

# Walk Wilmington:

## A COMPREHENSIVE PEDESTRIAN PLAN

Adopted by Wilmington City Council on August 4, 2009



prepared by:

**Toole**DesignGroup

# Final Plan



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# Chapter 1. Introduction

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## TAKING A WALK IN THE PORT CITY

Going for a stroll along the Riverwalk on a summer evening is a favorite pastime of many Wilmington residents and visitors. This part of the city has been walkable from its founding days in the mid-eighteenth century and has a lively street life year-round. Outside of the historic core of the city, the walking environment changes from a traditional compact grid network of streets with sidewalks to a loosely connected network of neighborhood streets, sidewalks, trails, and informal paths separated by arterial roadways with multiple lanes of traffic in each direction.



Figure 1 Great Walking Street

The pedestrian experience varies dramatically in different parts of Wilmington. The historic downtown area has a rich system of sidewalks, marked crosswalks, signalized intersections, and other accommodations for walkers. Within residential neighborhoods, there are many areas with low traffic volumes and low vehicle speeds, so walking on the side of road is fairly pleasant. However, along many of the city's major arterials, people must walk along busy roadways, and there are many areas where there are no sidewalks or crosswalks, resulting in a relatively unpleasant pedestrian environment.



Figure 2 Grand Opening of Cross City Trail  
Source: WMPO

Wilmington's leaders understand the importance of creating a city where streets, sidewalks and other pedestrian accommodations are designed to make pedestrians feel safe and comfortable. Several initiatives and projects are underway to support pedestrians and bicyclists including the Safe Routes to School program, Neighborhood Traffic Management Program, Cross-City Trail, Military Cutoff Trail, River to the Sea Bikeway improvements, and sidewalk construction program. The



Figure 3 Halyburton Park Trail

Military Cutoff Trail is a popular route for leisure walking and bicycling which connects the neighborhood of Ogden with the Mayfaire development. The Cross-City Trail, which will eventually span over ten miles, will connect key destinations such as Wrightsville Beach, University of North Carolina - Wilmington, McCrary Park, Empie Park, Cameron Art Museum, Halyburton Park and James E. L. Wade Park.

The walking environment is the base from which all residents, employees and visitors experience Wilmington. The city's pedestrian system is vital to everyone, regardless of his or her transportation choice. Everyone who travels in the city is a pedestrian at some point during their journey. This includes walking to and from bus stops and parking facilities.



Figure 4 Sidewalk on Carolina Beach Road

However, it takes more than sidewalks to ensure an effective and appealing pedestrian transportation system—it requires attention to elements both inside and outside of the right-of-way. These elements can include landscaping, lighting, building design, building orientation, access to transit, and the presence of street crossings.

Wilmington needs to build upon its current strategies for constructing, improving, and maintaining the pedestrian facilities throughout the city. This will help address problems such as gaps in the pedestrian system, inadequate maintenance and repair, and hazardous conditions. A key component to developing a walkable city is effective and sustained public education and involvement. Opportunities for education exist with relation to the laws governing our roads and sidewalks, the availability of city programs for pedestrians, as well as communicating the societal need for transportation choices.



Figure 5 Sidewalk at Castle Street and South Front Street

The *Walk Wilmington: Comprehensive Pedestrian Plan* serves as a framework for the implementation of new city policies, guidelines and design standards that ensure pedestrians are provided an adequate and safe transportation system. The plan also focuses on program development to expand education, encouragement and awareness campaigns and programs, which in turn helps to enhance safety and enforcement initiatives.



The *Walk Wilmington: Comprehensive Pedestrian Plan* encourages pedestrian activity by working toward creating a safe and inviting environment for walking. The plan expands upon the foundation created by *Choices: The City of Wilmington Future Land Use Plan 2004-2025*, the *Wilmington Urban Area Metropolitan Planning Organization (WMPO) 2005-2030 Long Range Transportation Plan*, and several other city planning studies and reports.

## BENEFITS OF WALKING

There are many benefits to be gained from walking. These can include the opportunity to use walking as a means of transportation, promoting safer and more vibrant communities and helping to improve a person's health and fitness. As cities across the country grow, walking is becoming an important quality of life component and factor residents consider in choosing where to live. The benefits of walking are summarized below.



Figure 6 Crossing North 3rd Street

### ***Vitality***

Walkable cities include vibrant and active streets that promote commercial and social exchange. With approximately 40% of the land area of United States' cities dedicated to transportation, streets and sidewalks are a city's most expansive public space. Sidewalks ideally function as positive places to meet, play, live, work and shop.

Walking provides a range of benefits to the community. Many of the tangible benefits of providing pedestrian facilities include safer and healthier residents, cleaner air, and higher property values. Investing in safe and connected pedestrian facilities achieves multiple objectives and will help to ensure a high quality of life for Wilmington residents as well as visitors.

## Equity

For many travelers, driving is not an option. About one-third of all Americans do not drive—they may be too young, too old, or unable to afford a car (2000 US Census). In Wilmington, approximately 12% of households do not own a car at all. The average family has to work for more than six weeks to pay a year's car expenses; while walking is an affordable option (US Census, 1998 median family income figures). Walking is the most broadly accessible form of transportation and recreation, requiring no fare, fuel, or license. For those who cannot use other modes of transportation, the ability to walk safely is essential. For young people, walking affords a sense of independence. For seniors, walking is an effective means to stay active, both physically and socially.

## Health

The health benefits of regular physical activity are far-reaching: reduced risk of coronary heart disease, stroke, and other chronic diseases; lower health care costs; and improved quality of life for people of all ages. Walkable cities promote healthy citizens. Health professionals recommend walking as a form of physical activity to help prevent a host of diseases including obesity, heart disease, and some forms of cancer. Research conducted



Figure 7 Walking the Dog

by the US Centers for Disease Control found that "obesity is linked to the nation's number one killer—heart disease, as well as diabetes and other chronic conditions". The report also states that one reason for Americans' sedentary lifestyle is that "walking and cycling have been replaced by automobile travel for all but the shortest distances."<sup>1</sup>

## Transportation

Increasingly, Americans are considering walking or bicycling as they plan their trips for work, errands, entertainment and other reasons. This may be for health purposes, or it may be a decision based on environmental concerns, convenience, or other factors. Although it is too soon to declare it a trend, there is anecdotal data indicating that rising fuel costs will encourage more people to choose more affordable transportation options such as walking, bicycling or transit. This

**"High gas prices have  
commuters looking for options"**  
-StarNews headline. June 3, 2008

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<sup>1</sup> David B. Allison, PhD; Kevin R. Fontaine, PhD; JoAnn E. Manson, MD, DrPH; June Stevens, PhD; Theodore B. VanItallie, MD, Annual Deaths Attributable to Obesity in the United States ([JAMA, 1999](#)) 1530.-1538.



pattern may likely be accelerated by the current economic situation where more people cannot afford automobiles and the associated costs of insurance and maintenance. Furthermore, in many areas of the country, school systems are requiring more kids to walk because they simply cannot afford to bus them.

