Restoring Connectivity Along the Waldo Road Corridor

December 8, 2010

Wes MacLeod & Brad Weitekamp

Table of Contents

1. Abstract 1

2. Introduction 2

3. Literature and Policy Review 4

4. Results 12

5. Methodology 13

6. Study Area Overview 16

7. Observations 18

8.0 Policy Recommendations 25

8.1 Design Recommendations 26

SE 2nd Ave 28

NE 5th Ave 30

Pedestrian Crossing 32

SE 10th 34

NE 8th 36

Waldo & University Avenue 40

9. Conclusion 45

10. Works Cited 47

Appendix A: Bicycle Survey 48

1.0 Abstract

This study was conducted in response to a request by the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area (MTPO), for a detailed study on pedestrian and bicycle traffic in the Waldo Road area. Issues addressed in this study included: current levels of safety at major intersections, traffic patterns of trail users, motorist/non-motorist interactions at intersections, roadway alignment, roadway geometry, and design recommendations.

Studied literature included design manuals at national and state levels, combined with research conducted at the global, national, and local scales. In addition to reviewing current literature, on-site observations and questionnaires were utilized to form a set of recommendations for the MTPO regarding design implementations safety improvements along the key intersections in the study area.

The majority of trail users in our study area represent a group of bicyclists requiring unique solutions for bicycle and pedestrian safety.

Observations showed the study area would greatly benefit from stricter law enforcement efforts centering on the obedience of traffic laws by motorists and non-motorists. In addition, we identified three main intersections that should be looked at in further detail due to their high traffic volume and opportunity for safety improvements.

Recommendations for the study area were premised on providing improved safety for pedestrians and bicyclists. This would be achieved through intelligent redesign, and reconfiguration of intersections in some cases. Additional measures should be implemented to calm traffic in the study area, eventually leading to the ultimate goal of a low-speed, pedestrian-friendly urban streetscape.

2.0 Introduction

For many, the Waldo Road corridor is the entryway to Gainesville. Passing south through speed trap towns on Highway 301, and eventually arriving on the east side of the sleepy college town is how many visitors from the northeast first experience Gainesville. Additionally, individuals arriving by plane will be greeted by the corridor as they travel further into the heart of the city before branching off to their final destination.

In Gainesville, much of the transportation infrastructure and urban development has happened on the west side of the city mainly as a result of Interstate 75. Yet "as of 2008, new development west of Gainesville has been limited by transportation capacity…." (University of Florida School of Architecture, 2009). A report conducted by the University of Florida found that many Gainesville residents avoid trips to the west side of town because of congestion. Halting development on the west side of town may signal a shift of focus to the historically under-utilized and less desirable east side of town, leaving the Waldo Road corridor uniquely situated to serve as the primary transportation arterial for much of the anticipated growth.

Additionally, Alachua County has proposed a dedicated lane bus rapid transit system for the corridor. This will invariably increase use for pedestrians and bicyclists along the corridor.

Because Waldo Road is part of the statewide Strategic Intermodal System (SIS), many challenges have arisen in planning for the pedestrian and the bicyclist. This system is characterized as "containing all forms of transportation for moving both people and goods, including linkages that provide for smooth and efficient transfers between modes and major facilities…. (Florida Department of Transportation, 2010)" Yet one finds it difficult to see Waldo Road as successful for moving people that aren't in motorized vehicles – whether bicyclist or pedestrian. The corridor is successful, however, in moving heavy trucks (freight) and passenger vehicles. Spanning south NW 8th Ave to SE 2nd Ave Average Annual Daily Traffic (AADT) for both heavy truck and passenger vehicles are among the highest in the city.

Unique to Waldo Road is the presence of the Rails-to-Trails multi-use path. Gainesville has an extensive system of the paths – commonly referred to as "rail trails" – that were formerly railroad rights-of-way and have since been decommissioned and converted to modified greenways. The Waldo Road Rails-to-Trail (WRRT) system runs adjacent to the eastern portion of the roadway on a separate ten foot path north of East University Avenue. Running south, the trail diagonally (northeast to southwest) traverses the Waldo Road and East University Avenue intersection before connecting to the Depot Avenue Rails Trail southwest of the intersection (see figure 2.1). The trail crossing location at Waldo Road and East University Avenue poses several challenges, as the intersection is highly trafficked by automobiles and heavy trucks. In light of such a conflicting dichotomy, research and field studies were conducted to determine how these contrasting transportation modes may coexist.

The following intersections were observed in detail:

- SE 2nd Avenue and SE 11th St
- Pedestrian Crossing at Citizens Field
- SE 10th St and East University Avenue
- NE 5th Avenue and Waldo Road
- NE 8th Avenue and Waldo Road
- Waldo Road and University Avenue

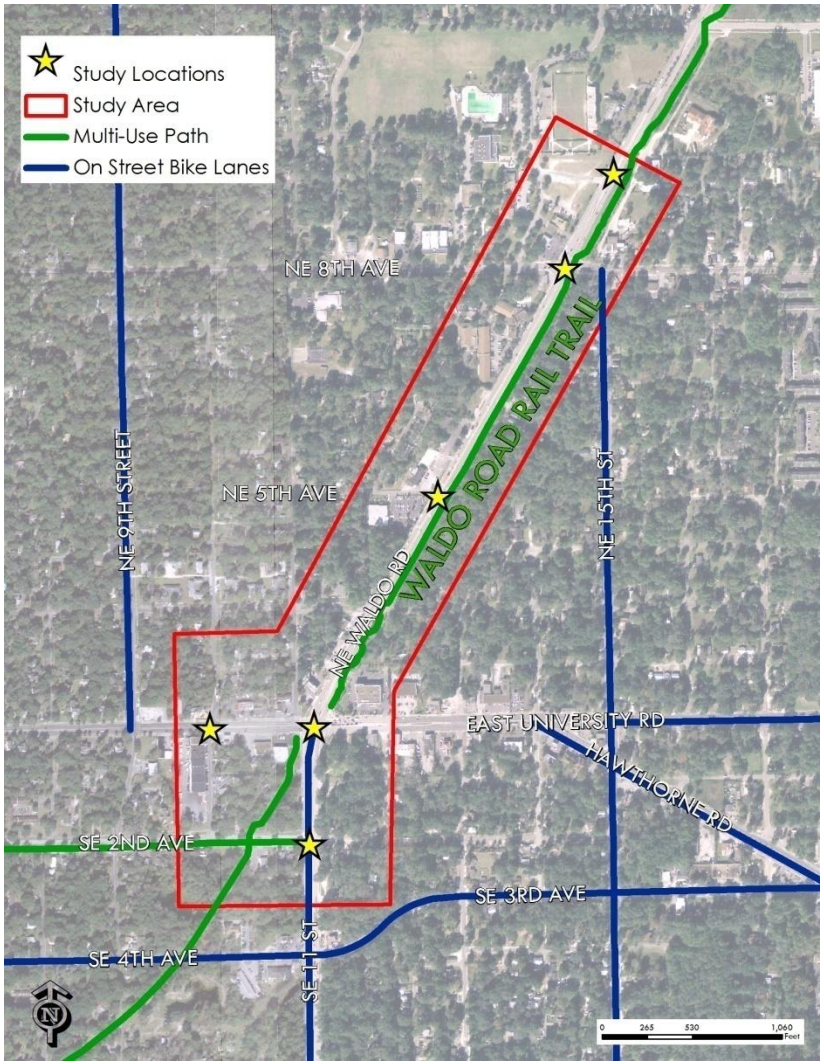


Figure 2.1: Existing Multi-Use paths and On Street Bike Lanes in relation to the study area and locations.

3.0 Policy and Literature Review

Western Europe

When looking at safety issues regarding bicyclists and pedestrians, one must first take a look at successful practices that have been implemented in other locations. European models of urban planning have often been studied as successful examples of how a city's layout can form the foundation of a thriving multi-modal transportation network.

In the early 2000's, researchers John Pucher and Lewis Dijkstra specifically focused on Western European practices that can be used as a model for planners and designers in the United States. Reviewing the research of Pucher and Dijkstra gives insight into European design techniques the United States can utilize in terms of designing an efficient transportation network, placing a greater importance on pedestrians and bicyclists. One main issue outlined by Pucher and Dijkstra is the fundamental differences in policy between Western Europe and the United States concerning pedestrian and bicyclist safety. In their article, *Making Walking and Cycling Safer: Lessons from Europe*, Pucher and Dijkstra outline the neglect for safety in the United States compared to Western European design standards. The suggestion is made, that perhaps due to a higher level of density, leading to a more walkable environment, Europe has ultimately had no choice but to address pedestrian and bicyclist safety as a main priority (Pucher & Dijkstra, 2000).

For much of the last century, growth in the U.S. has largely been fueled by a universal fascination with the automobile, ultimately creating a particularly dangerous situation for pedestrians and bicyclists. In studying transportation networks in the United States, an obvious conclusion can be made regarding the main priority of many transportation engineers and planners: efficient flow of automobiles, with other modes of transportation and the accompanying safety measures becoming a secondary goal. The challenge, as discussed by Pucher and Dijkstra, is to encourage a shift in the mindsets of American planners towards a design framework more sensitive to the needs of bicyclists and pedestrians.

Through their research, Pucher and Dijkstra illustrate how European countries, Germany and The Netherlands in particular, focus their efforts on specific areas of improvement.

Pucher and Dijkstra outline these six areas of successful implementation in Germany and the Netherlands:

- Improved pedestrian and bicycle facilities
- Increased importance placed on bicyclists and pedestrians
- Use of traffic calming techniques
- Limiting the use of automobiles
- Educational programs
- Improved enforcement of laws and regulations

In a related article, *Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany*, Pucher and Dijkstra hint that perhaps now is the ideal time for a movement in the United States towards making bicycle and pedestrian safety a top priority. As a result of increased obesity rates, the medical industry has intensified their push for increased amounts of exercise during the average citizen's daily routine.

Pucher and Dijkstra note a higher perceived danger as a fundamental reason for the lower rates of bicycling and walking in the United States as compared to European countries. This effort, well-merited as it may be, cannot be successful without addressing individuals' perceived danger of walking or cycling as part of their daily travels (Pucher & Dijkstra, Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany, 2003).

Funding Mechanisms in United States

With any proposed transportation facility improvements comes the reality of available funding. A reason current facilities may be inadequate is a function of the obsession with the automobile and the convenience related to driving. Over the past 20 years, several pieces of legislation have led to federal funding being allocated towards bicycle and pedestrian related projects.

The first landmark piece of legislation came in the form of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. As a direct result of this legislation, spending at the federal level increased by over $200 million in a span of seven years on pedestrian and bicycle enhancement projects.

Further funding for bicycle and pedestrian projects, came with the reauthorization of ISTEA in 1998 in the form of the Transportation Equity Act for the 21st Century(TEA-21), resulting in another increase of over $200 million for bicycle and pedestrian funding. By this time, bicycle and pedestrian project funding

had increased from $6 million in 1990 to over $427 million in 2004 (Pedestrian and Bicycle Information Center, 2010).

2009 marked an all-time high for pedestrian and bicycle funding, thanks in part to the implementation of the American Recovery and Reinvestment Act (ARRA). Even without the nearly $500 million in funding from the ARRA, it was projected that funding increases as a result of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) would result in an all-time high. Funding levels for pedestrian and bicycle related projects of well over $700 million was reached with the contributions from ARRA funding (Pedestrian and Bicycle Information Center, 2010).

A struggling economy is often an ideal time to make improvements to transportation infrastructure. As part of the ARRA, TIGER funding enables transportation improvements to become more financially realistic. In late October 2010, the United States Department of Transportation announced the winning projects for Transportation Investment Generating Economic Recovery (TIGER II) funding. Under this funding program, the Department of Transportation awards funding to innovative transportation related projects that, "will have a significant impact on the Nation, a metropolitan area or a region" (United States Department of Transportation, 2010).

Related to the focus on bicycle and pedestrian improvements, it is encouraging to see that out of 51 award winners for the initial TIGER funding, 24 mentioned bicycle or pedestrian facilities as part of their project improvements (United States Department of Transportation, 2010). The main goal of the funding is to reduce the reliance on foreign oil and encourage innovative ways to deal with current transportation policy issues. Furthermore, it appears a large percentage of future projects are addressing the need for a focus on bicycle and pedestrian safety needs.

Pedestrian and Bicycle Design

United States

Much has been written on pedestrian and bicyclist safety in the United States as it has more of a focus for transportation planning over the past 25 years. In 1975, the peak yearly bicyclist fatality number was reached when over 1,000 cases of fatal accidents were reported (NHTSA's National Center for Statistics and Analysis, 2007). Although this statistic has trended downwards as a result of national bicyclist

and pedestrian safety efforts, increasing safety remains a design issue for current planners.

Beginning in 1997, as part of an overall focus on the reduction of vehicle related fatalities, the American Association of State Highway and Transportation Officials (AASHTO) released their first *AASHTO Strategic Highway Safety Plan*. This guide has been revised several times over the years as a tool for planners to use in many aspects of transportation infrastructure (American Association of State Highway and Transportation Officials, 2005). Reviewing the guide, AASHTO targets some specific areas for planners and designers to address when analyzing the interaction between vehicles and pedestrian/bicycle traffic.

In terms of recommendations for pedestrians, the *Strategic Highway Safety Plan* notes a high priority should be placed on creating adequate facilities on public roadways. Currently, there is a lack of information available for what proper pedestrian design consists of, so AASHTO challenges states to collaborate with several parties of interest to review current policy and devise a new, more effective, set of guidelines to lead intelligent pedestrian facility design.

Additionally, AASHTO suggests a more comprehensive educational and safety program be put in place nationwide to address pedestrian safety. Such programs could be initiated in urbanized areas with a history of pedestrian fatalities and injuries (American Association of State Highway and Transportation Officials, 2005).

