PEDESTRIAN AND BICYCLE CRASH PLOTTING AND COUNTS AND BEHAVIORS OBSERVATIONS

Prepared for METROPLAN ORLANDO

Prepared by

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July 17, 2007

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EXECUTIVE SUMMARY

The objective of this study is to improve understanding of the behaviors and environmental and engineering factors that contribute to crashes between pedestrians and motorists and bicyclists and motorists. This study was performed to fulfill Task 4.7.7 of the METROPLAN ORLANDO Unified Planning Work Program, "Continuation of Pedestrian and Bicyclist Crash Analysis."

This study consisted of four tasks:

- Task 1 – Select street segments for study
- Task 2 – Collect data on study streets
- Task 3 – Develop relative risk measures
- Task 4 – Write study report

Task 1 – Select Street Segments for Study

GIS plots of nearly 2,300 pedestrian-motorist and bicyclist-motorist crashes that occurred in Orange, Seminole, and Osceola Counties in 2003 and 2004 revealed that crashes tended to be concentrated in certain corridors, including Orange Blossom Trail, Colonial Drive, Semoran Boulevard, and others. METROPLAN ORLANDO staff and the researchers agreed to focus on five corridors, which were selected on the basis of crash histories and the presence or absence of bicycle lanes, medians, and street lighting:

- Bicycle lanes vs. no bicycle lanes: Alafaya Trail and University Boulevard
- Medians vs. no medians: Colonial Drive and Orange Blossom Trail
- Street lighting vs. no street lighting: Colonial Drive and Silver Star Road

Task 2 – Collect Data on Study Streets

One hundred seventy-one hard-copy police crash reports were reviewed. These crashes all occurred on the study streets from 2002-2006. There were 118 bicyclist-motor vehicle crashes and 53 pedestrian-motor vehicle crashes. Based on the review of crash reports, the following behaviors were identified for field observations:

Bicyclist

- Riding in the roadway vs. riding on the sidewalk
- Riding with traffic vs. riding against traffic

- Use of lights at night

Pedestrian

- Crossing at an intersection (in a crosswalk) vs. crossing midblock (not in a crosswalk)
- Choice of adequate **gap** when crossing street

Field observations of bicyclist and pedestrian behaviors revealed the following key findings:

- 84 percent of bicyclists rode on the sidewalk and 16 percent rode in the street.
- 58 percent of bicyclists rode with traffic and 42 percent rode against traffic.
- 79 percent of pedestrians crossed midblock and 21 percent crossed at an intersection.
- 57 percent of pedestrians did not crossed in a gap and 43 percent crossed in a gap.

Task 3 – Develop Relative Risk Measures

Risks were calculated for pedestrian behaviors:

- Crossing a street with a median
- Crossing a street without a median
- Crossing a street with street lighting
- Crossing a street without street lighting
- Crossing at an intersection
- Crossing midblock

The risks were calculated according to the number of crashes per mile for each behavior and the number of pedestrians observed for each behavior.

Risks were also calculated for bicyclist behaviors:

- Riding on the sidewalk with traffic
- Riding in a shared lane with traffic
- Riding in a bike lane with traffic
- Riding on the sidewalk against traffic

The risks were calculated according to the number of crashes per mile for each behavior and the number of bicyclists observed for each behavior. Since no bicyclists were

observed riding in a shared lane against traffic, and no bicyclists were observed riding in a bike lane against traffic, it was not possible to calculate the risks for those behaviors.

In summary, the following conditions were associated with a higher risk of pedestrian-motorist crashes:

- No median (vs. median)
- No street lighting (vs. street lighting)
- Crossing midblock (vs. crossing at an intersection)

The following conditions were associated with a higher risk of bicyclist-motorist crashes:

- Bike lanes (vs. no bike lanes)
- Riding against traffic (vs. riding with traffic)
- Riding in the street (vs. riding on the sidewalk)

It is recommended that educational and enforcement countermeasures target bicycling against traffic in the roadway and bicycling at night without headlights. Engineering countermeasures include installing designated bike lanes, adding raised medians, and installing street lighting.

Conclusions

Based upon these findings, the authors recommend that

- Medians be installed, whenever feasible, as part of new roadway construction and as part of roadway reconstruction.
- Street lighting be added to both sides of the roadway. The longitudinal spacing should be such that there are no dark areas along the roadway. On divided roadways, it may be appropriate to also install street lights in the median, so that the middle of the roadway is properly illuminated. Street lighting should adhere to the standards given in Section 7.3 of the *Plans Preparation Manual*.
- Bike lanes be designated by pavement markings and signs (Figures 29-31) so that more bicyclists will recognize the bike lanes as an area of the roadway that has been set aside for them to ride, and that they are to ride with traffic when using the bike lanes.

INTRODUCTION

The objective of this study is to improve understanding of the behaviors and environmental and engineering factors that contribute to crashes between pedestrians and motorists and bicyclists and motorists. METROPLAN ORLANDO issued a contract to Sprinkle Consulting, Inc. to perform this study to fulfill Task 4.7.7 of the METROPLAN ORLANDO Unified Planning Work Program, "Continuation of Pedestrian and Bicyclist Crash Analysis." [1]

This study consisted of four tasks:

- Task 1 – Select street segments for study
- Task 2 – Collect data on study streets
- Task 3 – Develop relative risk measures
- Task 4 – Write study report

This report describes the activities performed for, and the results of, the first three tasks.

PREVIOUS WORK

During 1995 and 1996, METROPLAN ORLANDO staff analyzed and plotted all long form crash reports for Orange, Seminole, and Osceola Counties for 1993 and 1994. The Orlando Area Arterial Pedestrian Crash Study was completed in 2000. In that study, 617 crashes from 1993 through 1997 were analyzed and plotted. The crashes occurred on five major arterials: SR 50, SR 436, US 17/92, US 441, and US 192. More recently, METROPLAN ORLANDO staff and the University of Florida plotted 2,285 crashes (that occurred in 2003 and 2004 in Orange, Seminole, and Osceola Counties) in ArcGIS. METROPLAN ORLANDO staff analyzed these crashes for behaviors and other factors using the Federal Highway Administration's Pedestrian and Bicycle Crash Analysis Tool (PBCAT).[2]

[1] Metroplan Orlando. *Unified Planning Work Program: July 1, 2006 – June 20, 2007*. http://www.metroplanorlando.com/site/upload/documents/UPWP_0607_web.pdf

[2] For more information about PBCAT, see http://www.walkinginfo.org/pc/techbrief_HRT-06-90_print.pdf.

TASK 1 – SELECT STREET SEGMENTS FOR STUDY

Mr. Mighk Wilson of METROPLAN ORLANDO provided Sprinkle Consulting, Inc. staff members Mr. Theo Petritsch and Dr. Herman Huang with GIS data for nearly 2,300 pedestrian-motorist and bicyclist-motorist crashes. These crashes occurred in Orange, Seminole, and Osceola Counties in 2003 and 2004. Dr. Huang used GIS to plot these crashes. The GIS plots revealed that crashes tended to be concentrated in certain corridors, including Orange Blossom Trail, Colonial Drive, Semoran Boulevard, and others.

Mr. Wilson, Mr. Petritsch, and Dr. Huang discussed the crash histories in these and other corridors. Mr. Wilson provided his insights regarding the presence or absence of bicycle- and pedestrian-related street features such as bicycle lanes, medians, and street lighting. They agreed to focus on five corridors for the purposes of this study. As shown below, the corridors are paired according to whether a particular feature is present or absent. For example, SR 50 (Colonial Drive) has lighting and is paired with SR 438 (Silver Star Road), which does not have lighting[3]. SR 50 also has a median and is paired with US 17/19/441 (Orange Blossom Trail), which does not have a median. SR 434 (Alafaya Trail) has bike lanes and is paired with University Boulevard., which does not have bike lanes.

Lighting

SR 50 (Colonial Dr.) from Mission Road to Tampa Ave.

2.25 miles

6-lane divided with street lights (see Figure 1 for type of street lights)

5 night crashes during 2003/04

Low income, transit dependent neighborhoods

[3] Between June 2006 and April 2007, street lights were installed on the portion of Silver Star Road west of Pine Hills Road.

Figure 1 Street lights used on Colonial Drive

SR 438 (Silver Star Road) from Hiawassee Road to Princeton St.

2.45 miles

6-lane divided with/without street lights[4]

9 night crashes during 2003/04

Low income, transit dependent neighborhoods

Median

SR 50 (Colonial Dr.) from Mission Road to Tampa Ave.

2.25 miles

6-lane divided with street lights

15 crashes during 2003/04

Low income, transit dependent neighborhoods

Figure 2 shows that Colonial Drive has a raised median and bike lanes. However, the bike lanes are not designated as such.

Figure 2 Bike lane and raised median, Colonial Drive

[4] Between June 2006 and April 2007, street lights were installed on the portion of Silver Star Road west of Pine Hills Road.

US 17/19/441 (South Orange Blossom Trail) from I-4 to Oak Ridge Road

2.45 miles

6-lane undivided with street lights (see Figure 3 for type of street lights)

27 crashes during 2003/04

Low income, transit dependent neighborhoods

Figure 3 Street lights used on Orange Blossom Trail

Bike Lanes

SR 434 (Alafaya Trail) from University Blvd. to SR 50

2.15 miles

6-lane divided with bike lanes (Figure 4; the bike lanes are not designated as such)

13 crashes during 2003/04

College population (UCF)

Figure 4 Bike lane, Alafaya Trail

University Blvd. from SR 436 to SR 551

1.25 miles

6-lane divided without bike lanes

10 crashes during 2003/04

College population (Full Sail)

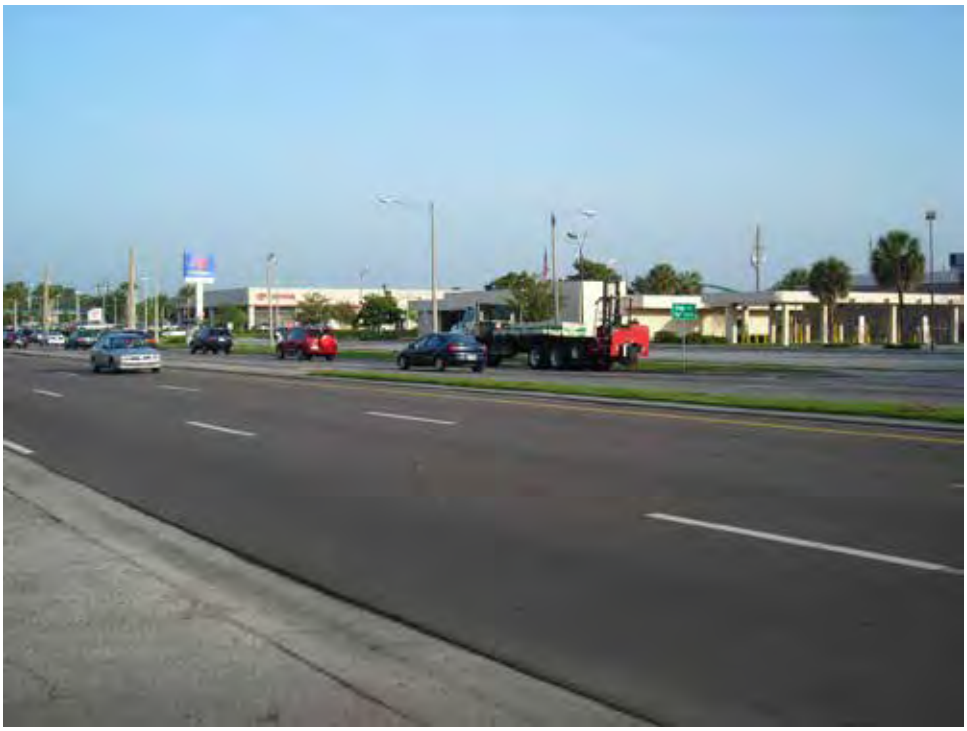


Figure 5 University Boulevard

Aerials of these corridors appear in Appendix A. GIS maps showing where crashes occurred in 2003 and 2004 appear in Appendix B.

Dr. Huang met with Mr. Wilson on June 19, 2007. Mr. Wilson suggested locations along the study streets that would be suitable for data collection, based upon his knowledge of bicyclist and pedestrian activity levels. Following the meeting, Dr. Huang conducted a field visit of the study streets and identified specific locations for data collection.

TASK 2 – COLLECT DATA ON STUDY STREETS

Dr. Huang obtained hard-copy police crash reports for pedestrian-motorist and bicyclist-motorist crashes occurring on the study streets in 2002-2006. He and Mr. Petritsch

reviewed these reports to better understand the crash circumstances. Dr. Huang prepared a spreadsheet (Appendix C) with summary information about each crash:

- **Report No. –** The report number assigned by the Florida Department of Highway Safety and Motor Vehicles.
- **Location –** Alafaya, Colonial, Orange Blossom Trail (OBT), Silver Star, University.
- **Bike/Ped –** Bicyclist-motorist crash or pedestrian-motorist crash.
- **Lighting –** Lighting condition as coded by the investigating officer: Daylight, dawn, dusk, dark – street light, dark – no street light.
- **Bike Location –** Where the bicyclist was immediately prior to the crash, as indicated in the crash report.
- **Bike Direction –** With traffic, against traffic (wrong-way riding)
- **Ped Location –** Where the pedestrian was immediately prior to the crash, as indicated in the crash report.
- **Description –** Indicates whether the motorist was going straight (thru), turning right (RT), or turning left (LT), as indicated in the crash report. The designations "1st half" and "2nd half" denote whether the pedestrian was struck during the 1st half or the 2nd half, respectively, of his/her crossing.
- **Comments –** These refer to additional information gleaned from the crash report, such as alcohol use or a hit-and-run driver.
- **Would bike lanes have prevented the crash? –** This is an assessment of whether bike lanes would have prevented the crash (*i.e.*, that the crash would not have occurred if bike lanes had been present).
- **Would a (wider) median have prevented the crash? –** This is an assessment of whether a median or a wider median would have prevented the crash.
- **Would better lighting have prevented the crash? -** This is an assessment of whether lighting or better lighting would have prevented the crash.

A total of 171 crashes (that occurred in 2002-2006) are listed in the spreadsheet. Some crash reports pertained to crashes that did not occur on the study streets or that did not involve either a bicyclist or a pedestrian; these crash reports were not reviewed and these crashes are not listed in the spreadsheet.

Figure 6 shows that crashes involving pedestrians accounted for 69% of the crashes that were analyzed.

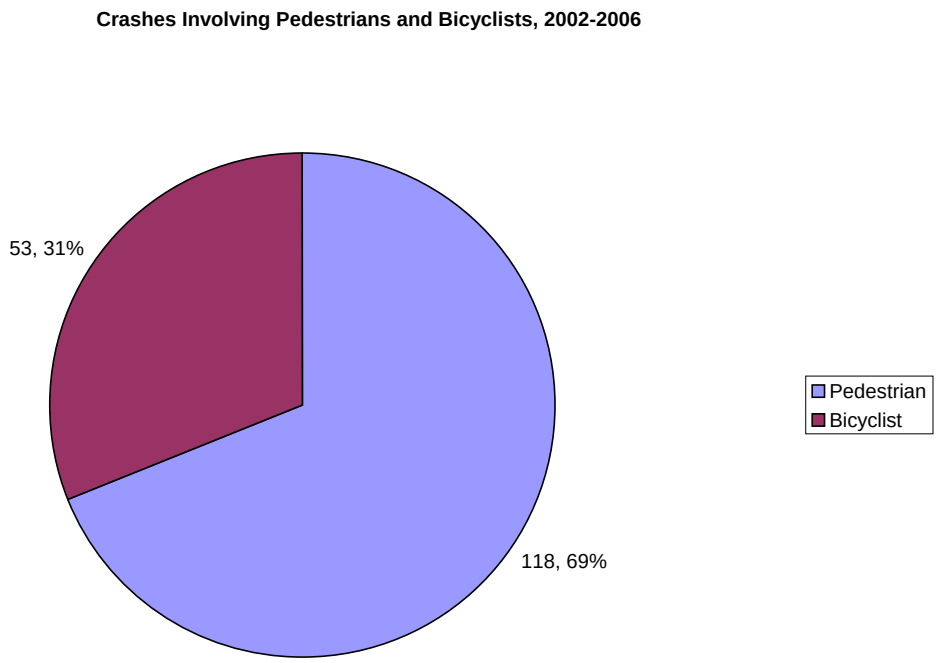


Figure 6 Crashes involving pedestrians and bicyclists, 2002-2006

The number of crashes by study street is shown in Figure 7. The majority of crash reports that were obtained for Alafaya Trail and University Boulevard pertained to bicyclist-motorist crashes, because this pair of study streets compares a street with bike lanes (Alafaya Trail) and a street without bike lanes (University Boulevard), so the study focus was on bicyclist-motorist crashes. The majority of crash reports that were obtained for Colonial Drive, Orange Blossom Trail, and Silver Star Road pertained to pedestrian-motorist crashes, because these study streets compare streets with and without medians (Colonial Drive and Orange Blossom Trail) and streets with and without lighting (Colonial Drive and Silver Star Road).

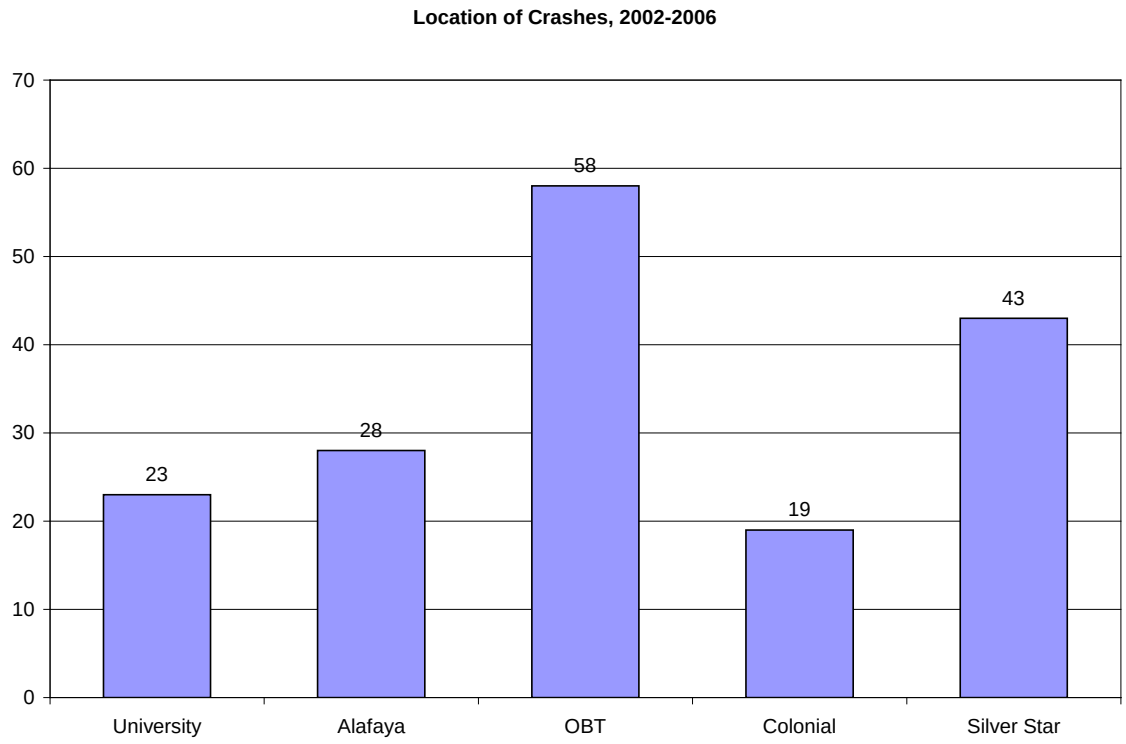


Figure 7 Location of crashes, 2002-2006

The distribution of crashes by lighting condition, as recorded by the investigating officer, is shown in Figure 8. About 54 percent of crashes occurred during daylight, and another 35 percent of crashes occurred during dark – street light.

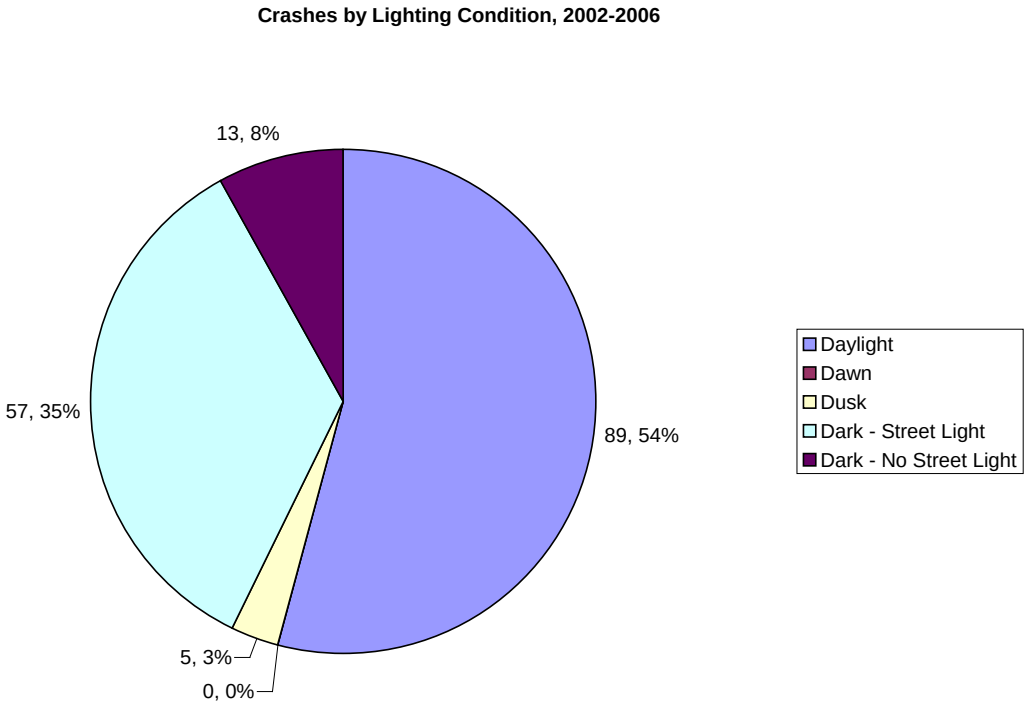


Figure 8 Crashes by lighting condition, 2002-2006

Daylight crashes predominated on all of the study streets except Orange Blossom Trail (Figure 9).