According to 2000 US Census data, in Wilmington, almost 3% of all work trips are by foot and a little over 12% of households do not own a car. Figure 8, Car Ownership Rates, illustrates the distribution of relative rates of car ownership around the city with darker colors corresponding to the census tracts where fewer people own cars. The areas with the lowest rates of car ownership are clustered along the river in the areas that generally correspond to the Central Business District Zone and the Urban Core Zone (see Figure 12).

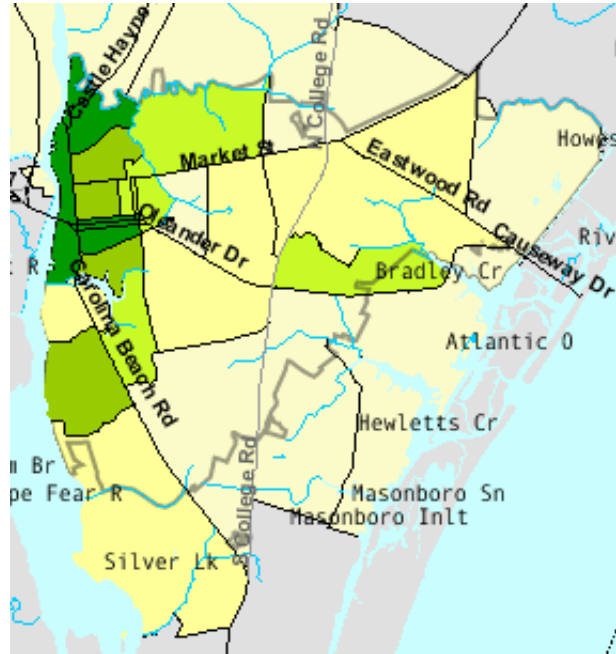


Figure 8 Car Ownership Rates

Source: US Census 2000 data

These are areas where it is more likely that people would need good pedestrian facilities. Whether it is by choice or by necessity, the city's demographics, climate, topography, and land use mix increase the likelihood that more residents may opt for the walking option in the future.

## Quality of Life

For Americans, the single-occupant vehicle has dominated the realm of transportation. Land use development across the country, especially for suburban development, has focused on accommodating the vehicle first and all other modes second, or not at all. By prioritizing the car, transportation systems have a tendency to ignore populations that cannot, or do not drive: the young, the elderly, the disabled, others. When transportation projects ignore these populations, they may become isolated.

An inclusionary school of thought that has emerged in response is the universal design paradigm. The main principle behind universal design is to develop facilities that function for all users. For example, sidewalks and curb ramps that work for people in wheelchairs are also excellent for small children, people pushing strollers and other users. Furthermore, enabling

mobility in groups that do not drive themselves not only provides these groups with independence, but it also improves the quality of life for the community as a whole.

Benefits of incorporating universal design can include economic growth, improvement in safety, options and opportunities for exercise, less automobile traffic, and improvement in air quality.

The health and safety benefits are obvious. When people have opportunities to walk to destinations instead of drive, they can more easily meet the US Department of Health and Human Services' recommended minimum of 30-60 minutes of daily exercise.<sup>2</sup> When people increase their activity level they are proactive in the prevention of obesity-related diseases such as diabetes and heart disease. Additionally, more people out walking on the streets increases community awareness, an important crime prevention tool.



Figure 9 Leaving Winter Park Elementary School

The less apparent benefit is economic growth. Designing central businesses districts and other commercial areas with a focus on walkability creates benefits for shops, restaurants, and other businesses. When streets are pleasant and accessible by foot, people often stay in the shopping centers longer than if they were designed with an emphasis on motor vehicle circulation. Lodi, California saw a 12% decrease in retail center vacancy rates after making targeted improvements in pedestrian infrastructure and streetscape improvements.<sup>3</sup>

Taxpayers appreciate alternatives to vehicular transportation because transportation costs are generally lower in walkable communities. This is especially true in the current economy where more people may not be able to afford automobiles, insurance, and fuel. According to data from the U.S. Bureau of Labor Statistics, transportation costs can be reduced by \$600.00 per month if people do not own a car.<sup>4</sup> This reduction in household expenses can free up money for other spending or investment. Furthermore if the trends of increasing fuel costs continue, more people will be willing to substitute other modes of transportation over the single-occupant vehicle.

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<sup>2</sup> Dietary Guidelines for Americans, 2005. Available online at <http://www.health.gov/DietaryGuidelines/dga2005/document/default.htm>

<sup>3</sup> "The Economic Benefits of Walkable Communities," by the Local Government Commission for the California Department of Health Services.

<sup>4</sup> <ftp://ftp.bls.gov/pub/special.requests/ce/share/2004/age.txt>

## BACKGROUND

Wilmington was incorporated in 1739 and officially earned city status in 1866. The city's prominent location on the Atlantic shore has contributed to its success in the railroad and shipping industries. Wilmington has been fortunate to experience steady growth since the nineteenth century, only experiencing setbacks during the Great Depression of the 1930s. Quickly bouncing back with post World War II growth, a state port was established by the North Carolina Legislature. In 1947 higher education established roots in the city when Wilmington College, now the University of North Carolina Wilmington opened for registration. The return of servicemen along with newcomers facilitated the suburban growth outside the downtown core.

Wilmington's early residential development focused mainly near the port and railroad stations. People could accomplish many of their trips by walking. First floor shops were complimented by offices and living areas in the second and third floors. All of the major institutions were located in the downtown. Motor vehicles were accommodated later in the mid to late twentieth century.

Like much of the United States, the City of Wilmington focused on accommodating personal motor vehicles in the late 1950s, as the automobile became available to the middle class. This resulted in a development pattern where uses were isolated keeping residential, industrial and retail establishments separate. Disconnected development patterns combined with a reliance on the automobile have resulted in higher congestion, degraded air quality, and less walking.



Figure 10 Sidewalk Ends at Intersection  
South College Road at Oleander Drive

Much of the development constructed from the 1950s through the 1990s provided no sidewalks and few interconnecting streets. Many arterial streets were designed as multi-lane roadways with long spacing between signalized intersections, making it difficult to cross the street safely. Additionally, some of the arterial roadways were originally narrower local roadways that have been widened over time to carry increasing traffic at higher speeds. Sidewalks that were provided were often located at the back of the curb without buffers, creating an unpleasant

walking environment. This has resulted in hundreds of miles of suburban and semi-rural roads with no sidewalks and little opportunity to travel as a pedestrian.