Similar measures are recommended for dealing with vehicle and bicycle interaction. Data reported by AASHTO in their report provides a unique insight into some areas that should be targeted while looking to provide nationwide guidelines for improving safety for bicyclists. Contrary to what many individuals may believe, AASHTO found that in nearly 75% of crashes, bicyclists were found to be at fault (American Association of State Highway and Transportation Officials, 2005). In terms of design, this can be a crucial piece of information, as it may lead to the determination that bicyclist education should be a major component of an effectively implemented safety plan for bicyclists. Of course, this finding differs from rules set forth in many European countries placing the blame more strictly on the motorist.

Within any educational safety program, AASHTO points out that a campaign for increased helmet

usage has a positive effect, as 70%-80% of all bicycle fatalities result from head injuries (American Association of State Highway and Transportation Officials, 2005). AASHTO has provided the overview needed to focus on safety at a broad, national level. However, one must look into state specific information as context sensitive design is a large part of implementing safe bicycle and pedestrian facilities.

Florida

Florida has taken a particularly strong stride towards addressing pedestrian and bicyclist safety needs, especially in the past ten years. The Florida Department of Transportation (FDOT) partnered with the University of North Carolina Highway Safety Research Center (HSRC) to produce three main design resources for the planning of bicycle and pedestrian facilities.

The *Florida Bicycle Facilities Planning and Design Handbook* is meant to serve as a reference for planners in Florida to reference along with other nationwide resources. Of particular interest in this design handbook is their discussion on the intersection of paths and roadways as Florida has a particularly extensive trail network throughout the state. Proper trail design in coordination with intersections is often times the most challenging aspect of trail implementation or redesign. According to the Handbook, the main issue with path and roadway intersection is the assignment of right-of-way. Determining the proper assignment often times is the key to a successful intersection (Florida Department of Transportation, 2000).

Another issue addressed by the Handbook is the need for proper signage and markings along the path. In cases where intersections or potentially dangerous areas are approached, warning signs or trail markings can be key in alerting bicyclists as to what is ahead (Florida Department of Transportation, 2000). The Handbook dicusses the desire to remove all markings for a more asthetically pleasing trail appearance, however the removal of effective markings may compromise the safety level of the trail.

Proper lighting is mentioned as an essential supplemental measure to be placed next to any signage, as well as potentially unsecure areas of a trail. Intersections should be given special attention as properly installed lighting will allow trail users to effectively view intersections and act appropriately in accordance with the traffic situation. Especially in areas that serve nighttime users, lighting is essential in providing a safe facility.

From the motorists perspective, a low level of light allows them to effectively view trail users as they approach an intersection. Additionally, a low level of light should be used in trails adjacent to roadways to maintain the visibility of motorists.

In addition to the Handbook, HSRC worked on compiling a *Trail Intersection Design Handbook*. It discusses various ways to design crossings and even how to regulate traffic at intersections. While outlining intersection crossings, the trail handbook acknowledges what John Pucher and Lewis Dijkstra had noticed in their European research – namely, that the perceived danger of bicyclists and pedestrians was real, challenging designers in the United States to hold them at a higher priority.

The *Trail Intersection Design Handbook* provides a table for recommendations on roadway treatments, often times calling for refuge areas at intersections where motorists travel at a high rate of speed (University of North Carolina Highway Safety Research Center , 1994). Additionally, refuge areas are recommended in areas with a substantial roadway width. Installation of such facilities ensure visibility and allow users to plainly acknowledge the dedicated crossing area (University of North Carolina Highway Safety Research Center , 1994).

In addition to refuge areas, the *Trail Intersection Design Handbook* approaches crosswalk marking as another crucial element to increasing visibility at intersections. Prominently and properly marking stop lines and crosswalk areas can have a major effect on how motorists and trail users approach an intersection. For example, the trail handbook outlines a scenario where perhaps widening the designated crosswalk area may have a greater effect on providing protection to trail users than increasing the distance of the stop line (University of North Carolina Highway Safety Research Center , 1994). Often times, if a stop line is placed at an increased distance from crosswalk areas, motorists simply ignore the stop line and approach the intersection as if it were never placed.

The *Florida Pedestrian Facilities Planning and Design Handbook* addresses important topics such as visibility and traffic calming techniques. The process of seeing an object is stable, but the time allowed to process the site can be altered. Certain materials and colors are acknowledged as both a way to increase visibility, and detract from visibility, stressing the importance of proper selection.

In terms of nighttime visibility, an aspect that has to be addressed, according to the HSRC, is the lack of

proper lighting at intersections due to substandard installation. This needs to be taken into account when determining visibility at certain intersection and design should be adjusted if lighting changes are not feasible (University of North Carolina Highway Safety Research Center, 1994).

Traffic calming is suggested by the HSRC as a way to make successful strides across the board in designing at the pedestrian level. Methods such as speed humps and signage are traditional ways of implementing traffic calming strategies, however, there has been a recent push to utilize the landscape as the driving factor to not only calm traffic, but to provide a more inviting atmosphere for pedestrians (University of North Carolina Highway Safety Research Center, 1994).

Gainesville, Florida

Pedestrian and bicyclist safety has taken on a particularly important role in Gainesville during the past two years. In 2008 alone, according to the Gainesville Police Department, 147 pedestrian crashes were reported and 33% of all fatalities in the City of Gainesville were pedestrians (Gainesville Police Department, 2010). The city has taken a stand on improving bicycle facilities as well as pushing for the enforcement of pedestrian safety. In the beginning of 2010, the Gainesville Police Department was awarded funding for a comprehensive look into various methods of improving pedestrian safety (Gainesville Police Department, 2010). In addition to increased local law enforcement measures taken, the city has also set out a wide variety of goals pertaining to the improvement of bicyclist and pedestrian experiences.

The Gainesville Comprehensive Plan addresses the need for improved bicycle and pedestrian facilities through the Transportation Mobility Element of the Comprehensive Plan (City of Gainesville Planning Department, 2002). The main goal of this section is to set forth a structured form of growth that includes all forms of transportation. Without favoring any certain demographic or geographic boundaries, the City of Gainesville can then move forward with an effective, integrated transportation system. Beginning with Section One of the transportation mobility element, the city has shown interest in having a specifically designed program for east Gainesville (see below).

1.1.13 The City shall strive to implement transportation-related aspects of Plan East Gainesville, including but not limited to:

a. Coordinating with the MTPO to establish a Bus Rapid Transit system connecting east Gainesville with centers of employment and commerce;

b. Coordinating with the MTPO and Alachua County to extend East 27th Street from University Avenue to NE 39th Avenue;

c. Coordinating with the MTPO and FDOT to narrow and enhance University Avenue between East 15th Street and East 27th Street;

d. Coordinating with MTPO and FDOT to modify Waldo Road from NE 16th Avenue to SE 4th Avenue so that this section of road becomes a low-speed, urban gateway boulevard; and

e. Include in the transportation network provisions for bicyclists, transit users, and pedestrians on NE 15th Street, East University Avenue, Main Street, and NE 8th Avenue, where applicable(City of Gainesville Planning Department, 2002).

Looking specifically at part d (bold typeface), it is clear the city has placed an increased importance on the Waldo Road Corridor. Utitilizing suggestions from the *Plan East Gainesville* report, the city ultimately sees the Waldo Road corridor serving as a pedestrian friendly, low speed road, if only for a small portion.

As the HSRC covered in their handbooks, the effectiveness of traffic calming techniques cannot be denied. As a result, Gainesville has chosen to designate a portion of the comprehensive plan for the benefits of traffic calming (City of Gainesville Planning Department, 2002). Reliance on traffic calming techniques could go a long way in furthering the city's plan to transform this corridor into an urban gateway boulevard.

4.0 Results and Findings

An overriding theme of prominent bicycle and pedestrian publications is the lack of a true authority when it comes to intersection safety. As mentioned during *Making Walking and Cycling Safer: Lessons from Europe*, John Pucher and Lewis Dijkstra noted prevalence of urban design for automobiles in the United States. Ironically, the Interstate Highway System in the United States – once the envy of the world, has resulted in countless negative externalities and side effects planners continue to struggle with. It is for this reason that a relatively low number of authorities have made attempts to address the specific needs of bicyclists and pedestrians through design.

National and state transportation authorities have been at the forefront of providing the majority of existing design guidelines, however, some of their guidance appears outdated.

As a result of research analysis, seven topics were identified for potential of implementation within the study area:

- Improved visibility from both the pedestrian and motorist perspective
- Targeted traffic calming techniques in areas deemed appropriate within the study area
- Strong need for a reduction in perceived danger among pedestrians and bicyclists when interacting with vehicles
- Increased levels of law enforcement to regulate motorist and non-motorist behavior
- Targeted safety and education programs
- Need for a realistic set of recommendations consistent with the city's vision for the study area
- Recommended policy enhancements and/or changes to existing policy to aid in the structure of funding any design recommendations given

5. Methodology

Research:

Policy research related to bicycle and pedestrian planning was conducted at several scales. The goal of our policy research was to study successful planning mechanisms and implementations that have created a more comfortable environment for the pedestrian and bicyclist. Additionally, a comprehensive review of best management practices as they relate to the proper design of bicycle and pedestrian facilities was completed.

A review of policy and design literature at the global, national, state and local scale allowed for a broad range of understanding.

Data Collection - Traffic Counts:

To determine the importance of studied intersections on the Waldo Road corridor a comprehensive pedestrian and bicyclist count was conducted. Counts were taken at each of the locations during both weekday hours and weekend hours.

Count methods and times were adapted from the "National Bicycle and Pedestrian Documentation Project (NBDP)." The NBDP is a collaborative effort between the private consulting agency Alta Planning + Design and the Institute of Transportation Engineers (ITE) Bicycle and Pedestrian Council. The project combines both "academic and applied research" to assist communities throughout the U.S. in documenting achieving a consistent and uniform method for collecting non-motorized traffic counts (National Bicycle and Pedestrian Documentation Project, 2009). The NBDP developed a systematic way to extrapolate count information in order to determine annual average daily traffic, average weekly users, monthly users, and annual users.

Formulas are used to account for the differences in the time of day, type of day (weekday vs. weekend), month, type of facility, and climate region. The NBDP identifies two types of facilities, a multi-use path and a pedestrian entertainment area. For the purposes of this study, calculations were based on the multi-use path rather than the pedestrian entertainment area due to the presence of the Waldo Road Rail Trail.

A minimum time block of one consecutive hour is needed to accurately project volumes for the remainder of the year – the majority of counts in this study were in two-hour time spans. All weekday counts were conducted at two-hour blocks. Counts were tabulated by directional heading and on-

street vs. off-street users. In locations where the Waldo Road Rail Trail was present path users were classified separately. Counts were tallied in fifteen minutes segments as recommended by NBDP (see figure 5.1 below).

Table 1

Hourly Adjustment Factors

Multi-use paths and pedestrian entertainment areas by season

	April - September 6am - 9pm				October - March 6am - 9pm			
	---- PATH-----		-----PED-----		--- PATH------		-----PED-----	
	wkdy	wkend	wkdy	wkend	wkdy	wkend	wkdy	wkend
0600	2%	1%	1%	1%	2%	0%	1%	0%
0700	4%	3%	2%	1%	4%	2%	2%	1%
0800	7%	6%	4%	3%	6%	6%	3%	2%
0900	9%	9%	5%	3%	7%	10%	5%	4%
1000	9%	9%	6%	5%	9%	10%	6%	5%
1100	9%	11%	7%	6%	9%	11%	8%	8%
1200	8%	10%	9%	7%	9%	11%	9%	10%
1300	7%	9%	9%	7%	9%	10%	10%	13%
1400	7%	8%	8%	9%	9%	10%	9%	11%
1500	7%	8%	8%	9%	8%	10%	8%	8%
1600	7%	7%	7%	9%	8%	8%	7%	7%
1700	7%	6%	7%	8%	7%	5%	6%	6%
1800	7%	5%	7%	8%	6%	3%	7%	6%
1900	5%	4%	7%	8%	4%	2%	7%	6%
2000	4%	3%	7%	8%	2%	1%	6%	6%
2100	2%	2%	6%	8%	2%	1%	5%	5%

Figure 5.1 – Hourly Adjustment Factors (NBPD)

Using the NBPD formulas, it is possible to project the total daily use from a one or two hour count. For example, if counts were taken from 5pm to 7pm on a Tuesday in November using the multi-use path calculation, the tally would account for 13% of the day's total usage. From here we can then calculate the total users for an average weekday. To determine the average users for a Saturday or Sunday repeat the same process.

Once the average weekday counts have been determined, the average weekly volumes, which consist of the average of the total weekday and weekend counts, can be calculated. Monthly volumes are calculated by multiplying the average weekly total by 4.33 (the average number of weeks in a month). Climate regions and monthly variations are used to aggregate the total month figure to annual totals. From here it is possible to calculate the average daily traffic by dividing the annual total by 365 (National Bicycle and Pedestrian Documentation Project, 2009).

Observations

A comprehensive analysis of each location was completed as part of the study. Field observations were used to shape proposed recommendations for the study area and specific locations. Environmental Systems Research Institute's (ESRI) geographic information system (GIS) software was used to conduct demographic analysis in the study area. Geographic data was obtained from the Florida Geographic Data Library, the Alachua County GIS department and ESRI's Business Analyst program.

Survey

The best way to include the public in this process is to tap their knowledge and recommendations as it relates to bicycle or pedestrian safety. Surveys sent to the Gainesville Cycling Club via Survey Monkey were collected over the course of two months. Additionally, intercept surveys were conducted in the field during field observations.

6.0 Study Area Overview

The Waldo Road corridor and surrounding community has been historically characterized by many as lacking in "urban infrastructure investment," focused planning efforts, and development (University of Florida School of Architecture, 2009). However, recent efforts are underway by the Gainesville Community Redevelopment Agency (CRA) and the City of Gainesville Planning Department, among others, to bring investment and development to the eastern part of the city. The recent addition of a Super Wal-Mart on NE 12th Avenue located adjacent Waldo Road signaled, for many, a shift in development patterns and urban growth in Gainesville.