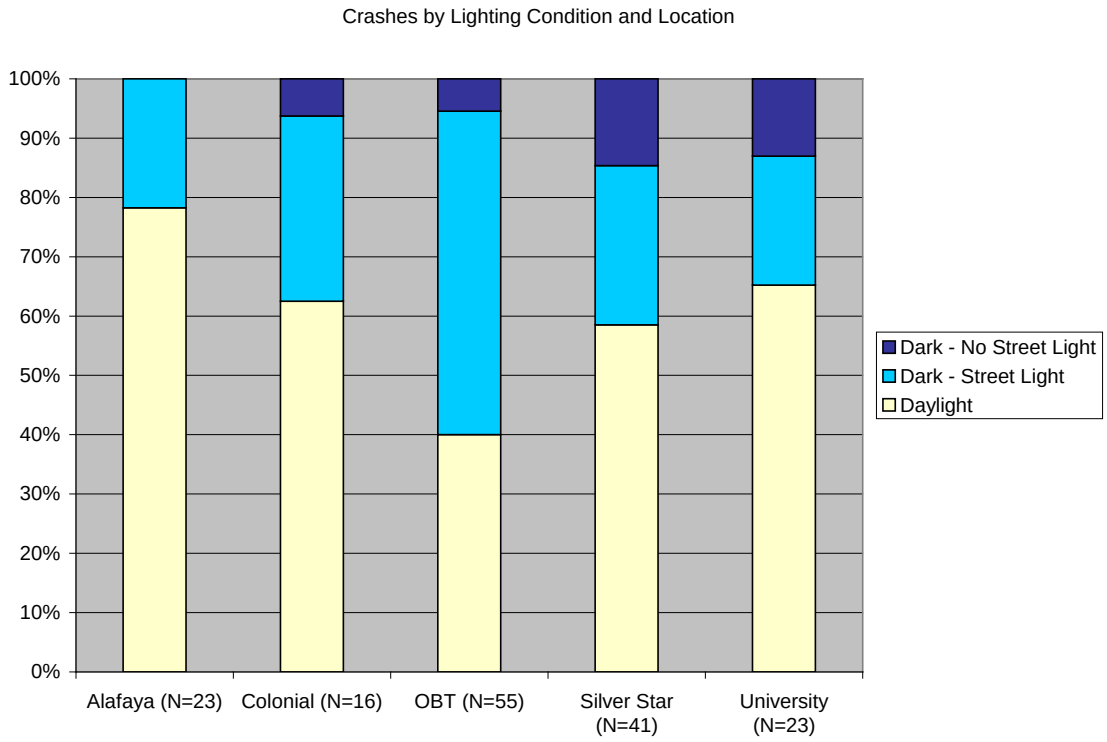


Figure 9 Crashes by lighting condition and location

Figure 10 shows that bicyclist-motorist crashes most commonly involved a bicyclist who was riding on the sidewalk against traffic.

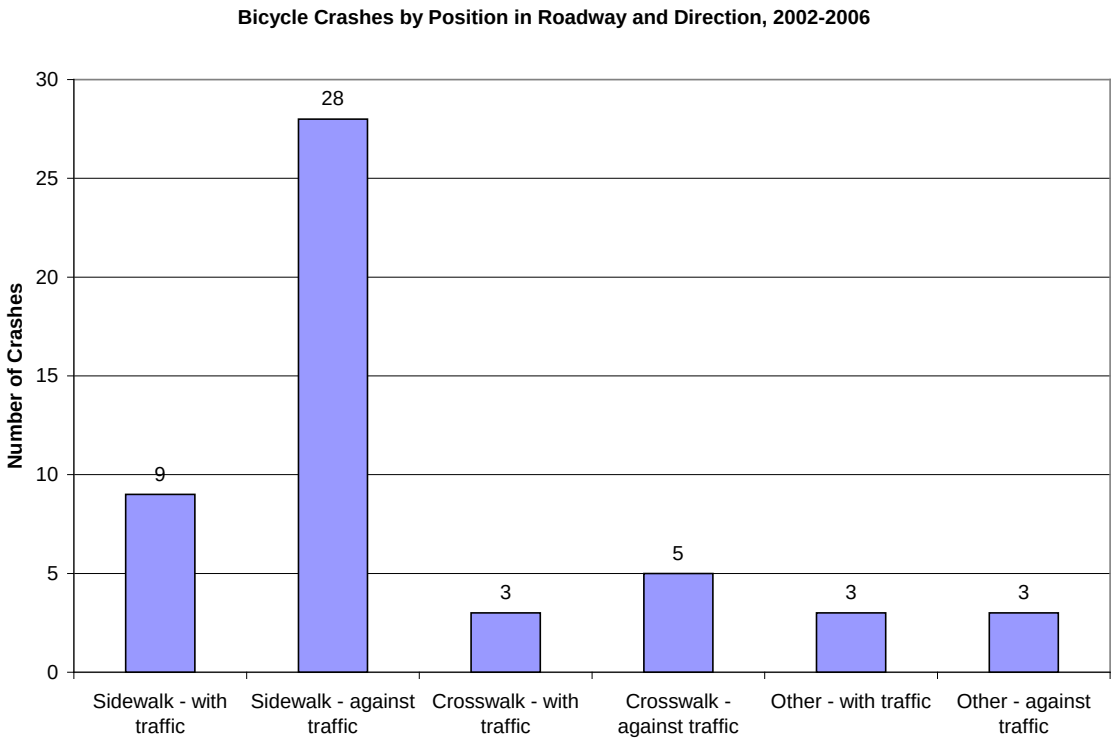


Figure 10 Bicycle crashes by position in roadway and direction, 2002-2006

Figure 11 shows pedestrian-motorist and bicyclist-motorist crashes by time of day. It shows, for example, that crashes on Orange Blossom Trail were most likely to occur from 6:00 PM – 11:59 PM. Crashes on Silver Star Road and Colonial Drive were most likely to occur during the early evening (6:00 PM – 8:59 PM). The most likely times for crashes on Alafaya Trail were early afternoon and early evening. Crashes on University Boulevard were most common during the early afternoon.

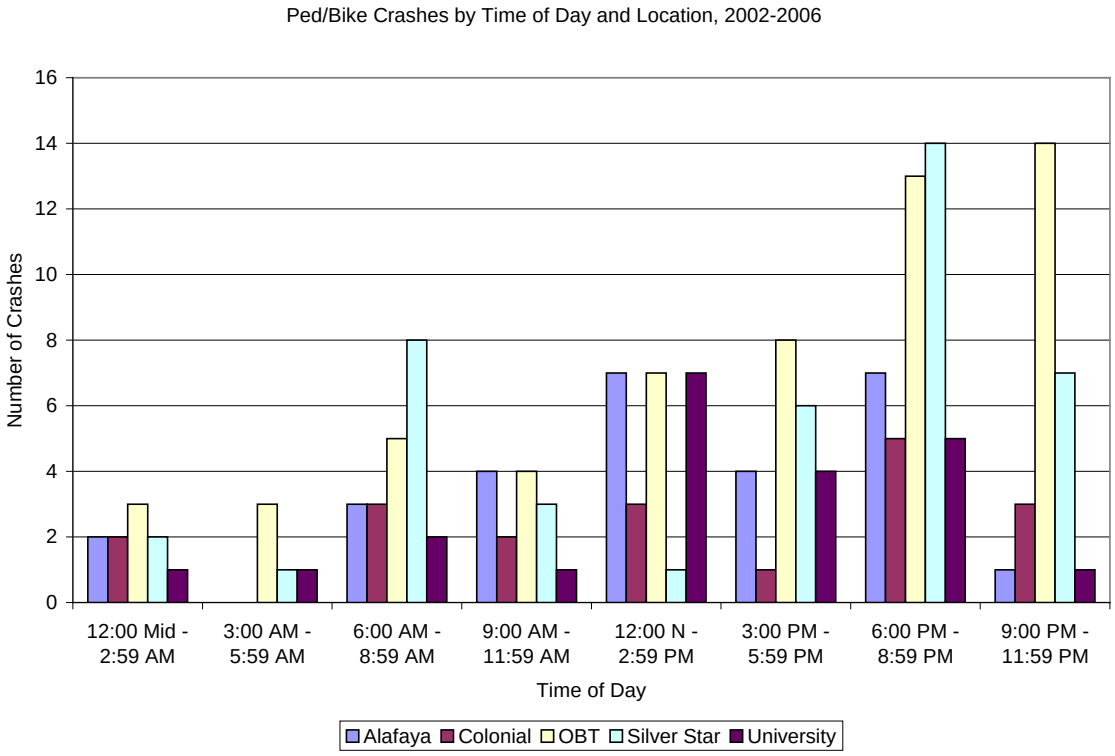


Figure 11 Crashes by time of day and location

Pedestrian "Stepped in Front of Car" Crashes

In many pedestrian-motorist crashes, the investigating officer noted that the pedestrian had stepped in front of a car (Table 1).

Table 1 Pedestrian "Stepped in Front of Car" Crashes

Location	Officer's Narrative
Silver Star Road	"Witnesses stated P1 ran into the path of V1."
Silver Star Road	"[Driver of V1] stated that as he turned right…P-1 suddenly stepped from the curb outside the crosswalk into his path."
Colonial Drive	"P#1 ran in front of Vehicle #2…"
Orange Blossom Trail	"P-1 walked into approaching traffic."
Silver Star Road	"P-1…walked into the path of V-2…"
Colonial Drive	"Pedestrian One walked in front of V-1."
Orange Blossom Trail	"P-1 traveled in front of V-2."
Silver Star Road	"P-1 stepped into the path of V-1."
Orange Blossom Trail	"P-1 walked in front of the path of V-2."
Orange Blossom Trail	"P-1 crossed in front of V-1."
Orange Blossom Trail	"P1 crossed into the path of V1."
Silver Star Road	"P1 crossed into the path of V1."
Silver Star Road	"P1 crossed the road directly into the path of V1."
Silver Star Road	"The other 2 witnesses stated P1 walked into the path of V1…"
Orange Blossom Trail	'P-1 walked into the path of V-1."
Silver Star Road	"P1 traveled into the path of V1."
Orange Blossom Trail	'P-1 walked into the travel path of V-1."
Orange Blossom Trail	"P-1 crossed into the path of V-1…"
Orange Blossom Trail	"P-1 failed to yield to V-1 and ran into V-1's path."
Orange Blossom Trail	"…P-1 … ran into V-2's path."
Orange Blossom Trail	"P-1 ran into the path of V-1."
Silver Star Road	"P-1 was attempting to cross … into the path of V-2."
Orange Blossom Trail	"The pedestrian ran into the path of V-2…"

Location	Officer's Narrative
Orange Blossom Trail	"P-1 stepped into the path of V-2."
Silver Star Road	"…P-1 crossed in front of V-1."
Silver Star Road	"P1 entered the path of V1."
Orange Blossom Trail	"The pedestrian walked into the path of V-1."

In other crash reports, reading the crash narrative and looking at the figures would lead one to believe the pedestrian just stepped in front of a car; that or the pedestrian completely failed to judge a gap in traffic. If we first assume the pedestrian was not intending to be hit by a car when crossing the street, we may feel the only option is that the pedestrian failed to judge a proper gap in traffic. This is not necessarily the case.

Most pedestrians do not cross the street in **gaps**; they cross in **holes**. A gap in traffic occurs when one can step into the street and get to a place of safety prior to any car encroaching onto the pedestrian crossing path. For instance, a pedestrian (walking at 3.5 feet per second) crossing three (twelve foot) lanes would require a 10.2 second *gap* in traffic to ensure no conflicts when crossing the street. This is not how people typically cross the street.

Pedestrians, particularly when crossing multilane roadways, will often begin their street crossings when there is traffic in the roadway in front of them. For instance, on a three lane crossing, there may be a car in the middle or far lane when the pedestrian begins crossing. Additionally, a car may be in the near lane so close that it will pass behind the pedestrian prior to the pedestrian completing the roadway crossing. Judging these holes in traffic is a complex psychological task and the potential for error is significant. As long as all the drivers behave as the pedestrian expects, these crossings may be made without incident. However, if conditions change, for example, if a car passes another car (Figure 12), the **hole** the pedestrian was expecting is gone and a crash is likely to ensue. Alternatively, if a car is traveling faster (or slower) than expected (a judgment call which is further complicated during darkness), dangerous conflicts or a crash can occur.

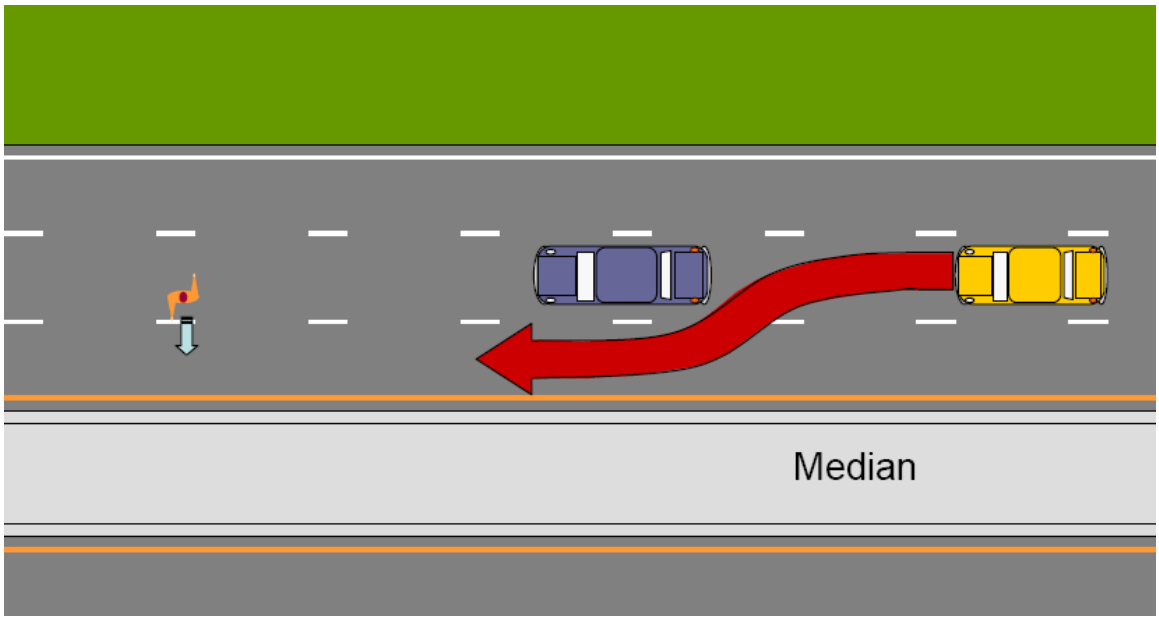


Figure 12 Changing holes in traffic

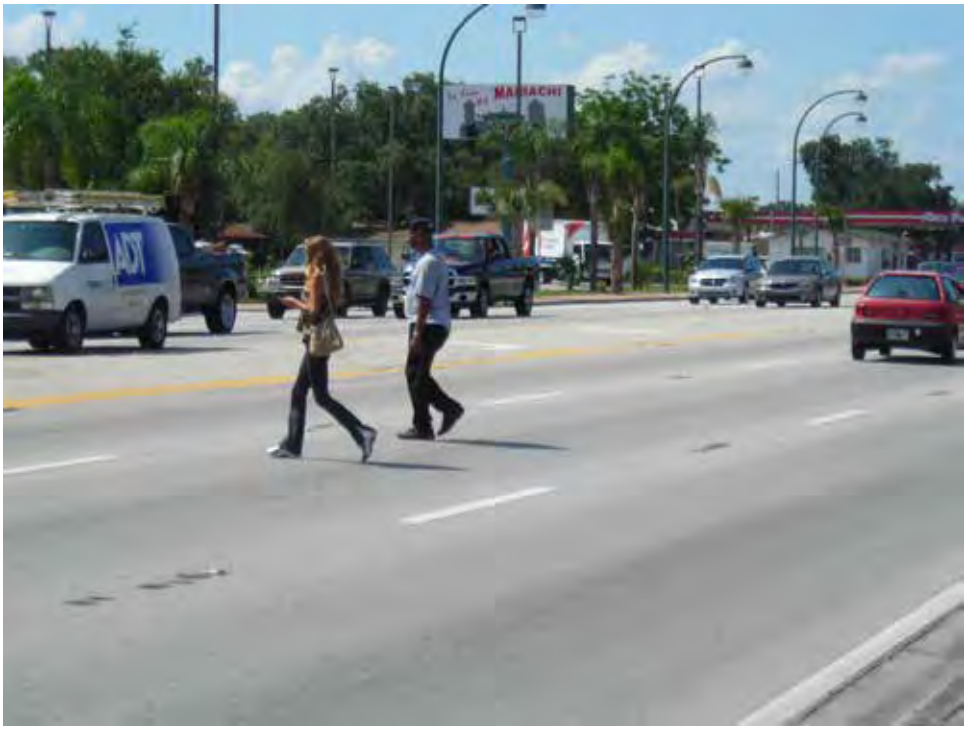


Figure 13 Pedestrians crossing in a hole in traffic

Figure 14 A gap in traffic (but no pedestrians)

Would Bike Lanes Have Prevented the Crash?

Through proper design, bike lanes can reduce crashes. Bike lanes have been shown to reduce wrong-way riding, increase motorist and bicyclist predictability, reduce sidewalk riding, and guide cyclists to the proper position for riding through intersections. Bike lanes can also reduce crashes that occur when a motorist overtakes a bicyclist by offsetting bicyclists from motorists. An additional benefit of bike lanes is the visual delineation of the regular travel lane at night. This becomes very important when motorists drive at a speed such that they cannot stop in the distance that the roadway is illuminated by their headlights.

Because Florida uses raised pavement markers in addition to lane striping, it is often possible for motorists to see where the vehicle lanes are thousands of feet ahead of the vehicle at night. However, this same level of visibility is not translated to roadsides and in-road objects, such as pedestrians and bicycles with poorly-maintained reflectors or lights.

The spreadsheet in Appendix C includes an assessment of whether bike lanes would have prevented the crash, assuming that the bicyclist would have ridden in the bike

lane, with traffic, if a bike lane had been provided. If bicyclists do not use bike lanes, or do not use them as intended (*i.e.*, riding with traffic), then the potential safety benefits of bike lanes will not be realized.

It is not possible to state with certainty that a crash occurred because there was no bike lane, or that a crash would not have occurred if there had been a bike lane. Even if a bike lane were provided, it is likely that some bicyclists will continue to ride on the sidewalk because they perceive sidewalk riding to be safer. It is also likely that many bicyclists riding on the sidewalk will continue to ride against traffic because they perceive that to be safer and more convenient than crossing multiple lanes of traffic, especially where no traffic signals are present, to reach the other side of the roadway in order to ride with traffic.

Would a (Wider) Median Have Prevented the Crash?

The spreadsheet in Appendix C includes an assessment of whether a median or a wider median would have prevented the crash. For this report, it is assumed that if a pedestrian is standing in a two-way left turn lane (TWLTL) and the motorist purposely drove into the TWLTL, the crash would've been prevented by the presence of a raised median. Seven of the reviewed crashes occurred when a motorist in the center turn lane struck a pedestrian who was either walking across the center turn lane or waiting for a gap in the center turn lane.

Beyond the above described condition, it is not possible to state with a certainty that a crash occurred because there was no median, or that a crash would not have occurred if there had been a median. Nevertheless, medians simplify the crossing task for pedestrians. When a two-way road has no median, a pedestrian wishing to cross the roadway must watch both directions of traffic and decide when to cross. "Braver" pedestrians may stand on the centerline, in a center turn lane, or even on lane lines while waiting for a gap to continue crossing. This behavior exposes pedestrians to being struck by a motorist who is in the process of changing lanes.

At night, pedestrians are watching car headlights and it is more difficult to correctly judge the speed of, and distance to, approaching motor vehicles when only headlights are visible. Valuable cues used by pedestrians to judge speed, *e.g.*, change in

the observed shape of the approaching car and relative location with respect to roadside objects are more difficult to observe at night. Variations in motor vehicle travel speeds add to the complexity of judging adequate gaps in traffic.

By comparison, when a two-way road has a median, a pedestrian wishing to cross the roadway need only watch one direction of traffic at a time. That is, he or she can cross from one side of the road to the median ("1st half"), then watch the opposite direction of traffic, and decide when to cross from the median to the other side of the road ("2nd half"). A median also restricts where motorists can make left turns. Another advantage of medians is that they provide a protected location to add additional street lighting.