Development in the city can be categorized into four character zones that radiate eastward starting with the *Central Business District Zone* shown in yellow, located on Cape Fear River (see Figure 11). The *Urban Core Zone*, shown in tan, includes the gridiron blocks of the downtown and coincides roughly with the 1945 corporate limits. Further to the east are the streetcar and post-WWII suburbs, within the *Traditional Suburban Zone*, shown in green. The furthest ring from the downtown is classified as the *Automobile-Oriented Suburban Zone*, shown in blue, and is characterized by low-density suburbs. Much of the land in the *Automobile-Oriented Suburban Zone* was annexed from New Hanover County by Wilmington within the last 20 years. The county has historically had fewer requirements for pedestrian accommodations so most roadways in older areas do not have sidewalks or street crossings. Tying together all four zones are several major state-maintained arterial roadways. Wilmington is unique among cities its size in that, with the exception of portions of the Martin Luther King, Jr. Parkway (US Highway 74), there are no freeways within the city limits. Please see Chapter 3 for a more detailed discussion of pedestrian facilities in the four character zones.

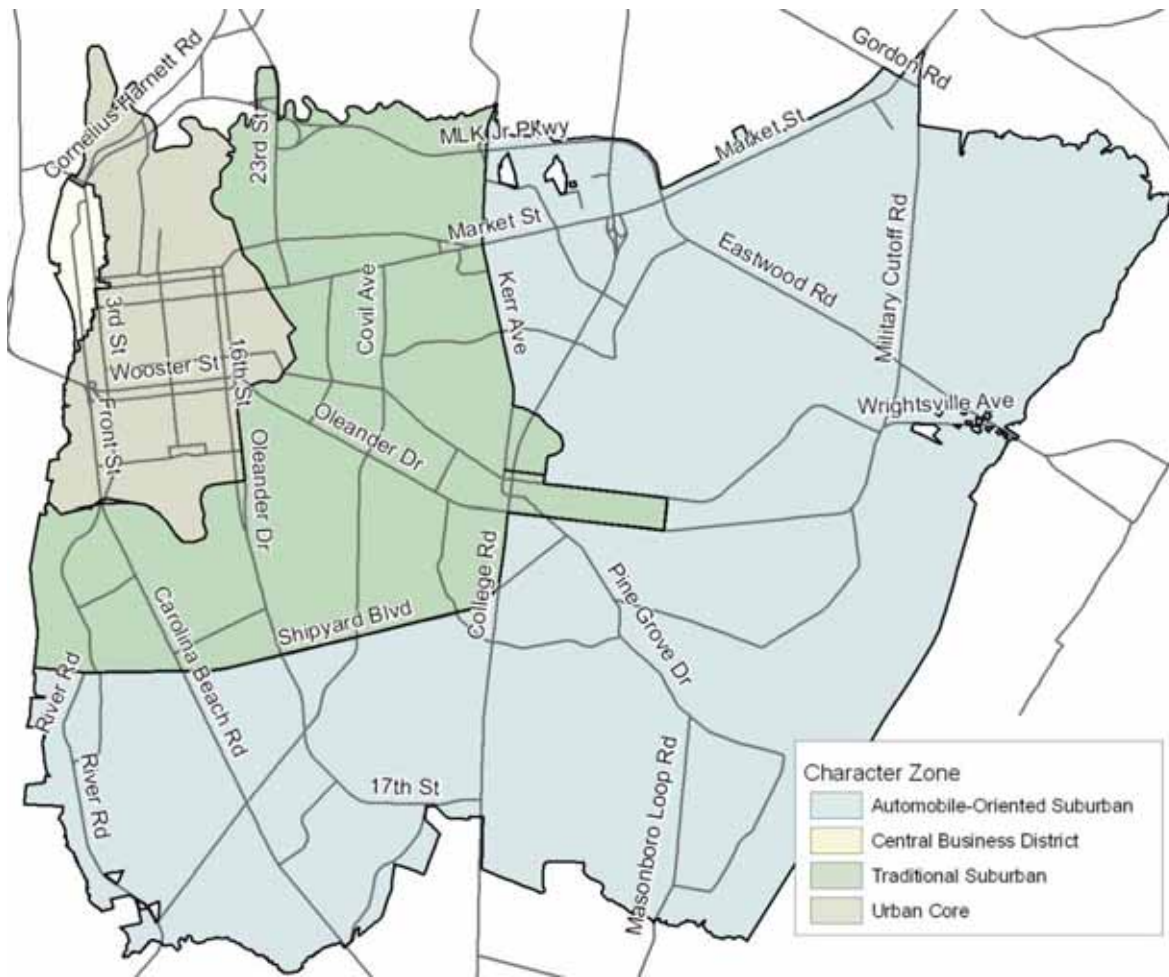


Figure 11 Wilmington Character Zones

Today, the City of Wilmington is a dynamic city of over 100,000 residents<sup>5</sup>. According to the US Census 2000, in 1999 Wilmington's median age was 34.1 years, which is slightly younger than the national median age of 35.3. However, 15.3% of the total population was 65 years old and over. Additionally, 15.1% of the total population had disability status compared to 12.4% nationally. In 1999 the median household income in Wilmington was \$31,099 per year and 13.3% of Wilmington's families had annual incomes below the poverty level. These three groups often use non-motorized transportation and/or mass transit. Subsequently, the quality and extents of the pedestrian network are important to providing mobility for these residents. Results of the online survey indicated that 37.7% of respondents frequently (three or more times a week) chose to walk for their errands.

<sup>5</sup> Wilmington Metropolitan Planning Organization, 2008



The populations that are most affected by walking conditions are children and seniors. These individuals are generally unable to drive and are often dependent on others for long trips. Because of this, they can be isolated if they live in areas where even short trips are not walkable due to lack of sidewalks or safe routes to bus stops. For children this is especially problematic for trips to school. In the morning rush hour, schools are crowded with buses and cars driven by parents dropping their children off at school. This congestion reduces air



Figure 12 Winter Park Elementary at McMillan Avenue

quality when engines are idling and waiting to enter and exit parking lots. Many of the students live within walking distance of schools (walking distance ranges from 0.25 to 0.5 mile) but do not walk to school. There are a variety of reasons, including:

- No safe routes to school
- Parents unaware of safe routes to school
- Parents uncomfortable letting their children walk unsupervised

Schools are also destinations for adults. Two institutions for higher education are located within the City of Wilmington: the University of North Carolina - Wilmington (UNCW) and Cape Fear Community College (CFCC). The main campus of CFCC is located in the *Central Business District Zone* and is a popular walking destination. UNCW is located further east of the downtown, within the *Automobile-Oriented Suburban Zone*. Because this campus is flanked by high-volume arterials, primary access is by private vehicle and shuttle bus, although a significant number of students were observed walking to and from school. Safe walking routes to and from these destinations are a critical element of this plan.