Growth and development in east Gainesville will certainly bring change to an area plagued by disinvestment and neglect. However, this change may come at a cost. Gentrification and resident displacement are often the side effects of major redevelopment efforts.

Neighborhoods within, and directly adjacent our study area have unique character and feel. The demographic identity in the area is mainly one of minority and low-income groups (see figure 6.1).

Ethnicity	One Mile Radius	City of Gainesville	% Difference from City of Gainesville
White	34.50%	59.40%	-72.17%
African-American	59.80%	30.90%	48.33%
Other	5.70%	9.70%	-70.18%
Household Income	**One Mile radius**	**City of Gainesville**	**% Difference from City of Gainesville**
Median	$27,269	$34,314	-25.84%
Average	$34,883	$43,641	-25.11%
Home Value	**One Mile Radius**	**City of Gainesville**	**% Difference from City of Gainesville**
Median	$87,986	$115,200	-30.93%
Average	$100,653	$128,130	-27.30%

Figure 6.1: Demographic data within a one mile radius of the study area in relation to city-wide statistics (ESRI, 2010).

According to 2010 demographic data created by ESRI, compared to the remainder of the city of Gainesville, the median household income and home values in the study area were 25% and 30% less respectively.

Interestingly, we found that the vast majority of non-motorized traffic in the study area was of utilitarian purpose – those users walking or cycling to work, a restaurant, or a destination for transportation. This differs from recreational users who choose to walk or cycle for pleasure, not because they need to get somewhere. Analysis done on U.S. census data suggests that two primary demographics make up the utilitarian cyclists – younger low-income individuals without access to a vehicle and older more affluent types who own a vehicle, but choose instead to cycle for fitness reasons and flexibility with their employer (J. Williams, 1996).

7.0 Observations

Destinations

Destinations play an important role analyzing pedestrian and bicycle traffic flow. Three distinct categories of destinations were classified in the study: local – those within the study area boundaries; regional – destinations outside the study area; and points of interest – destinations such as local schools or churches (see figure 7.1 and 7.2).

Local Destinations	Regional Destinations
West Coast Seafood	University of Florida
Orange and Blue Beverage and Fashion	Gainesville Downtown
McDonald's - University Avenue	Duval Neighborhood
Kangaroo Gas Station - Waldo & University Avenue	Gainesville Regional Airport

Points of Interest	
Marjorie Rawlings Elementary School	Gainesville Greyhound Station
Smokey Bear Park	Lake Forest Elementary School
WA Metcalfe Elementary School	Joseph William Elementary School
Howard Bishop Middle School	Near 8th Place
Gainesville High School	Florida Museum of Natural History
North East Park	Lincoln-Williams Park
Citizens Field	Abraham Lincoln Middle School
Harris Fields	Meadowbrook Park
Charles Duval Elementary School	Near SE 20th Place
Morningside Nature Center	Boulware Springs Park
Morningside Nature Park	Prairie View Elementary School
Young America Park	

Figure 7.1: Local and Regional Destinations and Points of Interest in the two mile proximity of the study area.

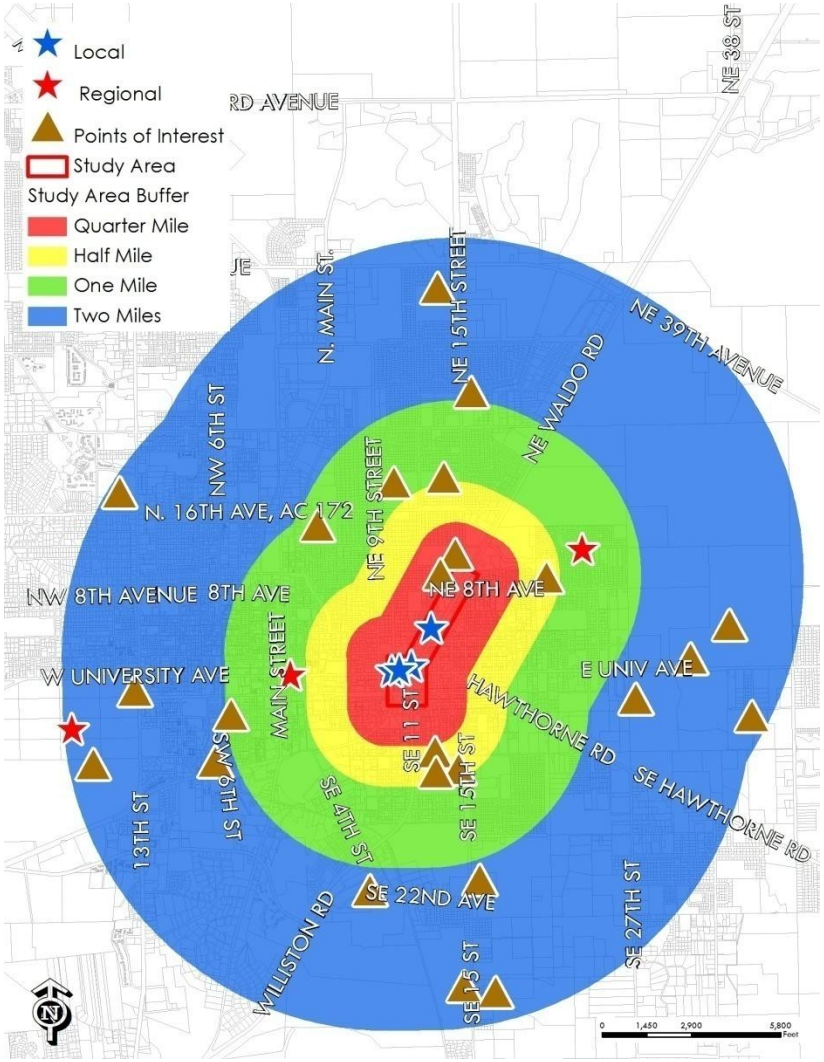


Figure 7.2: Map of Local and Regional Destinations and Points of Interest

Counts

Once counts were tabulated we found that the majority of non-motorized traffic in the study area was by bicycle. In fact, 59% of non-motorized traffic in the area was by cyclists. Annually, the study area is trafficked by 486,691 cyclists and 337,936 pedestrians. Average annual daily for both transportation modes combined was calculated at 376. Surprisingly, the intersection of NE 8th Avenue and Waldo housed the highest annual total counts, followed closely by the Waldo Road and University Avenue intersection (see figure 7.3).

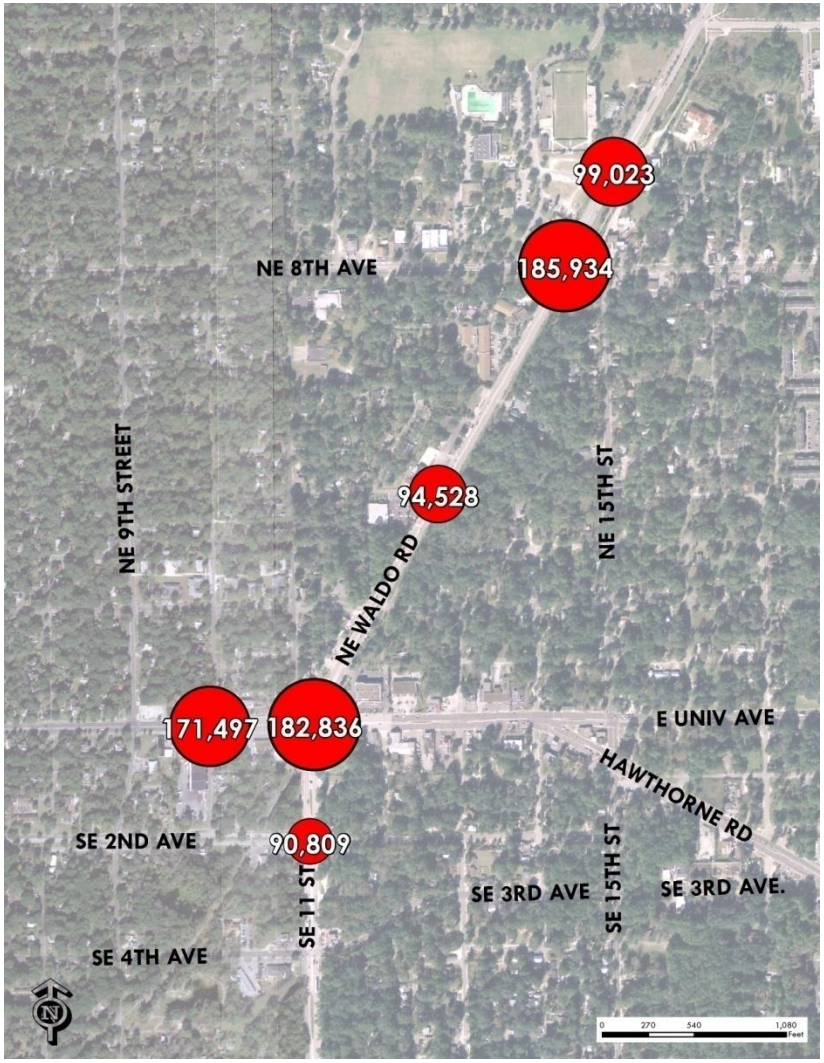


Figure 7.3: Map of Total Annual Counts of both bicyclist and pedestrian modes at studied intersections.

Much of the pedestrian and bicyclist traffic flow was in the north and westerly direction. In locations where the Waldo Rail Trail was present traffic flow was stronger in a north to south direction (see Figure 7.4). The highest east and west bound flows were shown at the Waldo and University Avenue intersection.

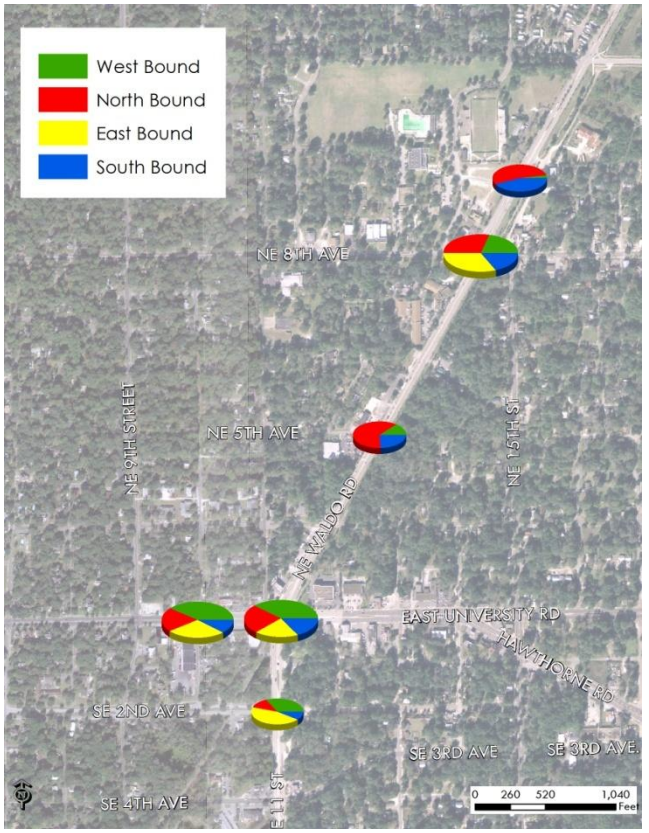


Figure 7.4: Map of directional heading observed for both bicyclist and pedestrian modes at studied intersections.

Calculations determined that the highest AADT for any one direction was westbound cyclists crossing through the Waldo Road and University Avenue intersection (see figures 7.5 through 7.10). Further analysis and detailed observations are continued in the discussion section.

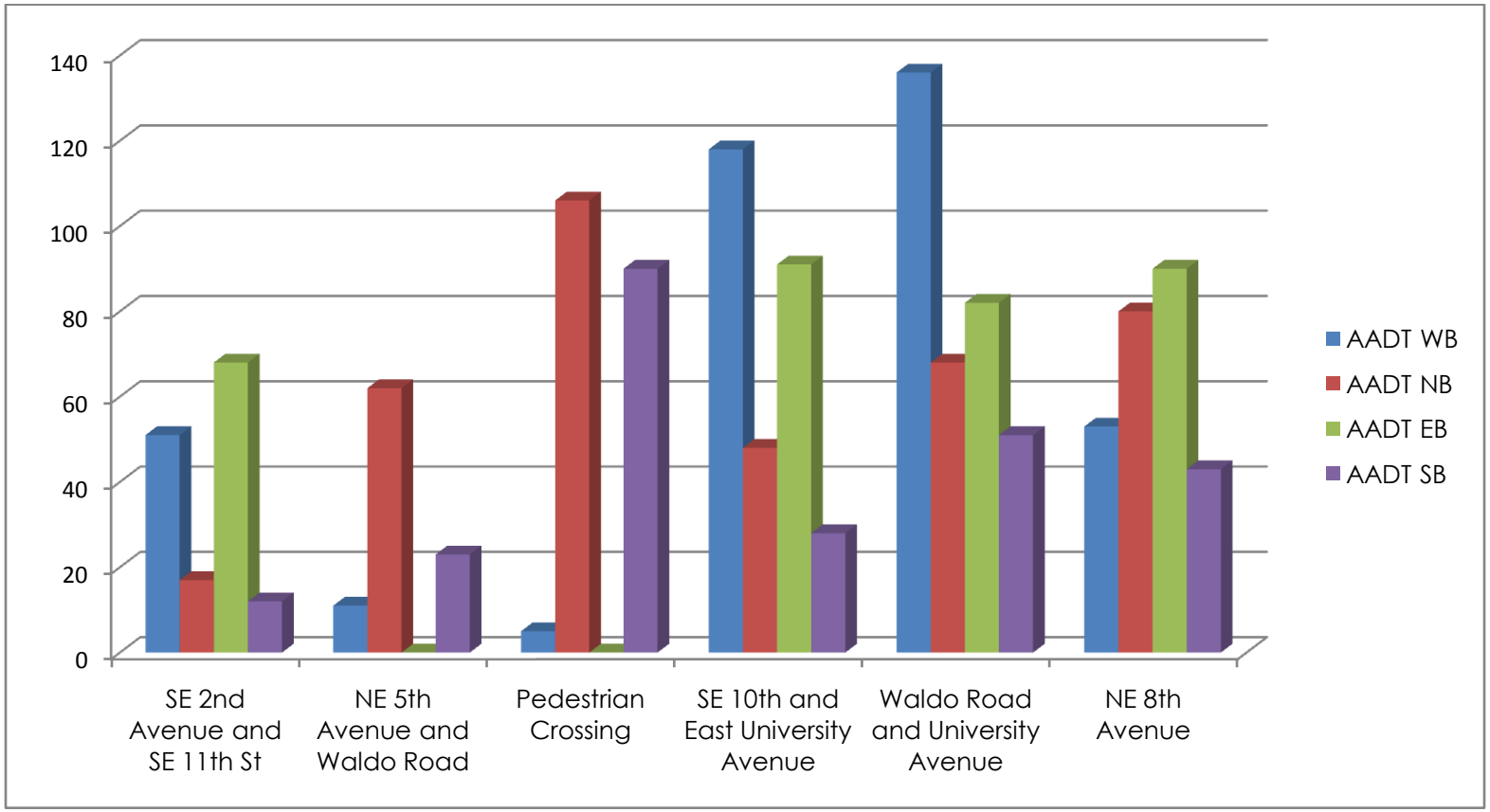


Figure 7.5: Bicycle Directional Heading Counts at studied intersections (WB = west bound, NB = north bound, etc).