In theory, a TWLTL may provide some additional perception of safety to crossing peds. However, a TWLTL is not a refuge. Some pedestrians may be uncomfortable standing in the TWLTL and rush to finish crossing the roadway before it is safe.

Figure 15 Pedestrian waiting in the median

Would Better Lighting Have Prevented the Crash?

The spreadsheet in Appendix C includes an assessment of whether better lighting would have prevented the crash. It is not possible to state with a certainty that a crash occurred

because there was no street lighting, or that a crash would not have occurred if there had been street lighting. Even when street lights are present and operational, some sections of roadway may be better illuminated than other sections, depending on the spacing between lights and the area lit by each light. That is, there may be a "strobe effect" of more brightly lit sections alternating with more dimly lit sections.[5] Also, some lanes may more be more brightly lit than others; this is quite likely to occur on six-lane roadways without supplemental median lighting.

Figure 16 Orange Blossom Trail at night

Bicyclist and Pedestrian Behaviors

Based on the review of crash reports, the following behaviors were identified for field observations:

Bicyclist

- Riding in the roadway vs. riding on the sidewalk
- Riding with traffic vs. riding against traffic
- Use of lights at night

[5] On one crash report coded as occurring under "Dark (street lights)" conditions, the law enforcement officer noted that the exact location where the crash occurred was not well lit.

Pedestrian

- Crossing at an intersection (in a crosswalk) vs. crossing midblock (not in a crosswalk)
- Choice of adequate **gap** when crossing street

Field observations of bicyclist and pedestrian behaviors were conducted on Tuesday, June 26, 2007. Table 2 lists the study streets, the observation locations (where staff were stationed), and the observation times. The times varied based upon the observed temporal patterns of crashes.

Table 2 Study Streets, Observation Locations, and Observation Times

Study Street	Observation Location	Observation Time
Alafaya Trail	Alafaya Trail and Lokanotosa Trail (Walgreens on NW corner)	2:00 PM – 7:00 PM
Colonial Drive	Colonial Drive and John Young Parkway (Mobil gas station on SW corner)	5:00 PM – 10:00 PM
Orange Blossom Trail	OBT and 39th Street (Chevron gas station on NE corner)	5:00 PM – 10:00 PM
Silver Star Road	Silver Star Road and Belco Drive (Chevron gas station on NW corner)	5:00 PM – 10:00 PM
University Boulevard	University Boulevard at east entrance to Full Sail (just west of Forsyth Road)	2:00 PM – 7:00 PM

Figures 17-21 depict the study streets in the vicinity of the observation locations.

Figure 17 Alafaya Trail at Lokanotosa Trail, looking south

Figure 18 Colonial Drive at John Young Parkway, looking east

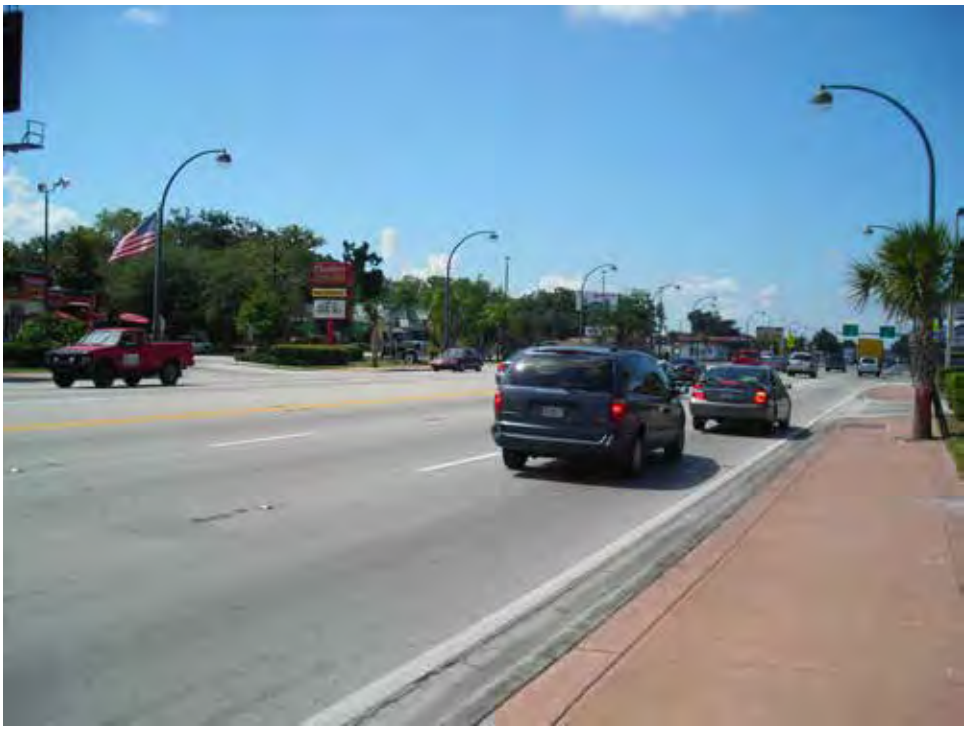


Figure 19 Orange Blossom Trail at 39th Street, looking north

Figure 20 Silver Star Road at Belco Drive, looking west

Figure 21 University Boulevard at east entrance to Full Sail, looking west

Dr. Huang recruited staff from local staffing agencies. He trained the staff on the data collection procedures and dispatched them to their assigned locations. During the training sessions, Dr. Huang explained the items on the data collection instruments (Appendix D). The items on the data collection instruments are described below.

Bicyclist Observations

Observers recorded bicyclists who rode in front of them, either on the near side or the far side of the street (*i.e.,* a "cut line"). Each row on the instrument pertains to one bicyclist.

- **Sidewalk, In Street, With, Against** – These columns refer to the position of the bicyclist. The Sidewalk and In Street columns on the left side of the instrument pertain to the far side of the street from where the observer was standing. The In Street and Sidewalk columns near the middle of the instrument pertain to the near side of the street, immediately adjacent to where the observer was standing. "With" and "Against" indicate whether the bicyclist was riding in the same direction as adjacent traffic or in the opposite

direction as adjacent traffic, respectively. For each bicyclist, the observer checked the appropriate column.

- **Head Light** – "Y" if a headlight was present, "N" if no headlight was present, and "UNK" if the observer could not determine whether a headlight was present (for example, when the bicycle was on the far side of the street).
- **Helmet** – "Y" if the bicyclist was wearing a helmet, "N" if the bicyclist was not wearing a helmet. No attempt was made to determine whether the bicyclist was wearing the helmet correctly.
- **Sex** – "M" or "F."
- **Age** – The observer estimated the age of the bicyclist and checked the appropriate column.

Pedestrian Observations

Observers recorded pedestrians crossing the study street within approximately two blocks upstream and downstream from the observation location. Pedestrians who did not cross the study street were not recorded. Each row on the instrument pertains to one pedestrian.

- **Crossed at Intersection, Midblock, Island** – A pedestrian crossed at an intersection if he/she crossed in the area within the stop bars. On Orange Blossom Trail, the City of Orlando has installed refuge islands at a number of midblock locations. One such island was just north of the observation location. A pedestrian who crossed at this island was recorded as "Crossed at Island." Otherwise, the pedestrian was recorded as "Crossed at Midblock."
- **Gap** – "Y" if a pedestrian crossed the entire roadway (to the median if present, otherwise to the curb on the far side) without any motor vehicles passing in front of, or behind him/her while he/she was in the process of crossing. This does not mean that the pedestrian waited for a gap; the traffic flow may have been such that the pedestrian made it all the way across without motor vehicles passing in front or behind. Otherwise, "N," which implies that the pedestrian crossed holes in traffic.

- **Clothing** – The observer made a subjective judgment as to whether the pedestrian was wearing light or dark clothing.

Riding in the Roadway vs. Riding on the Sidewalk

Table 3 shows sidewalk vs. street riding behavior on each of the study streets. Despite the presence of (undesignated) bike lanes on Alafaya Trail and Colonial Drive, only one bicyclist and six bicyclists, respectively, rode in the roadway. The highest percentage of bicyclists riding in the roadway was found on Orange Blossom Trail, which has no bike lanes.

Table 3 Bicyclist Behaviors – Riding in the Roadway vs. Riding on the Sidewalk

Location	Total Number of Bicyclists	Number (Percent)[a] Riding in the Roadway		Number (Percent)[a] Riding on the Sidewalk	
		With Traffic	Against Traffic	With Traffic	Against Traffic
Alafaya Trail (Bike lanes)	39	1 (2.6%)	0 (0.0%)	25 (64.1%)	13 (33.3%)
Colonial Drive (Bike lanes)	46	4 (8.7%)	2 (4.3%)	24 (52.2%)	16 (34.8%)
Orange Blossom Trail (No bike lanes)	59	6 (10.2%)	18 (30.5%)	18 (30.5%)	17 (28.9%)
University Boulevard (No bike lanes)	74	5 (6.8%)	0 (0.0%)	42 (56.8%)	27 (36.5%)
TOTAL	218	16 (7.3%)	20 (9.2%)	109 (50.0%)	73 (33.5%)

[a] Percentages may not add to 100 due to rounding.

Figure 22 shows sidewalk vs. in street riding behaviors and crashes on Alafaya Trail and University Boulevard, which are the study streets selected to compare bike lanes vs. no bike lanes. The observed behaviors on Colonial Drive and Orange Blossom Trail are included for comparison, but bicyclist involvement in crashes on those streets is not shown. For the purpose of this comparison, bicyclists who were crossing a side street in the side street's crosswalk are included with those bicyclists who were riding on the sidewalk, since the crosswalk can be thought of as an extension of the sidewalk.

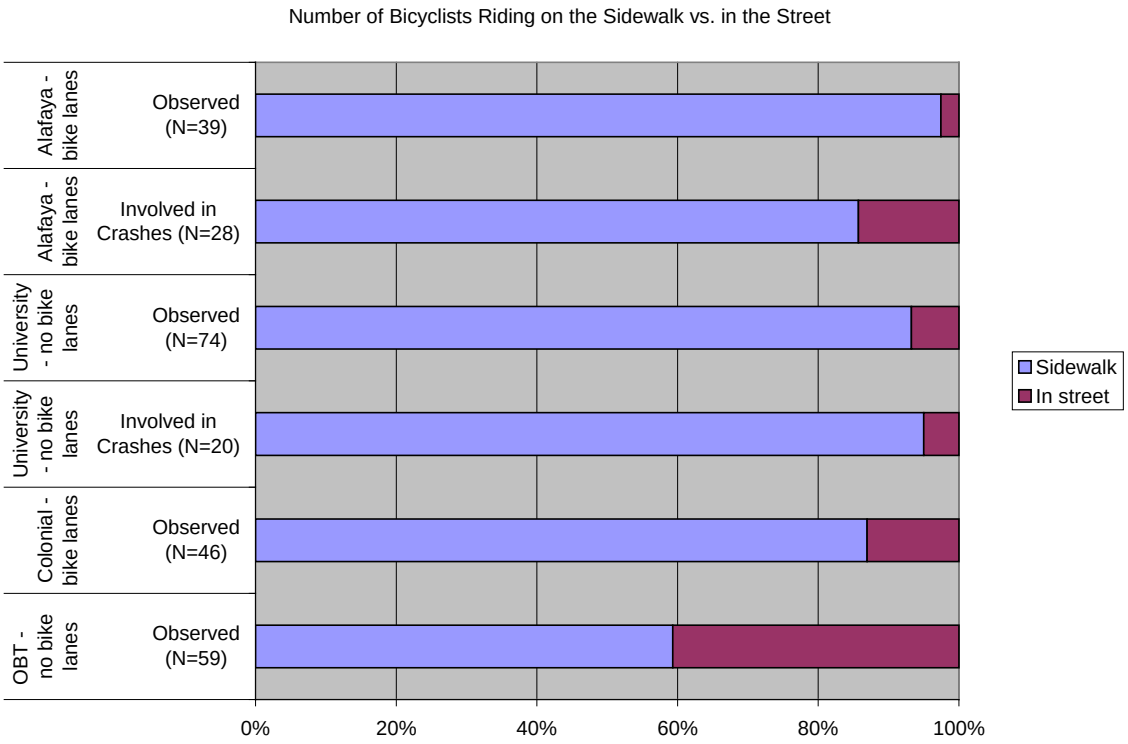


Figure 22 Number of bicyclists riding on the sidewalk vs. in the street

When all five study streets are combined, 83.5% of bicyclists rode on the sidewalk, and 69.0% of bicyclist-motorist crashes involved a bicyclist riding on the sidewalk (or crossing a side street in the side street's crosswalk).

Riding with Traffic vs. Riding against Traffic

Table 4 shows riding with vs. riding against traffic on each of the study streets. Despite the presence of bike lanes on Alafaya Trail and Colonial Drive, many bicyclists still rode against traffic (33 percent and 41 percent, respectively). This is likely the result of low levels of riding in the roadway (Table 3).

Table 4 Bicyclist Behaviors – Riding with Traffic vs. Riding against Traffic

Location	Total Number of Bicyclists	Number (Percent) Riding with Traffic	Number (Percent) Riding against Traffic
Alafaya Trail (Bike lanes)	39	26 (66.7%)	13 (33.3%)
Colonial Drive (Bike lanes)	44	28 (63.6%)	18 (40.9%)
Orange Blossom Trail (No bike lanes)	59	24 (40.7%)	35 (59.3%)
University Boulevard (No bike lanes)	74	47 (63.5%)	27 (36.5%)
TOTAL	216	125 (57.9%)	91 (42.1%)

Figure 23 shows riding with vs. riding against traffic and crashes on Alafaya Trail and University Boulevard, which are the study streets selected to compare bike lanes vs. no bike lanes. The observed behaviors on Colonial Drive and Orange Blossom Trail are included for comparison, but bicyclist involvement in crashes on those streets is not shown.

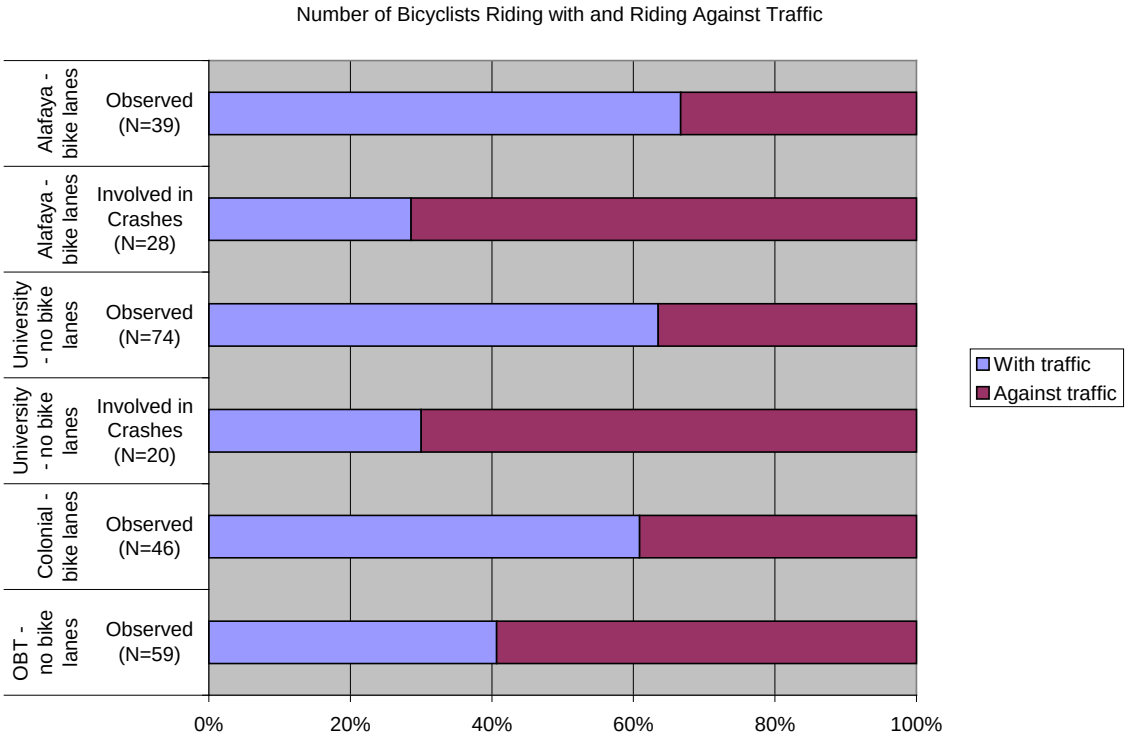


Figure 23 Number of bicyclists riding with and riding against traffic

When all five study streets are combined, 42.1% of bicyclists rode against traffic, and 64.3% of bicyclist-motorist crashes involved a bicyclist riding against traffic.

Bicyclists' Use of Headlights

Table 5 shows how many bicyclists used their lights at night, defined as 9:00 PM or later. As the sun set at about 8:30 PM, it was thought that by 9:00 PM, it would be sufficiently dark for a bicyclist to turn on a headlight if one was present on the bike.

Table 5 Bicyclist Behaviors – Use of Headlights at Night (9:00 PM or later)

Location	Total Number of Bicyclists	Number (Percent) Using Headlights	Number (Percent) Not Using Headlights
Colonial Drive	6	0 (0.0%)	6 (100.0%)
Orange Blossom Trail	17	8 (47.1%)	9 (52.9%)
TOTAL	23	8 (34.8%)	15 (65.2%)

Table 6 shows the number of bicyclists that had headlights present on their bicycles during the day, defined as before 8:30 PM.

Table 6 Bicyclist Behaviors – Having Headlights during the Day (before 8:30 PM)

Location	Total Number of Bicyclists	Number (Percent) with Headlights	Number (Percent) without Headlights
Alafaya Trail	40	10 (25.0%)	30 (75.0%)
Colonial Drive	40	2 (5.0%)	38 (95.0%)
Orange Blossom Trail	38	3 (7.9%)	35 (92.1%)
University Boulevard	76	3 (3.9%)	73 (96.1%)
TOTAL	194	18 (9.3%)	176 (90.7%)

Bicyclist Background Data

Background information about bicyclists was also collected. Table 7 shows that the majority of bicyclists were male.

Table 7 Bicyclists by Sex

Location	Total Number of Bicyclists	Males	Females
Alafaya Trail	39	37 (94.9%)	2 (5.1%)
Colonial Drive	50	49 (98.0%)	1 (2.0%)
Orange Blossom Trail	57	55 (96.5%)	2 (3.5%)
University Boulevard	76	66 (86.8%)	10 (13.2%)
TOTAL	222	207	15

Observers recorded bicyclist age into one of five categories: 10 and under, 11-17, 18-24, 25-64, and 65 and over. Table 8 shows the distribution of bicyclist ages. No bicyclists were 10 and under, and no bicyclists were 65 and over, so those categories are not shown.

Table 8 Bicyclists by Age

Location	Total Number of Bicyclists	Number (Percent) 11-17	Number (Percent) 18-24	Number (Percent) 25-64
Alafaya Trail	39	0 (0.0%)	16 (41.0%)	23 (59.0%)
Colonial Drive	50	1 (2.0%)	10 (20.0%)	39 (78.0%)
Orange Blossom Trail	58	3 (5.2%)[1]	23 (39.7%)[1]	32 (55.2%)[1]
University Boulevard	76	1 (1.3%)	45 (59.2%)	30 (39.5%)
TOTAL	223	5 (2.2%)	94 (42.2%)	124 (55.6%)

[1] Percentages do not add to 100 due to rounding.

Crossing at the Intersection vs. Crossing Midblock

Table 9 shows wide variation in the percentages of pedestrians who crossed at the intersection vs. those who crossed midblock. All intersections were signalized.

Table 9 Pedestrian Behaviors – Crossing at an Intersection vs. Crossing Midblock

Location	Total Number of Pedestrians	Number (Percent) Crossing at Intersection	Number (Percent) Crossing Midblock
Alafaya Trail (Raised median)	33	30 (90.9%)	3 (9.1%)
Colonial Drive (Raised median)	175	35 (20.0%)	140 (80.0%)
Orange Blossom Trail (No raised median) (Intermittent refuge islands)	83	36 (43.4%)	47 [1] (56.6%)
Silver Star Road (Raised median)	244	12 (4.9%)	232 (95.1%)
University Boulevard (Raised median)	25	7 (28.0%)	18 (72.0%)
TOTAL	560	120 (21.4%)	440 (78.6%)

[1] Includes 6 pedestrians who crossed at a midblock refuge island.

Figure 24 shows intersection vs. midblock street crossing behavior and crashes on Colonial Drive, Orange Blossom Trail, and Silver Star Road, which are the study streets selected to investigate pedestrian behaviors and crashes. The observed behaviors on Alafaya Trail and University Boulevard are included for comparison, but pedestrian involvement in crashes on those streets is not shown.

