

Year▶	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2007	Average 2008-2011
Ridership Willametter River Bridges	8,875	10,192	12,046	14,563	16,711	15,749	17,576	18,257	11,419	17,073

SW Madison at 3rd Bike Box Approach Legend – 3 Ft Letters with 6 Ft Gap, 10/15/12