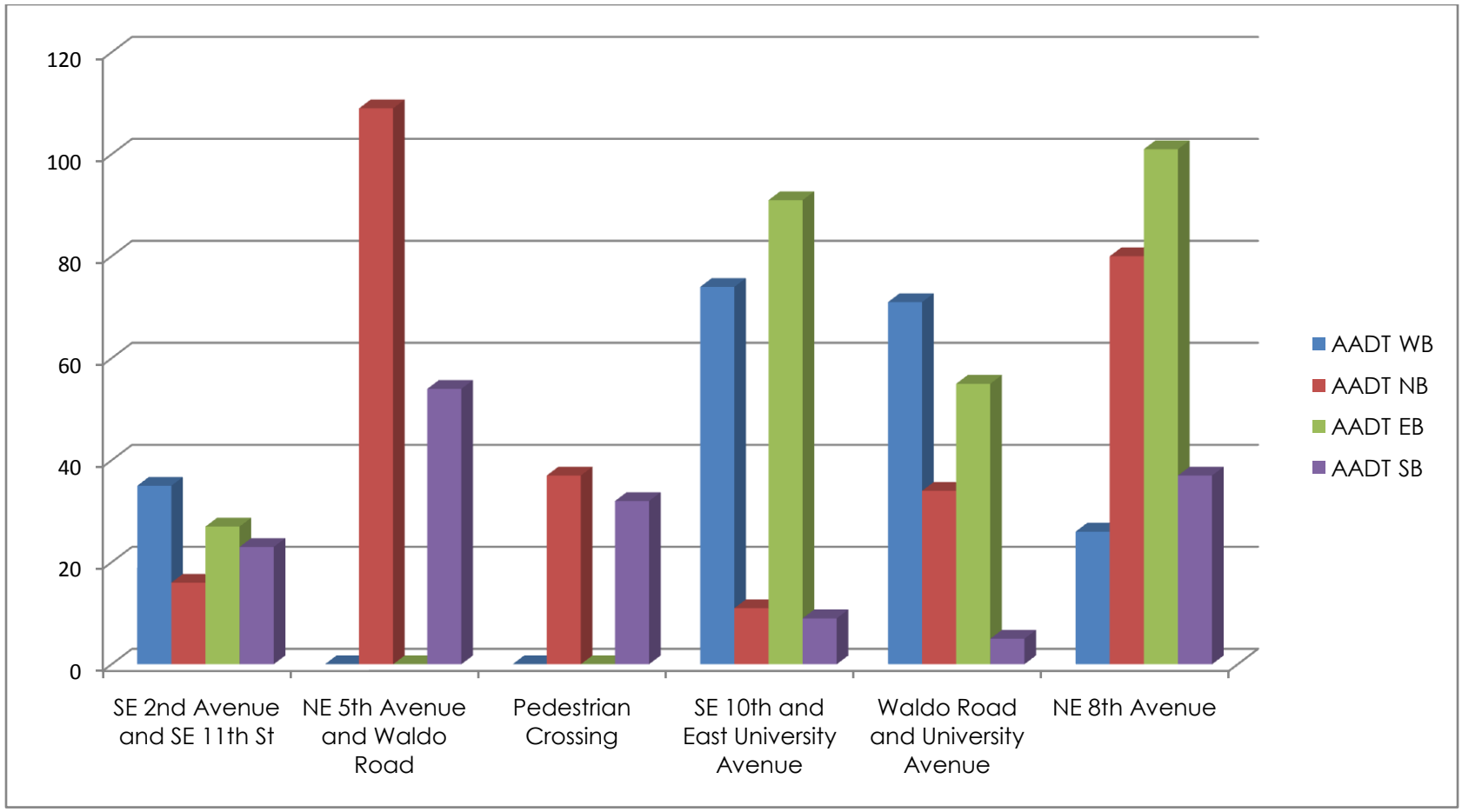


Figure 7.6: Pedestrian Directional Heading Counts at studied intersections (WB = west bound, NB = north bound, etc).

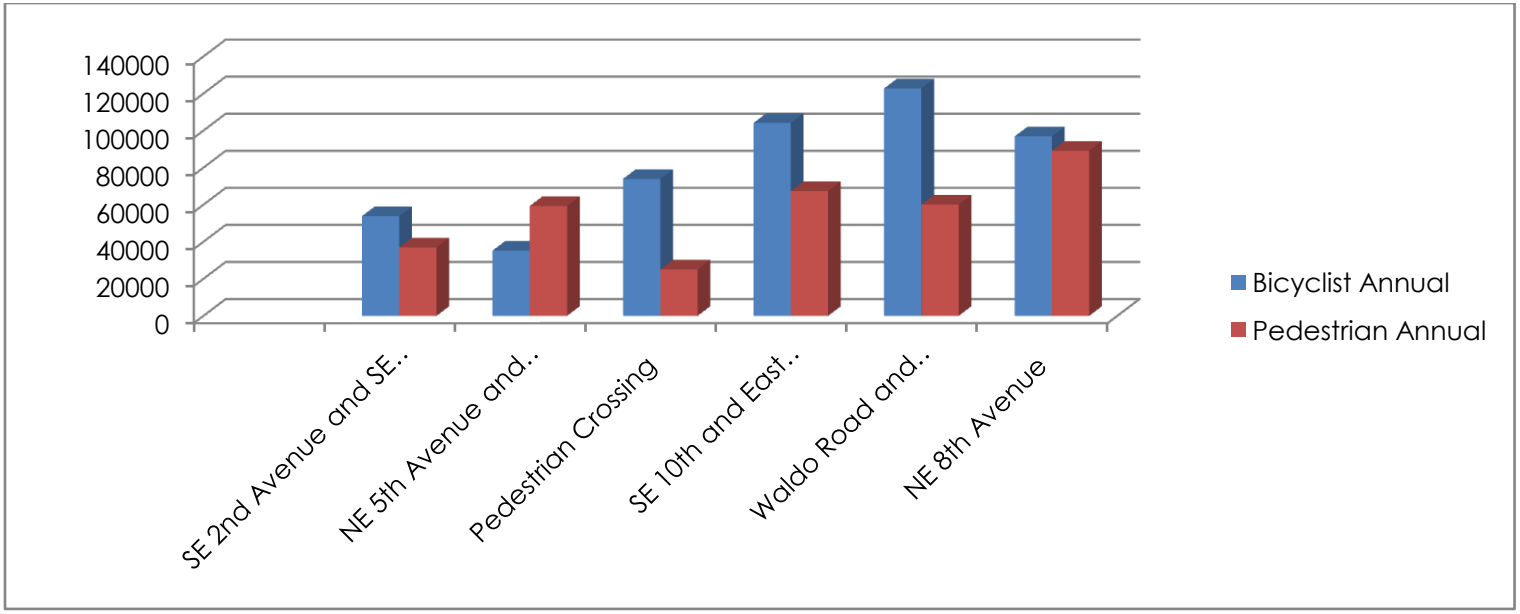


Figure 7.7 & 7.8: Total annual counts for pedestrian and bicycle counts (above) bicycle count data (data).

Bicyclist Counts					
Location	**AADT WB**	**AADT NB**	**AADT EB**	**AADT SB**	**Total AADT**
SE 2nd Avenue and SE 11th St	51	17	68	12	147
NE 5th Avenue and Waldo Road	11	62	0	23	96
Pedestrian Crossing	5	106	0	90	202
SE 10th and East University Avenue	118	48	91	28	285
Waldo Road and University Avenue	136	68	82	51	336
NE 8th Avenue	53	80	90	43	265
Total	374	381	331	247	1,331

Pedestrian Counts					
Location	**AADT WB**	**AADT NB**	**AADT EB**	**AADT SB**	**Total AADT**
SE 2nd Avenue and SE 11th St	35	16	27	23	101
NE 5th Avenue and Waldo Road	0	109	0	54	163
Pedestrian Crossing	0	37	0	32	69
SE 10th and East University Avenue	74	11	91	9	185
Waldo Road and University Avenue	71	34	55	5	165
NE 8th Avenue	26	80	101	37	244
Total	206	287	274	160	927

Figure 7.9 & 7.10: Pedestrian count data total (above) annual counts for pedestrian and bicycle counts.

Location	AADT Combined	Bicyclist Annual Total	Pedestrian Annual Total	Bicyclist and Pedestrian Combined Annual Total
SE 2nd Avenue and SE 11th St	248	53,824	36,985	90,809
NE 5th Avenue and Waldo Road	259	35,209	59,319	94,528
Pedestrian Crossing	271	73,912	25,111	99,023
SE 10th and East University Avenue	470	104,141	67,356	171,497
Waldo Road and University Avenue	501	122,752	60,084	182,836
NE 8th Avenue	509	96,853	89,081	185,934
Total	2,258	486,691	337,936	824,627

8.0 Policy Recommendations

Urban Gateway Overlay District:

The Metropolitan Transportation Planning Organization (MTPO) should enlist the service of a consultant or a design studio in the College of Design, Construction and Planning at the University of Florida to establish an overlay district focused on equitable design for the cyclist and pedestrian. A key component of the design guidelines will be case studies and innovative practices for the inclusion of bus rapid transit. Traffic calming measures should be studied and suggested as well. Additionally, a requirement of the design guidelines should be the proper inclusion into existing land development code and language.

Impact Fees:

Gainesville's Community Redevelopment Agency (CRA) and the MTPO should establish an enhanced fee structure that will allow for significant improvements along the Waldo Road corridor. Development within a two-mile radius should be tapped to provide funding for the retrofit of the corridor. Establishing a "fee bank" specifically for pedestrian and cyclist oriented enhancements along the corridor will assist in the redevelopment of multi-modal, transit oriented urban form desired in east Gainesville. The CRA would be granted exclusive oversight in design proposals prior to technical review. Design guidance by the CRA with technical supervision provided by the MTPO has the potential to create a greater sense of place along the corridor.

Law Enforcement:

Tickets for neglecting to stop completely prior to pedestrian crosswalks should be increased three fold. A percentage of revenue from red-light tickets can be put toward public service announcements on the importance of right turn on red situations. Additionally, revenue from these tickets should be spent on signage to be placed in high density pedestrian and cyclist environments where right turns on red are permitted. Signage should be placed adjacent stop lights reminding motorists to come to a complete stop before proceeding.

8.1 Design Recommendations

The presence of the Waldo Road Rail Trail amid a low income neighborhood creates a unique situation. By and large the majority of users in the study area were classified as utilitarian, with less than ten percent of the observed non-motorized traffic classified as recreational. Yet, just south of the study one will find just the opposite on the Hawthorne Rail Trail. Further study should be done to pinpoint the reason for this; however, one can infer that conditions and comfort are major factors. The Waldo Road Rail Trail (WRRT) is bisected by a major roadway. Portions of the trail run directly adjacent Waldo Road, leaving little separation from vehicles. If significant enhancements were made to the WRRT would there be more users – whether recreational or utilitarian? Research suggests that yes; safety enhancements – even simple – can increase both use and safety for motorists and non-motorists.

Waldo Road Rail Trail Reroute Option

Currently, Waldo Road and University Avenue intersection creates an extremely challenging crossing scenario for pedestrians and cyclists. The lane width of Waldo Road combined with the diagonal crossing nature of the Waldo Road Rail Trail create a harsh environment for pedestrians and bicyclists wishing to transfer to the Depot Avenue Rail Trail from the north, or to the Waldo Road Rail Trail from the south.

On-street bicycle lanes along Waldo Road running both north and south would be proposed. Traveling south along the Waldo Road Rail Trail, users would be encouraged to cross at the Citizen's Field pedestrian crossing through the use of an enhanced signage and wayfinding system for the Waldo Rail Trail. Users would then connect to the proposed on-street bicycle lane or off-street multi-use path travelling south along Waldo Road. Utilizing on-street bicycle lanes or an off-street path, southbound users now travel south along the west side of Waldo Road. Eliminating one of the crossings at the University Avenue and Waldo Road intersection will make the trail connection much more favorable for pedestrians and cyclists alike.

