

Bicycle Road Safety Audit of North Highland and Ponce de Leon Avenues



Atlanta, Georgia



Dan Nabors
Elissa Goughnour

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1. Introduction

1.1 Background

The objective of this study was to complete a bicycle road safety audit (RSA) for portions of North Highland and Ponce de Leon Avenues in Atlanta, Georgia. The study area, which is shown in Figure 1, includes North Highland Avenue from Drewry Street to the North to the Freedom Parkway to the South (approximately 0.6 miles) and along Ponce de Leon Avenue from North Highland Avenue to the East to Peachtree Street to the West (approximately 1.9 miles).

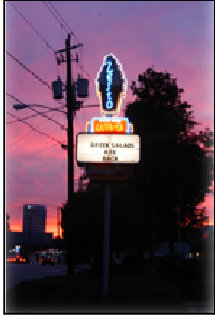


Figure 1. Study Area

1.2 Study Area

The length of the study corridor is 0.6 miles along North Highland Avenue and 1.9 miles along Ponce de Leon Avenue. Although the two roads intersect, Ponce de Leon and North Highland Avenues are physically and functionally different. North Highland Avenue, a primarily two-lane local road, crosses through a commercial and residential area and is lined with small, local businesses, restaurants, bars, and homes. North Highland Avenue intersects with the Freedom Park Trail, which is the southern-most point of the study area. The Freedom Park Trail is a six mile long shared use path that connects the Martin Luther King, Jr. National Historic Site, the Carter Center and the Jimmy Carter Presidential Library, and various Atlanta neighborhoods¹.

¹ Freedom Park: http://freedompark.org/about_ndx.html



**Commercial
businesses along
Ponce de Leon
Avenue**

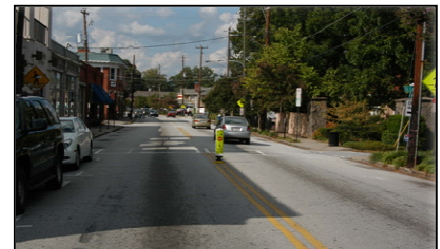
Ponce de Leon Avenue is a much larger commercial corridor that in some portions has four lanes while others have seven. There are a multitude of stores and fast food restaurants along Ponce de Leon Avenue, including some larger stores such as Urban Outfitters, Staples, and Home Depot. A multi use path that is under construction as part of the Atlanta BeltLine, crosses overtop Ponce de Leon Avenue. The former City Hall East building is currently being redeveloped into a mixed-use retail and residential center that will include a connection to the BeltLine.² Additionally, the BeltLine will add 22 miles of transit that will connect Atlanta neighborhoods and link major activity centers and attractions.³ Finally, there are planned pedestrian improvements along Ponce de Leon Avenue from Piedmont Avenue to Briarcliff Road.

2. Existing Conditions

2.1 *Site Characteristics and Bicycle Accommodations*

North Highland Avenue is primarily a two-lane road with on-street parking; however, there are sections with three lanes. Sidewalks are provided on both sides of North Highland Avenue and crosswalks are provided at most intersections. The posted speed limit on North Highland Avenue is 30 MPH; however, narrow lanes, on-street parking, and local businesses help to calm traffic.

There are a large number of pedestrians and cyclists on North Highland Avenue. Cyclists often ride on North Highland Avenue because it has business and entertainment attractions, provides a connection to the Georgia Tech campus and the Freedom Parkway Trail, and is relatively flat in comparison to nearby streets. The Freedom Parkway Trail is a shared use path that is intended for use by pedestrians and cyclists. There are no marked bicycle accommodations along North Highland Avenue so cyclists share the road with motorists.



Northbound at the intersection of North Highland Avenue at Saint Louis Place. This portion of the road is two lanes with on street parking and local businesses. There is a crosswalk at this intersection with a pedestrian knock-down sign.

Ponce de Leon Avenue is a larger road with the number of lanes varying from four (4) to seven (7) lanes. Sidewalks are provided on both sides of the road and crosswalks are available at some intersections and at some midblock crossings. Within the limits of the study area, the posted speed limit is 35 MPH. There are no marked bicycle accommodations along Ponce de Leon Avenue, although it does intersect with Charles Allen/Parkway Drive which has shared-lane markings, or sharrows, and there may also be a future connection with the existing BeltLine.

² City Hall East development: <http://www.poncecitymarket.com/home>

³ Atlanta BeltLine: <http://beltline.org/BeltLineBasics/TransitTrailsandTransportation/tabid/1738/Default.aspx>

2.2 Traffic Data

Based on traffic data provided by the Georgia Department of Transportation, the 2010 average daily traffic (ADT) on North Highland Avenue is 11,690 vehicles per day (vpd) from Virginia Avenue and Adair Avenue; 17,510 vpd between Rosedale Drive and Blue Ridge Avenue; and 5,970 vpd from Blue Ridge Avenue to Freedom Parkway.

The 2010 ADT on Ponce de Leon Avenue is 24,590 vpd from Piedmont Avenue to Boulevard, 34,710 vpd from Boulevard to Freedom Parkway; 33,590 vpd between Freedom Parkway and Moreland Avenue.

The Atlanta Bicycle Coalition provided bike counts along North Highland Avenue at Saint Charles Place and Freedom Parkway Trail and along Ponce de Leon Avenue at the Midtown Place Shopping Center⁴. The morning counts were collected from 7-9 AM and the evening counts were collected from 4:30-6:30 PM. The 2011 counts are the exact number of cyclists observed however the 2009 and 2010 counts are averages for counts that were conducted over multiple days.

Table 1. Atlanta Bicycle Coalition Bicycle Counts

Location	Bike Lane	Spring 2009		Fall 2009		Spring 2010		Fall 2010		Fall 2011	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
North Highland Avenue & Saint Charles Place	N	27	65	31	72	47	93	27	89	45	62
North Highland Avenue & Freedom Parkway Trail	N	--	--	--	--	--	--	--	--	62	134
Ponce de Leon Avenue (at Midtown Place Shopping Center)	N	--	--	--	--	--	--	--	--	9	23

Out of the sixteen locations analyzed by the ABC in 2009 and 2010, the intersection of North Highland Avenue and Saint Charles Place had the third highest average number of cyclists with 56.4 cyclists \pm 22.4.⁴

2.3 Collision Analysis

Bicycle collision information from 2003 to 2007 was provided for the study area by the Georgia Department of Health and the Georgia Department of Transportation. The bicycle crash locations and diagrams are shown in Appendix B. As depicted in Figure 2, most collisions occurred at intersections. Overall, 100 percent of the crashes on Ponce de Leon Avenue and 87 percent of the crashes on North Highland Avenue occurred at intersections.

⁴ Atlanta Bicycle Coalition. *Bike Count Report 2010*. Available: <http://www.atlantabike.org/BicycleTrafficCounts>

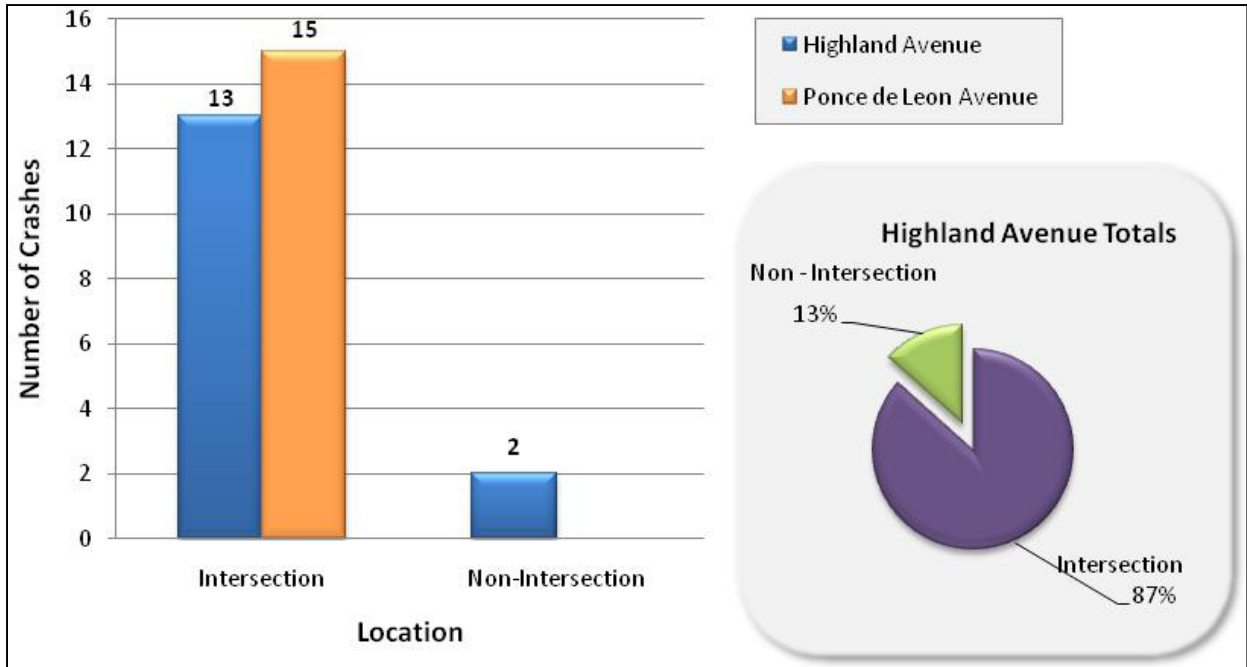


Figure 2. Bicycle Crash Location from 2003-2007

A review of the crash types, as shown in Figure 3, supports the location data as most of the crashes are angular (67 percent on North Highland Avenue and 100 percent on Ponce de Leon Avenue), which is typical for intersections. The remainder of the crashes were head-on, rear-end, and sideswipe – same direction crashes, which all occurred on North Highland Avenue.

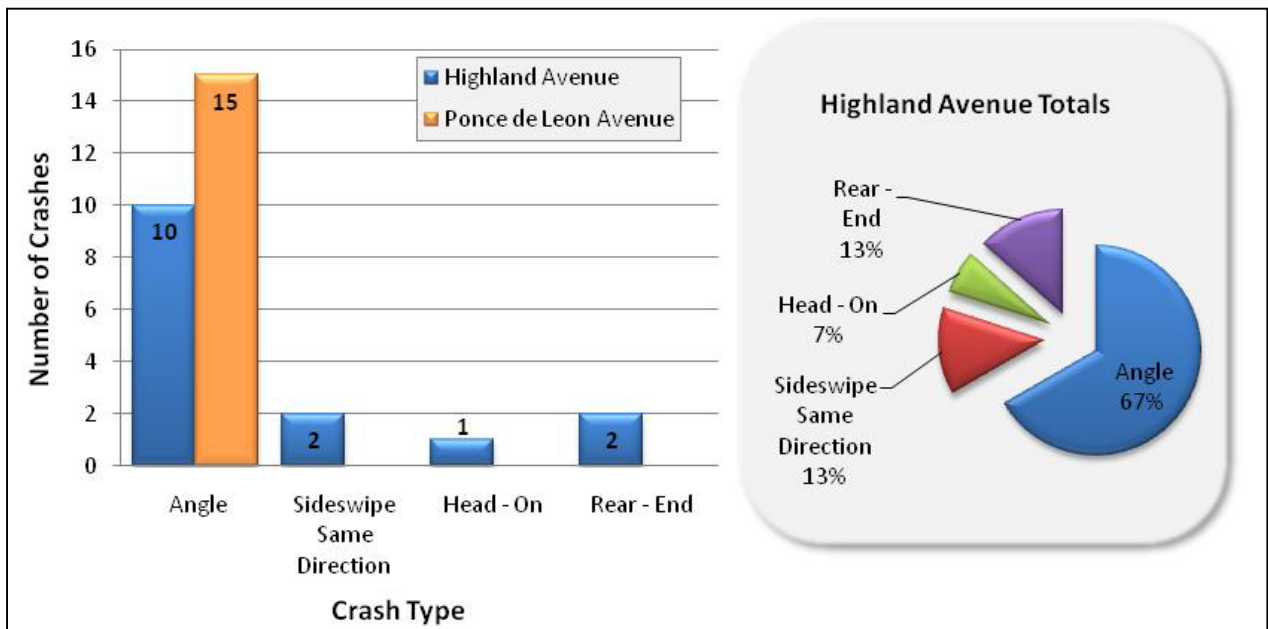


Figure 3. Bicycle Crash Types from 2003-2007

A closer look at the intersections reveals those with the most crashes. As shown in Figure 4, on Ponce de Leon Avenue those intersections with the most crashes were Peachtree Street, Boulevard, Glen Iris,

and Barnett Street, all with two crashes each. On North Highland Avenue, the intersections with North Avenue and Drewry Street both had two (2) crashes and Saint Louis Place had three (3).