A similar destination is the New Hanover Regional Medical Center located on South 17th Street south of downtown. The hospital, and associated medical facilities in the immediate region provide medical care for many of the city's residents, and several patients and employees travel to and from these facilities by bus and/or on foot. Additionally, many of the patients are seniors or use assistive devices for traveling and are therefore more impacted by the quality and accessibility of the pedestrian system. Leading pedestrian interval signals, countdown timers, median refuge islands and other recommendations included in Chapter 4, Policies, Codes and Ordinances will enhance the safety and comfort of these groups.

The city's Parks and Urban Forestry Division is responsible for the maintenance of over 500 acres of public parks and landscaped areas. This will make the process for constructing and improving trails within the parks, as well as connecting the parks to the surrounding areas and neighborhoods, relatively easy, as there is only one level of government involved. The city's Streets Division is responsible for the construction and maintenance of all city-owned streets and all public sidewalks within the city limits. These two city departments have a critical role in maintaining or improving the quality of the existing pedestrian network and implementing the facility and policy recommendations included in this plan.



Figure 13 Greenfield Lake Trail

Most major arterials within the city are maintained and managed by the North Carolina Department of Transportation (NCDOT). These roads include US Highways 17 Business, 74, 76, 117, 421 and NC 132 and 133. Several

## PLAN OUTLINE

Chapter 2 articulates Wilmington's vision, goals, and objectives related to pedestrians and provides an overview of the scope of work and public involvement process for the plan. Chapter 3 describes the existing pedestrian system, identifying key barriers to walking in Wilmington. Chapter 4 critiques existing pedestrian-related policies, codes and ordinances to ensure they support pedestrian travel. This chapter focuses on updating development ordinances to require the inclusion of pedestrian facilities in private residential and commercial development. Chapter 5 reviews existing pedestrian design standards and guidelines, and is supplemented with best practice design standards for pedestrian facilities. Chapter 6 identifies priority areas for pedestrian improvements. Chapter 7 addresses programs that support and encourage walking in Wilmington. Chapter 8 describes the process for constructing and maintaining pedestrian facilities and includes a chart of agencies/organizations and their realm of responsibility. This chapter also identifies current and potential funding sources and an implementation plan that names responsible parties and a general timeframe for implementation.

The technical appendix contains a variety of supplementary information: policy background, cost estimates, questionnaires and survey results. Most importantly, the Appendix contains design policy 'cut sheets' or white papers on key topics related to pedestrian accommodations.





## Chapter 2. Vision and Plan Development

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The City of Wilmington is committed to implementing safe and accessible pedestrian facilities, encouraging pedestrian-oriented site development patterns, implementing educational and encouragement programs to make residents aware of the importance of pedestrian safety and walking. The city recognizes the value of walking as a viable means of transportation, and for promoting environmental sustainability and the commercial vitality of downtown and neighborhood districts.

By 2030, the Wilmington metropolitan area population is expected to grow to 405,300. Quality of life issues, such as walkability, are critical to making this city a desirable place to live, work and recreate.

### FORMULATION OF A PEDESTRIAN VISION AND GOALS/OBJECTIVES

Wilmington's commitment to pedestrians is growing. In April of 2007, the WMPO BikePed Committee was formed to advise the WMPO Transportation Advisory Committee on issues regarding pedestrian programs, projects policies and safety. Members consist of city, and NCDOT staff, as well as appointees from various governmental agencies within the WMPO. It is this committee's efforts and labors that earned the NCDOT grant for this plan. Furthermore, this committee is responsible for the overall concept of the plan.

The Transportation Advisory Committee and Wilmington City Council accepted the WMPO BikePed Committee's recommendation to pursue a pedestrian plan and appointed key players to the plan's Steering Committee. The purpose of the Steering Committee is to establish a cohesive vision and participate actively in the steering of the plan.

### WILMINGTON PEDESTRIAN VISION

*The City of Wilmington will become a pedestrian-friendly environment, where citizens and visitors have safe and attractive alternatives for walking in and around the city.*

## GOALS

The following goals were established to reach the pedestrian vision:

### **Goal 1: Safety**

Residents and visitors of all physical abilities will be able to travel safely on foot along and across the city's roadways, trails, and sidewalks.

### **Goal 2: Transportation Choice**

Pedestrians, regardless of location, mobility level, age or socioeconomic status, will be able to choose a convenient and comfortable mode of travel to reach their desired destination. Pedestrians will be a strong presence on the streets of Wilmington.

### **Goal 3: Built Environment, Land Use, and Connectivity**

Land uses in Wilmington will provide pedestrians with walkable destinations and the built environment will enhance the pedestrian experience and encourage walking. Adjacent land uses will be connected by pedestrian facilities such as sidewalks and crosswalks so that pedestrians can safely and conveniently make trips on foot.

### **Goal 4: Education, Awareness and Enforcement**

People will have access to educational opportunities to learn about the benefits of walking as well as access to walking resources. Wilmington will raise awareness and enforcement of safe walking and driving practices and pedestrian and motorist rights and responsibilities.

### **Goal 5: Health**

Citizens will be more physically active by walking on a regular basis. Improving their health and reducing their health care costs. Creating more walking opportunities will also improve air quality, which will improve the outdoor environment.

### **Goal 6: Economic Development**

Tourists will be drawn to Wilmington for its comfortable walking environment. Among southern coastal cities, Wilmington will stand out because it's walking routes are safe and convenient, as well as aesthetically pleasing.

## OBJECTIVES AND POLICIES

Objectives and policies were developed for each goal to provide further direction for meeting the city's pedestrian goals and vision. Chapter 8, Implementation and Funding, describes the specific actions to achieve these goals and objectives.

### ***Goal 1: Safety***

Citizens of and visitors to Wilmington will be able to travel safely on foot along and across the city's roadways trails, and sidewalks. The Steering Committee specifically noted that children should have safe routes for walking to school.

#### **Objective 1.1**

All transportation projects should incorporate complete streets design elements. "Complete streets" are roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users. Pedestrians, bicyclists, motorists and public transport users of all ages and abilities are able to safely and comfortably move along and across a complete street. All new traffic signals should include pedestrian signal heads and marked crosswalks.

#### **Objective 1.2**

The city will develop countermeasures to reduce the number of pedestrian crashes at identified locations. This will include using traffic calming as a tool to increase pedestrian safety and comfort.

#### **Objective 1.3**

The city will install three or more new signalized pedestrian crossings per year. (about \$150,000/year in 2008 dollars)

#### **Objective 1.4**

The city will conduct education and enforcement campaigns and will design streets to reduce motor vehicle speeds and increase safe driving and walking behaviors.

#### **Objective 1.5**

The city will encourage schools to apply for Safe Routes to School Grants and also to participate in other Safe Routes to School programs and events.