In a similar manner, SE 2nd Avenue would serve as the northbound connector for Depot Rail Trail users wishing to make the transition across University Avenue and eventually onto the Waldo Road Rail Trail. Users would similarly be encouraged to make their crossing at the existing SE 2nd pedestrian crossing, connecting to the newly installed on-street bicycle

lanes or existing sidewalk before travelling north through University Avenue (see figure 8.1). The portion of the Waldo Rail Trail between University Avenue and SE 2nd Avenue would be removed or enhanced in the form of a pocket park.

Implementing such a scenario holds tangible advantages over existing conditions and other rerouting options. Implementing this plan would require little additional infrastructure, and would require minimal adjustments to existing facilities. In the end this option enables trail users a more pleasurable experience traversing the Depot Avenue Rail trail and Waldo Road Rail Trail.

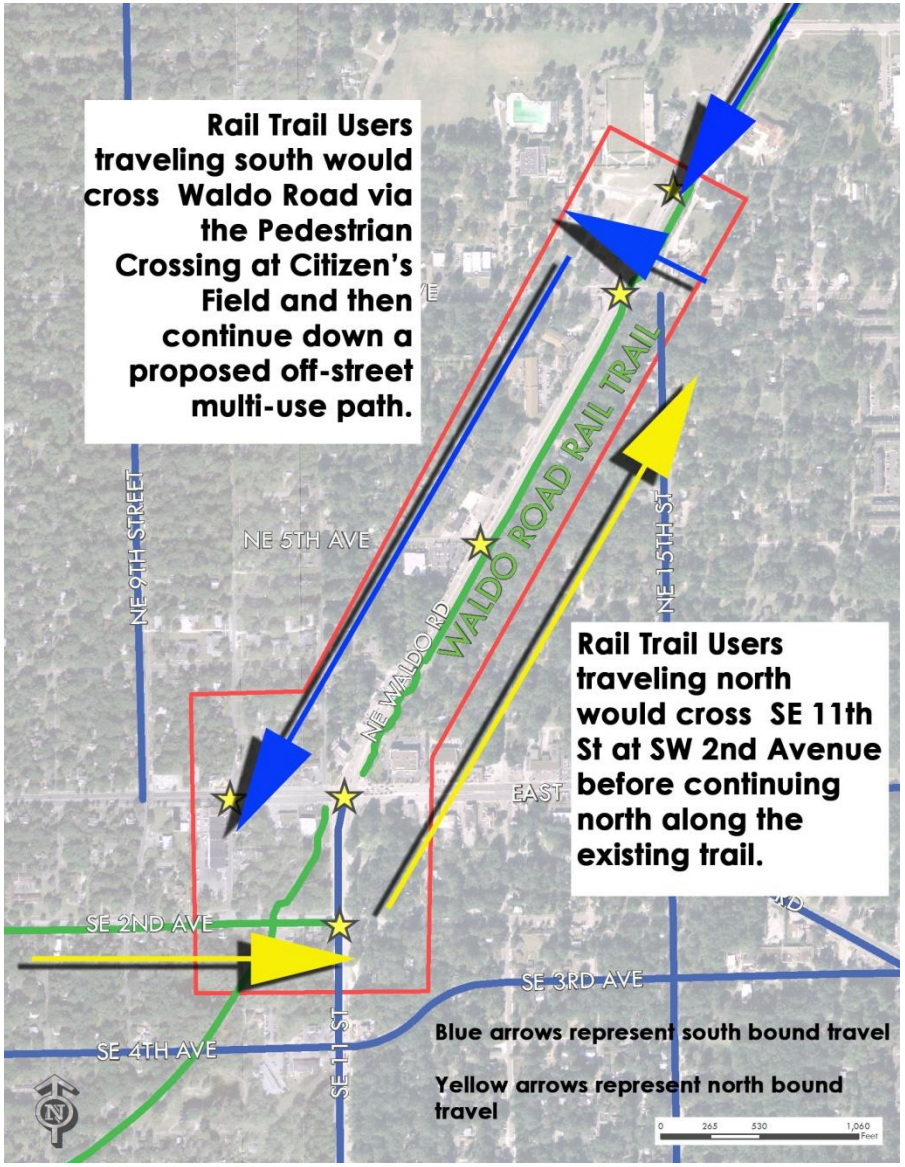


Figure 8.1: Proposed Waldo Rail Trail Re-route.

8.1. SE 2nd Avenue and SE 11th St

Strengths:

The presence of crosswalks, pedestrian signals and refuge in the median create a safer environment for non-motorized users. On-street bike lanes, vegetated median, tree canopy and wide sidewalks make SE 2nd Ave a comfortable environment for pedestrians and bicyclists.

Weaknesses:

A long crossing distance and brief pedestrian signal traversing SE 11th St may deter users from crossing at intersection (see Figure 8.1.1). Lack of on-street bike lanes on SE 11th St and narrow sidewalks with little separation from vehicle traffic creates an unfriendly environment for non-motorized traffic.

Figure 8.1.1: View west at SE 11th St crosswalk. Lack of striping and a long crossing distance are present.

Opportunities:

A wider median and pedestrian refuge will help further connect the streetscape that currently exists on SE 2nd Avenue. Striping along the crosswalk will improve motorist awareness for pedestrians and cyclists (see figure 8.1.2).

Figure 8.1.2: View west at SE 11th St crosswalk with proposed enhancements.

8.2. NE 5th Avenue and Waldo Road

Strengths:

The presence of the Waldo Road Rail Trail allows for ease of non-motorized travel in north to south directions.

Weaknesses:

No sidewalks on NE 5th Avenue and lack of pedestrian refuge while crossing Waldo Road create an unfriendly environment for the non-motorist. Because the Waldo Road Rail Trail is located on the opposite side of West Coast Seafood, Shands Community Practice, and a residential neighborhood, users are forced to cross Waldo Road. Heavy traffic travelling at greater than posted speed limits inhibits non-motorized use (see figure 8.2.1).

Figure 8.2.1: View west at intersection of NE 5th Avenue and Waldo Road. No pedestrian refuge and high speed traffic deters non-motorized use.

Opportunities:

Traffic calming measures could increase pedestrian and cyclist use at the intersection. Narrower drive lanes and a dedicated pedestrian crossing create the ideal environment for a bus rapid transit stop. Vacant commercial property on the eastern edge creates potential for a multi-modal transit and community retail node. Connection with NE 5th Ave to the east would allow greater access to proposed

transit stop, retail node and existing residential neighborhood.

Figure 8.2.2: View east at intersection of NE 5th Avenue and Waldo Road. No sidewalks or bike lanes. Connection through to NE 5th Avenue through the Waldo Rail Trail would enhance connectivity bring additional users to the area.

Threats:

Narrow lanes could slow vehicle traffic and create congestion. A transit stop without a dedicated lane or cut-out creates a potential bottle-neck and safety issues. Commercial establishments not properly oriented to the street may further automobile oriented condition that presently exists. Cost of connection to NE 5th and signal light may not be feasible.

8.3. Pedestrian Crossing at Citizens Field

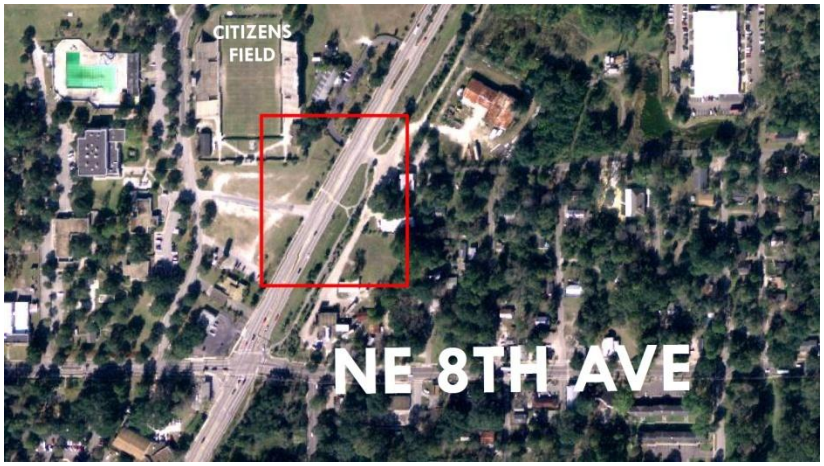


Figure 8.3.1: View south at Pedestrian Crosswalk at Citizens Field.

Strengths:

Narrow lane widths and a short crossing distance with dedicated pedestrian refuge allow for a comfortable pedestrian environment.

Weaknesses:

Narrow pedestrian refuge at crossing creates conflict for multiple users. Cyclists have difficulty navigating crossing due to median width. Lack of tree canopy and separation from high speed and heavy volume vehicle traffic creates perceived danger (see figure 8.3.1). There is a reluctance of users to use crossing, with many choosing instead to cross just north or south of the dedicated crossing.

Opportunities:

Increase width of crosswalk to allow for multiple uses and users. Enhance pedestrian crossing signage with flashing light. Reduce speed limit to 35 mph to deter the "drag strip effect" from the signalized intersection at NE 8th Ave.

Potential to utilize signage directing southbound bicyclists on the Waldo Road Rail Trail to use newly

implemented on-street bicycle lanes. This would ease the transition to the Depot Avenue Rail Trail continuing southbound.

Threats:

Further investment may seem unnecessary due to lack of use. Speed limit reduction met with criticism from motorists.

8.4. SE 10th and East University Avenue

Strengths:

An abundance of non-motorized users frequent the intersection, regardless of conditions and automobile oriented environment. A strong sense of community and neighborly feel is present in the immediate area - "everybody knows everybody" - people stop to talk to one another. Adjacent neighborhoods exhibit character and distinct establishment.

Weaknesses:

SE 10th is improperly aligned crossing north to south through University Avenue (see figure 8.4.2). Lack of pedestrian refuge, designated crossing area and the presence of a left turning lane create multiple collision opportunities (see figure 8.4.1). The southern leg of SE 10th does not have sidewalks. Heavy traffic volumes and a lack of bike lanes force bicyclists to use narrow sidewalks on University Avenue.

Figure 8.4.1: View north at intersection of SE 10th Avenue and University Avenue. No pedestrian refuge and high speed traffic deters non-motorized use.

Opportunities:

The installation of a vegetated median with tree canopy and pedestrian refuge will enhance safety and provide aesthetic value for the intersection. On-street bike lanes with narrower drive lanes will allow cyclists to use road for travel.

An opportunity exists to shift southern leg of intersection to the east due to existing property vacancy. Realignment will create a proper intersection and safer environment for motorist and non-motorist alike. The potential for a median to deter through traffic on SE 10th exists as well. Vacant property on SE corner can be redeveloped with pedestrian friendly urban form - shallow setbacks with wide sidewalks and orientation to roadway.

Figure 8.4.2: View south at intersection at SE 10th Avenue and University Avenue. Improper intersection alignment and lack of sidewalks and bike lanes create a harsh environment for non-motorized users.

Threats:

Restricting through access on SE 10th may be met with criticisms from local business owners. Adding on-street bike lanes on University Avenue may not increase safety or reduce sidewalk use by cyclists. Cost of SE 10th realignment may not be feasible.

8.5. NE 8th Avenue

Strengths:

The proximity of the Duval neighborhood to the intersection places a large user group at comfortable walking and cycling distances. The presence of crosswalks, pedestrian signals and refuge create a safer environment for non-motorized users.

Weaknesses:

High speed and heavy volume vehicle traffic flow deter non-motorized users. Waldo Rail Trail users are forced to cross intersection at pedestrian crosswalk. Overgrown landscape on the northeast corner hinders sightlines and allows for criminal vulnerability (see figure 8.5.2 & 3). Under-utilized commercial properties on western border promote automobile use and lack character. Lack of on-street bike lanes and narrow sidewalks without proper separation from automobile traffic fosters an uninviting environment for non-motorized traffic.

Figure 8.5.1: View northwest at the intersection of NE 8th and Waldo Road. Rail Trail users are forced on to cross at the intersection along with pedestrians.

Figure 8.5.2 & 3: View south (left) and northwest (right) at the intersection of NE 8th and Waldo Road. Overgrown landscape area creates vulnerabilities at the intersection.

Opportunities:

The abundance of non-motorized users creates the potential for a vibrant mixed-use community node. Increased densities with orientation to street and uses that function as destination locations will promote non-motorized users at the intersection. Bicycle parking with signage may promote additional use as well.

Wide drive lanes allow for the installation of on-street bike lanes and wider sidewalks with greater separation from roadway. Traffic calming and speed reduction should follow lane width reductions. Street trees or a vegetated median will help prevent the sense of separation shaped by Waldo Road. Higher densities and the presence of a destination mixed-use center create the need for a multi-modal transit stop.

Overgrown landscape presents an opportunity for beatification efforts to be implemented around the Duval neighborhood entrance sign to create a sense of place in the community.