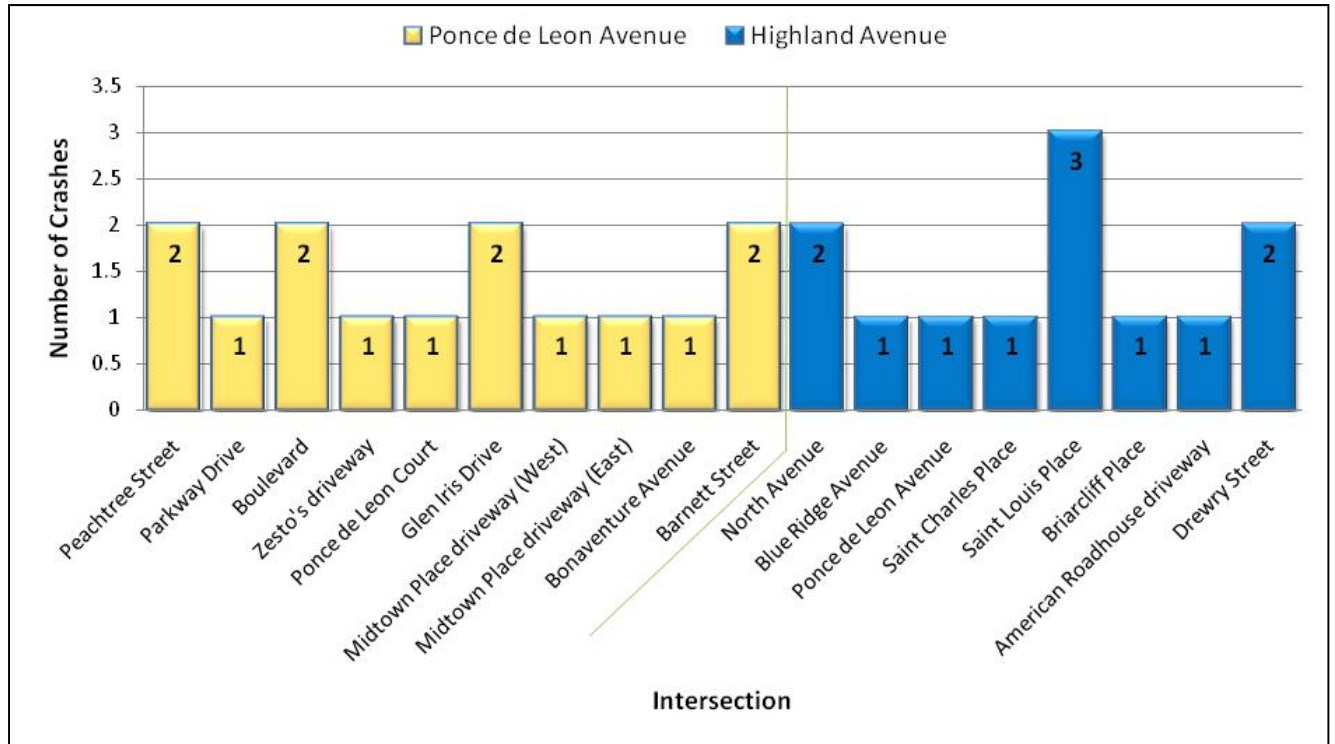


Figure 4. Number of Bicycle Crashes by Intersection from 2003-2007

In order to better comprehend the situation at these intersections, the motor vehicle crash data was compiled at some of the intersections for the period of 2003 through 2006 and is shown in Figure 5. An overview of the data can be found in Appendix A. The data indicates that those intersections with higher numbers of bicycle crashes also have a large number of motor vehicle crashes, particularly on Ponce de Leon Avenue.

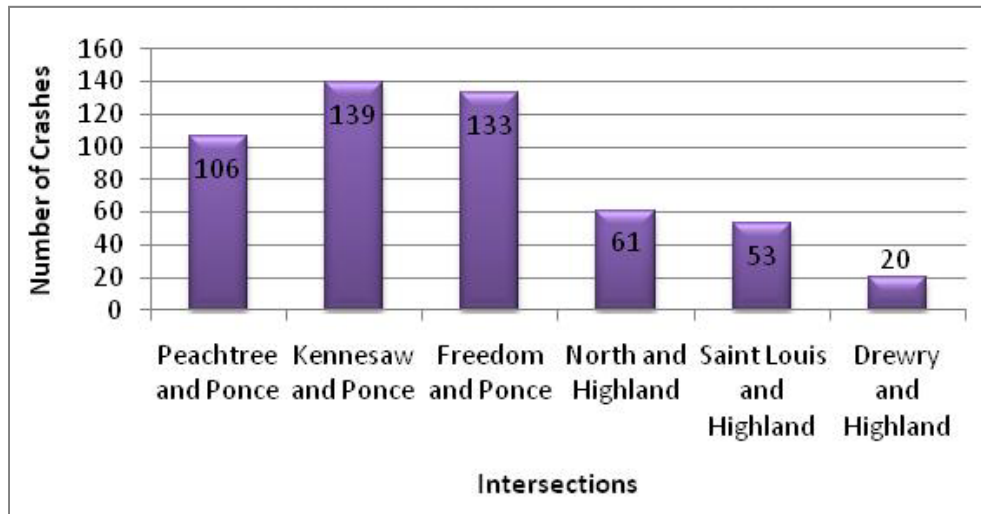


Figure 5. Vehicular Crashes of Selected Intersections from 2003-2006

Finally, Figure 6 shows a breakdown in the crashes by year and location for each road.

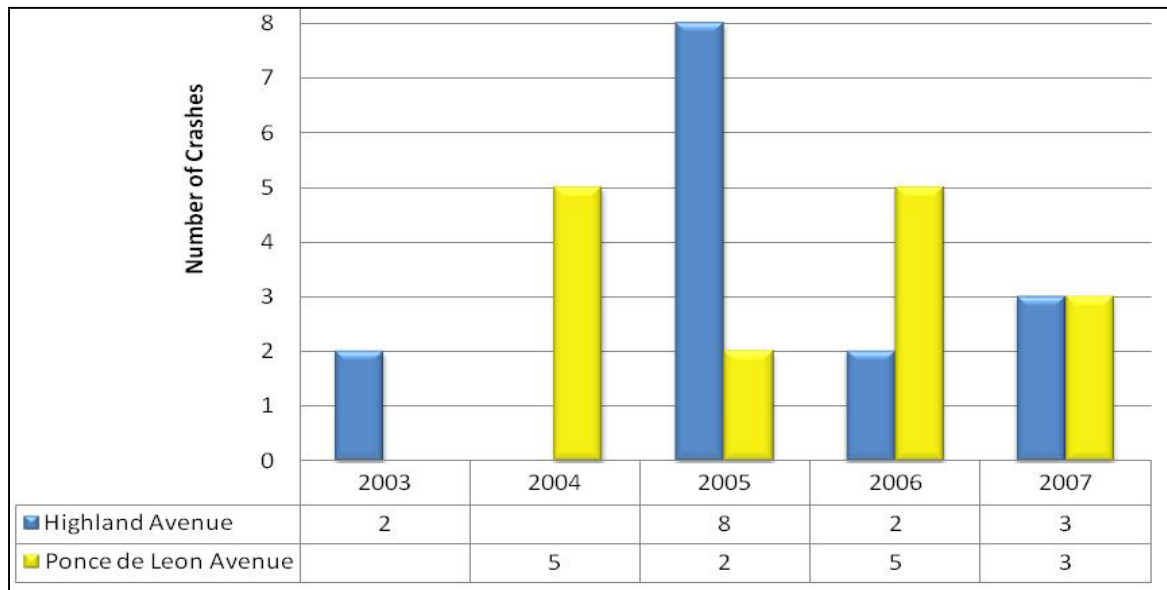


Figure 6. Bicycle Crashes from 2003-2006

Figure 6 helps to illustrate that there is no consistent bicycle crash trend along North Highland Avenue or Ponce de Leon Avenue. North Highland Avenue had three (3) or less crashes every year except for 2005 when the number of crashes jumped to eight (8). Ponce de Leon had similar inconsistency as 2003 and 2005 had little or no crashes, while 2004 and 2006 had higher numbers of crashes.

Finally, in looking at cyclist behavior, four (4) of the crashes along Ponce de Leon Avenue involved cyclists riding on the sidewalk, with one of those occurring at the intersection of Ponce de Leon and North Highland Avenues. Wrong way riding also may have contributed to some of the crashes with two (2) incidents along Ponce de Leon Avenue and one (1) incident on North Highland Avenue. Furthermore there were multiple cyclist-passing (6) and following-too-closely (2) related incidents along Highland Avenue.

Based on the crash information the following trends have been identified:

- Most of the crashes occurred on clear days with dry roads and at intersections.
- The most predominant bicycle crash type was angular.
- Most of the bicycle crashes resulted in slight injuries with none of the crashes in this period resulting in serious injuries or fatalities.
- Road user behaviors such as sidewalk or wrong-way riding, passing movements, and following-too-closely were factors in many of the crashes.

It is important to note that while severe crashes causing a fatality are reported, less serious crashes which are more frequent are underreported. The “Cyclist Road Safety Assessment Guidelines and Prompt Lists” states that approximately two-thirds of off-road crashes occur on sidewalks, parking lots, trails, parks, and playgrounds. Of those cyclists who received treatment for their injuries, nearly three-

fourths of their crashes occurred in non-roadway, non-motor vehicle events and so were not likely to be recorded in the State traffic records⁵.

3. Assessment Findings

3.1 Safety Benefits of Existing Roadway Features

Existing safety features along North Highland Avenue include on-street parking and narrow lanes, as these help to control motor vehicle speeds. Pedestrian safety features such as pedestrian signals, high visibility crosswalks, and knockdowns are present on North Highland Avenue. These safety features not only provide a safety benefit to pedestrians but to all roadway users by improving pedestrian awareness and reducing the need for emergency stops or erratic movements.

As previously mentioned, North Highland Avenue has the 3rd highest city bicycle count as recorded by ABC, so drivers may already be aware of the presence of cyclists. As mentioned by cyclists who use the roadway, one of the reasons that this route is so popular among cyclists is the bicycle-friendly road grade which is relatively flat in comparison to neighboring roads, and the connectivity to regional bike facilities such as the Freedom Park Trail.

Finally, street lights are currently provided on the eastern side of North Highland Avenue which is beneficial for visibility at night – especially since the local bars and restaurants are a popular nighttime attraction.

Existing safety features of Ponce de Leon Avenue include lighting to assist with nighttime visibility and the use of high visibility crosswalks.

One safety feature that affects the entire region is an updated vehicular code. Effective July 1, 2011, the updated code is designed to provide a safer bicycle riding environment for cyclists including provisions requiring motor vehicles to give three feet when passing cyclists, traffic laws applicable to bicycles, the transporting of children under one year of age, right of way of cyclists when riding in bike lanes, bicycle safety equipment, legalizing the use of recumbent bicycles, and the repeal of conflicting laws regarding cyclists.⁶ The updated portion of the code is provided in Appendix D.

Constraints

Before examining the safety issues and suggestions for improvement it is necessary to outline the constraints for each corridor. The constraints along North Highland Avenue are the roadway width, local property owner's rights for access, and the placement of street trees. Along Ponce de Leon Avenue, the constraints are local property owner's rights for access, multiple facility owners, and the presence of a

⁵ Federal Highway Administration. *Cyclist Road Safety Assessment Guidelines and Prompt Lists*.

⁶ Georgia General Assembly. HB 101 – Bicycles; safety; change provisions. Available:

http://www1.legis.ga.gov/legis/2011_12/sum/hb101.htmhttp://www1.legis.ga.gov/legis/2011_12/sum/hb101.htm

state route. The suggestions below take these constraints into consideration and may be factors in the implementation of improvements.

3.2 Identified Safety Issues and Suggestions for Improvement

During the RSA, field observations of safety issues along the corridors were identified. The RSA team then reviewed and prioritized each of the issues based on perceived importance. Table 2 contains the issues and suggestions for the entire study area.