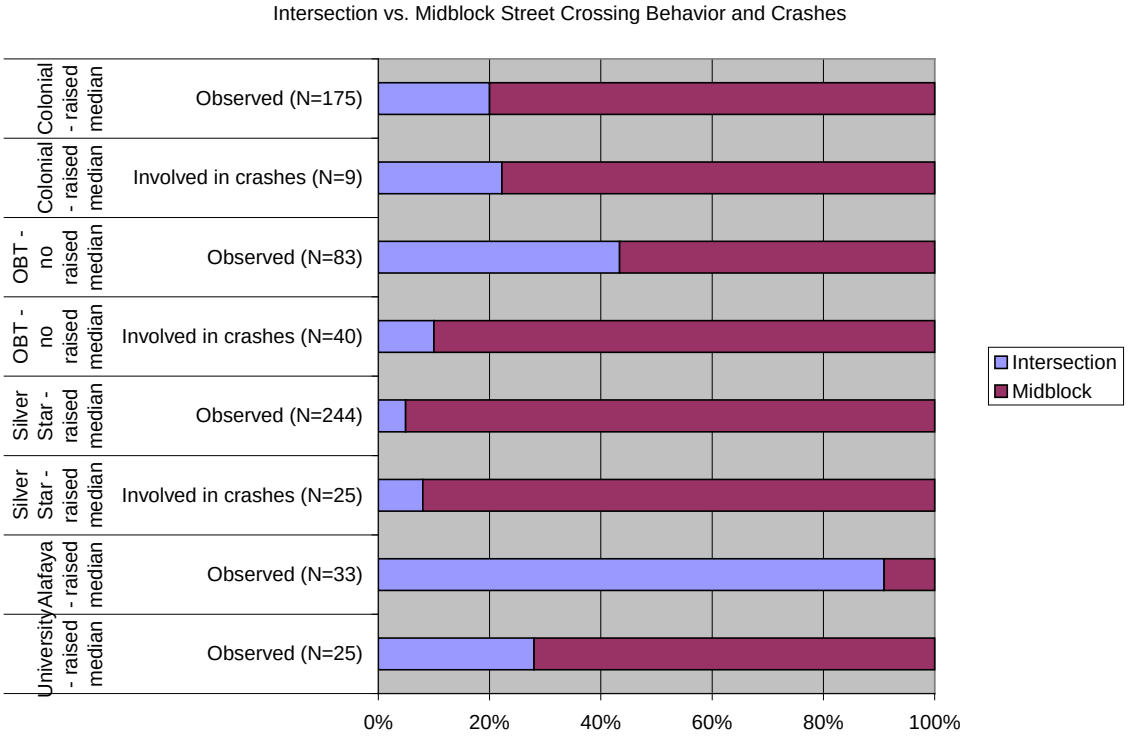


Figure 24 Intersection vs. midblock street crossing behavior and crashes

When all five study streets are combined, 78.6 percent of pedestrians crossed midblock, and 89.1 percent of pedestrian-motorist crashes involved a pedestrian who was crossing midblock.

Crossing in a Gap vs. Not Crossing in a Gap

As defined earlier in this report, a pedestrian crossed in a gap if he/she crossed the entire roadway (to the median if present, otherwise to the curb on the far side) without any motor vehicles passing in front of, or behind him/her while he/she was in the process of crossing. This does not mean that the pedestrian waited for a gap; the traffic flow may have been such that the pedestrian made it all the way across (to the median if present, otherwise to the curb on the far side) without motor vehicles passing in front or behind.

Table 10 shows only pedestrians who crossed midblock. Most pedestrians who crossed Alafaya Trail did so at the intersection; only three crossed midblock. When all five study streets are combined, the majority (57.0 percent) of pedestrians did not cross in a gap.

Table 10 Pedestrian Behaviors – Crossing in a Gap vs. Not Crossing in a Gap

Location	Total Number of Pedestrians	Number (Percent) Crossing in Gap	Number (Percent) Not Crossing in Gap
Alafaya Trail (Raised median)	3	2 (66.7%)	1 (33.3%)
Colonial Drive (Raised median)	140	99 (70.7%)	41 (29.3%)
Orange Blossom Trail (No raised median) (Intermittent refuge islands)	47	19 (40.4%)	28 (59.6%)
Silver Star Road (Raised median)	232	59 (25.4%)	173 (74.6%)
University Boulevard (Raised median)	18	10 (55.6%)	8 (44.4%)
TOTAL	440	189 (43.0%)	251 (57.0%)

Light vs. Dark Clothing

Investigating officers at crash scenes occasionally note whether the pedestrian was wearing light or dark clothing. Field observations revealed that about half of all pedestrians were wearing light clothing (Table 11).

Table 11 Pedestrians by Light vs. Dark Clothing

Location	Total Number of Pedestrians	Number (Percent) Wearing Light Clothing	Number (Percent) Wearing Dark Clothing
Alafaya Trail	33	18 (54.5%)	15 (45.5%)
Colonial Drive	174	82 (47.1%)	92 (52.9%)
Orange Blossom Trail	81	45 (55.6%)	36 (44.4%)
Silver Star Road	244	122 (50.0%)	122 (50.0%)
University Boulevard	25	15 (60.0%)	10 (40.0%)
TOTAL	557	282 (50.6%)	275 (49.4%)

Educational Countermeasures

The results of the crash analysis and field observations suggest a number of countermeasures. This section discusses educational countermeasures; the following sections discuss enforcement countermeasures and engineering countermeasures.

Riding Against Traffic

Riding against traffic is a major contributing cause to many bicycle crashes – particularly on the sidewalk. This is because motorists frequently do not look for traffic on the sidewalk, and only rarely look for traffic coming contra-flow to the normal traffic stream (for instance, a right turning motorist will rarely look to his right before making a turn).

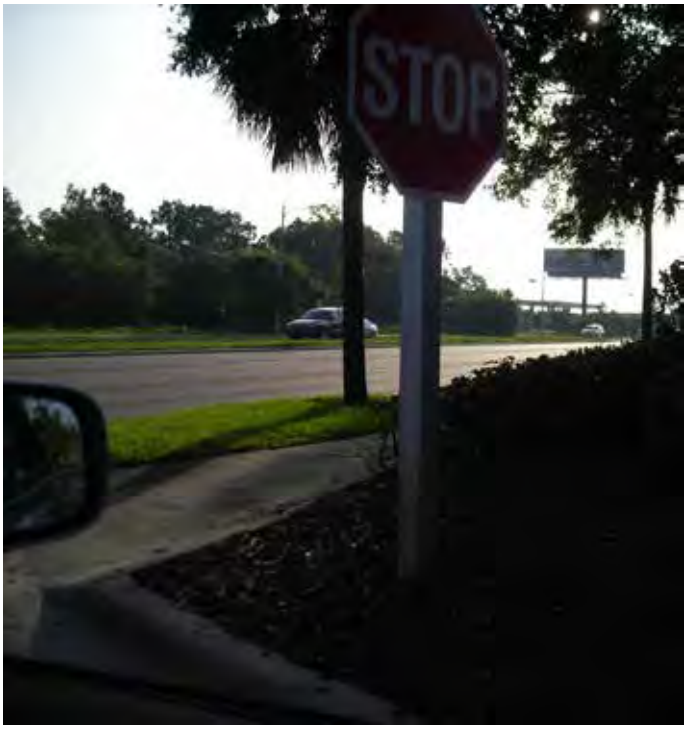


Figure 25 Even when a right-turning motorist does look right, his/her view of the sidewalk may be limited.

Consequently, the researchers recommend an educational campaign to inform bicyclists of the hazards associated with riding against traffic and on the sidewalk. The goal of such a campaign would be to teach bicyclists that motorists are not looking for traffic on the sidewalk and that they must take greater responsibility for their own safety

when riding on the sidewalk. An example of what an informational poster might look like for this campaign is provided in Figure 26

Figure 26 Example educational poster about riding against traffic on the sidewalk

Riding at Night without Lights

Crashes resulting from riding at night without lights can be targeted through educational efforts. All bicycles sold in Florida are supposed to be sold with reflectors, and many people riding bicycles may believe the reflector system that comes on a bicycle is adequate to ensure their visibility to motorists. While this is a reasonable assumption if the bicycle is approaching from within a motorist's headlamp cone of illumination, it is not true for when the bicycle is approaching the motorist on a perpendicular travel path. Consequently, a two part educational effort should be made. The first part would be composed of an educational campaign emphasizing the importance of retro-reflectivity and lighting. A draft graphic for a poster campaign is provided in Figure 27[6]. A second portion of the effort would educate bicyclists on the limitations of a reflectivity (or retro-

[6] Adapted from FHWA document FHWA-SA-0-011, a educational poster for pedestrians promoting the use of retro-reflective materials

reflectivity) based system and underscore the need for bicycle lighting. Such a campaign would likely include graphics showing the visibility of a cyclist about to cross a motorist's path at night.

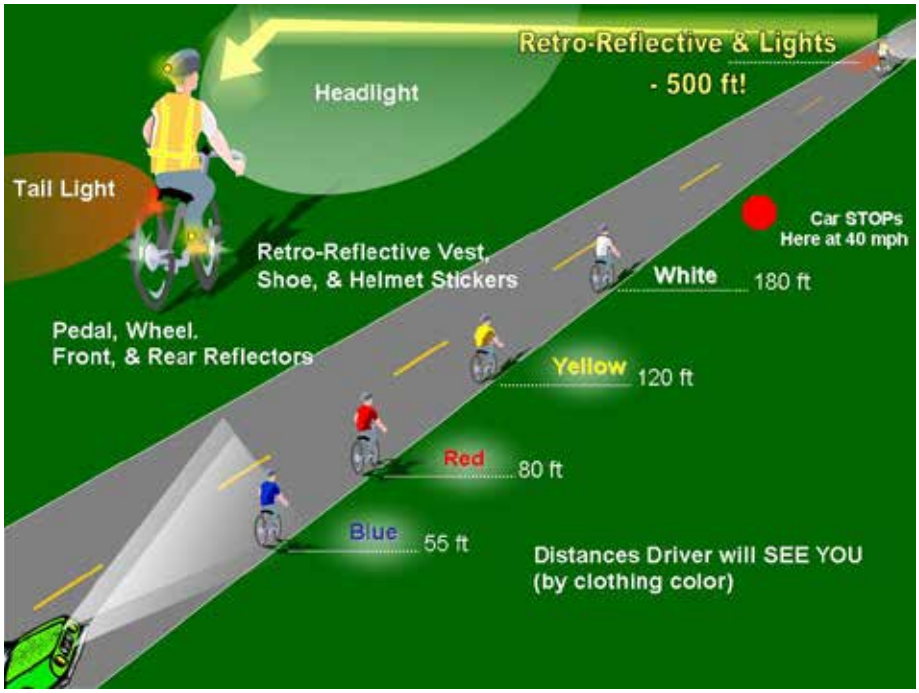


Figure 27 Example educational poster about bicyclist visibility at night

Enforcement Countermeasures

The effort to enforce the traffic laws as they relate to bicycle safety should be addressed in an overall, countywide, coordinated, bicycle enforcement campaign. Sporadic enforcement will not result in significant improvements to cyclist behavior and will likely result in resentment of law enforcement personnel. Those behaviors to be targeted should be determined at the outset of the law enforcement campaign. We recommend the following behaviors be targeted:

- Riding at night without lights
- Riding against traffic on the roadway
- Violating traffic signals

These three behaviors were chosen for two reasons. First, they represent particularly hazardous behaviors which result in many crashes. Secondly, and very importantly, the enforcement of these behaviors is easy to justify to the public. When coupled with (and in

fact preceded by) a large scale education campaign, the public will understand the importance of the campaign and consequently will accept the enforcement activity.

Enforcement Attitudes

Walking and bicycling (for whatever purposes) are forms of transportation. The rules of the road reinforce their consideration as transportation modes and provide for the safe mixing of pedestrians and bicyclists with motorists in the roadway environment. Neither walking nor bicycling should be treated as lesser modes than motor vehicles. To the contrary, the application of Florida Statutes gives pedestrians an elevated position when compared to vehicular (bicycle and motor vehicle) traffic.

During the review of crash reports several comments on the reports suggest some awareness campaign directed at law enforcement may be appropriate. Some of these comments are discussed below:

Pedestrians crossing at inappropriate locations. In numerous reports the law enforcement officer noted that a pedestrian crossing at a midblock location was crossing at a location where he or she should not have been crossing. In many cases, the midblock crossing is not illegal. Pedestrians are usually allowed to cross at midblock locations, provided they yield right-of-way. Several times the "midblock crossings" actually appeared to be occurring at unsignalized intersections. Crosswalks exist at all such intersections, whether they are marked or not, and motorists are required to yield right-of-way to the pedestrians in such places, even on arterials.

To some degree this is related to the discussion of pedestrian crossing behaviors (gaps vs. holes) above. If a pedestrian crosses in a hole, and a car changes lanes (as occurred in several crashes), did the pedestrian really fail to yield the right of way? These crashes did not occur because the pedestrian caused the motorists to change speed or direction (indications of not yielding), rather because the motorist did change speed or direction when it was unsafe to do so – essentially, changing lanes without ensuring that it was safe to do so.

These "crossing not at intersection" crashes are occasionally described as "the pedestrian stepped in front of the car." While this may be the case when the pedestrian is

hit in the first and possibly second lane of a crossing, this description can be questioned when the crash occurs in third (or later) lane of a crossing. That a motorist fails to see a pedestrian who is in the roadway six seconds (two 12 foot lanes at four feet per second) prior to a crash occurring must make one question the speed and/or attentiveness (application of the exercise due care rule) of the driver.

Bicyclists riding against the flow of traffic on the sidewalk. Legally speaking, there is no "wrong way" on the sidewalk. Cyclists are prohibited from driving against the flow of traffic on the roadway, but not on the sidewalk. The fact that a cyclist chooses to ride against the flow of traffic on the sidewalk does not relieve motorists from the requirement to yield to traffic on the sidewalk prior to crossing the (marked or unmarked) crosswalk.

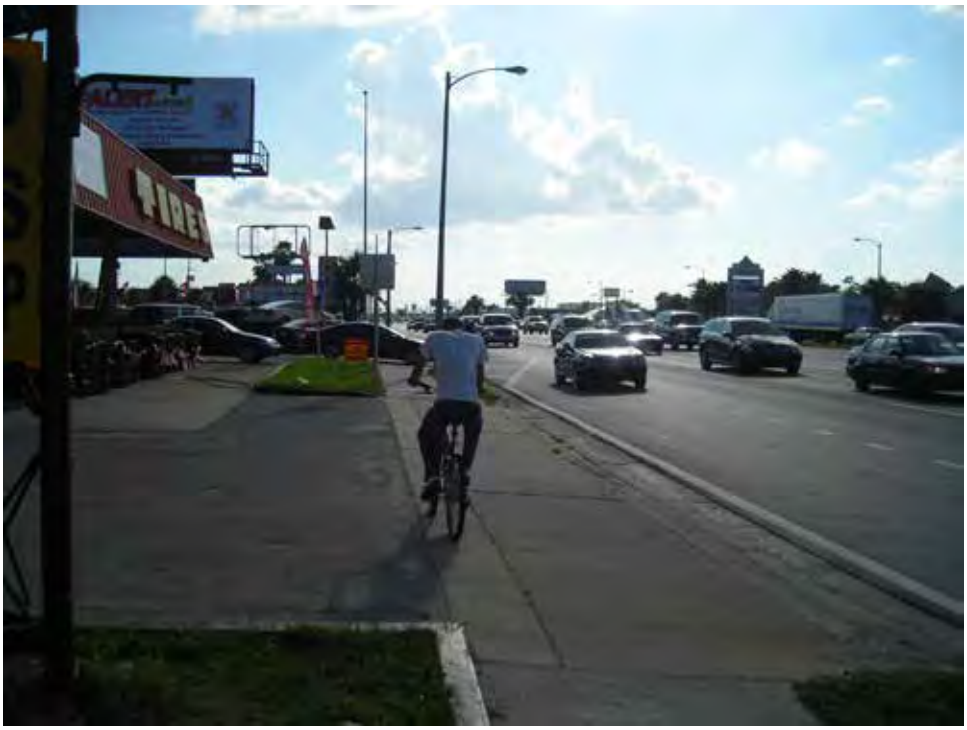


Figure 28 Bicyclist riding against flow of traffic

Lights (and reflectors) on bicycles at night. On only one crash report involving a bicyclist occurring during darkness was it reported that the bicyclist did not have a lamp on his bicycle. This suggests that either the bicyclists in the MetroPlan area have a very high rate of compliance with lighting laws, or that the lack of a lamp is not something law enforcement typically reports.

Bicyclist should be expected to have lights on their bikes at night and if they are not present this should noted on the crash reports. If bicycles are to mix safely at night on the roadway network, then they must be held to obeying the traffic lighting laws. This is particularly important for the more common crashes which involve motorists crossing the cyclist's path; a situation in which reflectors have very limited effectiveness.

The one crash report that noted the cyclist did not have lights on his bicycle was a crash in which an overtaking motorist turned right, in front of a bicyclist riding with traffic on the sidewalk. No mention was made of the bicycle's reflectors; this overtaking and turning type crash is a type of crash that reflectors may have helped prevent.

Bicycles as recreational vehicles. In one case, in the "Vehicle Special Function" box on the crash report, a bicycle's function was referred to as recreational. While this was an isolated case, there was nothing in the crash report narrative to suggest the recreational nature in which the bicycle was being used, or how it differed from a bicycle that would not have had a special function of "recreational."

Engineering Countermeasures

Designated Bicycle Lanes

The bike lanes on Alafaya Trail and Colonial Drive are not designated as bike lanes by pavement markings and signs. Crash reports for Alafaya Trail suggest that few bicyclists ride in the bike lane; two crashes involved bicyclists riding against traffic in the bike lane. The field observations on Alafaya Trail and Colonial Drive confirmed that few bicyclists ride in the bike lane (Table 3). Therefore, some bicyclists may be unaware that

- Bike lanes are one-way facilities, and
- Bicyclists are to ride with traffic when using bike lanes.

Accordingly, we recommend that bike lanes be designated. An example of pavement markings appears in Figure 29[7], and an example sign appears in Figure 30.

[7] Florida Department of Transportation. *2006 Design Standards*. http://www.dot.state.fl.us/rddesign/rd/RTDS/06/17346s8-13of13.pdf

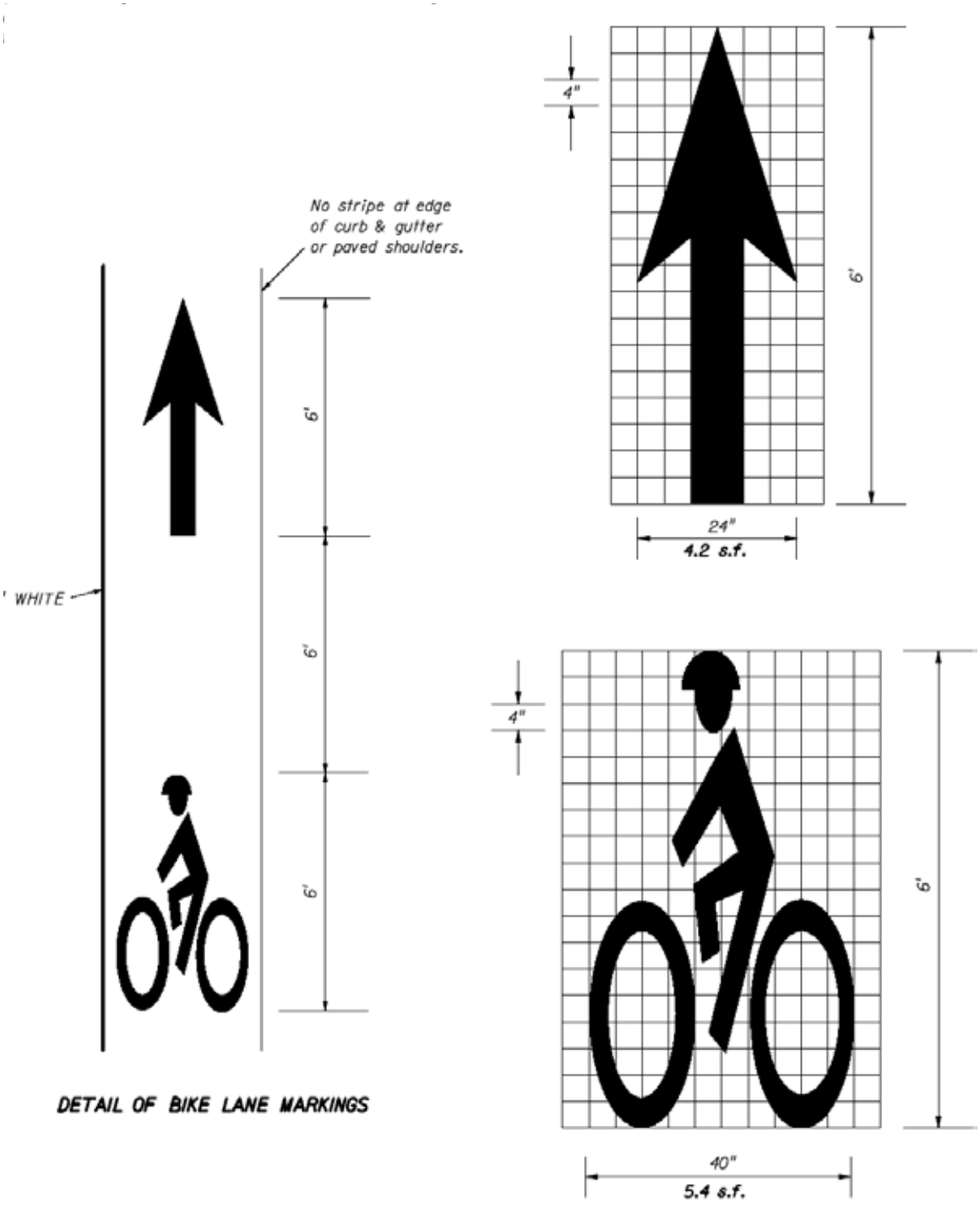


Figure 29 Pavement markings to designate a bike lane

Figure 30 Sign to designate bike lane (MUTCD, R3-17)[8]

In addition, we recommend that the "WRONG WAY' and "RIDE WITH TRAFFIC" signs be mounted so that they face bicyclists riding against traffic (Figure 31). These signs may be mounted on the back of other signs.