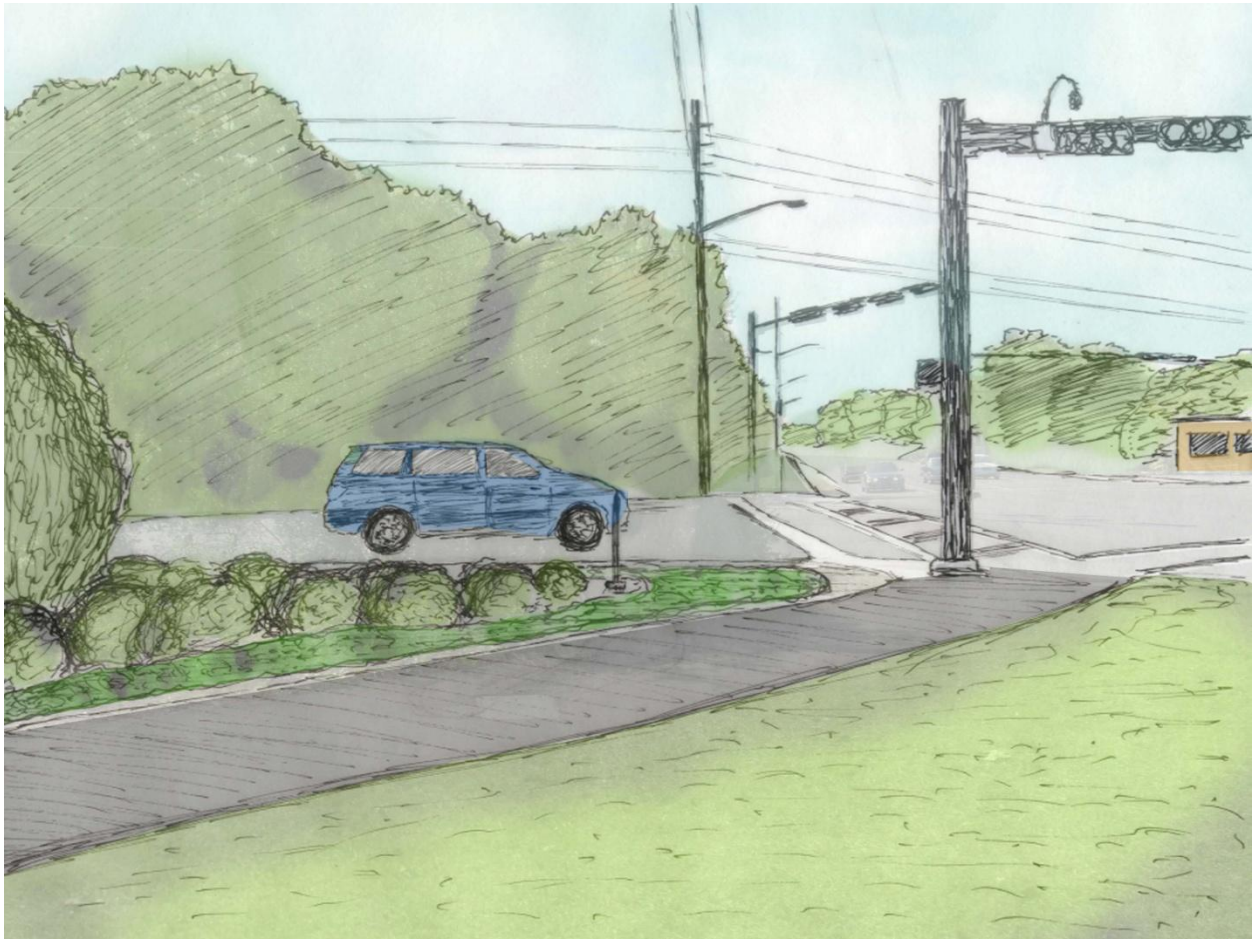


Figure 8.5.4: View south at the intersection of NE 8th and Waldo Road. Striping the crosswalk will make motorists more aware of cyclists and pedestrians. Removal of the overgrown landscape enhances sight lines and creates a welcoming opportunity for the entrance to the Duval Neighborhood.

Threats:

Disjointed redevelopment efforts and lack of implementation will leave the intersection and adjacent area in no better situation than is currently. Yet, focused redevelopment may change the character of the existing neighborhoods, while increased property values may displace residents. Reduction in lane widths and speed limits will be met with sharp criticism by motorists. Perceived criminal activity may further disinvestment in the area.

Figure 8.5.5: View northwest at the intersection of NE 8th and Waldo Road. The addition of Rail Trail signage provides wayfinding and increases aesthetics. Retail establishments along Waldo Road have the potential to be part of a vibrant mixed –use center.

8.6. Waldo Road and University Avenue

Strengths:

The presence of crosswalks and pedestrian signals create a safer environment for non-motorized users.

Weaknesses:

Wide crossing distances do not allow adequate time for most pedestrians and some cyclists to reach opposite side. Road geometries engineered for right-turning vehicles creates precarious situation for cyclists and pedestrians (see figure 8.6.1). Right turning vehicles are reluctant to come to a complete stop while turning onto University Avenue when travelling both east and west bound. The abundance of drive lanes leaves pedestrians and cyclists reluctant to traverse intersection.

Pedestrians and cyclists travelling north on Waldo Road with traffic are unable to see traffic signal and are forced to rely only on the pedestrian signal. Vertical elements hinder the view of pedestrians and cyclists for right-turning vehicles at the south east corner of the intersection (see figure 8.6.2).

Lack of pedestrian refuges at the medians make the intersection impassable for the handicapped or less agile pedestrian or cyclist. Lack of signage and wayfinding mechanisms deters rail trail users from continuing through intersection.

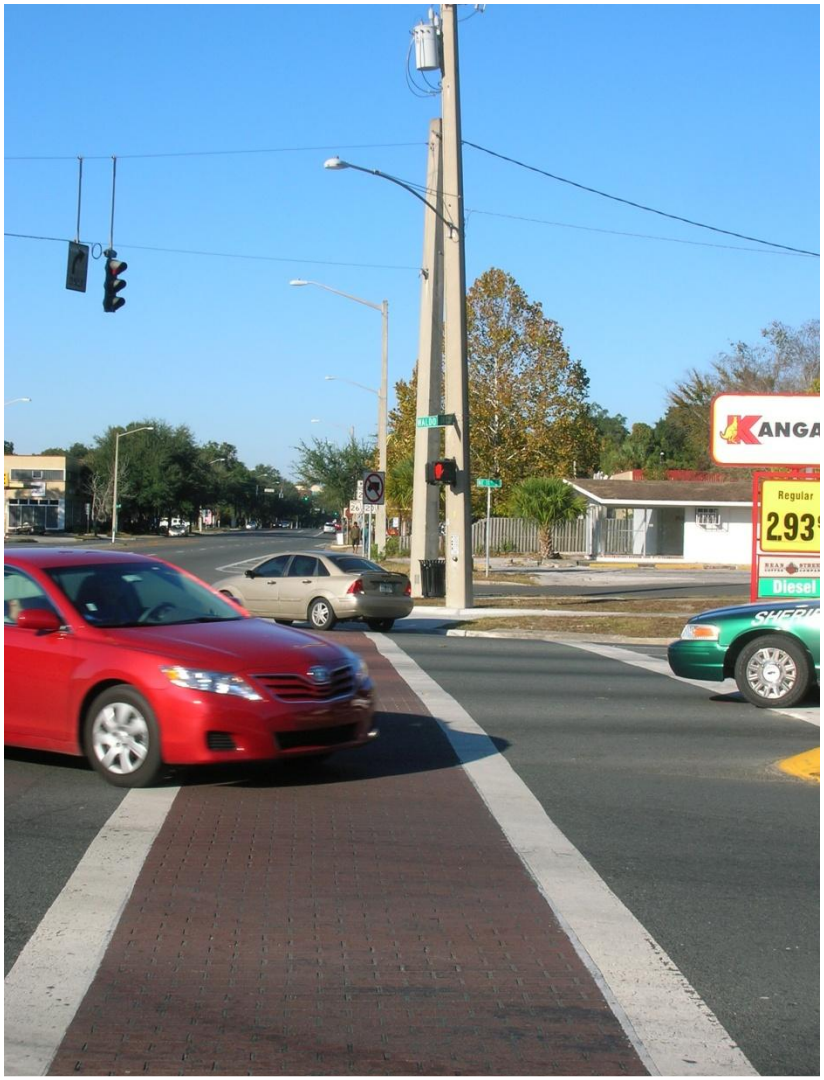


Figure 8.6.1: View west at the intersection of Waldo Road and University Avenue – plagued by long crossing distances and road geometries. Vehicles are often reluctant to come to a complete stop when turning red as shown above.

Figure 8.6.2: View south at the intersection of Waldo Road and University Avenue. Pedestrians and cyclists crossing north are unable to see the traffic signal and are vulnerable to right turning vehicles (see figure 8.6.5 below).

Figure 8.6.3: View west at the intersection of Waldo Road and University Avenue. Lack of striping and road geometries that cater to the motorist create a dangerous situation for the non-motorist (see fiaure 8.6.4 below).

Opportunities:

A proper connection for the Waldo Rail Trail will increase recreational use on the trail. This should be done with increased signage and wayfinding coupled with intersection enhancements. The intersection has the potential to embrace the Rail Trail with a modified "Barnes Dance" design coupled with smaller lane widths and the addition of pedestrian refuges at the medians. More specifically, the addition of on-street bike lanes and an off-street multi-use path would eliminate the need for south bound Waldo Rail Trail users to cross Waldo Road at the intersection.

Vegetated medians and canopy will increase safety and aesthetics at the intersection, while also providing a traffic calming effect. Reconfiguring the road geometry so that Waldo and SE 11th meet University closer to a ninety degree angle will also lessen the distance for which cyclists and pedestrians have to cross the intersection (see figure 8.6.4 & 5).

Considerations should be made to prohibit right turns on red from 7am to 7pm. Striping should be added to crosswalks to help further inform motorists of pedestrian and cyclist presence. Signal lights should be placed at the pedestrian scale to inform non-motorists of vehicle traffic flow.

Commercial establishments should be oriented to the street with parking placed at the rear of the building.

Threats:

This intersection is at the crossroads of two important freight roads. Opposition from the Florida Department of Transportation traffic engineers due to the potential for capacity reduction on the roadway. Traffic will have to be re-routed and delays will result from any construction related to reconfiguration.

Adjacent commercial establishments will likely object to any changes to the intersection, as they were initially established as to cater to the private vehicle.

Figure 8.6.4: View west at the intersection of Waldo Road and University Avenue with proposed enhancements.

Figure 8.6.5: View west at the intersection of Waldo Road and University Avenue with proposed enhancements. Note the pedestrian scale traffic signal, reconfigured geometry, and street trees.

9.0 Conclusion

The study area is subject to some unique conditions due to its inclusion in the Strategic Intermodal System (SIS). Namely, the Waldo Road corridor exists as both an urban highway and a recreational multi-use trail. After detailed research and observations conducted for the Waldo Road corridor, we can now conclude that primary and secondary level recommendations can be phased into this study area providing a much safer environment for pedestrians and bicyclists alike. By creating primary and secondary level recommendations, the bridge between the conflicting uses of the Waldo Road corridor can be made gradually to ensure periodic assessments can be made as the dynamics of the Waldo Road corridor change over time.

As part of our primary set of recommendations we propose elements that can be achieved with minimal financial investment, while still achieving desired goals. Stricter law enforcement, comprehensive signage, and community involvement are three primary recommendations we conclude will create the greatest positive gains with minimal financial investment.

Observing pedestrian and bicyclist behavior in the study area, we can conclude that stricter law enforcement of pedestrian, bicyclist, and motorist behavior will achieve more desired traffic circulation patterns in the area. As it currently stands, one of the most disturbing problems is the lack of enforcement, leading to potentially deadly conflicts between motorized and non-motorized users of the Waldo Road corridor.

Observations allowed us to conclude that a more cohesive and prominent signage program should be implemented as a primary measure towards a safe environment along the Waldo Road Rail Trail. Cohesive signage throughout the Waldo Road Rail Trail can be designed in a manner that is both aesthetically pleasing and informational for trail users. Proper signage would entail both consistent branding of the trail as well as proper trail etiquette. Prominent signage at intersections will give the motorist better visibility of locations where potential trail user interaction may occur.

Through observation, we can also conclude that community involvement will be necessary for a successful implementation of all recommendations, but particularly primary recommendations. We are con-

fident effective community involvement can be achieved through proven educational programs and community workshops that engage citizens on how to achieve the desired goal of improved pedestrian and bicyclist travel.

Moving towards our secondary set of recommendations, we deal with elements that require a more substantial financial investment, potential policy changes, and difficult permitting processes for infrastructure alterations. As part of this stage we conclude that a focus on setting the tone for a long-range goal of creating a dynamic pedestrian-friendly environment along the Waldo Road corridor. Small scale implementations, such as comprehensive pedestrian refuges along the study area are recommended to reduce the perceived danger for pedestrians and bicyclists along the corridor. We can also conclude the implementation of traffic calming measures on a larger scale should be implemented to further the feeling of safety along the study area. Lowering speed along the study area, combined with a comprehensive landscape plan in newly installed medians will create a walkable atmosphere conducive to attracting business to East Gainesville.

In addition to the secondary set of recommendations we can conclude that through observations, three key intersections have been identified for further study in order of priority:

- Waldo Road & East University Avenue
- NE 8th Avenue and Waldo Road
- SE 10th Avenue and 11th Street

These intersections represent three of the most heavily trafficked in the study area from both a motorist and non-motorist perspective. They also represent the intersections with the most potential for intensive redesign. Through additional research, elements of road configuration and potential trail rerouting can be explored in full detail. We understand that any reconfiguration of road geometries or trail rerouting would require significant financial investment for vested parties, therefore substantial additional research should be conducted.

10.0 Works Cited

American Association of State Highway and Transportation Officials. (2005). *AAASHTO Strategic Highway Safety Plan.* Washington, DC: American Association of State Highway and Transportation Officials.

City of Gainesville Planning Department. (2002, August 12). Transportation Mobility Element. Gainesville, Florida, United States.

Florida Department of Transportation. (2000, April). Florida Bicycle Facilities Planning and Design Handbook. Tallahassee, FL, United States.

Florida Department of Transportation. (2010). *Florida's Strategic Intermodal System*. Retrieved November 2010, from Florida Department of Transportation: http://www.dot.state.fl.us/planning/sis/

Gainesville Police Department. (2010). Crosswalk Safety– Making our streets safe. Gainesville, Florida, United States.

NHTSA's National Center for Statistics and Analysis. (2007). *Traffic Safety Data 2007.* Retrieved 10 14, 2010, from National Highway Transportation Association: http://www-nrd.nhtsa.dot.gov/pubs/810986.pdf

Pedestrian and Bicycle Information Center . (2010, May). The National Bicycling and Walking Study: 15-Year Report. Chapel Hill, North Carolina, United States.