Table 2. Identified Safety Issues and Suggestions for Improvement

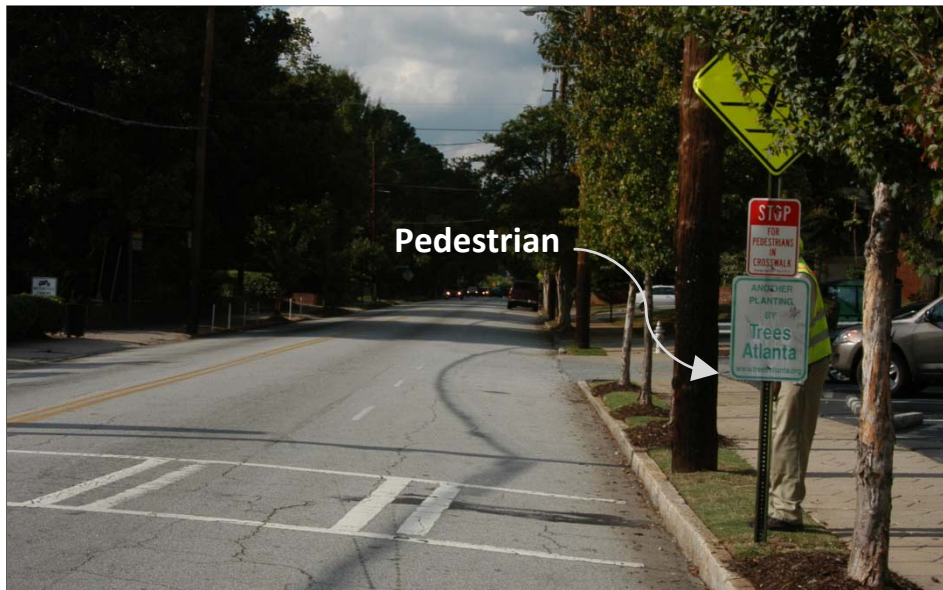
Location	Issue	Range	Measures	
North Highland Avenue	Poor visibility and sight distance	Short	Trim/prune the vegetation to ensure that it is not hindering visibility or blocking sight distance triangles.	
			Review sign placement to ensure that existing signs are placed at the proper height and are not blocked by vegetation or other obstacles.	
			Check parking placement to ensure that it is not blocking the visibility or sight distance at intersections or crosswalks.	
		Short/Intermediate	Revisit the parking policies, including where parking is permitted.	
	Add pavement markings to improve on-street parking visibility and to provide consistency in lane width along those sections of roadway.			
	Choke points at transitions and shifts in roadway alignment	Short	Revisit parking the parking policies, including where parking is permitted.	
Add pavement markings to improve on-street parking visibility and to provide consistency in lane width along those sections of roadway.				
Ponce de Leon Avenue	Inconsistency of roadway cross-sections	Short	Restripe roadway to promote uniformity in the number of lanes. Conduct engineering studies and modeling to assess the actual capacity needed.	
		Intermediate	Consider methods to provide uniformity in the number of lanes along with facilitating pedestrian and bicycle crossings such as raised medians. Pedestrian and cyclist crossing treatments may provide the added benefits of decreasing corridor speeds and can be used in providing consistency in the number of lanes which will benefit all roadway users by helping to reduce erratic movements from unexpected lane shifts.	
	Conflicts at access points	Short	Continue detailed review of crash data.	
		Intermediate	Redesign those intersections using right-turn channelization to an intersection that is more compatible with traffic characteristics.	
			Review those locations/access points with a high number of crashes to determine how to provide access while improving roadway safety.	
	Conflicting traffic movements	Long	Update access management plan for the corridor.	
		Short	Review traffic operations and movements at intersections. Possibly consider providing protected pedestrian and bicycle phases.	
		Intermediate	Install a low-speed right-turn channelized island.	
	Adherence to posted speed limit	Long	Incorporate low-speed designs at intersections.	
		Short	Reapply worn pavement markings, particularly at crosswalks.	
		Intermediate	Consider using a road diet to redistribute and reduce the number of lanes. A reduction in the number of lanes would provide a visual narrowing of the roadway which could help to reduce motor vehicle speed and could also provide the space for a dedicated bike lane, raised medians, or pedestrian refuge areas.	
	Entire Study Area	Poor pavement condition	Short	Mill and repave the roadways. Paving alone would increase the lip that was visible at various driveway entrances.
		Faded pavement markings	Short	Reapply pavement markings.
		Lack of visibility of signage	Short	Prune vegetation so that signs are visible.
Maintain signs including replacing those signs with reduced retroreflectivity, ones with markings or stickers on them, or those signs that are damaged from passing vehicles.				
Ensure that signs are placed correctly and remove unnecessary signs to reduce clutter.				
Diminished Lighting		Short	Trim vegetation so that street lights are both visible and effective.	
Proper attention and care by all users given road conditions by all users	Short	Provide shared lane markings (sharrows) and Bicycles May Use Full Lane signs (MUTCD R4-11).		
		Use public service announcements to provide awareness and educate all roadway users about how to share the roadway.		

The following is a detailed discussion of each of the issues along with suggestions for improvement. Conceptual sketches are illustrated in Appendix C.

3.2.1 North Highland Avenue

Poor visibility and sight distance –*Visibility and sight distance triangles were obstructed by vegetation, parked vehicles, and other obstacles.* This issue presents safety concerns for all roadway users. There are numerous locations where crosswalks coincide with on-street parking locations. The parked vehicles prevent drivers and cyclists from seeing the pedestrian entering the street. At night this problem is magnified due to a combination of factors including reduced light and the increased number of pedestrians.

Visibility and sight distance triangles are also hindered by overgrown vegetation. North Highland Avenue has numerous street trees blocking the view of signs and street lights, thereby reducing their effectiveness.



Signs placed in front of this crosswalk on North Highland Avenue block the view of the pedestrian.

Suggestions for Improvement:

- Short Range –
 - Trim/prune the vegetation to ensure that it is not hindering visibility or blocking sight distance triangles.
 - Review sign placement to ensure that existing signs are placed at the proper height and are not blocked by vegetation or other obstacles.
 - Check parking placement to ensure that it is not blocking the visibility or sight distance at intersections or crosswalks.
- Short/Intermediate Range –
 - Revisit the parking policies, including where parking is permitted.

- Replace existing crosswalk with a high visibility crosswalk.
- Add pavement markings to improve on-street parking visibility and to provide consistency in lane width along those sections of roadway.
- Add shared lane markings, or sharrows, to provide consistency in cyclist trajectory.

Choke points at transitions and shifts in roadway alignment – *There are sections of North Highland Avenue that have choke points. On-street parking on North Highland Avenue is intermittent and the transition between an additional travel-lane to on-street parking can cause choke points. The abrupt transition doesn't give roadway users much time to react and creates a potential hazard. Additionally, some bulb-outs were constructed so that they protrude into the travel way creating an obstacle for all roadway users.*



A portion of North Highland Avenue that transitions from two travel lanes to one travel lane and on-street parking.

Suggestions for Improvement:

- Short Range –
 - Revisit parking policies, including where parking is permitted.
 - Add pavement markings to improve on-street parking visibility and to provide consistency in lane width along those sections of roadway.
- Intermediate Range –
 - Reconstruct those bulb-outs that obstruct the road travel way or are not conducive for safe travel for all modes.

3.2.2 Ponce de Leon Avenue

Inconsistency of roadway cross-sections – *Some sections of the road were four lanes while others were seven. The changes in the number of lanes cause choke points and confusion among roadway users. In those sections with seven lanes, the additional space can lead to an increase in vehicular speeds, which can make it difficult for pedestrians to cross, especially at mid-block crossings.*



Varying roadway cross-sections along Ponce de Leon Avenue.

Suggestions for Improvement:

- Short Range –
 - Restripe roadway to promote uniformity in the number of lanes.
 - Conduct engineering studies and modeling to assess the actual capacity needed.
- Intermediate Range –
 - Consider methods to provide uniformity in the number of lanes along with facilitating pedestrian and bicycle crossings such as raised medians, and bicyclist travel such as a cycle track. These crossing treatments and bicycle facilities may provide the added benefits of decreasing corridor speeds and can be used in providing consistency in the number of lanes which will benefit all roadway users by helping to reduce erratic movements from unexpected lane shifts. Appendix C contains an example of how to provide uniformity in the lane configuration through a road diet that redistributes space on the roadway to accommodate 4 travel lanes, 2 bike lanes or cycle tracks, along with turn lanes and medians in various locations.
- Long Range –
 - Coordinate development with above measures. With the Ponce City Market development and other future development in the area, it is beneficial to work together and coordinate plans to ensure that not only are motor vehicles accounted for but that cyclists and pedestrians are also taken into consideration.

Conflicts at access points – *Potential access point conflicts such as instances where right-turn channelization incompatible with traffic characteristics and some destinations along road acting as significant traffic generators.* The access points along Ponce de Leon Avenue have a large effect on the safety of the roadway in part because there are so many of them, and also because it is a large roadway that in some locations has high speeds and limited sight distance. Some locations had a right-turn channelization design that was incompatible with the roadway. The channelized design not only reduced the sight distance for drivers entering the roadway but also facilitated motor vehicles entering the roadway at higher speeds, which is incongruent with the speed limit.

In addition to the issues mentioned, at the intersection of Peachtree Street and Ponce de Leon Avenue, the east bound right slip lane also is a source for confusion as the striping continues past the lane so it is unclear that the lane ends at the right turn. Appendix C contains an alternative to the existing intersection design.

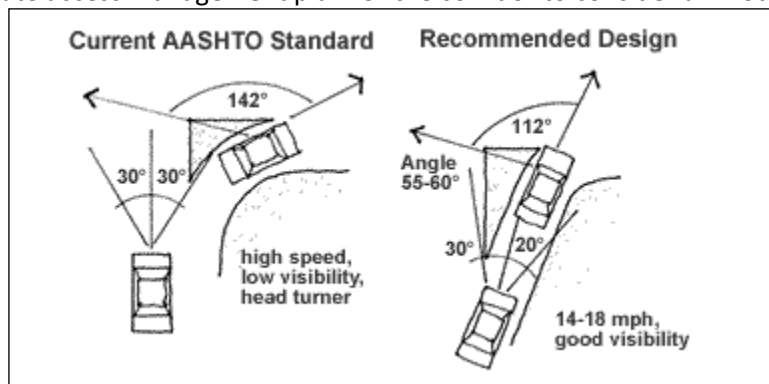
Additionally, some access points appeared to be significant traffic generators. For example, the McDonalds and Zesto's (across from the intersection of Kennesaw Avenue and Ponce de Leon Avenue) generate enough traffic to necessitate a police officer to assist drivers and direct traffic out of the lot. The roadway characteristics and traffic conditions may warrant restricting left turns to help reduce the number of conflicts.



Incompatible right-turn channelization at the intersection of Peachtree Street and Ponce de Leon Avenue.

Suggestions for Improvement:

- Short Range –
 - Continue detailed review of crash data.
- Intermediate Range –
 - Redesign those intersections using right-turn channelization to an intersection that is more compatible with the speed and function of the roadway such as what is shown in Figure 7.
 - Review those locations/access points with a high number of crashes to determine how to provide access while improving roadway safety.
- Long Range –
 - Update access management plan for the corridor to consider all modes.



Sketches by Michael Kimelberg

Figure 7. Right Turn Slip Lane Design⁷

⁷ PedSafe. *Improved Right Turn Slip Lane Design*. Available: http://www.walkinginfo.org/pedsafe/pedsafe_curb1.cfm?CM_NUM=15

Conflicting traffic movements - *Traffic movements at some intersections cause conflicts between roadway users.* One location where this is apparent is the intersection of Freedom Parkway and Ponce de Leon Avenue. On Freedom Parkway there are two right-turning lanes that conflict with the pedestrian and cyclist crossing on Ponce de Leon Avenue. When a pedestrian is present, the vehicular and pedestrian green occurs simultaneously. There is confusion over who has the right-of-way and some vehicles don't expect to share a green with the pedestrians and so they don't look in the crosswalk before turning. Additionally, both right-turning lanes are permitted to turn right on red. In doing so, drivers are looking to their left for a gap in traffic and may not be cognizant of pedestrians or cyclists coming from the shared use path that has an entrance on the south eastern corner of the intersection.