Figure 31 "WRONG WAY" AND "RIDE WITH TRAFFIC" signs (MUTCD, R5-1b (top) and R9-3c (bottom))[9]

[8] *Manual on Uniform Traffic Control Devices*, 2003. http://mutcd.fhwa.dot.gov/pdfs/2003/Ch9.pdf

Lighting

We recommend that local agencies conduct a thorough evaluation of lighting levels along the study streets. Such an evaluation should focus on whether all portions of the roadway (including the sidewalks, the travel lanes, and the median) are adequately lit. It may be, for example, that areas between adjacent light standards are not properly lit or that the median is not receiving adequate light from standards mounted next to the curb. Possible countermeasures include adjusting the brightness of the standards, changing the longitudinal spacing of the standards, and installing lighting in the median.

TASK 3 – DEVELOP RELATIVE RISK MEASURES

Table 12 shows the pedestrian-motorist crash rate per mile on the study streets. Table 13 shows the bicyclist-motorist crash rate per mile.

Table 12 Pedestrian-Motorist Crash Rates (Crashes per Mile)

Study Street	Total Pedestrian-Motorist Crashes	Length (miles)	Pedestrian-Motorist Crash Rate (crashes per mile)
Colonial Drive (raised median)	17	2.25	7.56
Orange Blossom Trail (no raised median)	57	2.45	23.27
Silver Star Road (raised median)	43	2.45	17.55

[9] *Manual on Uniform Traffic Control Devices*, 2003. http://mutcd.fhwa.dot.gov/pdfs/2003/Ch9.pdf

Table 13 Bicyclist-Motorist Crash Rates (Crashes per Mile)

Study Street	Total Bicyclist-Motorist Crashes	Length (miles)	Bicyclist-Motorist Crash Rate (crashes per mile)
Alafaya Trail (bike lanes)	28	2.15	13.02
University Boulevard (no bike lanes)	23	1.25	18.40

Wachtel and Lewiston[10] defined the risk of a bicyclist-motorist crash as

(a/A) / (b/B) (Eq. 1)

where

a = number of crashes in a group (for example, number of crashes on one study street or number of crashes involving bicyclists riding with traffic)

A = total number of crashes

b = number of bicyclists in a group (for example, number of bicyclists on one study street or number of bicyclists riding with traffic)

B = total number of bicyclists

Wachtel and Lewiston counted bicyclists and bicyclist-motorist crashes at specific intersections. We counted bicyclists at specific intersections but counted bicyclist-motorist crashes along corridors of varying lengths. Therefore, in our calculations of risk, we use crash rates instead of total crashes.

The risk ratio is defined as the risk of one group divided by the risk of another group. For example, the risk ratio of riding against traffic vs. riding with traffic is simply the risk of riding against traffic divided by the risk of riding against traffic. A risk ratio greater than 1.0 means that the risk of riding against traffic exceeds the risk of riding with traffic. A risk ratio equal to 1.0 means that the risk of riding against traffic equals the risk

[10] Wachtel, Alan and Diana Lewiston. Risk Factors for Bicycle-Motor Vehicle Collisions at Intersections. *ITE Journal*, September 1994, pp. 30-35.

of riding with traffic. A risk ratio less than 1.0 means that the risk of riding against traffic is less than the risk of riding with traffic.

Although Wachtel and Lewiston's study was limited to bicyclist-motorist crashes, we use the same methodology to calculate risks and risk ratios for pedestrian-motorist crashes.

Table 14 shows that the risk of a pedestrian-motorist crash when the pedestrian crosses a street with no median (Orange Blossom Trail) than when he/she crosses a street with a median (Colonial Drive) (risk ratio = 6.481).

Table 14 Pedestrian-Motorist Crash Risk Ratio, Median vs. No Median

	Median (Colonial)	No Median (OBT)
a (crashes per mile – either median or no median)	7.56	23.27
A (total crashes per mile – median and no median)	30.83	30.83
b (number of pedestrians – either median or no median)	175	83
B (total number of pedestrians – median and no median)	258	258
Risk ((a/A)/(b/B))	0.362	2.346
Risk ratio	(Median to no median) 0.154	(No median to median) 6.481

Table 15 shows that the risk of a pedestrian-motorist crash is higher when the pedestrian crosses a street with no street lighting (Silver Star Road) than when he/she crosses a street with street lighting (Colonial Drive) (risk ratio = 1.664).

Table 15 Pedestrian-Motorist Crash Risk Ratio, Lighting vs. No Lighting

	Lighting (Colonial)	No Lighting (Silver Star)
a (crashes per mile – either lighting or no lighting)	7.56	17.55
A (total crashes per mile – lighting and no lighting)	25.11	25.11
b (number of pedestrians – either lighting or no lighting)	175	244
B (total number of pedestrians – lighting and no lighting)	419	419
Risk ((a/A)/(b/B))	0.721	1.200
Risk ratio	(Lighting to no lighting) 0.601	(No lighting to lighting) 1.664

Table 16 shows the pedestrian-motorist crash rates (crashes per mile) for crashes involving pedestrians crossing at intersections and those involving pedestrians crossing midblock. The total crash rates were calculated by adding the number of crashes on each study street and dividing by the combined length of the study streets.

Table 16 Pedestrian-Motorist Crashes per Mile, Intersection vs. Midblock

	Colonial Drive	Orange Blossom Trail	Silver Star Road	Total
Length (miles)	2.25	2.45	2.45	7.15
Intersection – Crashes	2	4	2	8
Intersection - Crashes per Mile				1.119
Intersection – Pedestrians	35	36	12	83
Midblock – Crashes	7	36	23	66
Midblock - Crashes per Mile				9.231
Midblock – Pedestrians	140	47	232	419

Table 17 shows that the risk of a pedestrian-motorist crash is higher when the pedestrian crosses midblock than when he or she crosses at an intersection (risk ratio = 1.633).

Table 17 Pedestrian-Motorist Crash Risk Ratio, Intersection vs. Midblock

	Intersection	Midblock
a (crashes per mile – either intersection or midblock)	1.12	9.23
A (total crashes per mile – intersection and midblock)	10.35	10.35
b (number of pedestrians – either intersection or midblock)	83	419
B (total number of pedestrians – intersection and midblock)	502	502
Risk ((a/A)/(b/B))	0.654	1.068
Risk ratio	(Intersection to midblock) 0.612	(Midblock to intersection) 1.633

Table 18 shows that the risk of a bicyclist-motorist crash according to bicyclist direction of travel and bicyclist location. The data in this table pertain to Alafaya Trail and University Boulevard.

Bicyclist Direction – Riding with traffic, riding against traffic, or crossing the study street.

Bicyclist Position – Riding on the sidewalk, riding in a shared lane, or riding in a bike lane. Bicyclists riding in a shared lane (University Boulevard) or bike lane (Alafaya Trail) are considered to be riding in the street.

Number of Crashes – The number of reported crashes, 2002-2006, for each combination of direction and position. "A" denotes the number that occurred on Alafaya Trail and "U" denotes the number that occurred on University Boulevard.

Number Observed – The number of bicyclists that were observed, for each combination of direction and position, during the field observations on June 26, 2007. During the observation period, there were no bicyclists who rode against traffic in a shared lane, nor were there any bicyclists who rode against traffic in a bike lane. Bicyclists crossing the study streets were not counted.

Crashes per Mile – The number of reported crashes divided by the length of the study street, for each combination of direction and position. Since both study streets have sidewalks, the crashes per mile for sidewalk is the total number of crashes on both study streets divided by the combined length of the study streets (3.40 miles = 2.15 miles (Alafaya Trail) + 1.25 miles (University Boulevard)). Since only University Boulevard has shared lanes, the crashes per mile for shared lane is the number of crashes on University Boulevard divided by the length of University Boulevard (1.25 miles). Since only Alafaya Trail has bike lanes, the crashes per mile for bike lane is the number of crashes on Alafaya Trail divided by the length of Alafaya Trail (2.15 miles).

Risk by Position – The risk by position is calculated separately for riding with traffic and riding against traffic. To use "With Traffic – Sidewalk" as an example, and referring to Equation 1:

- "a" is the crashes per mile for "With Traffic – Sidewalk" and has a value of 3.24.

- "A" is the sum of the crashes per mile for "With Traffic – Sidewalk," "With Traffic – Shared Lane," and "With Traffic – Bike Lane," and has a value of 3.24 + 0.80 + 0.93 = 4.97.
- "b" is the number of bicyclists observed for "With Traffic – Sidewalk" and has a value of 67.
- "B" is the sum of the number of bicyclists observed for "With Traffic – Sidewalk," "With Traffic – Shared Lane," and "With Traffic – Bike Lane," and has a value of 67 + 5 + 1 = 73.

The risk is (a/A) / (b/B) = (3.24/4.97) / (67/73) = 0.710. Since no bicyclists were observed riding against traffic in a shared lane or in a bike lane, the risks for those behaviors are undefined because the calculations involve division by zero.

Risk by Direction – The risk by position is calculated for riding on the sidewalk. To use "With Traffic – Sidewalk" as an example, and referring to Equation 1:

- "a" is the crashes per mile for "With Traffic – Sidewalk" and has a value of 3.24.
- "A" is the sum of the crashes per mile for "With Traffic – Sidewalk" and "Against Traffic – Sidewalk," and has a value of 3.24 + 9.42 = 12.66.
- "b" is the number of bicyclists observed for "With Traffic – Sidewalk" and has a value of 67.
- "B" is the sum of the number of bicyclists observed for "With Traffic – Sidewalk" and "Against Traffic – Sidewalk," and has a value of 67 + 40 = 107.

The risk is (a/A) / (b/B) = (3.24/12.66) / (67/107) = 0.409. Since no bicyclists were observed riding against traffic in a shared lane or in a bike lane, the risks for those behaviors are undefined because the calculations involve division by zero.

Relative Risk by Position – The relative risk of riding with traffic <u>on the sidewalk</u> vs. riding with traffic <u>in a shared lane</u> is the quotient of the individual risks, *i.e.*, 0.710 (risk of riding with traffic <u>on the sidewalk</u>) divided by 2.350 = 0.302. In other words, the risk of riding with traffic <u>on the sidewalk</u> is about 30 percent that of the risk of riding with traffic <u>in a shared lane</u>. Since the risks for "Against Traffic – Shared Lane" and "Against Traffic – Bike Lane" are undefined, the relative risks involving those combinations are also undefined.

Relative Risk by Direction – The relative risk of riding with traffic on the sidewalk vs. riding against traffic on the sidewalk is the quotient of the individual risks, *i.e.*, 0.409 (risk of riding with traffic on the sidewalk) divided by 1.990 (risk of riding against traffic on the sidewalk) = 0.206. In other words, the risk of riding with traffic on the sidewalk is about 21 percent of the risk of riding against traffic on the sidewalk. Since the risks for "Against Traffic – Shared Lane" and "Against Traffic – Bike Lane" are undefined, the relative risks involving those combinations are also undefined.

The authors believe that the risks and relative risks by position are not reliable because only one bicyclist was observed riding in the bike lane (on Alafaya Trail).

Table 18 Bicyclist-Motorist Crash Risk Ratio (A=Alafaya, U=University)

Bicyclist Direction	Bicyclist Position	Number of Crashes	Number Observed	Crashes per Mile	Risk by Position	Risk by Direction	Relative Risk by Position	Relative Risk by Direction
With Traffic	Sidewalk	11 (A=6, U=5)	67 (A=25, U=42)	3.24	0.710	0.462 (with traffic)	Sidewalk – Shared Lane: 0.302 Sidewalk – Bike Lane: 0.051	With Traffic – Against Traffic: 0.212
	Shared Lane	1 (U=1)	5 (U=5)	0.80	2.350	1.000 (with traffic)	Shared Lane – Sidewalk: 3.310 Shared Lane – Bike Lane: 0.172	Undefined[a]
	Bike Lane	2 (A=2)	1 (A=1)	0.93	13.660	0.500 (with traffic)	Bike Lane – Sidewalk: 19.239 Bike Lane – Shared Lane: 5.813	Undefined
Against Traffic	Sidewalk	32 (A=18, U=14)	40 (A=13, U=27)	9.42	0.910	2.176 (against traffic)	Undefined	Against Traffic – With Traffic: 4.710
	Shared Lane	0	0	0.00	Undefined	Undefined	Undefined	Undefined
	Bike Lane	2 (A=2)	0	0.93	Undefined	Undefined	Undefined	Undefined
Crossing Study Street		2 (U=2)	Not Observed	0.59	Undefined	Undefined		Undefined

[a] These calculations involve division by zero, so the results are undefined.

Although this analysis appears to indicate that bike lanes are associated with a higher risk of bicyclist-motorist crashes, this unexpected finding does not mean that bike lanes are inherently unsafe. The bike lanes on Alafaya Trail are undesignated. Therefore, this finding is not indicative of what happens on roadways with designated bike lanes. Instead, the authors maintain that the findings are a reflection of bicyclist behaviors – even on the street with bike lanes (Alafaya Trail), the vast majority of bicyclists rode on the sidewalk, and many of them rode against traffic.

Table 19 shows the bicyclist-motorist crash rates (crashes per mile) for crashes involving bicyclists riding with traffic and those involving bicyclists riding against traffic. The total crash rates were calculated by adding the number of crashes on each study street and dividing by the combined length of the study streets.

Table 19 Bicyclist-Motorist Crashes per Mile, With Traffic vs. Against Traffic

	Alafaya Trail	University Boulevard	Total
Length (miles)	2.15	1.25	3.40
With traffic – Crashes	8	6	14
With traffic - Crashes per Mile			4.118
With traffic – Bicyclists	26	47	73
Against traffic – Crashes	20	14	34
Against traffic - Crashes per Mile			10.000
Against traffic – Bicyclists	13	27	40

Table 20 shows that the risk of a bicyclist-motorist crash is higher when the bicyclist rides against traffic than when he/she rides with traffic (risk ratio = 4.427).

Table 20 Bicyclist-Motorist Crash Risk Ratio, With Traffic vs. Against Traffic

	With traffic	Against traffic
a (crashes per mile – either with traffic or against traffic)	4.12	10.00
A (total crashes per mile – with traffic and against traffic)	14.12	14.12
b (number of bicyclists – either with traffic or against traffic)	73	40
B (total number of bicyclists – with traffic and against traffic)	113	113
Risk ((a/A)/(b/B))	0.452	2.001
Risk ratio	(With traffic to against traffic) 0.226	(Against traffic to with traffic) 4.427

Table 21 shows the bicyclist-motorist crash rates (crashes per mile) for crashes involving bicyclists riding on the sidewalk and those involving bicyclists riding in the street. The total crash rates were calculated by adding the number of crashes on each study street and dividing by the combined length of the study streets.

Table 21 Bicyclist-Motorist Crashes, Sidewalk vs. In Street

	Alafaya Trail	University Boulevard	Total
Length (miles)	2.15	1.25	3.40
Sidewalk – Crashes	25	19	44
Sidewalk - Crashes per Mile			12.941
Sidewalk – Bicyclists	38	69	107
In street – Crashes	3	1	4
In street - Crashes per Mile			1.176
In street – Bicyclists	1	5	6

Table 22 shows that the risk of a bicyclist-motorist crash is higher when the bicyclist rides in the street than when he/she rides on the sidewalk (risk ratio = 1.621).

Table 22 Bicyclist-Motorist Crash Risk Ratio, Sidewalk vs. In Street

	Sidewalk	In street
a (crashes per mile – either sidewalk or in street)	12.941	1.176
A (total crashes per mile – sidewalk and in street)	14.117	14.117
b (number of bicyclists – either sidewalk or in street)	107	6
B (total number of bicyclists – sidewalk and in street)	113	113
Risk ((a/A)/(b/B))	0.968	1.569
Risk ratio	(Sidewalk to in street) 0.617	(In street to sidewalk) 1.621

In summary, the following conditions were associated with a higher risk of pedestrian-motorist crashes:

- No median (vs. median)
- No street lighting (vs. street lighting)
- Crossing midblock (vs. crossing at an intersection)

The following conditions were associated with a higher risk of bicyclist-motorist crashes:

- Bike lanes (vs. no bike lanes)[11]
- Riding against traffic (vs. riding with traffic)

[11] As mentioned in the text following Table 17, the bike lanes on the study street (Alafaya Trail) were in reality paved shoulders. There were no signs or pavement marking indicating to bicyclists where to ride and to ride with traffic. The majority of bicyclist-motorist crashes on Alafaya Trail involved a bicyclist riding on the sidewalk, often against traffic. The majority of observed bicyclists on Alafaya Trail rode on the sidewalk, and many rode against traffic. Only one bicyclist was observed riding in the bike lane on Alafaya Trail.

- Riding in the street (vs. riding on the sidewalk)

CONCLUSIONS

Based upon these findings, the authors recommend that

- Medians be installed, whenever feasible, as part of new roadway construction and as part of roadway reconstruction.
- Street lighting be added to both sides of the roadway. The longitudinal spacing should be such that there are no dark areas along the roadway. On divided roadways, it may be appropriate to also install street lights in the median, so that the middle of the roadway is properly illuminated. Street lighting should adhere to the standards given in Section 7.3 of the *Plans Preparation Manual*.[12]
- Bike lanes be designated by pavement markings and signs (Figures 29-31) so that more bicyclists will recognize the bike lanes as an area of the roadway that has been set aside for them to ride, and that they are to ride with traffic when using the bike lanes.

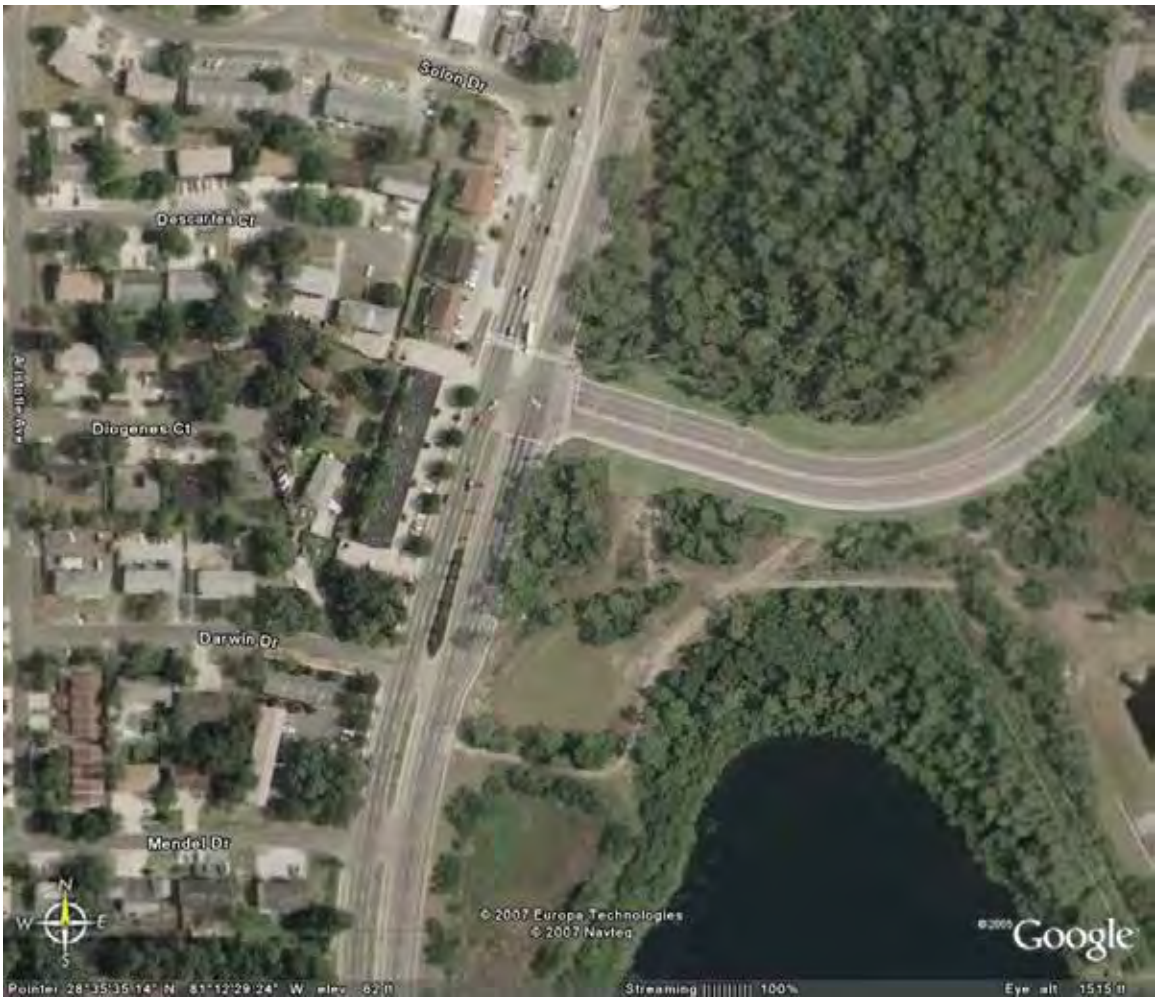
[12] Florida Department of Transportation. *Plans Preparation Manual*. January 2007. http://www.dot.state.fl.us/rddesign/PPMManual/2007/Volume1/zChap07.pdf