#### **Objective 1.6**

Provide greater awareness of pedestrian laws, rights and responsibilities to affected groups, including but not limited to law enforcement, court officials, and the general public.

#### **Objective 1.7**

Provide a higher level of enforcement to increase pedestrian safety.

## ***Goal 2: Transportation Choice***

Pedestrians regardless of location, mobility level, age or socioeconomic status will be able to choose a convenient and comfortable mode of travel to reach their desired destination. Pedestrians will be a strong presence on the streets of Wilmington.

### **Objective 2.1**

The city will construct two miles (10,560 feet) of new sidewalk per year. (about \$422,000 in 2008 dollars)

### **Objective 2.2**

The city will develop strategies and design solutions to overcome barriers to pedestrian travel in Wilmington, such as arterials, bridges and missing linkages.

### **Objective 2.3**

Streets in Wilmington will be designed as multi-modal facilities, providing access to destinations by motor vehicle, on foot, by bicycle and by transit.

### **Objective 2.4**

The city will increase the provision of off-road pedestrian paths and improve connectivity to existing paths and greenways.

### **Objective 2.5**

The city will ensure that pedestrian facilities are maintained and repaired and are accessible for all users. This includes requiring property owners to maintain vegetation adjacent to sidewalks on a regular basis.

## ***Goal 3: Built Environment, Land Use and Connectivity***

Land uses in Wilmington will provide pedestrians with walkable destinations and the built environment will enhance the pedestrian experience and encourage walking. Adjacent land uses will be connected by pedestrian facilities such as sidewalks and crosswalks so that pedestrians can safely and conveniently make trips on foot.

### **Objective 3.1**

Modify the city's codes, policies and ordinances to include requirements ensuring that new development is scaled and oriented to pedestrian travel, and that logical connections are provided internally and externally for pedestrians and bicyclists.

### ***Goal 4: Education, Awareness and Encouragement***

People will have access to educational opportunities to learn about the benefits of walking as well as access to walking resources. Wilmington will raise awareness and enforcement of safe walking and driving practices and pedestrian and motorist rights and responsibilities.

#### **Objective 4.1**

The city will encourage more citizens to travel as pedestrians for all types of trips, including work, errands, exercise and recreation.

#### **Objective 4.1**

The city will increase citizen participation in educational and encouragement programs and promotions.

#### **Objective 4.2**

The city will increase awareness and understanding of pedestrian laws, rights and responsibilities by affected groups, including but not limited to law enforcement, court officials, and the general public.

#### **Objective 4.3**

The city will conduct education and enforcement campaigns to increase safe driving and walking behaviors.

#### **Objective 4.4**

The city will encourage more students to walk to school and other destinations, either alone or with a parent or caregiver.

#### **Objective 4.5**

The city will encourage schools to apply for Safe Routes to School grants and also to participate in other Safe Routes to School programs and other events.



Figure 14 Mobile Speed Trailer

### **Goal 5: Health**

Citizens will be more physically active by walking on a regular basis. Improving their health and reducing their health care costs. Creating more walking opportunities will also improve air quality, which will improve the outdoor environment.

#### **Objective 5.1**

Increase awareness of the recommended levels of daily physical activity and the health benefits of walking.

### **Goal 6: Economic Development**

Walkable streets will become attractive destinations for residents and visitors. Increased pedestrian activity will promote private investment in retail, commercial and residential development. Wilmington will partner with local organizations on streetscape enhancement projects to create streets that are aesthetically pleasing, safe and convenient.

#### **Objective 6.1**

New streets in the *Central Business District Zone* and *Urban Core Zone* will incorporate pedestrian lighting along with vehicular lighting.

#### **Objective 6.2**

Existing corridors and thoroughfares will be retrofitted with pedestrian lighting.

#### **Objective 6.3**

Wilmington will continue to support the missions of *Wilmington Downtown, Inc.*, as it aims to revitalize the historic downtown.

#### **Objective 6.4**

Encourage the inclusion of amenities, plantings and art in pedestrian improvement projects.

#### **Objective 6.5**

The city will produce brochures and other materials to be distributed at events in order to encourage walking and to provide information about Transportation Demand Management services.

#### **Objective 6.6**

The city will work with the Wilmington Tree Commission to ensure that trees are included in the pedestrian environment while maintaining the pedestrian path of travel.

## PLANNING CONTEXT

Wilmington's commitment to pedestrian planning is demonstrated in the city's comprehensive plan, *Choices: The City of Wilmington Future Land Use Plan 2004-2025*. Many of the priorities identified in the *Choices* plan are formalized in the adoption of the *Wilmington Urban Area Metropolitan Planning Organization 2005-2030 Long-Range Transportation Plan*. The decision to draft this pedestrian plan is a direct result of the goals and priorities originally identified by the community when the future land use plan was developed. This section highlights key pedestrian related components of the following plans:

- *Choices: The City of Wilmington Future Land Use Plan*
- *WMPO 2005-2030 Long Range Transportation Plan*
- *Wilmington Vision 2020: A Downtown Waterfront Plan*
- *Cape Fear Historic Byway Corridor Management Plan*
- *Dawson and Wooster Corridor Plan*
- *US 17 Business (Market Street) Corridor Study 2007*
- *Market Street Corridor Study 2009*
- *Joint Safe Routes to School Workshop*

The following section provides a general overview of each of these plans, and a detailed discussion, including identification of specific pedestrian-supportive elements is included in the Appendix.

### ***Choices: The City of Wilmington Future Land Use Plan 2004-2025***

The Future Land Use Plan establishes a vision for the city's landscape. The plan guides how the city's character and sense of place will evolve. Throughout the document are several strategies identified that relate to improving the pedestrian environment. The strategies identified were found in the following categories: *infill development*, *environmental resources*, *neighborhoods*, *public spaces*, *transportation*, and *sidewalk level of service*. Incorporating pedestrian-friendly and pedestrian-focused strategies in various sections demonstrates the comprehensive approach that the city has taken to improving the pedestrian network.

Additionally, the City of Wilmington Future Land Use Plan 2005 Progress Report relates a relevant finding drawn from public outreach conducted as part of the report development—"Although the city has developed to support cars as a main mode of transportation, there is a poor network of sidewalks for pedestrians, particularly in the recently annexed areas."

### **WMPO 2005-2030 Long Range Transportation Plan (LRTP)**

The LRTP provides a foundation for all future transportation planning efforts, including pedestrian and bicycle facilities. This pedestrian plan aims to further develop and implement the pedestrian-oriented vision and goals established by the pedestrian element of the LRTP.