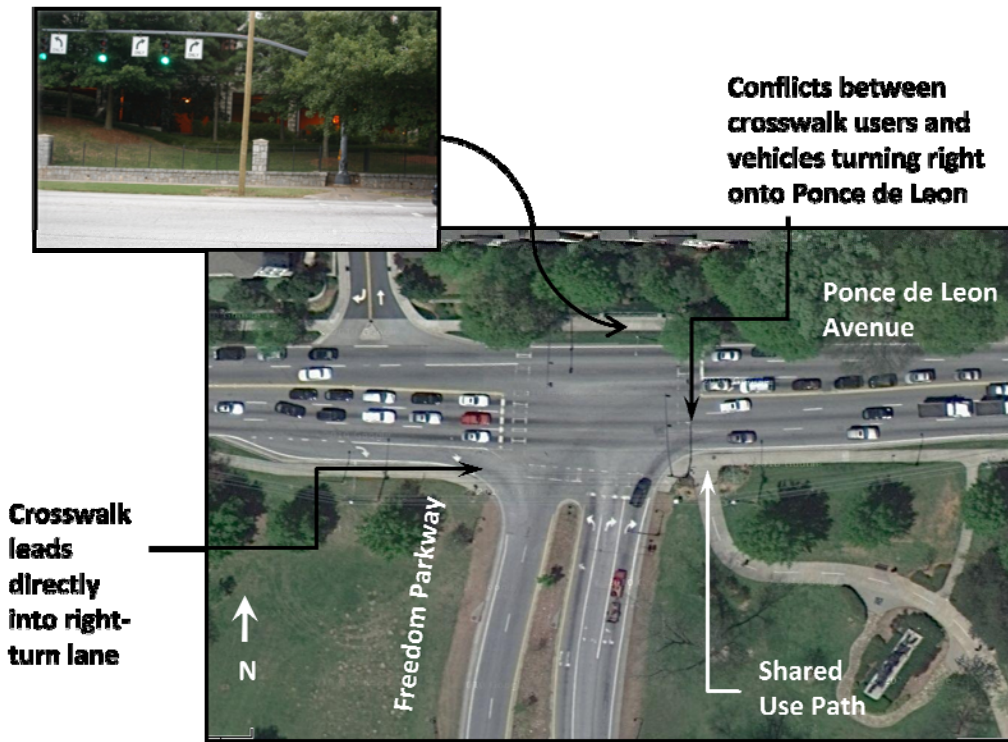


Image from Google Maps

The intersection of Freedom Parkway and Ponce de Leon Avenue demonstrating potential conflicts between roadway users and obstruction of pedestrian signal.

Suggestions for Improvement:

- Short Range –
 - Review traffic operations and movements at intersections.
 - Possibly consider providing protected pedestrian and bicycle phases.
- Intermediate Range –
 - Install a low-speed right-turn channelized island.
- Long Range –
 - Incorporate low-speed designs at intersections.

Adherence to posted speed limit – *Vehicles appear to travel above the speed limit.* As witnessed during the RSA and according to local residents, vehicles appear to travel above the posted speed limit of 35 MPH. Faster speeds are a safety issue not just for cyclists but for all road users. Not only do the number of crashes increase with speed but so do the level of injuries which is of particular concern to cyclists who don't have the crumple zone safety feature that is provided with motor vehicles. As Figure 8 illustrates, the higher the speed, the greater chance of injury or fatality⁸.

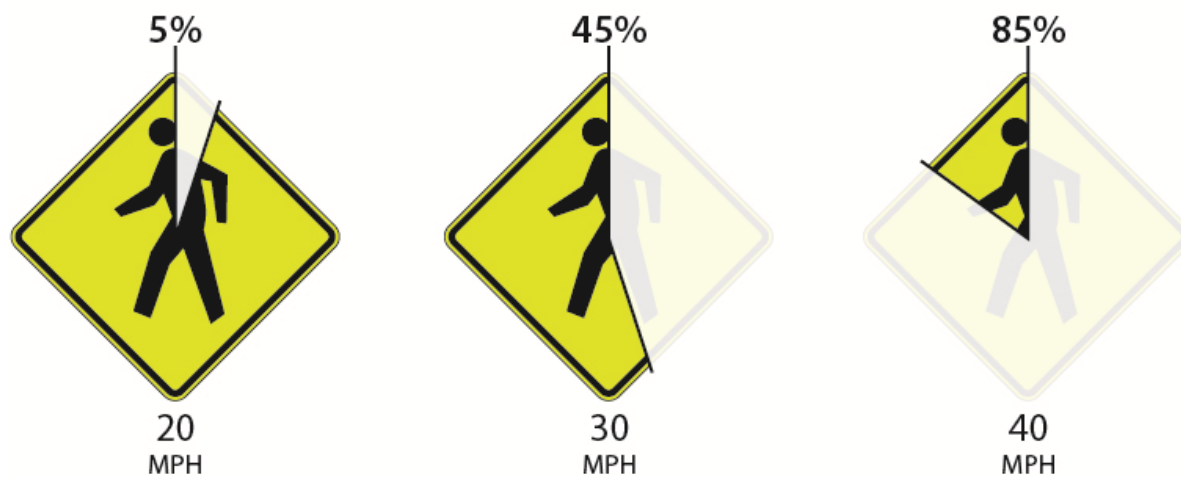


Figure 8. The probability of a pedestrian being killed in a collision with a vehicle increases dramatically with speed. At 20 MPH, a pedestrian has a 5-percent chance of being killed in a collision with a motor vehicle; at 30 MPH, the probability of a pedestrian being killed increases to 45 percent; and at 40 MPH, the probability that a pedestrian will be killed in a collision with a motor vehicle is 85 percent.

Suggestions for Improvement:

- Short Range –
 - Reapply worn pavement markings, particularly at crosswalks.
- Intermediate Range –
 - Consider using a road diet to redistribute and reduce the number of lanes. A reduction in the number of lanes would provide a visual narrowing of the roadway which could help to reduce motor vehicle speed and could also provide the space for a dedicated bike lane, raised medians, or pedestrian refuge areas.

3.2.3 General Efforts

Poor pavement condition – *The pavement was observed to be cracked, buckled, had potholes, and in some locations was not flush with driveway aprons or ramps.* The poor pavement condition poses

⁸ Federal Highway Administration. *PedSAFE: Crash Statistics*. Available: <http://www.walkinginfo.org/pedsafe/crashstats.cfm>.

potential hazards for cyclists who have to be aware of motor vehicles while avoiding possible pavement pitfalls.



Potholes and cracks in the pavement along Ponce de Leon Avenue are potential safety hazards.

Suggestions for Improvement:

- Short Range –
 - Mill and repave the roadways. Paving alone would increase the lip that was visible at various driveway entrances.

Faded pavement markings - *Crosswalks, stop bars, turn arrows, and other pavement markings were faded or not visible. While high visibility pavement markings were used initially, their effectiveness is greatly diminished due to faded or cracking.*



Faded pavement markings along Ponce de Leon Avenue.

Suggestions for Improvement:

- Short Range –
 - Reapply pavement markings.

Lack of visibility of signage – *Signs were cluttering the roadway. Some signs were not placed according to existing guidance while others were not visible. Some signs were not visible because they were obscured by vegetation, other signs had diminished retroreflectivity, were angled/bent due to being hit by passing vehicles, or were vandalized with paint and stickers.*



Signs along North Highland Avenue that were vandalized or blocked by trees.

Sign placement was also an issue. Some signs were placed in front of crosswalks and thus blocked the view of pedestrians who were entering the street.

Suggestions for Improvement:

- Short Range –
 - Prune vegetation so that signs are visible.
 - Maintain signs including replacing those signs with reduced retroreflectivity, ones with markings or stickers on them, or those signs that are damaged from passing vehicles.
 - Ensure that signs are placed correctly and remove unnecessary signs to reduce clutter.

Diminished Lighting – *Lighting was obscured by vegetation.* Lighting is crucial for the safety of all roadway users. Along both Ponce de Leon and North Highland Avenues, street lights were blocked by trees thus reducing their effectiveness.

Suggestions for Improvement:

- Short Range –
 - Trim vegetation so that street lights are both visible and effective.



Streetlight obscured by vegetation.

Proper attention and care by all users given road conditions– *Roadway users were observed improperly using the road.* All road users need to use the road correctly in order to provide a safe environment. There were instances where cyclists were riding against traffic on the sidewalk, following-too-closely, and passing without sufficient visibility or in an illegal manner. Sidewalk-riding related crashes were more prevalent along Ponce de Leon Avenue, which may be due to the roadway environment. Ponce de Leon Avenue has multiple lanes and motor vehicles that travel at high rates of speed leading to a large speed differential between cyclists and motor vehicles. Cyclists along Ponce de Leon Avenue may ride on the sidewalk out of concern for their personal safety. However, drivers of motor vehicles may not expect cyclists on the sidewalk, particularly at intersection

and driveway crossings. In Georgia riding on the sidewalk is not permitted unless you are a child or riding with a child.

As a result of the lower speeds and traffic on North Highland Avenue, there were incidents of cyclists passing motor vehicles that were stopped or making a turning-movement and incidents of cyclists following other vehicles too closely.



Cyclist riding on the sidewalk on North Highland Avenue.

Additionally, some motorists lack the knowledge or willingness to share the roadway. Those drivers not accustomed to sharing the roadway or unfamiliar with the law may not expect cyclists in the roadway and therefore aren't scanning for them. Other motorists who are familiar with sharing the roadway may still act in an unsafe manner by passing too closely or honking their horns at cyclists.

Suggestions for Improvement:

- Short Range –
 - Provide shared lane markings (sharrows) and Bicycles May Use Full Lane signs (MUTCD R4-11). Appendix C provides examples of how this can be implemented along North Highland Avenue.
 - Use public service announcements to provide awareness and educate all roadway users about how to share the roadway.



R4-11

There are some suggestions that would apply to the general study area. Education is one area that could be improved upon and would benefit all interested parties. Drivers, cyclists, the community at large, transportation agencies, and law-enforcement could all benefit from education regarding cycling related laws and safety considerations.

In order to better understand conditions that effect the safety of cyclists, design appropriate countermeasures, and ensure that future designs are adequate, accurate data (such as traffic counts for all modes) should be collected and shared. Enhanced data collection and sharing would ensure that funds are spent wisely – both in terms of collecting the data and ensuring that designs are adequate to begin with.

4. Conclusions

In performing this bicycle RSA, eleven (11) safety issues have been identified. Engineering and education suggestions have been provided for each of the safety issues and have been categorized into short-, intermediate-, and long-range implementation time frames.

The primary safety issues identified along North Highland Avenue are congestion, expectancy of other road user movements and intent, and in general road user behavior by all roadway users. Many of the suggestions for North Highland Avenue are short-range improvements. As North Highland Avenue is currently a popular route among local cyclists, it is important that steps be taken to improve the safety for all roadway users.

The primary safety issues identified along Ponce de Leon Avenue are the inconsistency in roadway cross-section, roadway user behavior, and expectancy of other road user movements and intent. Ponce de Leon Avenue has the potential to be a showcase project for integrating multi-modal transportation and embracing the “complete streets” design concept. Because of the existing and future retail and residential attractions, and connectivity to regional bike routes, Ponce de Leon Avenue has the potential to become a popular route for cyclists.

Future steps, in addition to implementing the suggested measures outlined in the previous section, include; promoting the concept of “complete streets”; striving to better quantify the corridor issues through data collection and analysis and accurately coding, recording, and mapping data sources such as police reports; and expanding engagement and coordination among stakeholders including the City of Atlanta, Georgia DOT, law enforcement, the Chamber of Commerce/local businesses, and community/special interest groups.