APPENDIX A – AERIALS OF STUDY STREETS

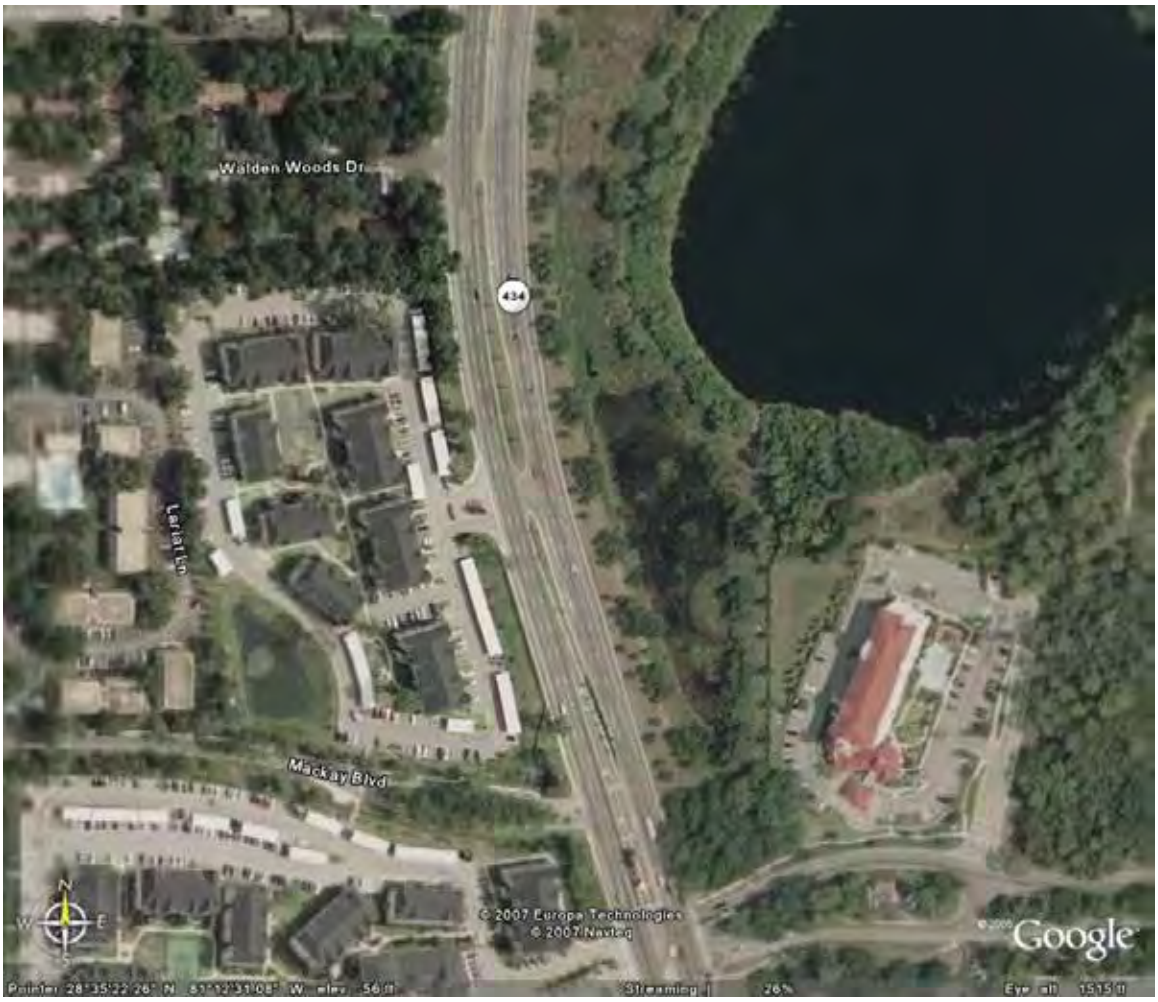
Alafaya – 1

The Alafaya Trail corridor extends from University Boulevard at the north end to SR 50 at the south end. The aerials depict the corridor from north to south.

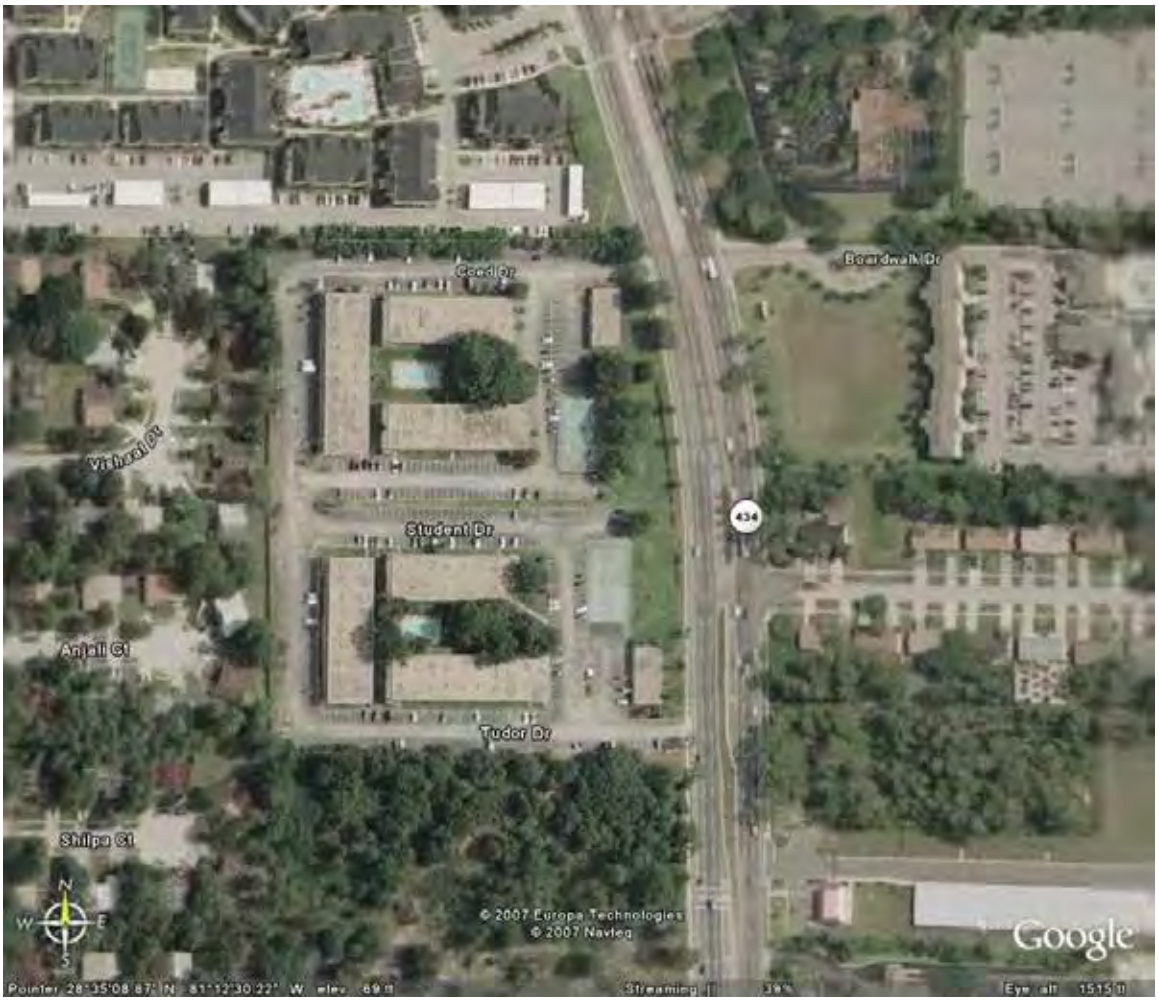
Alafaya – 2


Solon Dr
Descartes Ct
Diogenes Ct
Darwin Dr
Mendel Dr
N
W
E
S
© 2007 Europa Technologies
© 2007 Navteq
Google

Alafaya – 3


Walden Woods Dr
434
Lariat Ln
Mackay Blvd
© 2007 Europa Technologies
© 2007 Navteq
Google

Alafaya – 4


Coed Dr
Boardwalk Dr
Student Dr
Anjali Ct
Tudor Dr
Shilpa Ct
434
© 2007 Europa Technologies
© 2007 Navteq
Google

Alafaya – 5


Lokanotosa Trl
Royal Wulff Ln
Red Ibis Ln
Blue Schilling
Green Badger Ln
Red Quill Ln
Blue Whistler Ln
Pepperdine Pl
Southern Pine Dr
434
© 2007 Europa Technologies
© 2007 Navteq
Google

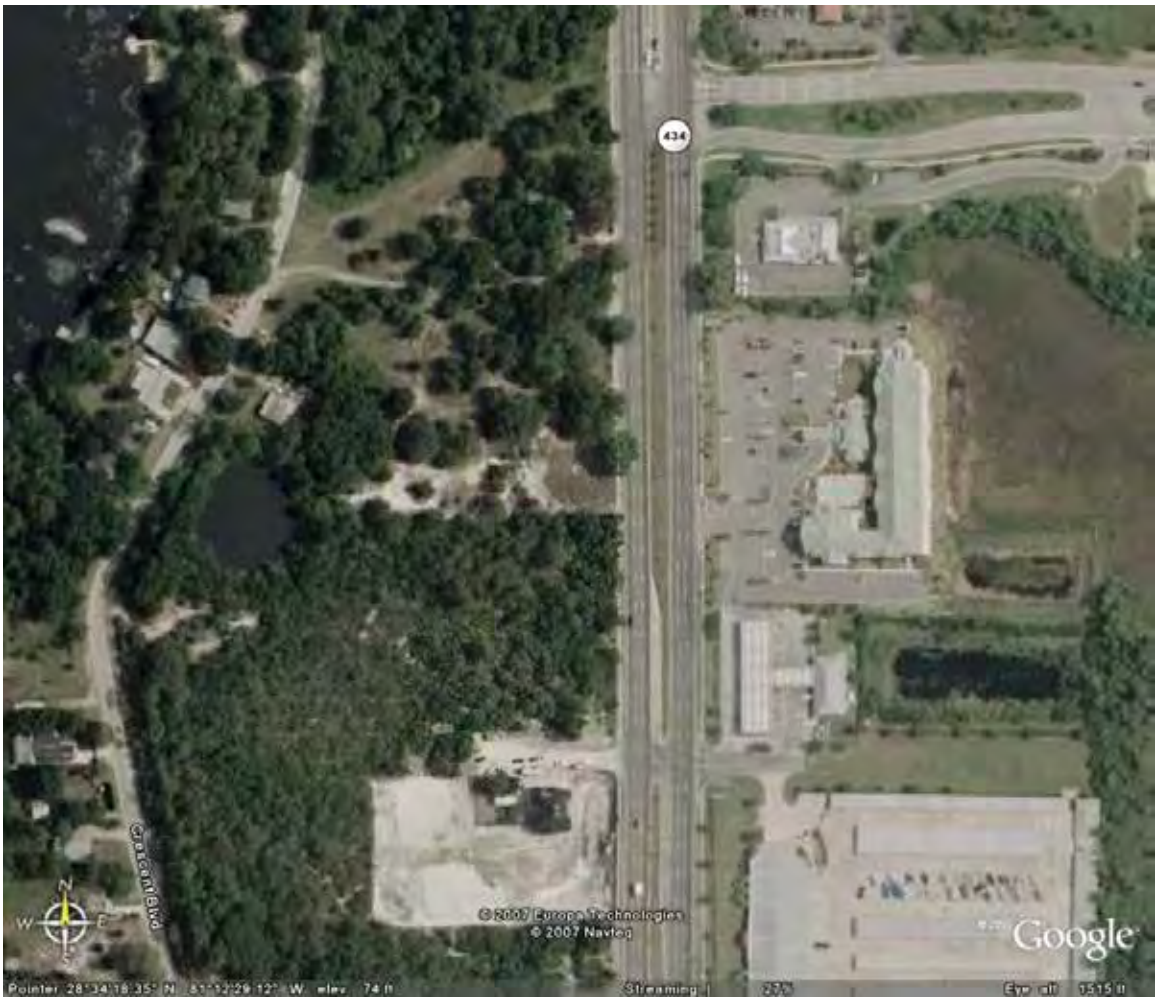
Alafaya – 6


Pepperdine Pl
Eastcove Dr
434
College Park Trl
Renaissance Ct
College Knight Ct
Graesdale Ct
Google

Alafaya – 7


Graduate Dr
Huntsman Ln
Fox Hound Ln
Lester Dr
Cochin Ct
N
W
E
S
© 2007 Europa Technologies
© 2007 Navteq
Google

Alafaya – 8


434
Crescent Blvd
© 2007 Europa Technologies
© 2007 Navteq
Google

Alafaya – 9


Orpington St
Shadyspring Rd
50
434
© 2007 Europa Technologies
© 2007 Navteq
Google

Colonial – 1

The Colonial Drive corridor extends from Mission Road at the west end to Tampa Avenue at the east end. The aerials depict the corridor from west to east.

Colonial – 2

Colonial – 3


Florida Rd
50
Denson St
N
W
E
S
© 2007 Europa Technologies
Norwood St
© 2007 Navteq
Google

Colonial – 4

Colonial – 5

Colonial – 6

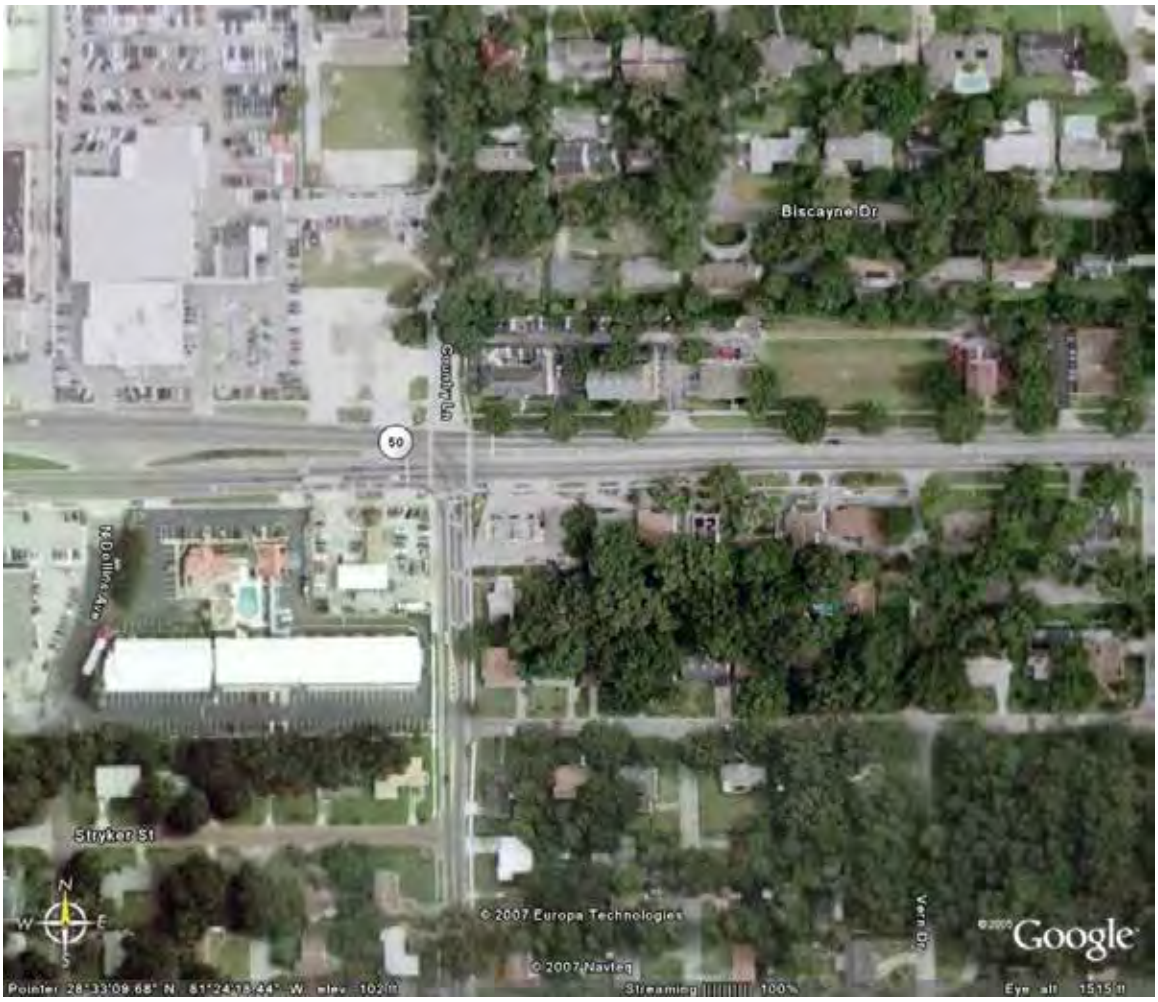

Cherry Ln
Pershing Dr
Washington Dr
N Orange Ave
© 2007 Europa Technologies
© 2007 Navteq
Google

Colonial – 7

Colonial – 8


50
N Bumby Ave
N Bolling Ave
Stryker St
Bentley
© 2007 Europa Technologies
© 2007 Navteq
Google

Colonial – 9


Biscayne Dr
Country Ln
50
Strykker St
Vern Dr
© 2007 Europa Technologies
© 2007 Navteq
Google

OBT – 1

The Orange Blossom Trail corridor extends from I-4 at the north end to Oak Ridge Road at the south end. The aerials depict the corridor from north to south.

OBT – 2


Woods Ave
36TH St
36TH St
S Nashville Ave
39TH St
© 2007 Europa Technologies
© 2007 Navteq
Google

OBT – 3

OBT – 4

OBT – 5

OBT – 6

OBT – 7


Redman St
Tropical Dr
© 2007 Europa Technologies
© 2007 Navteq
Google

OBT – 8

OBT – 9

OBT – 10

OBT – 11

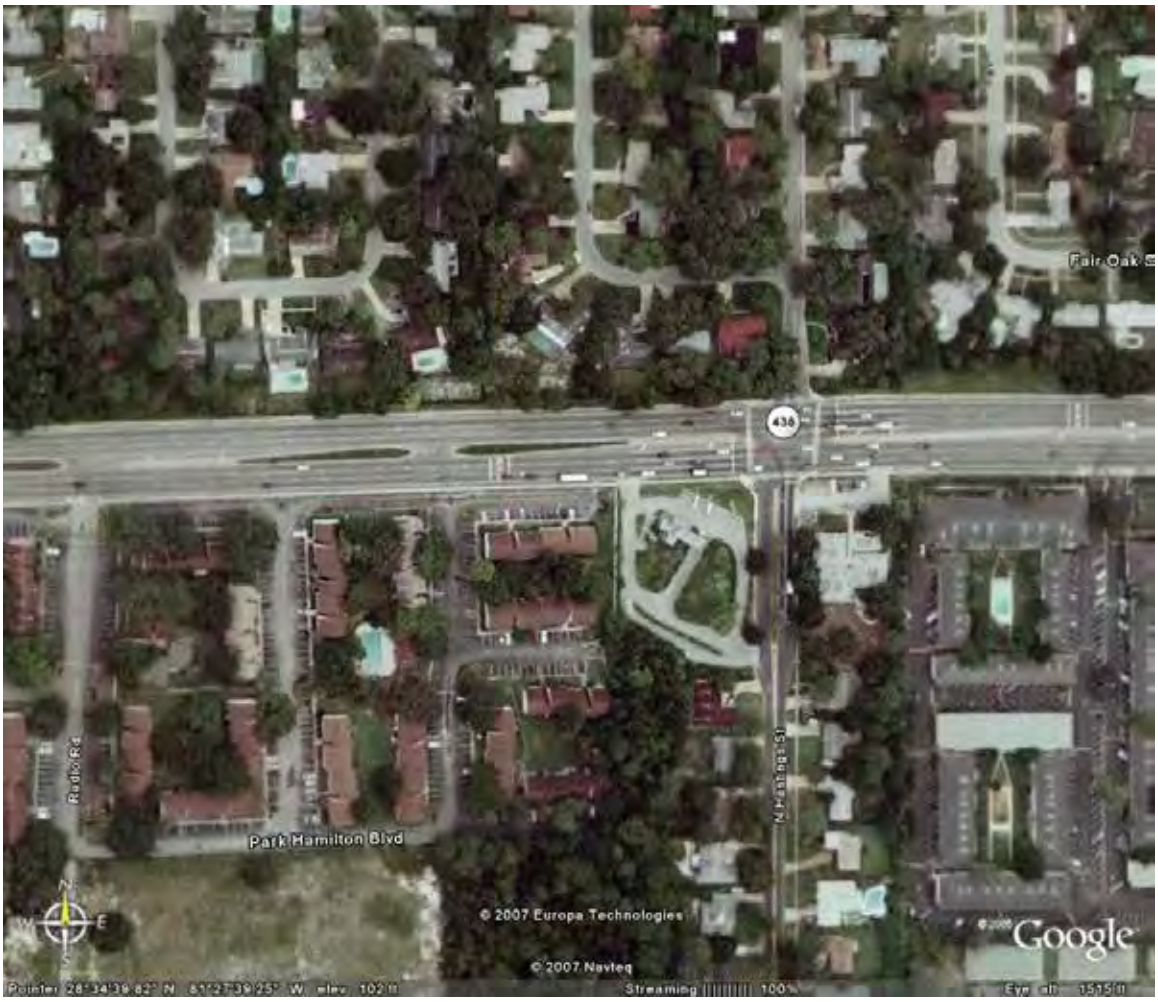
Silver Star – 1

The Silver Star Road corridor extends from Hiawassee Road at the west end to Princeton Street at the east end. The aerials depict the corridor from west to east.