Pucher, J., & Dijkstra, L. (2000). Making Walking and Cycling Safer: Lessons from Europe. *Transportation Quarterly* .

Pucher, J., & Dijkstra, L. (2003). Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany. *American Journal of Public Health* , 1509-1516.

United States Department of Transportation. (2010, April 26). *Tiger II Discretionary Grants Program.* Retrieved Septemeber 20, 2010, from http://www.dot.gov/docs/tigerii_fact_sheet.pdf

United States Department of Transportation. (2010, February 17). Transportation Investment Generating Economic Recovery(TIGER) Grants. Washington DC, United States.

University of Florida School of Architecture. (2009). *Designing the Waldo Road Corridor.* Gainesville: University of Florida.

University of North Carolina Highway Safety Research Center . (1994). Trail Intersection Design Handbook. Chapel Hill, North Carolina, Unietd States.

University of North Carolina Highway Safety Research Center. (1994). Florida Pedestrian Facilities Planning and Design Handbook. Chapel Hill, North Carolina, United States.

Appendix A. Survey Overview

Surveys were conducted both in-person and online to gauge the feelings of local bicycle enthusiasts concerning issues surrounding the bicycle network throughout Gainesville. Questions were asked to collect their basic opinion on elements of the bicycle network they view as being positive, as well as elements that could be improved upon. Topics included surface preference, maintenance issues, and current road design. The vast majority of subjects interviewed were recreational focused bicyclists, which gave a different viewpoint from the typical utilitarian user of the Waldo Road Rail Trail. A vast majority of individuals surveyed suggested they would like to see more bike lanes installed and a less segmented bicycle network, items which we took into account through our recommendations.

A.1 Intercept and Online Survey Questions

1.) How many times per month do you ride your bicycle? *Please provide a specific number*.

2.) Where did your last bicycle trip begin?

1. Home
2. Work
3. School
4. Store
5. Other_____

3.) Where did your last bicycle trip end?

1. Home
2. Work
3. School
4. Store
5. Other_____

4.) For what primary purpose do you use your bicycle?

1. To/from work or school
2. Recreation (within city limits)
3. Recreation (highways/touring)
4. Nature trails
5. Competition/Training
6. Other_____

5.) For what other purpose do you use your bicycle?

1. To/from work or school
2. Recreation (within city limits)
3. Recreation (highways/touring)
4. Nature trails
5. Competition/Training
6. Other_____

6.) Thinking of your bicycle preferences, how desirable do you find the following riding surfaces:

Please respond on a scale of 1 to 5, with 1 meaning you find this surface to be very undesirable to ride on and 5 meaning you find this surface to be very desirable to ride on.

1.	Separated (off-street), paved bicycle path	1	2	3	4	5
2.	Street with bicycle lane	1	2	3	4	5
3.	Separated (off-street), unpaved bicycle path	1	2	3	4	5
4.	Paved shoulder of road	1	2	3	4	5
5.	Sidewalk	1	2	3	4	5
6.	Multi-use trail (rollerbladers, pedestrians, bi-cycles, etc.)	1	2	3	4	5
7.	Paved roadway (no bicycle lane)	1	2	3	4	5

7.) Concerning bicycling in Gainesville, Florida, what is your level of satisfaction with the following:

Please respond on a scale of 1 to 5, with 1 meaning you are very unsatisfied and 5 meaning you are very satisfied.

1.	Safety education/training	1	2	3	4	5
2.	Enforcement of bicycle laws	1	2	3	4	5
3.	Bicycle laws	1	2	3	4	5
4.	Width of highways and street shoulders	1	2	3	4	5
5.	Courtesy of motorists towards bi-cyclists	1	2	3	4	5
6.	Courtesy of pedestrians towards bicyclists	1	2	3	4	5
7.	Courtesy of bicyclists towards pe-destrians	1	2	3	4	5
8.	Road debris (allows for a clean rid-ing surface)	1	2	3	4	5
9.	Crossing conditions at intersections	1	2	3	4	5

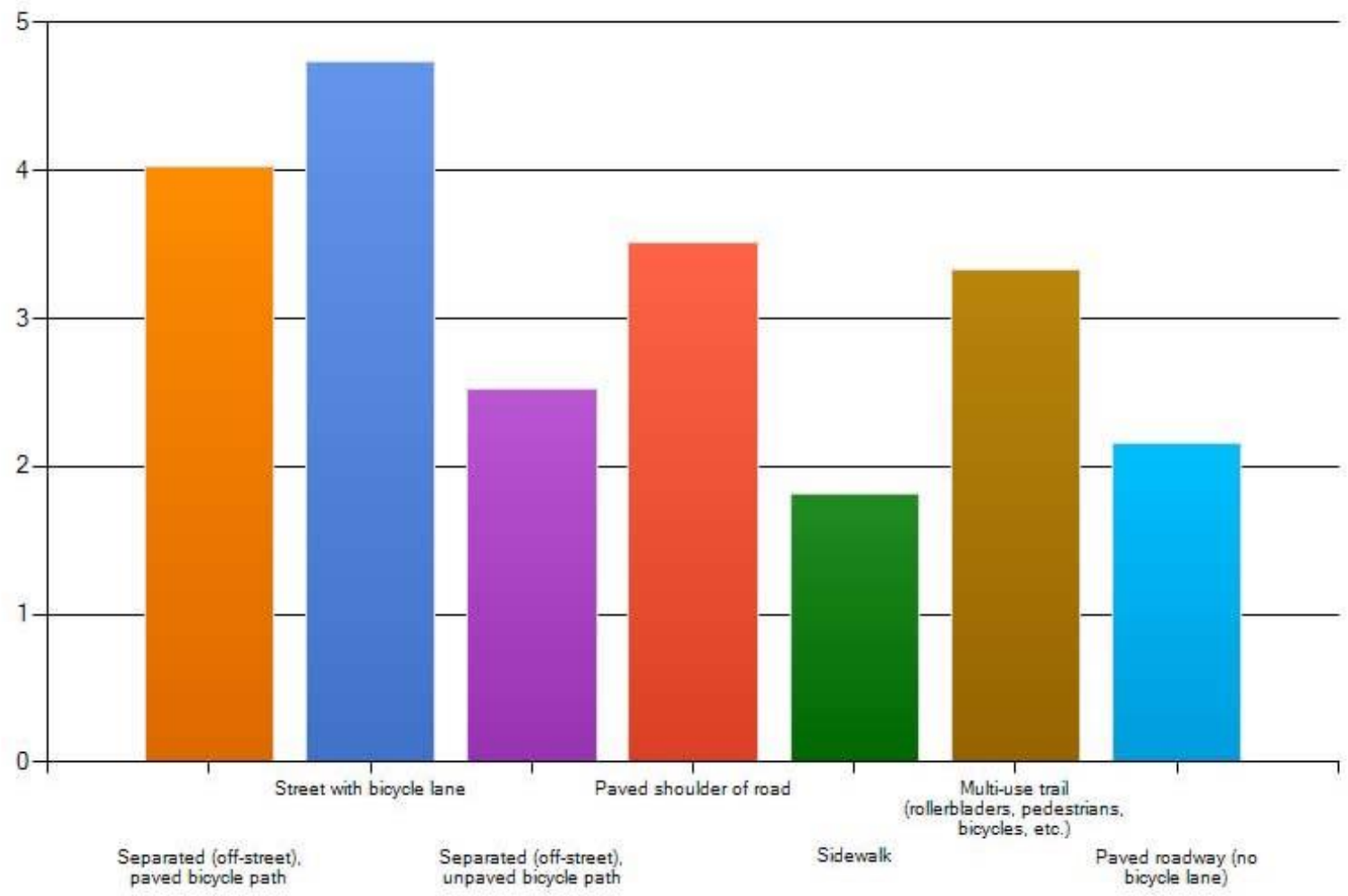
8.) What would you like to see done to improve bicycle transportation in Gainesville, FL?

9.) Considering bicyclist safety, what are the primary problems with Gainesville, Florida's current road designs?

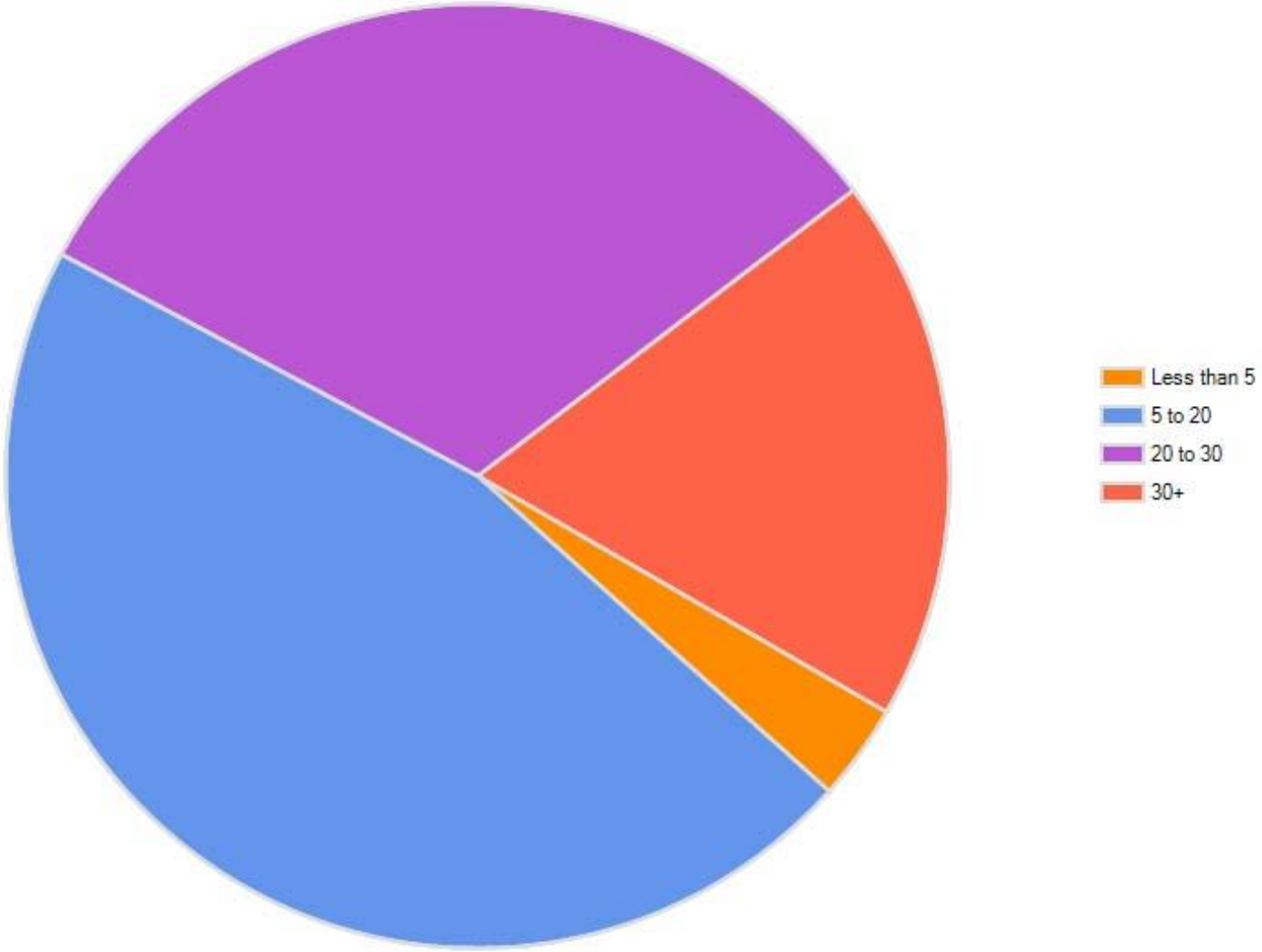
10.) Please answer the following questions for survey purposes only.