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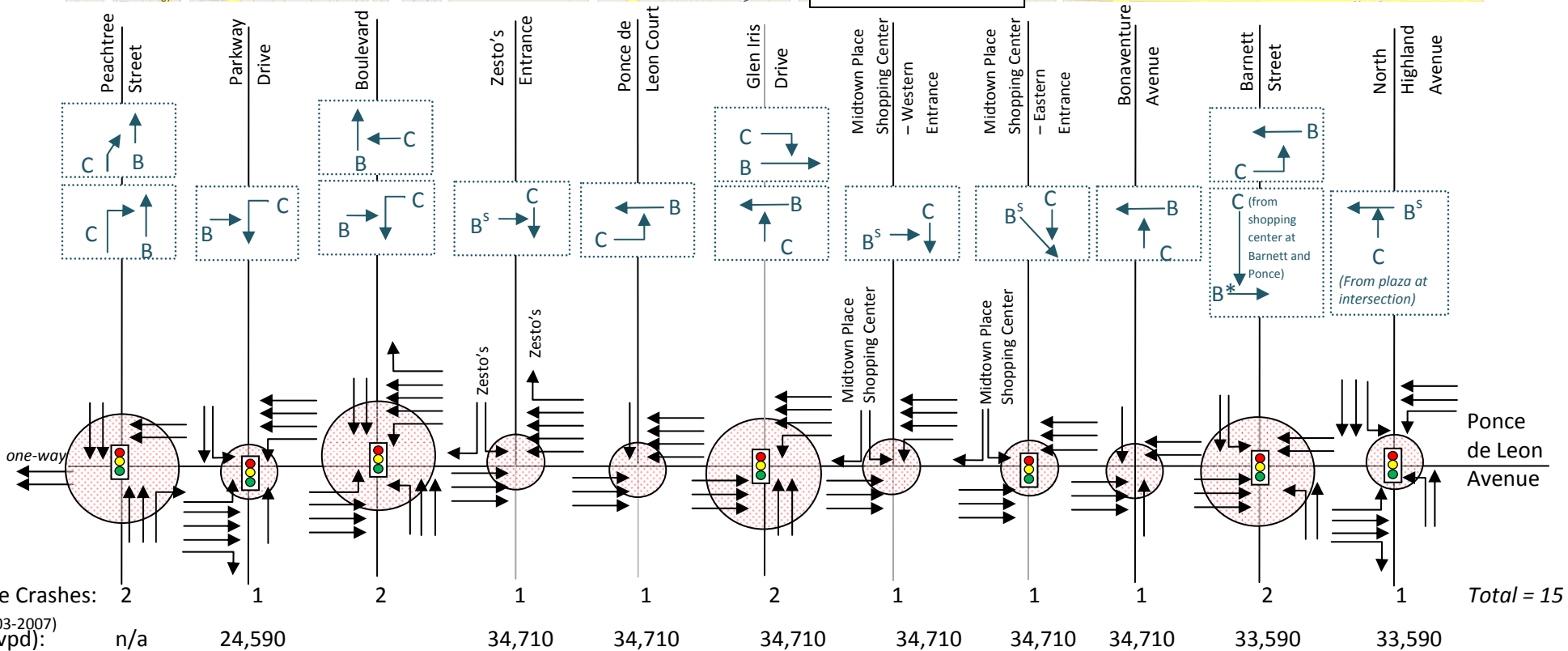
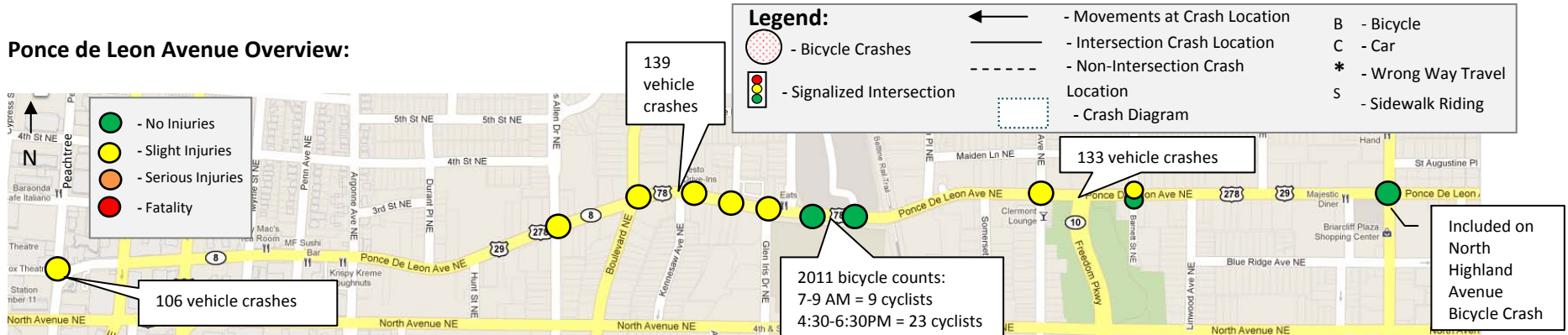
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Appendix A: Vehicular Crash Data

		Ponce de Leon			North Highland	
		Peachtree	Kennesaw	Freedom	North	Saint Louis
Total Crashes		106	139	133	61	53
Year	2003	19	33	15	8	6
	2004	26	39	34	13	10
	2005	31	44	55	25	23
	2006	30	23	29	15	14
Crash Types	A	32	24	37	26	15
	NO	16	34	27	6	11
	SS-OD	1	1	1		1
	SS-SD	9	15	13	5	7
	HO	1	8	1	1	2
	RE	47	57	54	23	17
Injuries	Slight Injury	36	42	42	25	16
	Serious Injury			2	1	
	Fatality		1		2	1
Time of Day	0000-0259	3	3	3	2	3
	0300-0559	2	6	1	2	
	0600-0859	10	22	17	9	8
	0900-1159	18	15	18	7	7
	1200-1459	17	30	24	17	6
	1500-1759	31	35	40	12	19
	1800-2059	19	17	16	11	5
	2100-2359	6	11	14	1	5
Ambient Light	Dark-Lighted	10	13	12	6	4
	Dark-Not Lighted	11	20	21	7	5
	Daylight	81	100	96	47	43
	Dawn	2	4	4	1	
	Dusk	2	2			1
Road Conditions	Dry	82	104	111	50	39
	Icy	1	4	2		2
	Wet	23	30	20	11	12
	Snowy		1			
Weather Conditions	Clear	69	78	79	45	30
	Cloudy	19	37	35	9	13
	Fog	1	3	1		
	Rain	16	17	15	7	9
	Sleet			3		1
	Snow	1	4			

Appendix B: Annotated Study Area Maps and Crash Diagrams

Ponce de Leon Avenue Overview:



Notes:

- Vehicle crashes are from 2003-2006; see Appendix A for additional vehicular crash data.
- See Table 1 for additional bicycle count data.

LEGEND:

<i>Crash Type</i>	A = Angle HO = Head – On RE = Rear – end SS-SD = Sideswipe – Same Direction SS-OD = Sideswipe – Opposite Direction NO = Not a collision w/a Motor Vehicle U = Unknown	<i>Severity</i>	● = No Injury ● = Slight Injury ● = Serious Injury ● = Fatality	<i>Location</i>	+ = Intersection 🚦 = Signalized Intersection
				<i>Direction</i>	★ = Wrong Side of Road
				<i>Crash Diagrams</i>	☐ = Crash Diagram B = Bicycle C = Car * = Wrong Way Travel ^s = Sidewalk Riding

Note: unless otherwise noted, all pedestrian/bicycle crashes occurred during the daytime, under clear conditions, and on dry pavement

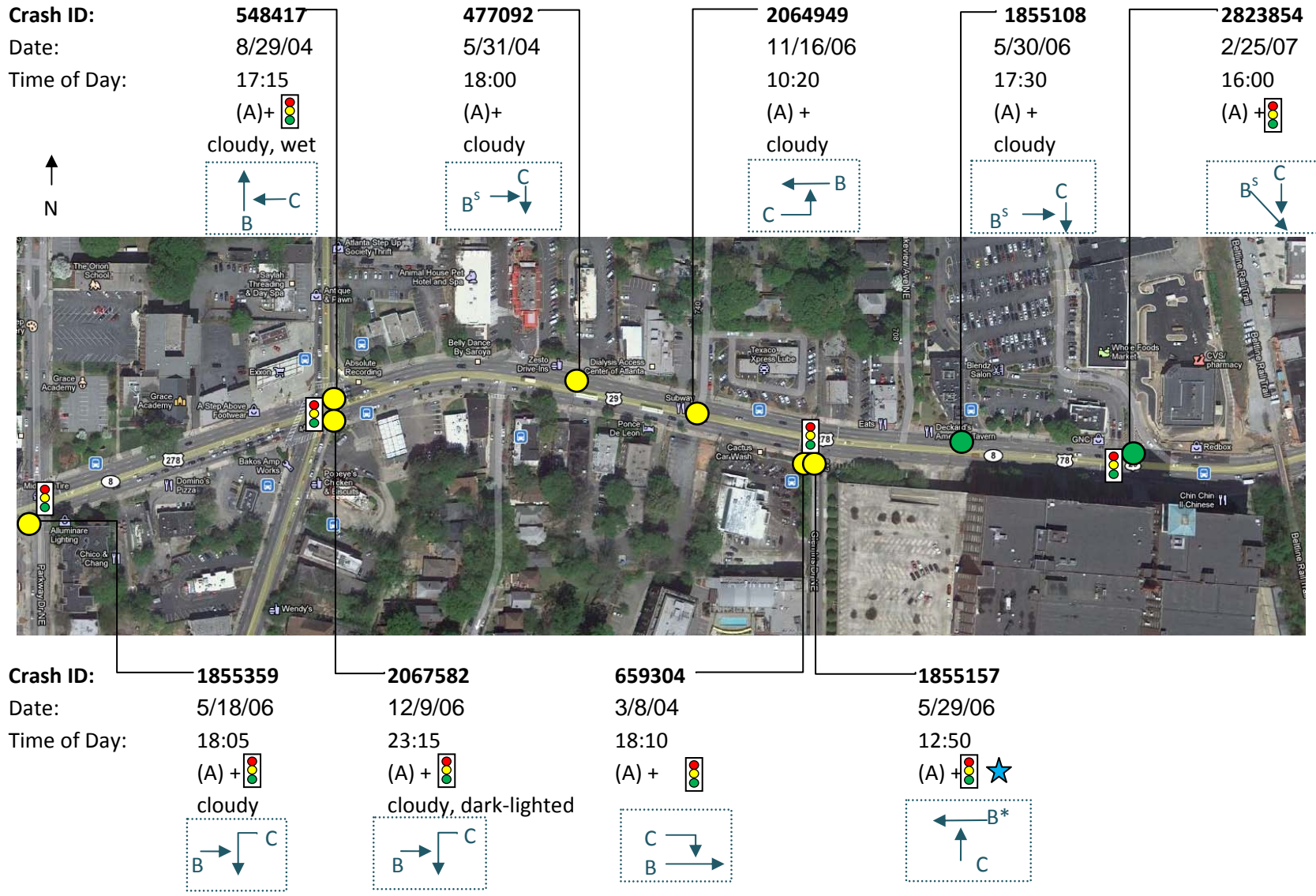
Ponce de Leon 2003-2007 Bicycle Crash Details



Crash ID: 501353
Date: 7/4/04
Time of Day: 02:47
 ☐ C ↗ B ↑ (A)+ 🚦 cloudy, dark-lighted

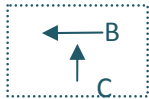
Crash ID: 529828
Date: 8/7/04
Time of Day: 08:26
 ☐ C ↗ B ↑ (A)+ 🚦


Ponce de Leon 2003-2007 Bicycle Crash Details




Ponce de Leon 2003-2007 Bicycle Crash Details

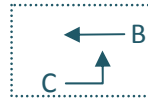
Crash ID: **2913533**
 Date: **7/2/07**
 Time of Day: **17:00**
(A) +