A specific example of this commitment is shown in the vision statement of the LRTP:

*“To develop and maintain a safe place to live, work, raise a family and retire. The region will be known for its historic character and culture, a vibrant metropolitan urban area that promotes its water fronts, protects its environmental assets, recognizes the importance of its many neighborhoods, provides convenient travel choices for access to amenities throughout the Wilmington Metropolitan Area including well-integrated, connected public transportation, pedestrian, and bicycle networks and freight movement.”*

The LRTP also identifies corridors and mixed-use transit oriented centers that should be retrofitted to better accommodate pedestrians. They include:

- Independence Boulevard
- Oleander Drive
- North and South Kerr Avenue

### **Wilmington Vision 2020: A Downtown Waterfront Plan**

*Vision 2020* seeks to strengthen and enhance the connections between downtown Wilmington and its historic waterfront. Currently, surface parking lots, a parking garage, a large hotel and other uses separate the restaurants, stores and clubs along Front Street from the Cape Fear River waterfront. Although there is the Riverwalk along the water, it is not as heavily used as it could be if the pathways to the waterfront were improved. *Vision 2020* contains a number of specific strategies and actions for improving these connections.



### ***Cape Fear Historic Byway Corridor Management Plan***

The corridor management plan contains several recommendations for improving the streetscape and visitor experience along the corridor, including installing street trees and plantings, street furniture, and landscaped medians.



Figure 15 Official Route of the Cape Fear Historic Byway

Source: *Cape Fear Historic Byway Management Plan*

### ***Dawson and Wooster Corridor Plan***

Dawson Street and Wooster Street are a parallel pair of one-way streets south of the city's central business district. Together, these streets comprise a heavily traveled segment of US 76 connecting Wilmington to Brunswick County. The plan presents a number of recommendations for improving the safety and comfort of pedestrians, bicyclists and motorists along the corridor.



Figure 16 Dawson and Wooster Plan Study Area

### ***US 17 (Market Street) Business Corridor Study (2007)***

The 2007 Market Street study focuses on the corridor between 3<sup>rd</sup> Street and Covil Avenue. The general purpose of the project was to evaluate this section of Market Street for opportunities to improve the streetscape, control heavy vehicle traffic, and improve corridor operation and safety for both motorists and pedestrians.

### ***Market Street Corridor Study (2009)***

The WMPO is currently developing a corridor plan for Market Street from Colonial Drive to the Pender County line. The project is focused on improving safety and mobility along the corridor for motorists, pedestrians, and other users. Recommendations will address access management, design standards, and conceptual designs. The plan is anticipated to be completed in February, 2009.



Figure 17 Market Street Corridor Study Bicycle and Pedestrian Connectivity Map

Source: Map developed by Kimley-Horn and Associates for WMPO

### ***Joint Safe Routes to School Workshop for Bradley Creek, Holly Tree and Parsley Elementary Schools***

In September, 2007, the city hosted a Safe Routes to Schools workshop for three elementary schools. This meeting marked the beginning of the Safe Routes to Schools program in Wilmington.

A report was generated after the workshop that identifies a series of specific recommendations for improving pedestrian and bicyclist comfort and safety along routes leading to each of the schools. Suggested improvements include new sidewalks, crosswalks, traffic signals, and other accommodations.



Figure 18 Holly Tree Safe Routes to School Recommendations

### ***Other Related Planning Efforts***

The city has studied pedestrian issues in other documents, such as the parks and recreation master plan, several corridor plans, small area plans and other transportation and land use studies.

## **SCOPE OF WORK AND PLANNING PROCESS**

The project scope includes an examination of the existing pedestrian facilities in Wilmington, identification of key destinations, needed connectivity between destinations, regional or state routes, and barriers to walking. The scope also includes a review of existing policies, guidelines and ordinances to ensure they support pedestrian-friendly facilities and meet the transportation needs of all citizens. It should be noted that this plan does not include an exhaustive list of every pedestrian facility



Figure 19 Stakeholder Walking Tour- May 11, 2008

needed in Wilmington. Rather it provides the policy direction and design guidance to ensure that the city can use a rigorous approach to improving pedestrian accommodations in the future.



To guide the planning process, the city assembled the plan Steering Committee to guide the development of the plan. The members are listed below:

Lawless Bean	Cape Fear Breeze
Brian Chambers	City of Wilmington Long Range Planning
Joe Chance	NCDOT Division 3
Tina D'Amico-Poole	New Hanover Health Network
Ilse Henagan	Coalition of Neighborhood Associations
Johnnie Henagan	Sunset Park Neighborhood Association
Nina Johnston	City of Wilmington Public Services
Ricky Meeks	Resident
Ken Nance	New Hanover County Public Schools
Chris O'Keefe	New Hanover County Planning
Lt. Ed Pigford	City of Wilmington Police
Jackson Provost	NCDOT Division 3
Jeff Sanchez	Centro Latino
Nolan Smith	WMPO BikePed Committee
Andrea Talley	City of Wilmington Community Services
John Vine-Hodge	NCDOT Division of Bicycle & Pedestrian Transportation
Misty Watkins	City of Wilmington Development Review

This group convened meetings throughout the plan's development. Every time that the committee has met, the group has taken a walking tour of the immediate environment to better understand the pedestrian environment in various parts of the city. During these walking tours, committee members were asked to identify and record both positive and negative experiences and assess the functionality and comfort of the pedestrian accommodations.

During the Steering Committee's February 2008 kick-off meeting, the overall vision, and goals for the city were discussed and recorded. Additionally, the goals for development of the Plan itself were discussed.

***Goals for development of the Pedestrian Plan:***

- 1. Answer the question "What's the benefit to me?" In doing so, the plan should explore the issues confronting pedestrians in Wilmington and provide recommendations for improving these challenges.*
- 2. Provide a comprehensive overview of the pedestrian transportation system, including facilities, priorities and opportunities.*

3. *Provide recommendations and implementation strategies to address Wilmington's diverse walking population, which includes the elderly, children, immigrants and tourists, and those with impairments.*
4. *Provide realistic and achievable recommendations that are within budgets. Furthermore, the plan should identify highly visible improvements that can be undertaken quickly with maximum cost benefit.*
5. *Assess interconnectivity of neighborhoods and developments and focus on connecting existing sidewalks in key locations.*
6. *Provide and describe processes for prioritizing pedestrian facility projects and provide maps showing locations of projects.*

### **Field Analysis**

Field analysis was a major component of this plan. The consultant team carried out reconnaissance surveys for zones of the city: *central business district zone, urban core zone, traditional suburban zone, and the automobile-oriented suburban zone*. The intent of these surveys was not to develop an exhaustive list of every deficiency, large and small, within the city. Rather, the focus was on understanding general conditions and the character of the pedestrian environment in various parts of the city. During these field surveys, consultant staff examined elements affecting the pedestrian experience such as:

- sidewalk design and placement,
- curb ramp design,
- driveway access design,
- intersection design and configuration,
- pedestrian crossing accommodations,
- lane widths and number of lanes,
- speed limits and traffic speed,
- roadway character, and
- development character.