1. Year Born: _____
2. Gender:
    a. Male
    b. Female

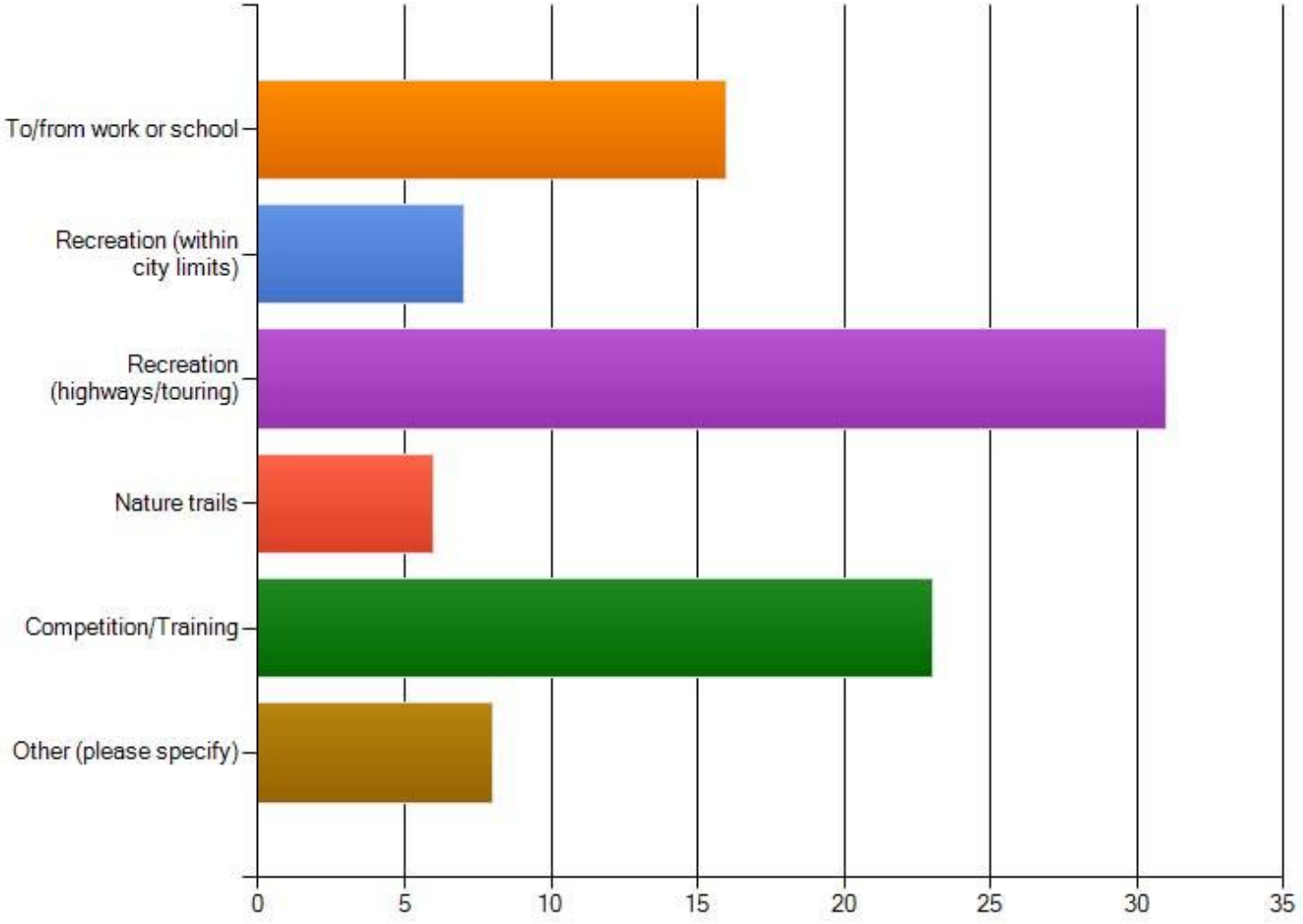
Graph A.1 Preferred Riding Surface for Bicyclists



Graph A.2 Number of Times Bicycle Used per Month



Graph A.3 Primary Purpose of Bicycle



What would you like to see done to improve bicycle transportation in Gainesville, FL?

	Response Count
	81
answered question	**81**
skipped question	**11**

7. What would you like to see done to improve bicycle transportation in

	Response Text	
1	More enforcement of bicycle laws regarding motorists and cyclists	Nov 5, 2010 5:02 PM
2	Wider seperation between road and bike lane. More bike lanes. Especially between the Interstate and 34th street on Archer road.	Nov 6, 2010 7:36 PM
3	wider and more bike lanes. Also the lanes that are available like Millhopper road have grass growing over them with limbs	Nov 6, 2010 7:38 PM
4	Ticket cyclists who ride the wrong way down a one-way street, particularly in a marked bicycle path. Warn (maybe not ticket) cyclists who ride on sidewalks--many casual riders do not know that this is unsafe. Ticket cyclists who run stop signs and traffic lights when traffic is present. Issue more motorist citations for "buzzing" cyclists. Remove the stop signs for cyclists on the Gainesville-Hawthorne trail. Require a bicycle safety module (targeted both at drivers sharing the road with cyclists and cyclists observing proper riding etiquette) as part of obtaining a FL driver license. Issue cyclists $1 speeding tickets when exceeding 20mph on campus :)	Nov 6, 2010 7:39 PM
5	more bike lanes and rails to trails, ticket riders riding against traffic, ticket motorists and scooters driving in the bike lanes	Nov 6, 2010 7:44 PM
6	More trails ... driver sensitivity education -- likewise bicyclist sensitivity to auto POV	Nov 6, 2010 7:47 PM
7	Have raised pedestrian crossings to act as speed bumps in commercial parking lots to slow down traffic. Also, more bike lanes, and no sidewalks without proper safe entry curbs to the road	Nov 6, 2010 7:48 PM
8	Education of motorists. Enforcement of automobile driver road rage. Education of auto drivers about the actual law pertaining to bicycles. They have many misconceptions (ie. bicycles should never ride 2 abreast....not what the law states).	Nov 6, 2010 7:51 PM
9	better bike lanes	Nov 6, 2010 7:53 PM
10	Wider bike lanes like the one on South Williston Rd	Nov 6, 2010 7:53 PM
11	Make motorist pay attention when driving.	Nov 6, 2010 8:09 PM
12	Narrow the streets. Add road furniture or other traffic calming features. Please, be more creative than speed bumps.	Nov 6, 2010 8:13 PM
13	More bike lanes of course. Get drivers to get off their cell phones and pay attention! More times they don't.	Nov 6, 2010 8:22 PM

7. What would you like to see done to improve bicycle transportation in

	Response Text	
14	More rumble strips between bike lanes and roads. More separate bike lanes. More city-sponsored off road bike parks.	Nov 6, 2010 8:38 PM
15	smoother riding surfaces, more bike lanes, clean up the debris in the roads especially the glass from car accidents	Nov 6, 2010 8:38 PM
16	More bike lanes with stutter bumps like 441 and 121. better surfaces, repainting of lines that have faded.	Nov 6, 2010 8:49 PM
17	Courtesy of motorists and education	Nov 6, 2010 8:57 PM
18	Establishing a comprehensive city bicycling network. More bike education for local schools.	Nov 6, 2010 9:04 PM
19	Traffic lights that are triggered by bicycles	Nov 6, 2010 9:12 PM
20	The cycling lanes are inconsistent. They appear and disappear in certain spots on roads, as on 13th street. There is a lot of debris, such as glass and metal, in the bike lanes. Drivers are inconsiderate and ignorant when it comes to cyclists. They don't share the road, even though it's the law, and I'm not sure a lot of drivers even know it's the law. I've had people yell at me to get on the sidewalk.	Nov 6, 2010 9:44 PM
21	more bike lanes educate drivers	Nov 6, 2010 9:56 PM
22	MORE BIKE LANES	Nov 6, 2010 10:14 PM
23	More bike lanes	Nov 6, 2010 10:29 PM
24	clean streets more often	Nov 6, 2010 10:36 PM
25	Bike line on University Ave More bike racks More share the road signs	Nov 6, 2010 10:44 PM
26	More bike lanes, repairing bike lanes with potholes & cracks, keeping joggers out of bike lanes, and keeping debris out of bike lanes.	Nov 6, 2010 11:21 PM
27	more bike lanes	Nov 6, 2010 11:23 PM
28	more bicycle lanes but NOT by making Gville's roads smaller!! no way should 16th/23rd be a single lane road just to make a bicycle lane.	Nov 6, 2010 11:24 PM
29	improve compliance of bicyclists with traffic laws, too many downtown on sidewalks who ride across intersections without looking	Nov 7, 2010 2:50 AM
30	More bike lanes	Nov 7, 2010 3:38 AM
31	Bike lanes on 16th, 8th and 23rd Street/Blvd.	Nov 7, 2010 10:59 AM
32	Resurface worn roads.	Nov 7, 2010 11:53 AM
33	connect bicycle lanes	Nov 7, 2010 12:55 PM
34	separation of Bicycles from traffic	Nov 7, 2010 12:58 PM
35	more routine inspection for potholes, glass, and other road hazards	Nov 7, 2010 1:40 PM
36	Clean out the edge of the roadway, I see the trucks that clean the road constantly, and all they do is brush debris right into the bike lane. While there are many drivers who act aggressively and try to intimidate me, I feel its other cyclist complete disrespect for the transportation laws that end up causing more of a threat to my existence at the end of the day. Cyclists! Quit running red lights and riding on the wrong side of the road.	Nov 7, 2010 1:50 PM
37	Repave some of the roads that have lateral grooves in them.	Nov 7, 2010 1:59 PM
38	cops enforce traffic rules and clean up of road debris.	Nov 7, 2010 3:09 PM
39	more dedicated paths	Nov 7, 2010 3:34 PM
40	More bike lanes in important commuting routes (i.e. Archer Rd. from 75 to campus). I use that route for commuting occasionally and I choose instead to ride over to Williston Rd and back as it is completely unsafe to ride between 75 and 34th st. on Archer.	Nov 7, 2010 4:26 PM

7. What would you like to see done to improve bicycle transportation in

	Response Text	
41	Add bike lanes to major roads.	Nov 7, 2010 4:33 PM
42	Greater enforcement of laws towards both motorist and rogue bicyclists. More bike lanes	Nov 7, 2010 5:49 PM
43	More Bike lanes and/or Bike usable shoulders. I also like the rumble bumps newly installed on Williston Road for alerting drifting auto drivers.	Nov 7, 2010 7:45 PM
44	Better education for motorists. Bike lanes for all newly paved roads.	Nov 7, 2010 8:21 PM
45	The bike lanes are not wide enough but it is not fair to cut down the driving lane	Nov 7, 2010 9:58 PM
46	Improve your survey....get a pro to help you	Nov 7, 2010 10:46 PM
47	Outlaw selling beer in GLASS bottles; the jerks who drink it while driving seem to adore tossing the bottles out of cars, making the road shoulders riddled with broken glass. Allow only aluminum cans and put a 10 cent deposit on each to encourage them to keep the cans onboard and recycle them, or make it worth someone else's time to pick the empties up off the side of the road.	Nov 8, 2010 12:23 AM
48	more bike lanes; stronger penalties for drivers who intimidate or injure bicyclists.	Nov 8, 2010 1:17 AM
49	More Cycling "Arteries": Tower Rd Bike lane. NW 23rd Ave Bike Lane NW 98th St Bike Lane Archer Road Bike Lane east of I75	Nov 8, 2010 2:34 AM
50	Creation of bicycle lanes where there are none such as 13th street, Waldo road, Archer road.	Nov 8, 2010 1:44 PM
51	better and more bike lanes thru out county	Nov 8, 2010 1:55 PM
52	More conections between bike lanes. we have a bike lane here and a bike lane there but very few that actually go N-S to downtown or archer rd.	Nov 8, 2010 1:56 PM
53	improve number and quality of gainesville's bike lanes along roads used by commuters	Nov 8, 2010 2:43 PM
54	educate motorists, use signage, do not use recessed gouges in roadway as warning strips (ie 441 south) as they are very dangerous for cyclists and have caused several serious accidents with injuries in my group alone --- use the small raised reflective dots now being installed on some roadways - edcuate motoritsts abou the 3 foot and no passing rulse to recognize that cyclists pay taxes too and have the same right to use the roads as motorists do...	Nov 8, 2010 4:06 PM
55	Any new roads to include adequate bike path.	Nov 8, 2010 4:28 PM
56	more bike lanes near the university	Nov 8, 2010 8:52 PM
57	More attention to re-building exisitng roads to be better suited to bicycles sharing the road as provided for in Florida Statutes.	Nov 8, 2010 9:54 PM
58	More bicycle lanes on frequently traveled streets	Nov 8, 2010 11:55 PM
59	I would like to see more bike lanes on the major roads leading into Gainesville: NW 13th street, NW6th street, etc.	Nov 9, 2010 2:26 AM
60	Cops need to enforce the law more with issues when motorists are driving their cars onto bike lanes so they can make the past on the right side.	Nov 9, 2010 2:40 AM
61	more bicycle lanes and more enforcement of vehiclular violators	Nov 9, 2010 4:39 AM
62	more bike lanes	Nov 9, 2010 10:53 AM
63	East- West Bike lanes for commuters (16th Avenue, 8th Avenue, University Avenue) as well as North - South Bike lanes for commuters (6th Street, 34th Street)	Nov 9, 2010 2:18 PM
64	Better coordination between Bike Ped Advisory Board, City/County govt., and cycling community regarding goals and communication of ideas. BPAB is old, anti-bike, unrealistic, and out of touch with commuter needs. Council people don't understand commuting, except for Byerly.	Nov 9, 2010 3:29 PM
65	I wish cars gave me more distance while passing	Nov 9, 2010 5:01 PM
66	More bike lanes! and More Trails!	Nov 9, 2010 5:07 PM

7. What would you like to see done to improve bicycle transportation in

	Response Text	
67	Road clean up. we have quite a lot of dead animals, trash, gravel, etc. on the roads.	Nov 9, 2010 5:09 PM
68	More bike lanes!	Nov 9, 2010 5:12 PM
69	regularly sweep bike lanes & intesections	Nov 9, 2010 5:13 PM
70	Larger shoulders, and wish the rumble strips along 441 had been put in immediately next to the paint, not a foot and a half away from it. Makes a much smaller area to ride on.	Nov 9, 2010 5:25 PM
71	All roads should have bike lanes or paved shoulders and intersections should show that the bike lane still exists	Nov 9, 2010 5:51 PM
72	Keep lanes clean.	Nov 9, 2010 5:53 PM
73	Addition of bike lanes on roads that have no specified area to ride (and likely no significant shoulder).	Nov 9, 2010 6:50 PM
74	Multi use trail along more streets, especially university avenue. Have to ride backstreets to get past there.	Nov 9, 2010 7:30 PM
75	more east-west road roads with bike lanes.	Nov 9, 2010 9:10 PM
76	Bike lane on 232 from 241 to 27/41 Bike lane on 98th St Bike lane from Tioga back towards Gainesville	Nov 9, 2010 9:37 PM
77	Install more bike lanes.	Nov 10, 2010 12:04 AM
78	Laws prohibiting cell phone usage by motor vehicle drivers. Most drivers are quite attentive to pedestrians and bicyclists, however, those on their cell phones are completely oblivious to their surroundings and the people there.	Nov 11, 2010 6:59 PM
79	Driver education concerning bicycles on roads without bike lanes and the three-foot law.	Nov 12, 2010 3:19 PM
80	Provide for bike sensors at signalized intersections, redesign secondary roads designed to speed bicycle travel	Nov 16, 2010 9:53 PM
81	Bike lanes are good.	Nov 19, 2010 10:43 PM