Crash ID: **968412**
 Date: **11/30/05**
 Time of Day: **10:40**
(A) + 

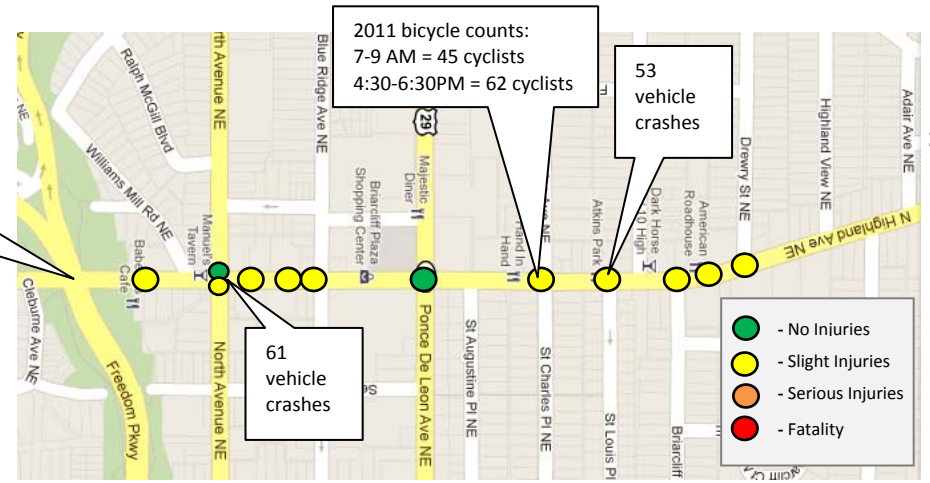


Crash ID: **302945**
 Date: **10/30/07**
 Time of Day: **22:30**
(A) + 
 dusk



North Highland Avenue 2003-2007 Bicycle Crash Overview

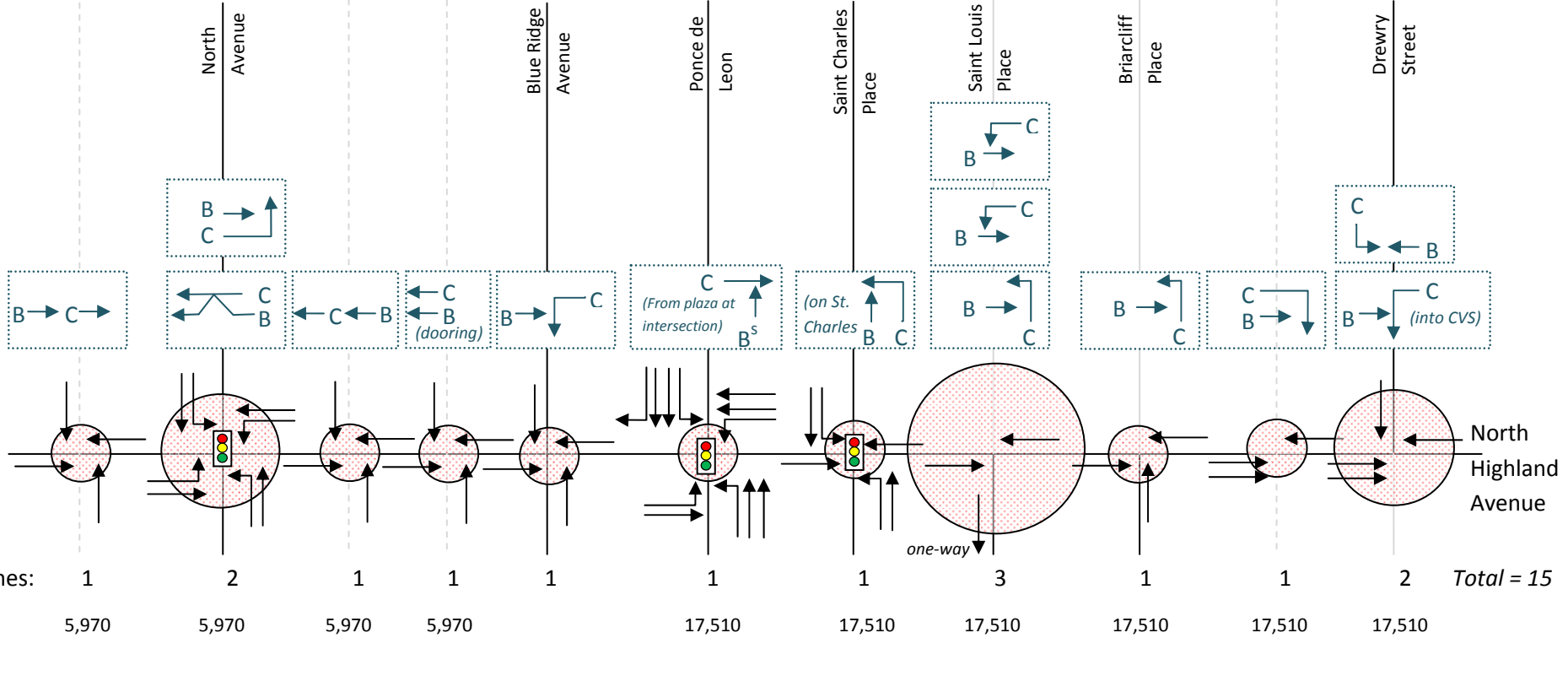
2011 bicycle counts:
7-9 AM = 62 cyclists
4:30-6:30PM = 134 cyclists



Legend:

- Bicycle Crashes
- Signalized Intersection
- Movements at Crash Location
- Crash Diagram
- Intersection Crash Location
- Non-Intersection Crash Location

B - Bicycle
C - Car
* - Wrong Way Travel
S - Sidewalk Riding

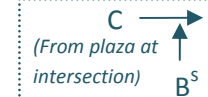
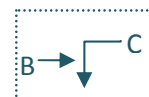
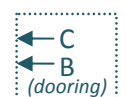
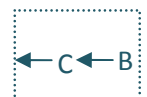
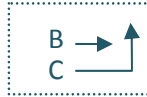


a. Vehicle crashes are from 2003-2006; see Appendix A for additional vehicular crash data.
b. See Table1 for additional bicycle count data.

North Highland Avenue 2003-2007 Bicycle Crash Details

Crash ID:	1802954	745066	999700	2816046	2867351	865556	885581
Date:	4/4/06	4/8/05	12/16/05	2/7/07	4/25/07	8/5/05	8/15/05
Time of Day:	18:55 (RE)	16:30 (SS-SD) +	18:30 (HO) +	12:10 (RE)	18:30 (A)	20:05 (A) +	11:49 (A) +

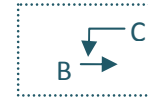
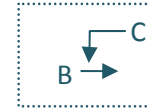
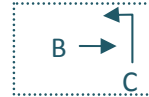
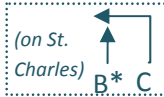
Dark - lighted



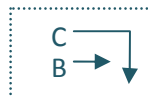
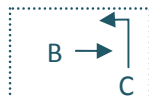
N →

North Highland Avenue 2003-2007 Bicycle Crash Details

Crash ID:	885581	976453	2892833	882018	734048
Date:	8/15/05	12/2/05	5/31/07	3/12/05	3/12/05
Time of Day:	11:49 (A) +	1:00 (A) +	21:03 (A) +	16:00 (A) +	18:10 (A) +



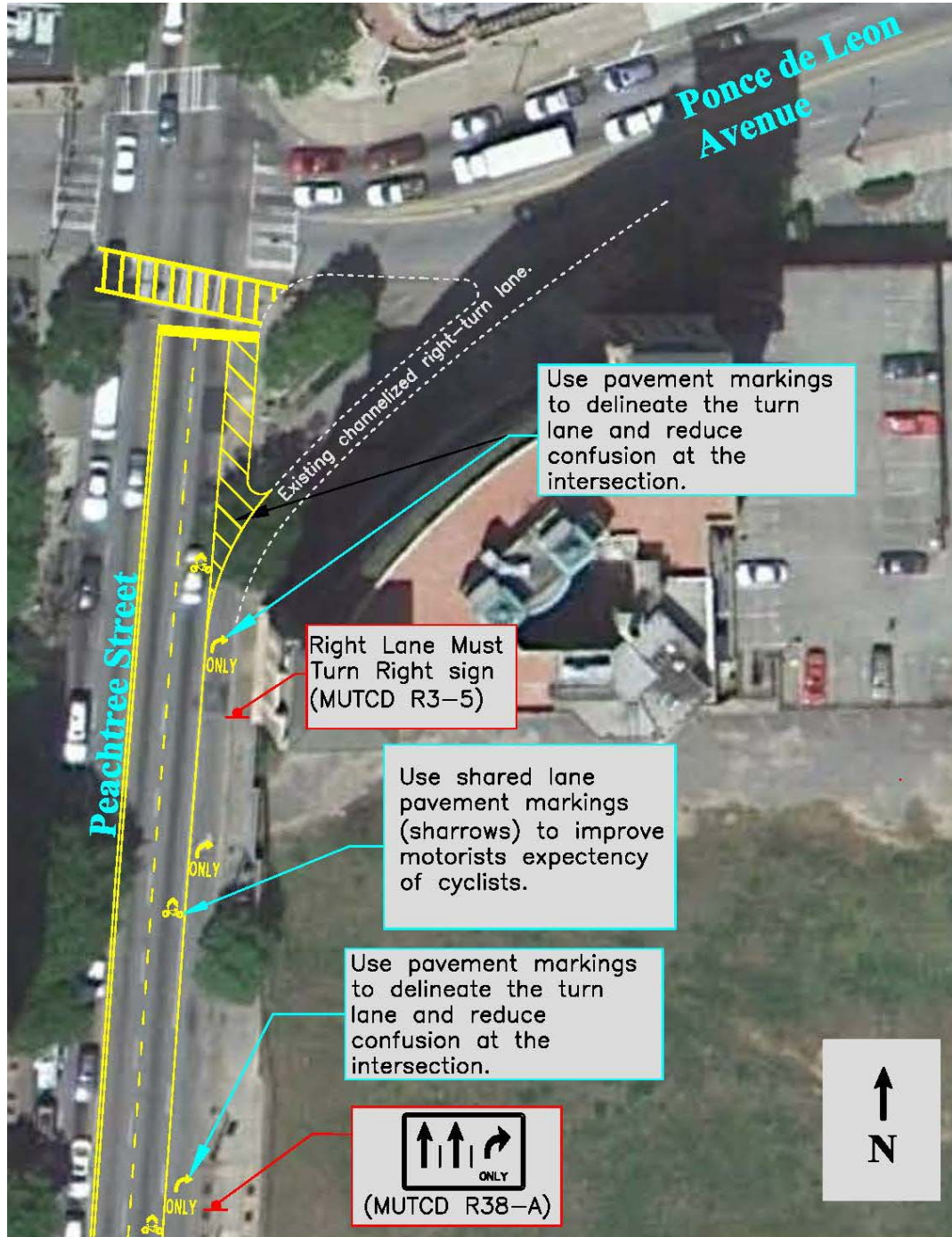
Crash ID:	256820	1846986	835917	3842	N →
Date:	9/10/03	5/13/06	7/13/05	1/14/03	
Time of Day:	18:32 (A) +	14:10 (A) +	18:15 (SS-SD) + Cloudy	11:30 (A) +	



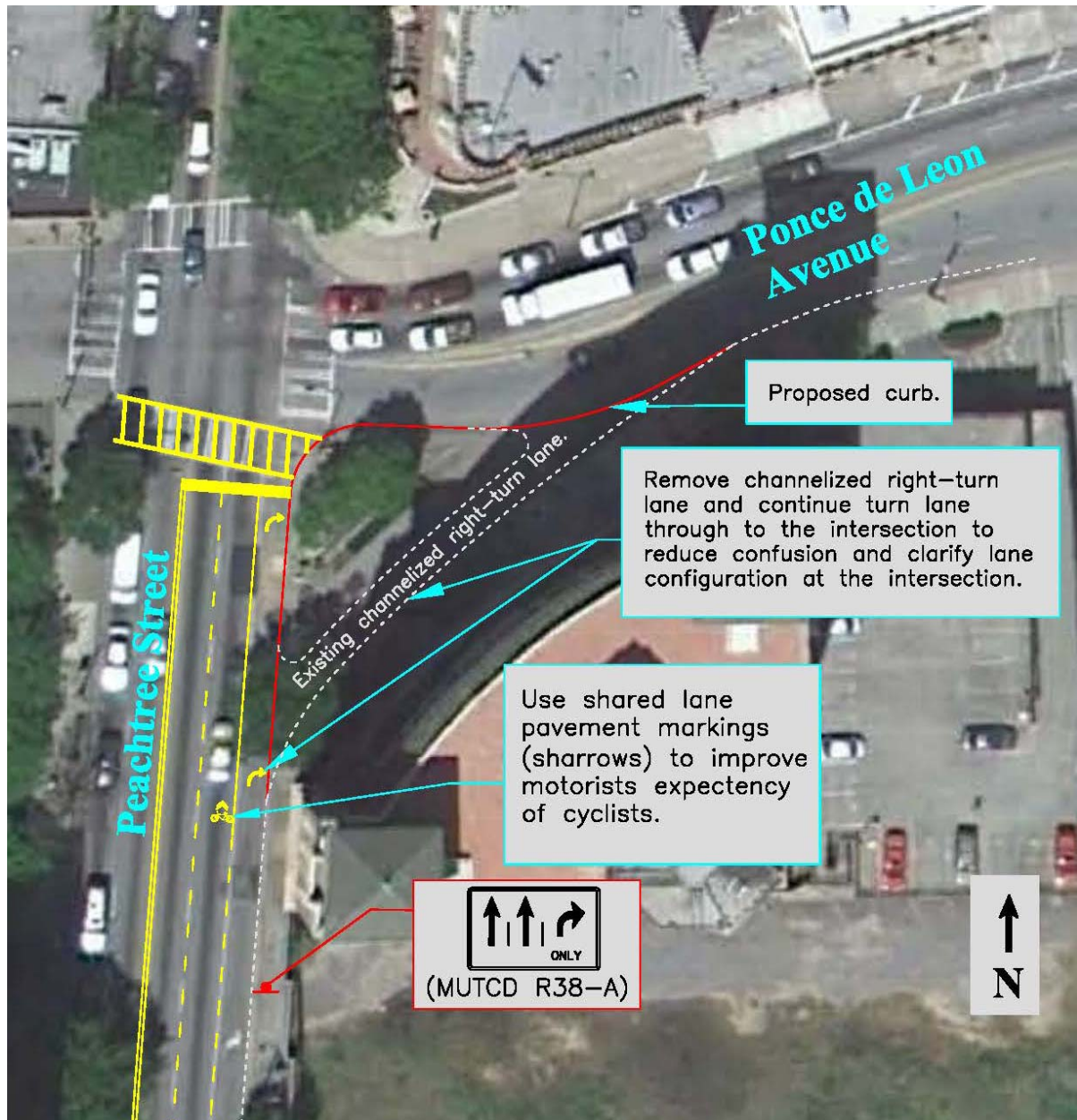
Appendix C: Suggested Improvements Concepts