Figure 20 Pedestrian Crossing North 3rd Street  
Narrowly Missed by Car

Through this fieldwork, the project team developed an exhaustive photo library of pedestrian conditions throughout the city.

## **Stakeholder Interviews**

Early in the plan development process, a series of interviews was conducted with staff in various city departments. Representatives from WAVE Transit and the New Hanover County Public Schools were also interviewed. Representatives from the North Carolina Department of Transportation Bicycle and Pedestrian Transportation Division as well as staff from the local NCDOT Division 3 were also interviewed during plan development. Findings from these interviews are included in the Appendix.

### **Interview Highlights**

- **Planning Division, Development Services Department**

*Do current codes/ordinances/standards support pedestrian-oriented design/development? What are the loopholes? What are the shortcomings?*

The existing built environment does not support pedestrian travel. We require, but then waive connections in new and re-development. And, some requirements are contradictory, such as buffers around commercial development which limit pedestrian access and don't add to a pedestrian-friendly environment.

- **Traffic Engineering Division, Development Services Department**

*What do you want from the plan?*

A change in policy from the state. Currently, the city needs NCDOT approval to put pedestrian facilities on state-maintained roads. Most state roads are rural with low volumes and NCDOT policies are geared towards these, not roads in a city such as Wilmington.

- **Parks, Recreation and Downtown Services Division, Community Services Department**

*What are the things that have a negative impact on walkability?*

- Not enough pedestrian signals at crosswalks.
- The city is bisected by major roads that are barriers, e.g., Carolina Beach Road between Shipyard Boulevard and Burnett Boulevard – 45 mph with some sidewalks, but mostly dirt paths.
- Need to complete missing sidewalks.
- Need mid-block crossing at neighborhood streets where the Cross-City Trail is planned.

- **WAVE Transit**

*In general, how accessible are bus stops?*

- Over 50% of the stops do not have sidewalks.
- WAVE does work pro-actively with the city to install sidewalks, but WAVE has no authority or funding to install better access to bus stops.

- ***New Hanover County Public Schools***

*In general, how accessible are New Hanover County Public Schools for kids walking or biking to school?*

- Sidewalk access to schools is limited.
- Most kids take the bus to school or are driven to school.
- Very few walk or bike to school.
- Riding the bus is preferable to being driven.

## Public Outreach

Plan development also included public outreach to ensure that the needs of the city's diverse populations were understood and addressed.

Two surveys were developed to gather information about citizen habits, preferences and priorities related to walking. The first survey was made available online during the spring of 2008. A hard copy questionnaire was distributed during popular public events: a

*Downtown at Sundown* concert, the *Juneteenth Festival* and at the *Riverfront*



Figure 21 Public Outreach Table- Riverfront Farmers Market

*Farmers' Market*. The online survey produced almost 250 results. Staff received almost 140 responses to the hardcopy questionnaire. During the in-person public outreach, the public was encouraged to provide written (or drawn) input on hard copy maps that were available at the event. Project staff and the consultant team assisted respondents and elicited a wide range of comments, ranging from suggestions for improvements at a discrete location (e.g. repair to existing sidewalks) to requests for new facilities along stretches of roadway (e.g. South College Road).

The Results from the two surveys are summarized below. The full survey report is found in the Appendix. While these surveys are not statistically significant because the responding audience is somewhat self-selected, they do provide a valuable representation of the communities' challenges, goals, and desires.

As evidenced in the survey results, the respondents support and understand the importance of improving walking conditions throughout the city. The respondents realize that walking provides transportation options, health benefits, opportunity for social interaction and an improved quality of life.

### Online Survey Highlights:

- The survey was online during the spring of 2008 and was publicized by *Wilmington Star News*, as well as WMPO and city websites.
- The survey had a total of 12 questions; all of which were made available in both English and Spanish.



- 247 persons responded and 85 provided additional comments in an open format

### Survey Results

**99%** Respondents answered that they walk in the City of Wilmington

**98.4%** Walk for exercise or personal fitness

**92%** Walk to leisure activities

**81.6%** Walk to reach destinations for running errands

**53.6%** Lack of sidewalks and/or gaps in the sidewalk make walking difficult or unpleasant in the city

**33.6%** Heavy traffic makes walking difficult or unpleasant in the city

**30%** Said that intersection and road crossings are the most important areas for the city to focus on improving pedestrian facilities.

### What should be the city's TOP PRIORITY for improving the walking network?

Almost one-third of the respondents indicated that the city should focus on intersection and road crossing improvements as it enhances the pedestrian network. Over 20 percent of respondents said that more pedestrian facilities in residential neighborhoods.