Silver Star – 2

Silver Star – 3

Silver Star – 4



Silver Star – 5

Silver Star – 6

Silver Star – 7

Silver Star – 8

Silver Star – 9

Silver Star – 10

University – 1

The University Boulevard corridor extends from SR 436 at the west end to SR 551 at the east end. The aerials depict the corridor from west to east.

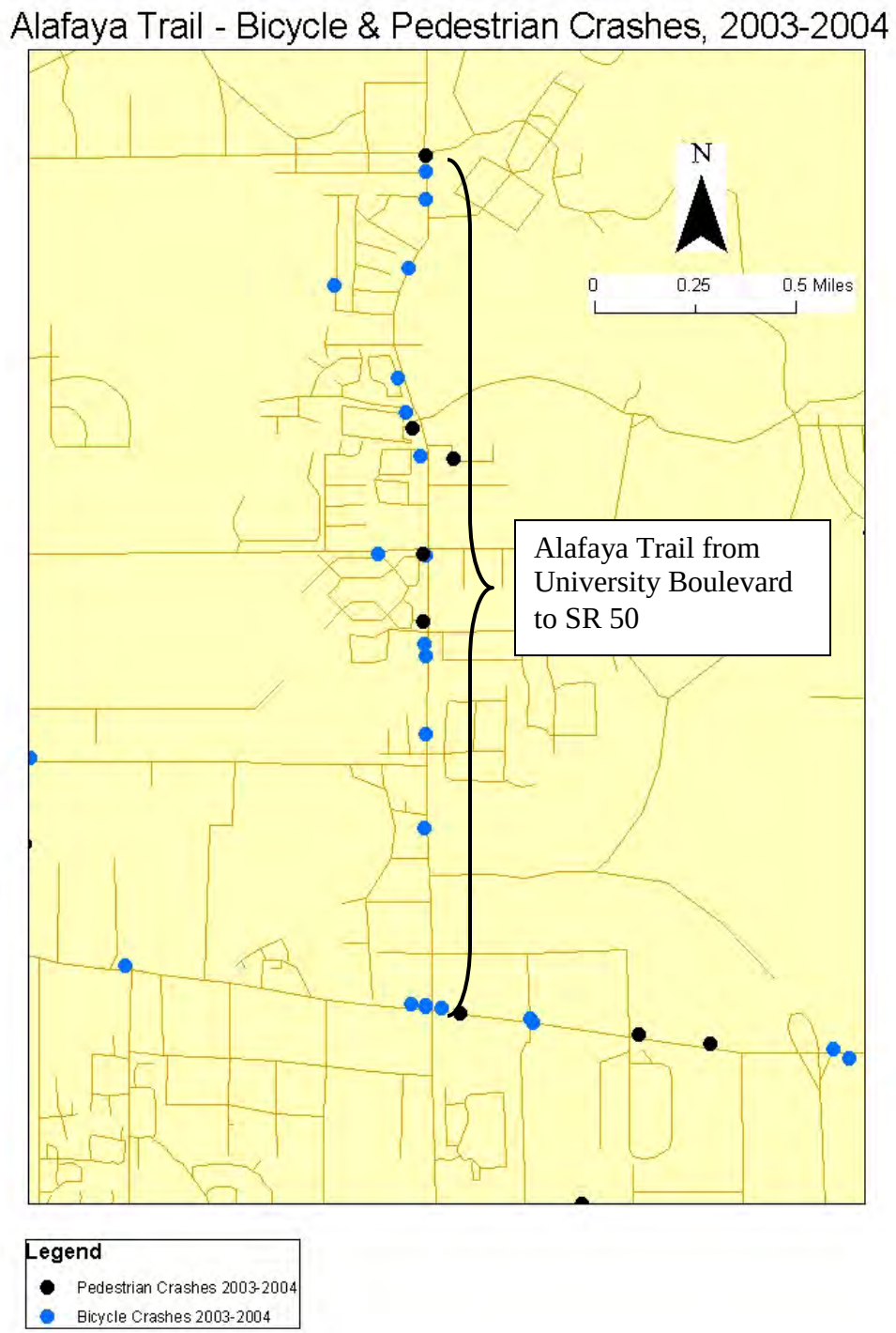
University – 2

University – 3

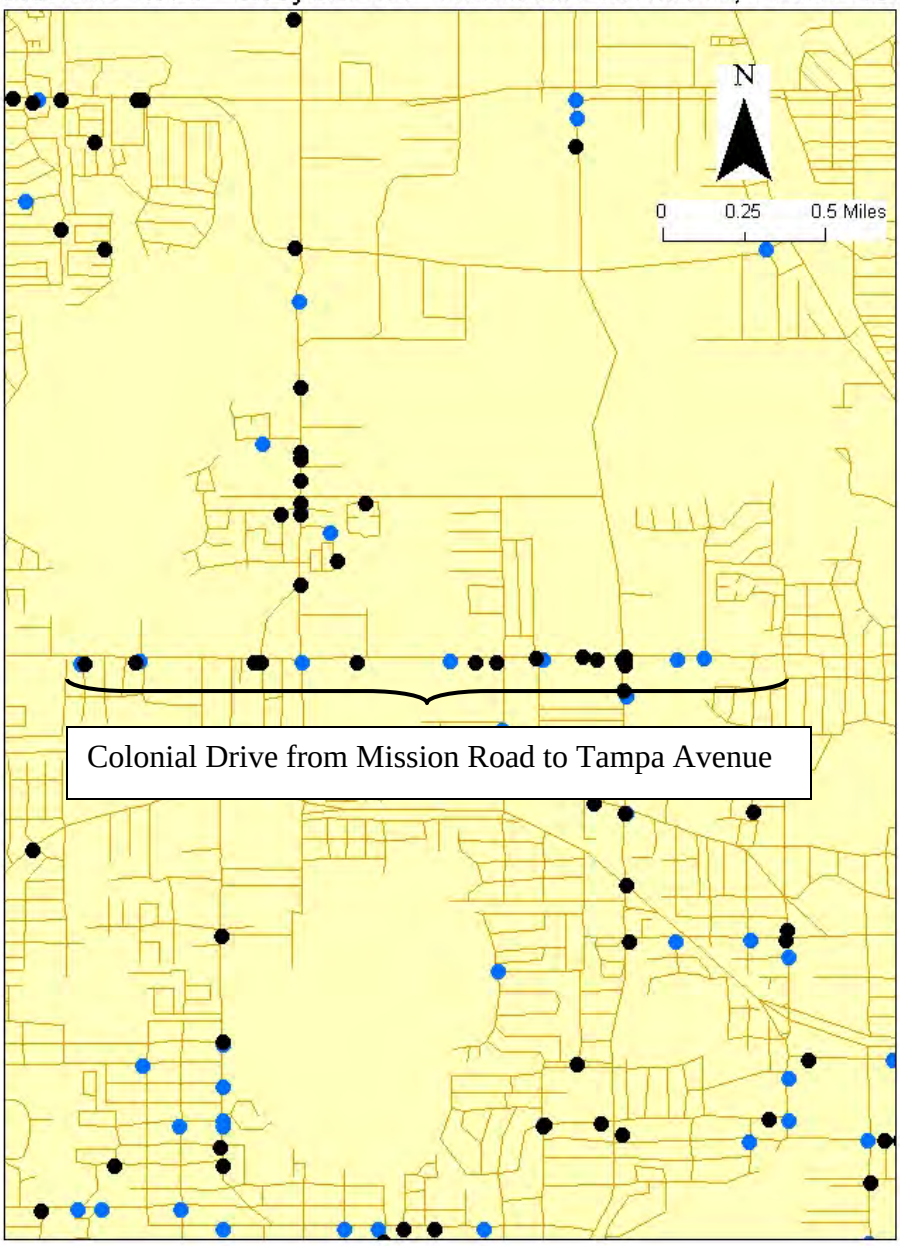
University – 4

University – 5

APPENDIX B – GIS MAPS OF CRASHES ON STUDY STREETS


Alafaya Trail - Bicycle & Pedestrian Crashes, 2003-2004
N
0
0.25
0.5 Miles
Alafaya Trail from University Boulevard to SR 50
Legend
Pedestrian Crashes 2003-2004
Bicycle Crashes 2003-2004

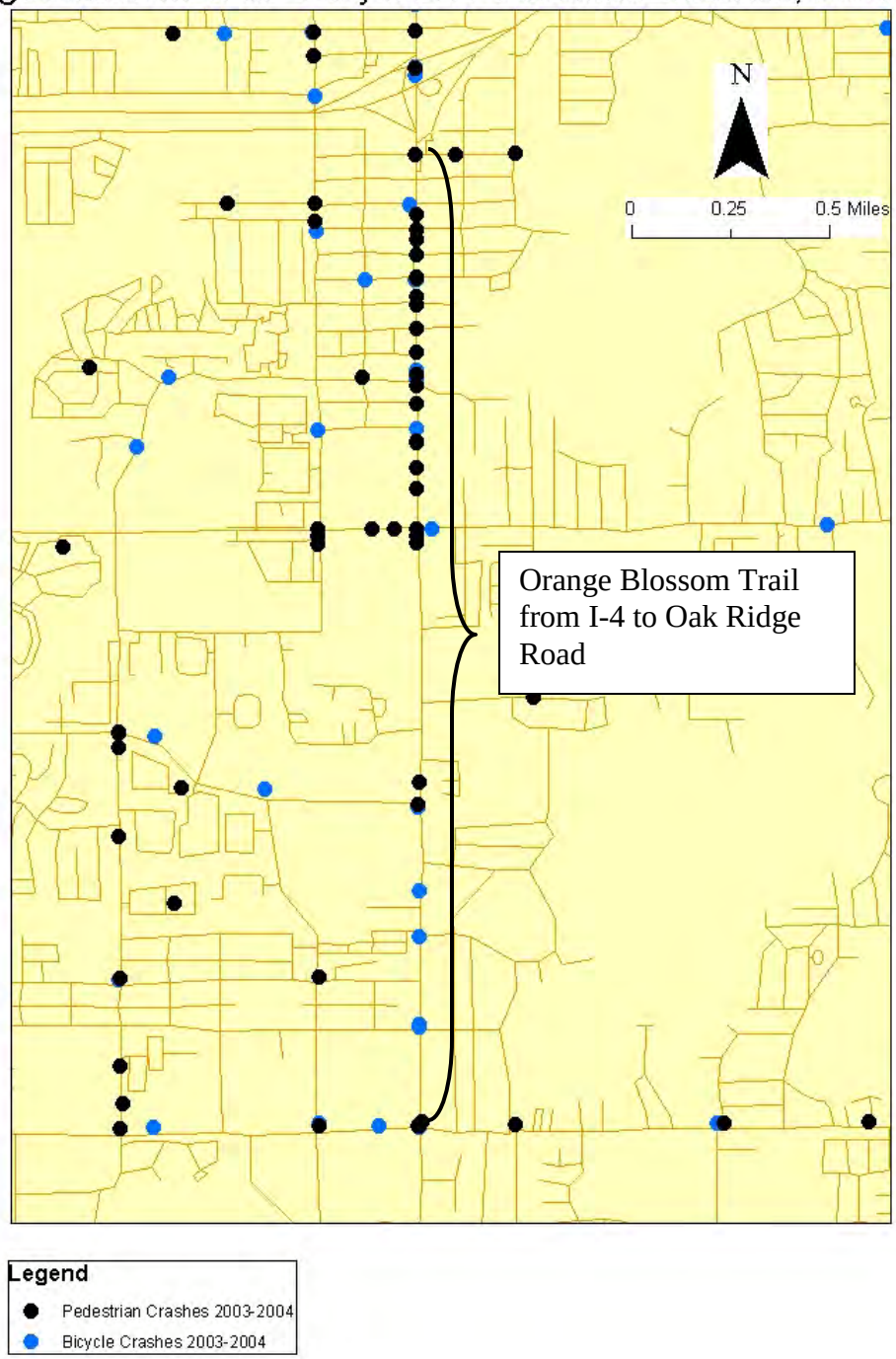
Colonial Drive - Bicycle & Pedestrian Crashes, 2003-2004



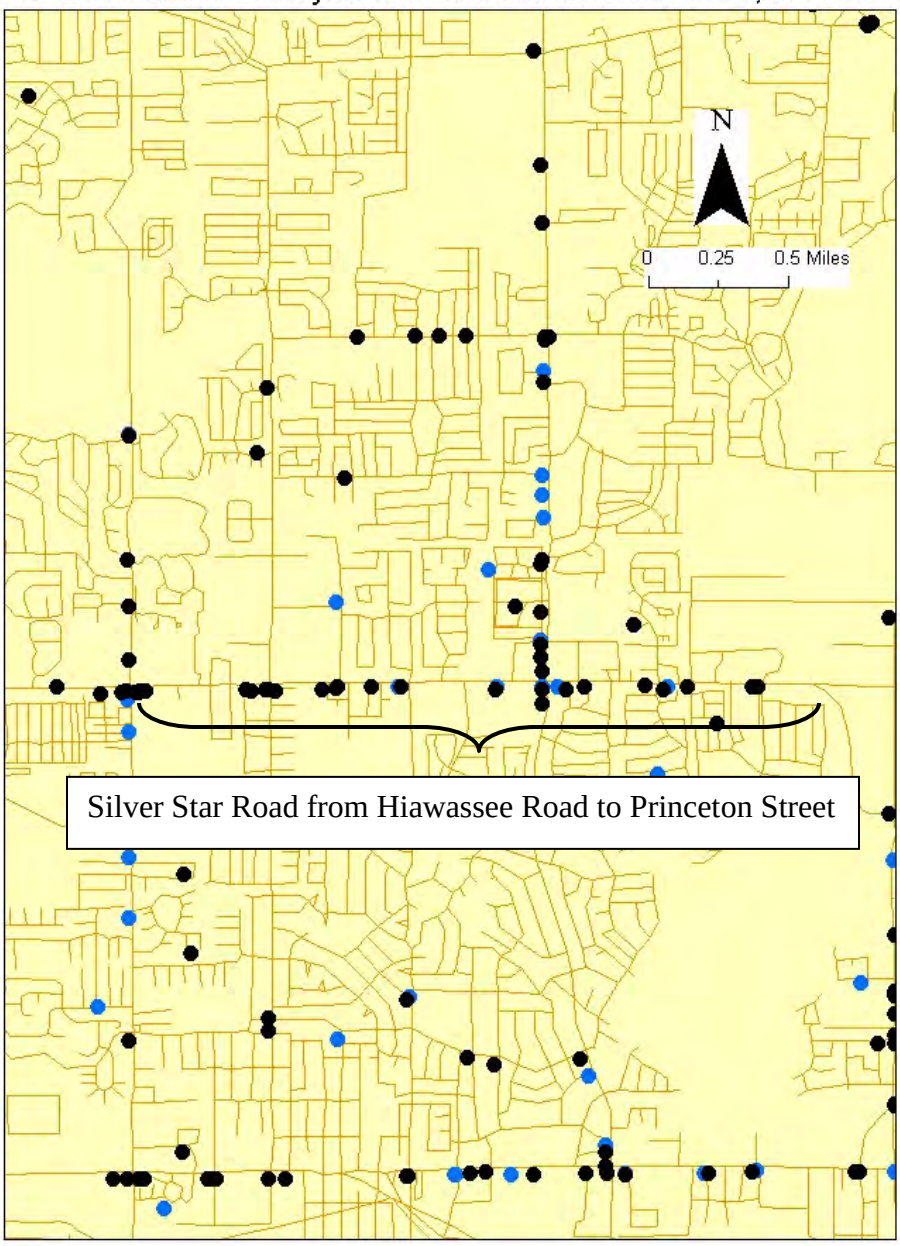
Legend

- Pedestrian Crashes 2003-2004
- Bicycle Crashes 2003-2004

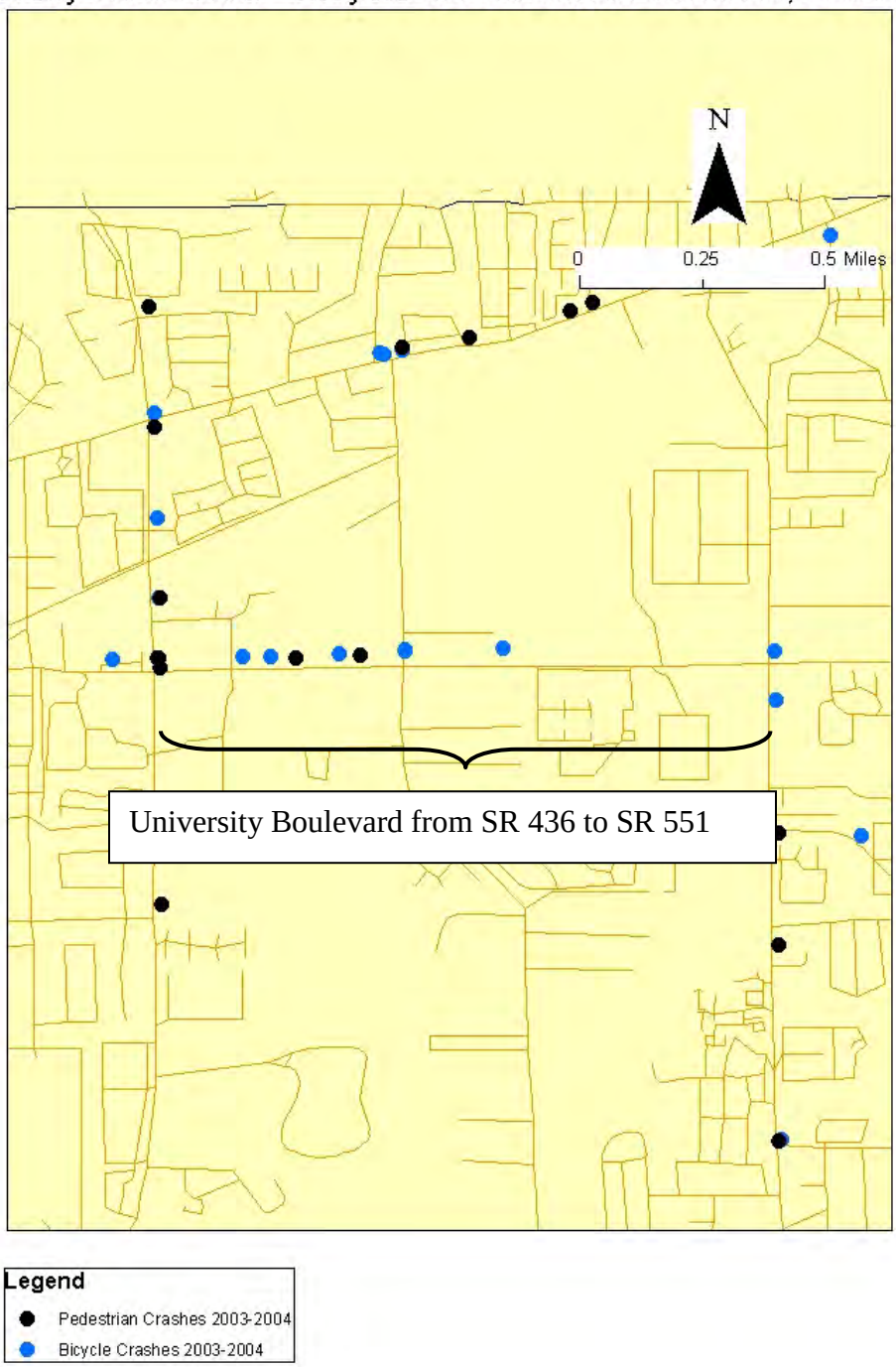
Orange Blossom Trail - Bicycle & Pedestrian Crashes, 2003-2004



Silver Star Road - Bicycle & Pedestrian Crashes, 2003-2004



University Boulevard - Bicycle & Pedestrian Crashes, 2003-2004



APPENDIX C – CRASH SUMMARIES

	A	B	D	I	K	L	N	O	P	U	V	W
1												
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
3	6484265	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist from side street hit bicyclist		Possibly		No - daylight
4	7509087	Alafaya	Bike	Daylight	Sidewalk	Against traffic		Motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
5	70766077	Alafaya	Bike	Dusk	Near crosswalk, crossing Alafaya	Against traffic		Thru motorist hit bicyclist riding across Alafaya		No - bicyclist was crossing study street		Possibly - depends on whether that portion of study street was lit
6	70777475	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist				
7	70779876	Alafaya	Bike	Dark - Street Light	Sidewalk	Against traffic		RT motorist exiting driveway hit bicyclist	Bike lanes not shown on police report	Possibly		Possibly - depends on whether that portion of study street was lit
8	71323868	Alafaya	Bike		Sidewalk	Against traffic		RT motorist exiting driveway hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		Possibly - depends on whether that portion of study street was lit
9	71406144	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		No - daylight
10	71407965	Alafaya	Bike	Dark - Street Light	Bike lane	Against traffic		RT motorist on side street hit bicyclist		No - bicyclist was alredy in bike lane		Possibly - depends on whether that portion of study street was lit
11	73595819	Alafaya	Bike	Daylight	Sidewalk	Against traffic			RT motorist on side street hit bicyclist	Possibly		
12	73632976	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist		Possibly		
13	73658512	Alafaya	Bike	Dark - Street Light	Bike lane	Against traffic		RT motorist on side street hit bicyclist		Possibly		Possibly - depends on whether that portion of Alafaya was lit
14	73665149	Alafaya	Bike	Daylight	Crosswalk, crossing Alafaya	With traffic		Thru motorist hit bicyclist riding across Alafaya	Large trucks stopped to the left of motorist may have obstructed motorist's view of bicyclist	No - bicyclist was crossing study street		No - daylight
15	73668803	Alafaya	Bike	Not coded, but crash occurred at 2:48 PM	Sidewalk	Against traffic		Motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
16	73668809	Alafaya	Bike	Dusk	Sidewalk	Against traffic		RT motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		Possibly - depends on whether that portion of study street was lit
17	73668976	Alafaya	Bike	Dark - Street Light	Sidewalk	Against traffic		RT motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		Possibly - depends on whether that portion of study street was lit
18	73765710	Alafaya	Bike	Daylight	Sidewalk	Against traffic		Thru motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
19	73765743	Alafaya	Bike	Daylight	Bike lane? ("right side of roadway")	With traffic		RT motorist exiting driveway hit bicyclist	Hit and run	No - bicyclist was already in bike lane?		No - daylight
20	73766728	Alafaya	Bike	Daylight	Sidewalk	With traffic		RT motorist hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
21	73769586	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
22	75088303	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist from side street hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		No - daylight
23	75091508	Alafaya	Bike	Dark - Street Light	Sidewalk	With traffic		RT motorist hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		Possibly - depends on whether that portion of study street was lit
24	75091642	Alafaya	Bike	Daylight	Bike lane	With traffic		LT motorist hit bicyclist		No - bicyclist was already in bike lane		No - daylight
25	75094146	Alafaya	Bike	Daylight	Sidewalk	With traffic		RT motorist hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		No - daylight
26	76909189	Alafaya	Bike	Daylight	Sidewalk	Against traffic		Motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
27	76913369	Alafaya	Bike	Daylight	Crosswalk	Against traffic		RT motorist on side street hit bicyclist		Possibly		No - daylight
28	76917329	Alafaya	Bike	Dusk	Crosswalk	With traffic		LT motorist on side street hit bicyclist riding across Alafaya		No - bicyclist was crossing study street at crosswalk		Possibly - depends on whether that portion of study street was lit