Ponce de Leon Avenue and Peachtree Street

Short – Intermediate Range:

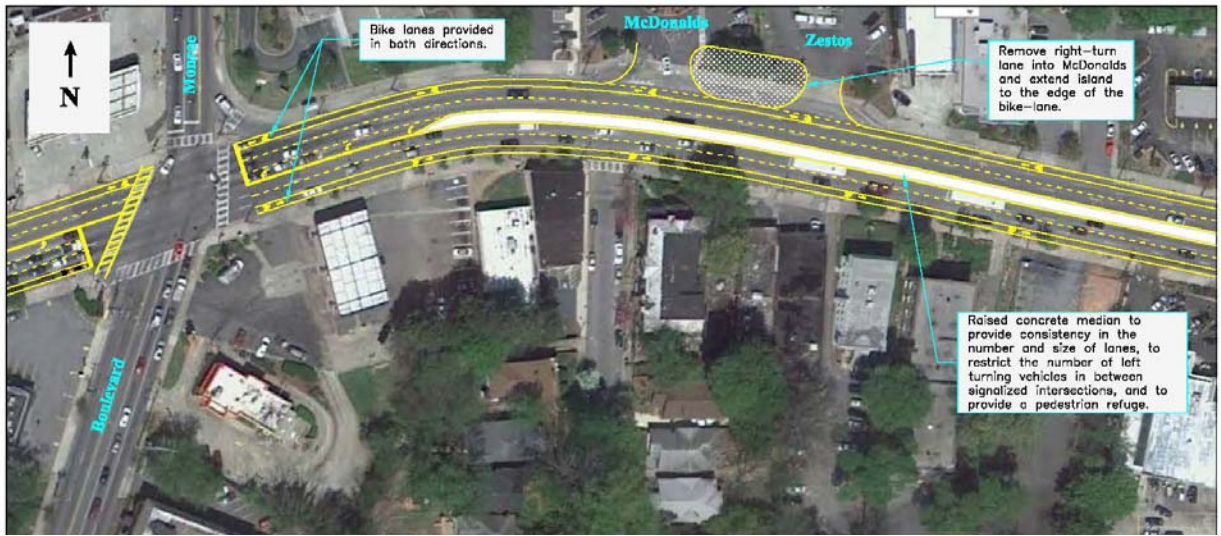
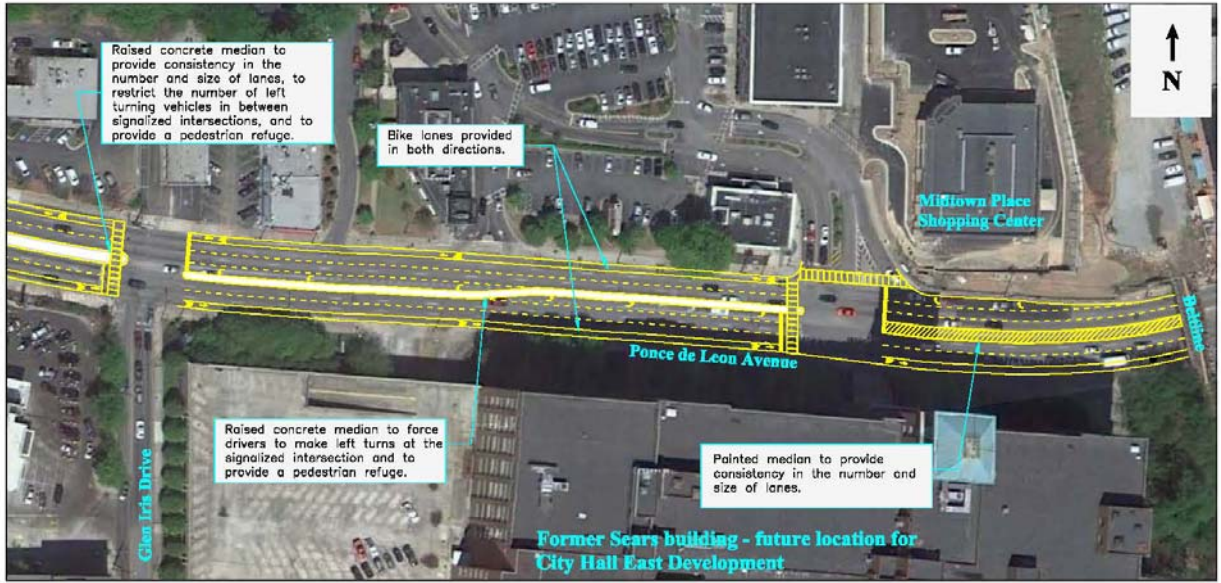


Long Range:



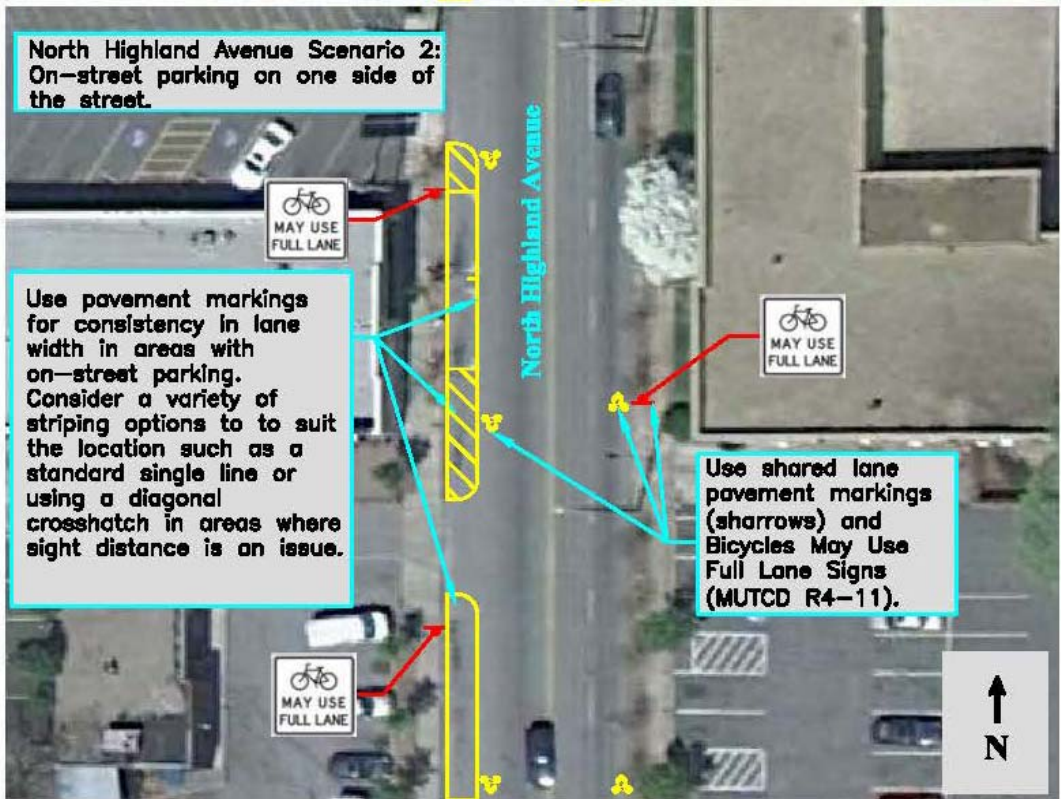
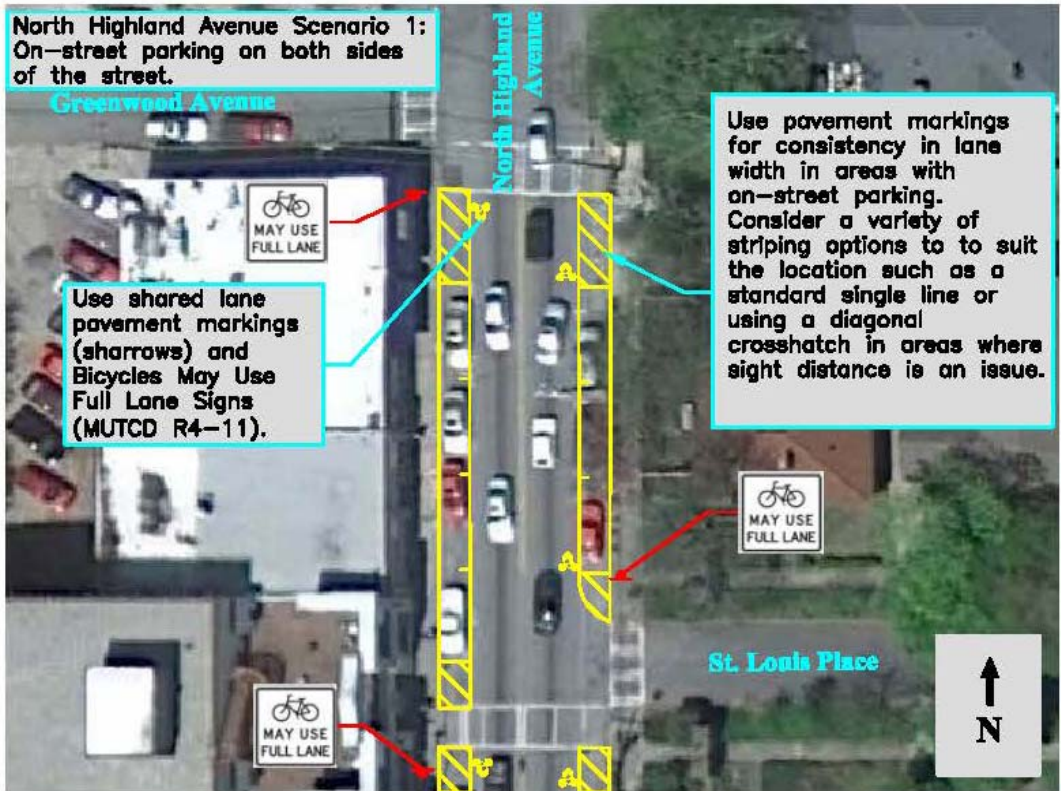
Ponce de Leon Avenue

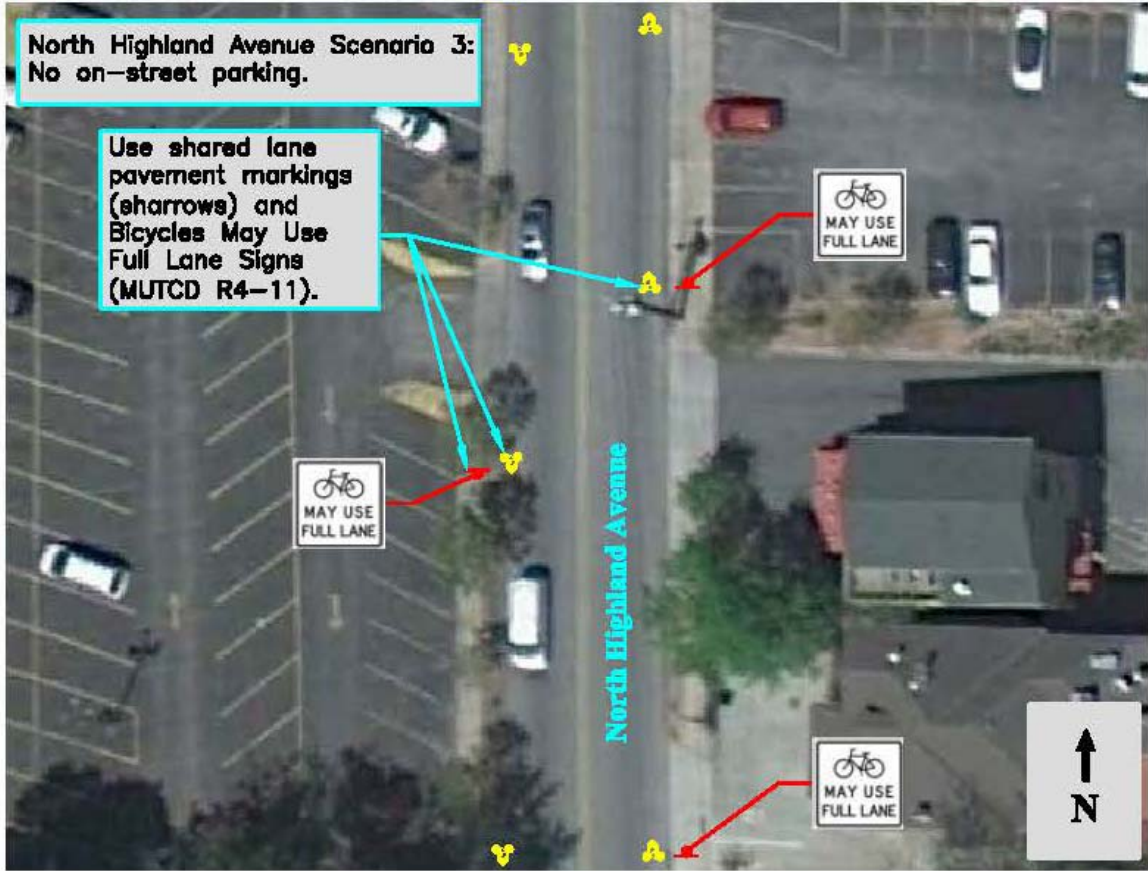
----- Continued Below -----



----- Continued Above -----

North Highland Avenue





Appendix D: Updated Official Code of Georgia

11 HB 101/AP

House Bill 101 (AS PASSED HOUSE AND SENATE)