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
29	76921510	Alafaya	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist	Bike lanes not shown on police report	Possibly		No - daylight
30	73665829	Alafaya	Bike	Daylight	Sidewalk	With traffic		Motorist exiting driveway hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report			No - daylight
31	72777333	Colonial	Bike	Daylight	Shared use lane	Against traffic		RT motorist exiting driveway hit bicyclist		Possibly		No - daylight
32	73619629	Colonial	Bike	Daylight	Sidewalk	With traffic		RT motorist exiting driveway hit bicyclist		Possibly		No - daylight
33	70653687	Colonial	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Ped had been drinking		No - study street already has median	Possibly
34	70884086	Colonial	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
35	72776013	Colonial	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
36	72776122	Colonial	Ped	Dark - Street Light			Walking in roadway	Thru motorist hit ped	"Pedestrian 1 exited the vehicle he was riding in and walked against traffic in the outside straight lane near the middle straight lane"		No - ped wasn't crossing study street	Possibly - depends on whether that portion of study street was lit
37	72777270	Colonial	Ped	Not coded, but crash occurred at 2:26 PM			Sidewalk, crossing driveway	RT motorist hit ped			No - ped wasn't crossing study street	No - daylight
38	72777463	Colonial	Ped	Daylight			Standing in median	Thru motorist veered off roadway and hit ped			No - ped wasn't crossing study street	No - daylight
39	72782629	Colonial	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Ped under influence of alcohol		Possibly	Possibly - depends on whether that portion of study street was lit
40	72788103	Colonial	Ped	Dark - Street Light			Crossing side street at intersection, in crosswalk	Thru motorist on side street hit ped	Motorist had green light; ped had been drinking		No - ped wasn't crossing study street	Possibly
41	72828102	Colonial	Ped	Daylight			Crossing side street at intersection, unknown if in crosswalk	RT motorist on side street hit ped			No - ped wasn't crossing study street	No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
42	72828719	Colonial	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Ped had been drinking		No - study street already has median	No - daylight
43	73617045	Colonial	Ped	Daylight			Crossing at intersection, unknown if in crosswalk	RT motorist on side street hit ped	Ped in wheelchair		No - study street already has median	No - daylight
44	75298820	Colonial	Ped	Daylight			Sidewalk, crossing driveway	Motorist exiting driveway hit ped			No - pedestrian wasn't crossing study street	No - daylight
45	75298844	Colonial	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			No - study street already has median	No - daylight
46	76258390	Colonial	Ped	Daylight			Sidewalk, crossing driveway	Motorist exiting driveway hit ped			No - study street already has median	No - daylight
47	76302905	Colonial	Ped	Dusk			Crossing at intersection, in crosswalk	Thru motorist hit ped, 1st half	Sight distance blocked by motorist in curb lane		No - study street already has median	Possibly - depends on whether that portion of study street was lit
48	76303316	Colonial	Ped	Daylight			Crossing at intersection, in crosswalk	RT motorist hit ped	Ped in wheelchair		No - study street already has median	No - daylight
49	76304157	Colonial	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street was lit
50	71420142	OBT	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist		Possibly		No - daylight
51	2890950	OBT	Ped	Dark - Street Light			Unknown	Unknown			Unknown	Possibly - depends on whether that portion of study street was lit
52	5655846	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
53	70650155	OBT	Ped	Coded as daylight but crash occurred at 9:09 PM			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Fatal		Possibly	Possibly - depends on whether that portion of study street was lit
54	70651900	OBT	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half	Ped was carrying bike; motorist was FHP with lights and siren on; diagram shows that street light closest to point of impact was not operational		Possibly	Possibly - depends on whether that portion of study street was lit
55	70654201	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
56	70765061	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	2 thru motorists hit ped, 2nd half	1 motorist was hit and run		Possibly	No - daylight
57	70776012	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
58	70776637	OBT	Ped	Daylight			Crossing side street at intersection, in crosswalk	RT motorist on side street hit ped			No - ped wasn't crossing study street	No - daylight
59	70778211	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Ped had been drinking		Possibly	Possibly - depends on whether that portion of study street was lit
60	71405023	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street was lit
61	71405454	OBT	Ped	Dark - Street Light			Crossing at intersection, in crosswalk	Thru motorist hit ped, 2nd half	Fatal; motorist was behind semi and changed lanes; semi may have blocked motorist's view		Possibly	Possibly - depends on whether that portion of study street was lit
62	71406640	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
63	71420778	OBT	Ped	Daylight			Crossing at intersection, unknown if in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
64	71424352	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half			Possibly	
65	71424740	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street was lit
66	71517027	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	LT motorist exiting side street hit ped in center turn lane, 1st/2nd half			Possibly	No - daylight
67	72786866	OBT	Ped	Dark - Street Light			Working in construction zone	Thru motorist hit ped	Motorist under influence of alcohol		No	Possibly - depends on whether that portion of study street was lit

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
68	73623003	OBT	Ped	Daylight			Sidewalk, crossing driveway	RT motorist hit ped	2 peds hit; another motorist rear-ended RT motorist, causing RT motorist to hit peds		No - pedestrian wasn't crossing study street	No - daylight
69	73623368	OBT	Ped	Daylight			Sidewalk	Tire flew off car and hit ped			No	No - daylight
70	73623387	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Fatal; ped was drunk		Possibly	Possibly - depends on whether that portion of study street was lit
71	73630065	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Ped had been drinking		Possibly	Possibly - depends on whether that portion of study street was lit
72	73632493	OBT	Ped	Dark - No Street Light			Crossing side street midblock, not in crosswalk	Thru motorist on side street hit ped, 2nd half			No - pedestrian wasn't crossing study street	Possibly
73	73632503	OBT	Ped	Dark - Street Light			Unknown	Thru motorist hit ped			Unknown	Possibly - depends on whether that portion of study street was lit
74	73632577	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
75	73633061	OBT	Ped	Daylight			Sidewalk, crossing driveway	Motorist exiting driveway hit ped			No - ped wasn't crossing study street	No - daylight
76	73633206	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half	Ped under influence of alcohol and drugs		Possibly - depending on location of median opening	Possibly - depends on whether that portion of study street was lit
77	73634552	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	LT motorist exiting driveway hit ped in center turn lane, 1st/2nd half			Possibly - depending on location of median opening	No - daylight
78	73656021	OBT	Ped	Dark - Street Light			Sidewalk, crossing driveway	Motorist exiting driveway hit ped			No - pedestrian wasn't crossing study street	
79	73656225	OBT	Ped	Dark - Street Light			Crossing at intersection, in crosswalk	Thru motorist hit ped, 1st half	Ped had "no physical address"		Possibly	Possibly - depends on whether that portion of study street was lit
80	73656233	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Fatal; ped was transient; ped was under influence of alcohol and drugs		Possibly	Possibly - depends on whether that portion of study street was lit

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
81	73661781	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
82	73664583	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Vehicle in adjacent lane may have blocked motorist's view		Possibly	No - daylight
83	73765520	OBT	Ped	Daylight			Sidewalk, crossing side street	RT motorist from side street hit ped			No - ped wasn't crossing study street	No - daylight
84	73766115	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	LT motorist hit ped, 1st half			Possibly	No - daylight
85	73766189	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist (in left-turn bay) hit ped, 1st/2nd half			Possibly	No - daylight
86	73767467	OBT	Ped	Dusk			Sidewalk, crossing driveway	Motorist exiting driveway may have hit 2 peds	Conflicting statements as to whether motorist hit peds; both peds had been drinking		No - pedestrians weren't crossing study street	Possibly - depends on whether that portion of study street was lit
87	73768259	OBT	Ped	Dark - Street Light			Crossing side street midblock, not in crosswalk	Thru motorist on side street hit ped, 1st half			No - pedestrian wasn't crossing study street	Possibly - depends on whether that portion of study street was lit
88	73768671	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Fatal; M65NB street lights were inoperative; ped had been drinking and had drugs; ped was transient		Possibly	Possibly - depends on whether that portion of study street was lit
89	74666945	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	"The pedestrian was not sure if he actually got hit by a car or not:		Possibly	No - daylight
90	75087241	OBT	Ped	Daylight			Crossing at intersection, unknown if in crosswalk	Thru motorist hit ped, 2nd half			Possibly	No - daylight
91	75087666	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	No - daylight
92	75088678	OBT	Ped	Daylight			Crossing side street at intersection, in crosswalk	RT motorist hit ped			No - ped wasn't crossing study street	No - daylight
93	75092460	OBT	Ped	Daylight			Crossing at intersection, in crosswalk	LT motorist on side street hit ped, 1st half	Fatal; motorist was on cell phone		Possibly	No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
94	75093768	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist (#2) in center turn lane hit ped, 1st/2nd half	Fatal; thru motorist #1 hit #2, #2 hit #3, #2 veered into center turn lane		Unlikely - unusual circumstances	No - daylight
95	75330356	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street was lit
96	75332682	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
97	75332697	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	LT motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street was lit
98	75332701	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Ped had been drinking		Possibly	Possibly - depends on whether that portion of study street was lit
99	75333703	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
100	75333960	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half			Possibly	No - daylight
101	76904585	OBT	Ped	Dark - Street Light			Crossing at intersection, in crosswalk	Thru motorist on side street hit ped, 1st half	Fatal		Possibly	Possibly - depends on whether that portion of study street was lit
102	76913275	OBT	Ped	Dark - No Street Light			Walking in travel lane	Thru motorist hit ped	"P-1 was crawling on his hands and knees prior to the collision"		Unlikely	Possibly
103	76914101	OBT	Ped	Dark - Street Light			Sidewalk, waiting for taxi	Thru motorist veered off roadway and hit ped			No - ped wasn't crossing study street	Possibly - depends on whether that portion of study street was lit
104	76914479	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
105	76915402	OBT	Ped	Not coded			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half	Lighting condition not coded but crash occurred at 10:22 PM		Possibly	Possibly - depends on whether that portion of study street was lit
106	76915415	OBT	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
107	76920562	OBT	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Motorist in center turn lane hit ped, 1st/2nd half	Ped had been drinking; no diagram		Possibly	Possibly - depends on whether that portion of study street was lit
108	1636751	Silver Star	Ped	Dark - Street Light			Crossing side street at intersection, unknown if in crosswalk	RT motorist on side street hit ped			No - ped wasn't crossing study street	Possibly - depends on whether that portion of study street was lit
109	70651700	Silver Star	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	WB thru motorist in center turn lane hit 2 peds, 1st/2nd half; EB thru motorist in adjacent thru lane hit 1 of the 2 peds	1 fatality; 1 ped was carrying another ped; EB thru motorist was hit and run		Possibly	Possibly
110	70736625	Silver Star	Ped	Daylight			Crossing - unknown location	Motorist in LT lane hit ped			No - study street already has median	No - daylight
111	70767081	Silver Star	Ped	Dark - Street Light			Unknown	Unknown			Possibly	Possibly - depends on whether that portion of study street was lit
112	70767737	Silver Star	Ped	Dark - No Street Light			Crossing driveway	LT motorist hit ped			Possibly	Possibly
113	70768593	Silver Star	Ped	Unknown			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Unknown
114	70768944	Silver Star	Ped	Daylight			Crossing, unknown if midblock or at intersection	Thru motorist hit ped, 2nd half			No - study street already has median	No - daylight
115	70769689	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
116	70775328	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	No - daylight
117	70777268	Silver Star	Ped	Daylight			Crossing side street at intersection, in crosswalk	Motorist on side street hit ped				No - daylight
118	71424221	Silver Star	Ped	Daylight			Crossing side street	Motorist on side street hit ped	No diagram		No - ped wsn't crossing study street	No - daylight
119	71424758	Silver Star	Ped	Dark - Street Light			Walking along side of road	Thru motorist hit ped, 1st half			Possibly	Possibly
120	71424786	Silver Star	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly
121	71968737	Silver Star	Ped	Dark - Street Light			Crossing at intersection, unknown if in crosswalk	2 thru motorists hit ped, 2nd half	Fatal; both motorists were charged with drag racing		Possibly	Possibly

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
122	72777499	Silver Star	Ped	Dark - Street Light			Standing in median, waiting to cross midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly - depends on whether that portion of study street was lit
123	72780664	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
124	73596163	Silver Star	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Construction barricades in median may have blocked motorist's view		Possibly	Possibly
125	73596620	Silver Star	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly
126	73596888	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
127	73597541	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	No - daylight
128	73598212	Silver Star	Ped	Dark - Street Light			Crossing side street at intersection, in crosswalk	RT motorist hit ped			No - ped wasn't crossing study street	Possibly
129	73631574	Silver Star	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Fatal		Possibly	Possibly
130	73633492	Silver Star	Ped	Daylight			Sidewalk, crossing driveway	RT motorist hit ped			Possibly	No - daylight
131	73633848	Silver Star	Ped	Coded as daylight but crash occurred at 9:58 PM			Crossing midblock, not in crosswalk	RT motorist exiting driveway hit ped, 1st half			Possibly	Possibly
132	73634139	Silver Star	Ped	Daylight			Sidewalk, crossing driveway	Motorist exiting driveway hit ped	No diagram		Possibly	No - daylight
133	73634321	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half				No - daylight
134	73657019	Silver Star	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly
135	73659510	Silver Star	Ped	Daylight			Crossing side street at intersection, unknown if in crosswalk	Motorist on side street hit ped			Possibly	No - daylight
136	73660672	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
137	73662102	Silver Star	Ped	Daylight			Sidewalk, crossing side street	LT motorist hit ped			Possibly	No - daylight
138	73663547	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
139	73666411	Silver Star	Ped	Daylight			Crossing at intersection, in crosswalk	Thru motorist hit ped, 2nd half			Possibly	No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
140	73768251	Silver Star	Ped	Dark - Street Light			Sidewalk, crossing driveway	RT motorist exiting driveway hit ped			Possibly	Possibly - depends on whether that portion of study street was lit
141	73768252	Silver Star	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half			Possibly	Possibly
142	73768323	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	No - daylight
143	73903401	Silver Star	Ped	Dark - Street Light			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half			Possibly	Possibly - depends on whether that portion of study street is lit
144	75093675	Silver Star	Ped	Dark - No Street Light			Crossing midblock, not in crosswalk	2 thru motorists hit ped, 1st half	1 motorist was hit and run			Possibly
145	75100792	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist in center turn lane hit ped, 1st/2nd half				No - daylight
146	75334215	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 2nd half	Ped had been drinking		Possibly	No - daylight
147	76912676	Silver Star	Ped	Daylight			Crossing midblock, not in crosswalk	Thru motorist hit ped, 1st half				No - daylight
148	76913991	Silver Star	Ped	Daylight			Crossing at intersection, in crosswalk	Thru motorist hit ped, 1st half	Motorist had green light			No - daylight
149	76914570	Silver Star	Ped	Daylight			Sidewalk, crossing driveway	RT motorist exiting driveway hit ped			No - ped wasn't crossing study street	No - daylight
150	79768944	Silver Star	Ped	Daylight			Crossing at unknown location	Thru motorist hit ped, presumably 2nd half			Possibly	No - daylight
151	3342059	University	Bike	Daylight	Sidewalk	Against traffic		LT motorist on side street hit bicyclist		Possibly		No - daylight
152	59875413	University	Bike	Dark - No Street Light	In/near crosswalk	Against traffic		Thru motorist on University hit bicyclist crossing University	Fatal	No - bicyclist was not on study street		Possibly - depends on whether that portion of study street was lit
153	61407403	University	Bike	Dark - No Street Light	Unknown	Unknown		Thru motorist on University hit bicyclist crossing University	No diagram; bicyclist had been drinking	No - bicyclist was not on study street		Possibly
154	61735524	University	Bike	Dark - Street Light	Shared use lane	With traffic		Thru motorist hit bicyclist	Motorist was passing bicyclist	Possibly		Possibly - depends on whether that portion of study street was lit
155	70728808	University	Bike	Daylight	Sidewalk	With traffic			RT motorist hit bicyclist			
156	70735505	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist exiting driveway		Possibly		No - daylight

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
157	70738741	University	Bike	Daylight	Sidewalk	With traffic		RT motorist hit bicyclist		Possibly		No - daylight
158	70739247	University	Bike	Daylight	Crossing midblock	Crossing midblock		Thru motorist hit bicyclist		No - bicyclist was crossing study street midblock		No - daylight
159	70768257	University	Bike	Dark - Street Light	Crossing midblock	Crossing midblock		Thru motorist hit bicyclist riding across University	Fatal; motorist charged with DUI manslaughter; bicyclist "operating after sundown without required lights"	No - bicyclist was crossing study street midblock		Possibly - depends on whether that portion of study street was lit
160	71407313	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist exiting driveway hit bicyclist				
161	73597802	University	Bike	Daylight	Sidewalk	Against traffic		Motorist on side street hit bicyclist		Possibly		No - daylight
162	73599702	University	Bike	Dark - No Street Light	Sidewalk	With traffic		RT motorist hit bicyclist	Distance between sidewalk and roadway is unknown	Possibly		Possibly
163	73664928	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist exiting driveway hit bicyclist	Distance between sidewalk and roadway is unknown; bike lanes not shown on police report	Possibly		No - daylight
164	75086236	University	Bike	Daylight	Crosswalk	Against traffic		Thru motorist on side street hit bicyclist riding on University		Possibly		No - daylight
165	75089462	University	Bike	Daylight	Sidewalk	With traffic		Motorist exiting driveway hit bicyclist		Possibly		No - daylight
166	75103389	University	Bike	Daylight	Sidewalk	Against traffic		Thru motorist on side street hit bicyclist riding on University		Possibly		No - daylight
167	75330359	University	Bike	Dark - Street Light	Crosswalk	With traffic		Thru motorist hit bicyclist riding across University		No - bicyclist was crossing study street		Possibly - depends on whether that portion of study street was lit
168	75331024	University	Bike	Daylight	Sidewalk	Against traffic		Motorist exiting driveway hit bicyclist	Crash report notes visual obstruction for driver (7 ft high sign)	Possibly		No - daylight
169	75331039	University	Bike	Dark - Street Light	Sidewalk	Against traffic		LT motorist hit bicyclist	Distance between sidewalk and roadway is unknown	Possibly		Possibly - depends on whether that portion of study street was lit
170	76428403	University	Bike	Dark - Street Light	Crosswalk	Against traffic		Thru motorist on side street hit bicyclist riding on University		Possibly		Possibly - depends on whether that portion of study street was lit

	A	B	D	I	K	L	N	O	P	U	V	W
2	Report No.	Location	Bike/Ped	Lighting	Bike Location	Bike Direction	Ped Location	Description	Comments	Would bike lanes have prevented the crash?	Would a (wider) median have prevented the crash?	Would better lighting have prevented the crash?
171	76914493	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist from side street hit bicyclist		Possibly		No - daylight
172	76923897	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist		Possibly		No - daylight
173	76924866	University	Bike	Daylight	Sidewalk	Against traffic		RT motorist on side street hit bicyclist		Possibly		No - daylight

APPENDIX D – DATA COLLECTION INSTRUMENTS

PEDESTRIAN OBSERVATIONS June 26, 2007

Name: _____ Location: _____ Time: _____

Number	Crossed at			Gap (Y/N)	Clothing (light/dark)
	Intersection	Midblock	Island		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

BICYCLIST OBSERVATIONS June 26, 2007

Name: _____ Location: _____ Time: _____

No.	Sidewalk		In Street (Bike Lane)			In Street (Bike Lane)		Sidewalk		Head Light (Y/N, UNK)	Helmet (Y/N)	Sex (M/F)	Age (check one)				
	↓	↑	↓	↑		↓	↑	↓	↑				10 & under	11-17	18-24	25-64	65 & over
	With	Against	With	Against		Against	With	Against	With								
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
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20																	