By: Representatives McKillip of the 115th and Holt of the 112th

A BILL TO BE ENTITLED

AN ACT

To amend Title 40 of the Official Code of Georgia Annotated, relating to motor vehicles and traffic, so as to provide for safer bicycle riding for bicyclists and the motoring public; to provide for definitions; to provide for the operation of motor vehicles and bicycles on roadways with bicycle lanes a safe distance between such motor vehicles and bicycles when such vehicles are passing a bicycle; to change provisions relating to traffic laws being applicable to bicycles; to remove obsolete provisions relating to the transporting of children under the age of one year on a bicycle; to change provisions relating to riding on roadways and bicycle paths; to change provisions relating to equipment on bicycles; to legalize the use of recumbent bicycles; to provide for related matters; to repeal conflicting laws; and for other purposes.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF GEORGIA:

SECTION 1.

Title 40 of the Official Code of Georgia Annotated, relating to motor vehicles and traffic, is amended by revising Code Section 40-1-1, relating to definitions, by revising paragraphs (6.1) and (6.2) and adding a new paragraph to read as follows:

"(6.1) 'Bicycle lane' means a portion of the roadway that has been designated by striping.

pavement markings, or signage for the exclusive or preferential use of persons operating bicycles. Bicycle lanes shall at a minimum, unless impracticable, be required to meet accepted guidelines, recommendations, and criteria with respect to planning, design, operation, and maintenance as set forth by the American Association of State Highway and Transportation Officials.

(6.2) 'Bicycle path' means a right of way under the jurisdiction and control of this state or a local political subdivision thereof designated for use by bicycle riders.

(6.2)(6.3) 'Bicycle trailer' means every device pulled by a bicycle and designed by the manufacturer of such device to carry human passengers."

SECTION 2.

Said title is further amended in Article 3 of Chapter 6, relating to driving on the right side of the roadway, overtaking and passing, and following too closely, by adding new Code sections to read as follows:

"40-6-55.

Notwithstanding other provisions of this chapter relating to operating a vehicle on a roadway, where a bicycle lane is provided on the roadway, the operator of a motor vehicle shall yield to a person operating a bicycle in a bicycle lane.

40-6-56.

(a) As used in this Code section, the term 'safe distance' means not less than three feet.

(b) Notwithstanding any provision of this article to the contrary, when feasible, the operator of a motor vehicle, when overtaking and passing a bicycle that is proceeding in the same direction on the roadway, shall leave a safe distance between such vehicle and the bicycle and shall maintain such clearance until safely past the overtaken bicycle."

SECTION 3.

Said title is further amended by revising Part 1 of Article 13 of Chapter 6, relating to bicycles

and play vehicles, as follows:

"40-6-290.

The provisions of this part applicable to bicycles shall apply whenever a bicycle is operated upon a highway, upon a bicycle lane, or upon any bicycle path set aside for the exclusive use of bicycles, subject to those exceptions stated in this part.

40-6-291.

(a) The provisions of this chapter that apply to vehicles, but not exclusively to motor vehicles, shall apply to bicycles, except as provided in this Code section and except that the penalties prescribed in subsection (b) of Code Section 40-6-390, subsection (c) of Code Section 40-6-391, and subsection (a) of Code Section 40-6-393 shall not apply to persons riding bicycles.

(b) Notwithstanding the provisions of Code Section 40-6-50, any person operating a bicycle may ride upon a paved shoulder; provided, however, that such person shall not be required to ride upon a paved shoulder.

(c) Any person operating a bicycle may signal a right turn with his or her right arm and hand extended horizontally or with his or her left hand and arm extended upward.

40-6-292.

(a) A person propelling a bicycle shall not ride other than upon or astride a permanent and regular seat attached thereto and shall allow no person to ride upon the handlebars.

(b) No bicycle shall be used to carry more persons at one time than the number for which it is designed and equipped.

(c) No person shall transport a child under the age of one year as a passenger on a bicycle on a highway, roadway, bicycle path, bicycle lane, or sidewalk; provided, however, that a child under the age of one year may be transported on a bicycle trailer or in an infant sling so long as such child is seated in the bicycle trailer or carried in an infant sling according to the bicycle trailer's or infant sling's manufacturer's instructions, and the bicycle trailer is properly affixed to the bicycle according to the bicycle trailer's manufacturer's instructions or the infant sling is

properly worn by the rider of the bicycle according to the infant sling's manufacturer's instructions and such child transported in a bicycle trailer or infant sling is wearing a bicycle helmet as required under paragraph (1) of subsection (e) of Code Section 40-6-296.

(d) No child between the ages of one year and four years shall ride as a passenger on a bicycle or bicycle trailer or be transported in an infant sling unless the child is securely seated in a child passenger bicycle seat, bicycle trailer, or infant sling according to the child passenger bicycle seat's, bicycle trailer's, or infant sling's manufacturer's instructions and the child passenger seat or bicycle trailer is properly affixed to the bicycle according to the child passenger bicycle seat's or bicycle trailer's manufacturer's instructions or the infant sling is worn according to the infant sling's manufacturer's instructions.

(e) Violation of subsections (c) and (d) of this Code section shall not constitute negligence per se nor contributory negligence per se or be considered evidence of negligence or liability.

(f) No person under the age of 16 years failing to comply with subsections (c) and (d) of this Code section ~~may~~ shall be fined or imprisoned.

40-6-293.

No person riding upon any bicycle, coaster, roller skates, sled, or toy vehicle shall attach the same or himself or herself to any vehicle upon a roadway.

40-6-294.

(a) ~~As used in this Code section, the term 'hazards to safe cycling' includes, but shall not be limited to, surface debris, rough pavement, drain grates which are parallel to the side of the roadway, parked or stopped vehicles, potentially opening car doors, or any other objects which threaten the safety of a person operating a bicycle.~~

(b) Every person operating a bicycle upon a roadway shall ride as near to the right side of the roadway as practicable, except when ~~turning~~:

(1) ~~Turning left or avoiding~~;

(2) ~~Avoiding hazards to safe cycling, when the~~;

~~(3) The lane is too narrow to share safely with a motor vehicle, when traveling;~~

~~(4) Traveling at the same speed as traffic, or while exercising;~~

~~(5) Exercising due care when passing a standing vehicle or one proceeding in the same direction; or~~

~~(6) There is a right turn only lane and the person operating the bicycle is not turning right;~~

provided, however, that every person operating a bicycle away from the right side of the roadway shall exercise reasonable care and shall give due consideration to the other applicable rules of the road. ~~As used in this subsection, the term 'hazards to safe cycling' includes, but is not limited to, surface debris, rough pavement, drain grates which are parallel to the side of the roadway, parked or stopped vehicles, potentially opening car doors, or any other objects which threaten the safety of a person operating a bicycle.~~

~~(b)(c)~~ Persons riding bicycles upon a roadway shall not ride more than two abreast except on bicycle paths, bicycle lanes, or parts of roadways set aside for the exclusive use of bicycles, or when a special event permit issued by a local governing authority permits riding more than two abreast.

~~(e)(d)~~ Whenever a usable bicycle path has been provided adjacent to a roadway and designated for the exclusive use of bicycle riders, then the appropriate governing authority may require that bicycle riders use such bicycle path and not use those sections of the roadway so specified by such local governing authority. The governing authority may be petitioned to remove restrictions upon demonstration that the bicycle path has become inadequate due to capacity, maintenance, or other causes.

~~(d)(e)~~ Bicycle paths ~~Paths~~ subject to the provisions of subsection ~~(e)~~ (d) of this Code section shall at a minimum be required to meet accepted guidelines, recommendations, and criteria with respect to planning, design, operation, and maintenance as set forth by the American Association of State Highway and Transportation Officials, and such bicycle paths shall provide accessibility to destinations equivalent to the use of the roadway.

~~(f)~~ Any person operating a bicycle in a bicycle lane shall ride in the same direction as traffic on the roadway.

~~(e)~~(g) Electric assisted bicycles ~~as defined in Code Section 40-1-1~~ may be operated on bicycle paths.

40-6-295.

No person operating a bicycle shall carry any package, bundle, or other article which prevents him or her from keeping at least one hand upon the handlebars.

40-6-296.

(a) Every bicycle when in use at nighttime shall be equipped with a light on the front which shall emit a white light visible from a distance of 300 feet to the front and with a light on the back which shall emit a red reflector on the rear of a type approved by the Department of Public Safety which shall be light visible from a distance of 300 feet to the rear when directly in front of lawful upper beams of headlights on a motor vehicle. A light emitting a red light visible from a distance of 300 feet to the rear may be used in addition to the red reflector. Any bicycle equipped with a red reflector on the rear that is approved by the Department of Public Safety shall not be required to have a light on the rear of the bicycle.

(b) Every bicycle sold or operated shall be equipped with a brake which will enable the operator to make the braked wheels skid on dry, level pavement.

(c) No bicycle shall be equipped or operated while equipped with a set of handlebars so raised that the operator must elevate his or her hands above ~~his~~ the operator's shoulders in order to grasp the normal steering grip area.

~~(d) No bicycle shall be equipped, modified, or altered in such a way as to cause the pedal in its lowermost position to be more than 12 inches above the ground, nor shall any bicycle be operated if so equipped.~~

~~(e)~~(1) No person under the age of 16 years shall operate or be a passenger on a bicycle on a highway, bicycle path, bicycle lane, or sidewalk under the jurisdiction or control of this state or any local political subdivision thereof without wearing a bicycle helmet.

(2) For the purposes of this subsection, the term 'bicycle helmet' means a piece of protective

headgear which meets or exceeds the impact standards for bicycle helmets set by the American National Standards Institute (ANSI) or the Snell Memorial Foundation.

(3) For the purposes of this subsection, a person shall be deemed to wear a bicycle helmet only if a bicycle helmet of good fit is fastened securely upon the such person's head with the straps of the such bicycle helmet.

(4) No bicycle without an accompanying protective bicycle helmet shall be rented or leased to or for the use of any person under the age of 16 years unless that person is in possession of a bicycle helmet at the time of the rental or lease.

(5) Violation of any provision of this subsection shall not constitute negligence per se nor contributory negligence per se or be considered evidence of negligence or liability.

(6) No person under the age of 16 failing to comply with any provision of this subsection ~~may~~ shall be fined or imprisoned.

40-6-297.

~~(a) It shall be unlawful for any person to sell a new bicycle or a pedal for use on a bicycle unless the pedals on such bicycle or such pedals are equipped with reflectors of a type approved by the Department of Public Safety. The reflector on each pedal shall be so designed and situated as to be visible from the front and rear of the bicycle during darkness from a distance of 200 feet. The commissioner of public safety is authorized to promulgate rules and regulations and establish standards for such reflectors.~~

~~(b) This Code section shall not apply to any bicycle purchased prior to July 1, 1972, by a retailer for the purpose of resale.~~

40-6-298.

(a) It is shall be a misdemeanor for any person to do any act forbidden or fail to perform any act required in this part.

(b) The parent of any child and the guardian of any ward shall not authorize or knowingly permit such child or ward to violate any of the provisions of this part.

~~40-6-299~~, 40-6-298.

The Board of Public Safety is authorized to promulgate rules and regulations to carry this part into effect and is authorized to establish regulations for any additional safety equipment or standards it shall require for bicycles."

SECTION 4.

All laws and parts of laws in conflict with this Act are repealed.

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