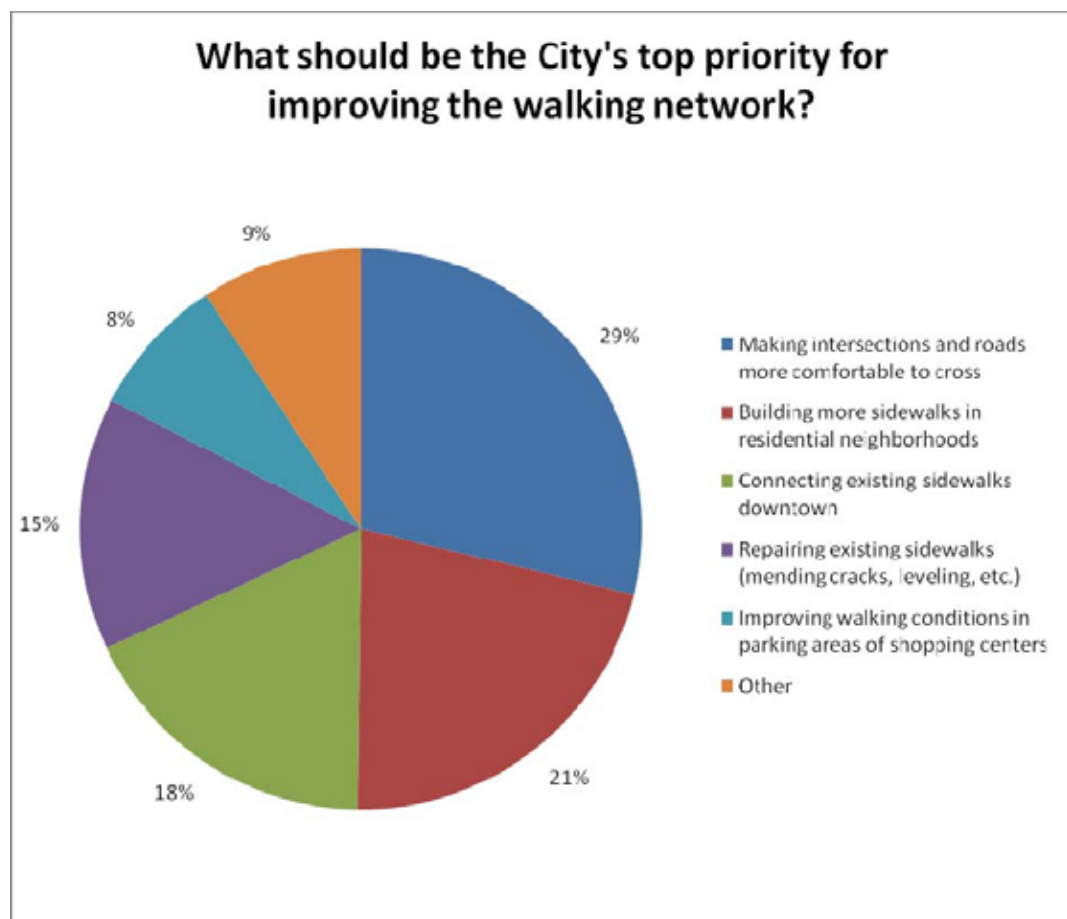


Figure 22 Top Priorities for Improving Walking Network

**What is the MOST critical issue that people face while walking in the City of Wilmington?**

- 66.9%** Unsafe street crossings or intersections
- 22.8%** Missing or poorly maintained sidewalks
- 3.1%** Lack of personal safety
- 7.1%** Other

Of the 85 respondents who made individual comments, the following ‘themes’ were most often mentioned:

- Need more connectivity between land uses (i.e. subdivision to retail, schools, parks, greenways, library, churches)
- Intersection improvements
- Need more enforcement of pedestrian laws (drivers don’t stop/yield to pedestrians)

**Frequently mentioned areas needing pedestrian improvements:**

- Oleander Drive
- Military Cutoff Road
- North and South 3<sup>rd</sup> Street
- Market Street

**In-Person Survey Highlights:**

The in-person pedestrian survey was developed to consult the public (who would most likely not participate in an online survey) about pedestrian conditions. Surveys were recorded by staff during three public events: a *Downtown at Sundown Concert*, the *Juneteenth Festival*, and the *Riverfront Farmers’ Market*.

- The survey had a total of nine questions.
- 138 persons responded.
- While not scientific, this survey provided useful information to the City of Wilmington and NCDOT staff.



Figure 23 Citizen Completing Survey at Juneteenth Festival

- 20%** Walk to destinations such as school and work
- 54%** Responded that sidewalks, crosswalks and pedestrian signals should be a top priority when constructing or improving roadways.
- 47%** Responded that environmental conditions, such as high speed traffic and lack of sidewalks, are the main reasons for why their children do not walk to school

**6%** Responded that distance was the main reason that their children do not walk to school

Along with requests for improvements in crossings and buffers (planting strips, parked cars and other objects that separate motorized transit from pedestrians and bikers), respondents requested improvements in bicycling access as well. Future improvements in bicycling amenities such as improved paving and crossings would likewise improve the pedestrian experience. This input is consistent with the online survey respondents.

City staff was very interested in gaining feedback on how the improvements could be funded. Interestingly, the option for “no new funding” was the least popular answer, receiving only 7% of the responses. The top two choices picked were:

**23%** Hotel tax paid mostly by visitors

**20%** Municipal bonds

Respondents were asked to scale the priority for pedestrian facility improvements from 1-10 (10 being the highest):

**54%** Rated the priority as a 10

**8%** Rated the priority below 7

Wilmington’s citizens are very comfortable with increasing signal timing to allow pedestrians more time to cross the street:

**76%** Responded that they were comfortable with minor increases in delay at traffic signals to allow pedestrians to cross more safely and comfortably.

Common written-in responses for places that could specifically benefit from improvements in the pedestrian environment include: Halyburton Park, Military Cutoff Road and Downtown Wilmington

## Chapter 3. Pedestrian Transportation System

This chapter examines the existing pedestrian network within the city. Generally, the chapter describes the availability, quantity and quality of pedestrian facilities. These facilities include sidewalks, trails, crosswalks, signals, and signs. Ideally such facilities are easy to find, connect popular destinations, and are well maintained.

### SYSTEM HIGHLIGHTS

#### Roadways

Roadways in Wilmington are owned and maintained by one of three entities. The City of Wilmington owns most local and collector roadways, and most of these roads are within residential neighborhoods. Major arterials are primarily the responsibility of NCDOT. In addition to the publicly-owned roads, a number of roads are owned and maintained by other entities such as property owner associations or other organizations. These roads are generally within planned developments, institutions such as UNCW, or within industrial areas.

Table 1 Roadway Ownership in Wilmington		
<b>Jurisdiction</b>	<b>Miles</b>	<b>% of Total</b>
<b>City Roads</b>	<b>513</b>	<b>67</b>
NCDOT Roads	145	19
Private Roads	107	14
<i>Total Roads</i>	<i>766</i>	<i>100</i>

As illustrated in Table 1, the large majority of roads are under the direct purview of the city. On these roads, the city has the direct authority to establish speed limits and pursue traffic calming measures, construct pedestrian amenities, acquire right of way and other actions. NCDOT roads comprise nearly 20% of the road network. On these roads, Wilmington must coordinate with the state on speed limits, roadway improvements, intersection and crossing design, sidewalk installation and other actions that address the pedestrian transportation system. Private roads comprise the smallest percentage of the city's road network. On private roads, the city has limited oversight once a project is developed, provided the roads comply with the city's standards. During the rezoning, subdivision, or redevelopment approval process the city has more authority to require pedestrian accommodations or specific roadway design elements.

## ***Walking Conditions***

Pedestrian transportation systems cannot be properly evaluated in the context of the city as a whole. Different areas of the city serve different roles and therefore have different needs regarding transportation and recreation. Wilmington development patterns and the corresponding character of the pedestrian system can be divided into four general zones: *Central Business District Zone*, *Urban Core Zone*, *Traditional Suburban Zone*, and *Automobile-Oriented Suburban Zone* (see Figure 24).

Within each of these zones, major arterials and local streets (non-arterial roadways) fulfill a critical role in the city's transportation network and provide varying levels of accommodation for pedestrians. These streets serve unique purposes and support differing volumes of traffic and therefore they should be assessed separately.

Much of the discussion and many of the recommendations in this plan are structured around these character zones. In this section, each area will be evaluated on the following aspects:

- *Connectivity* – does the pedestrian system provide convenient connections for non-vehicular travel?
- *Street Crossings* – does the crossing provide appropriate accommodations for pedestrians?
- *Quality of Facility* – generally, do pedestrian facilities look well maintained or is it in a state of disrepair?
- *Accessibility* – how easy is it for pedestrians with physical disabilities to use?
- *Streetscape Design* – does the surrounding area feel safe and welcoming for pedestrians?

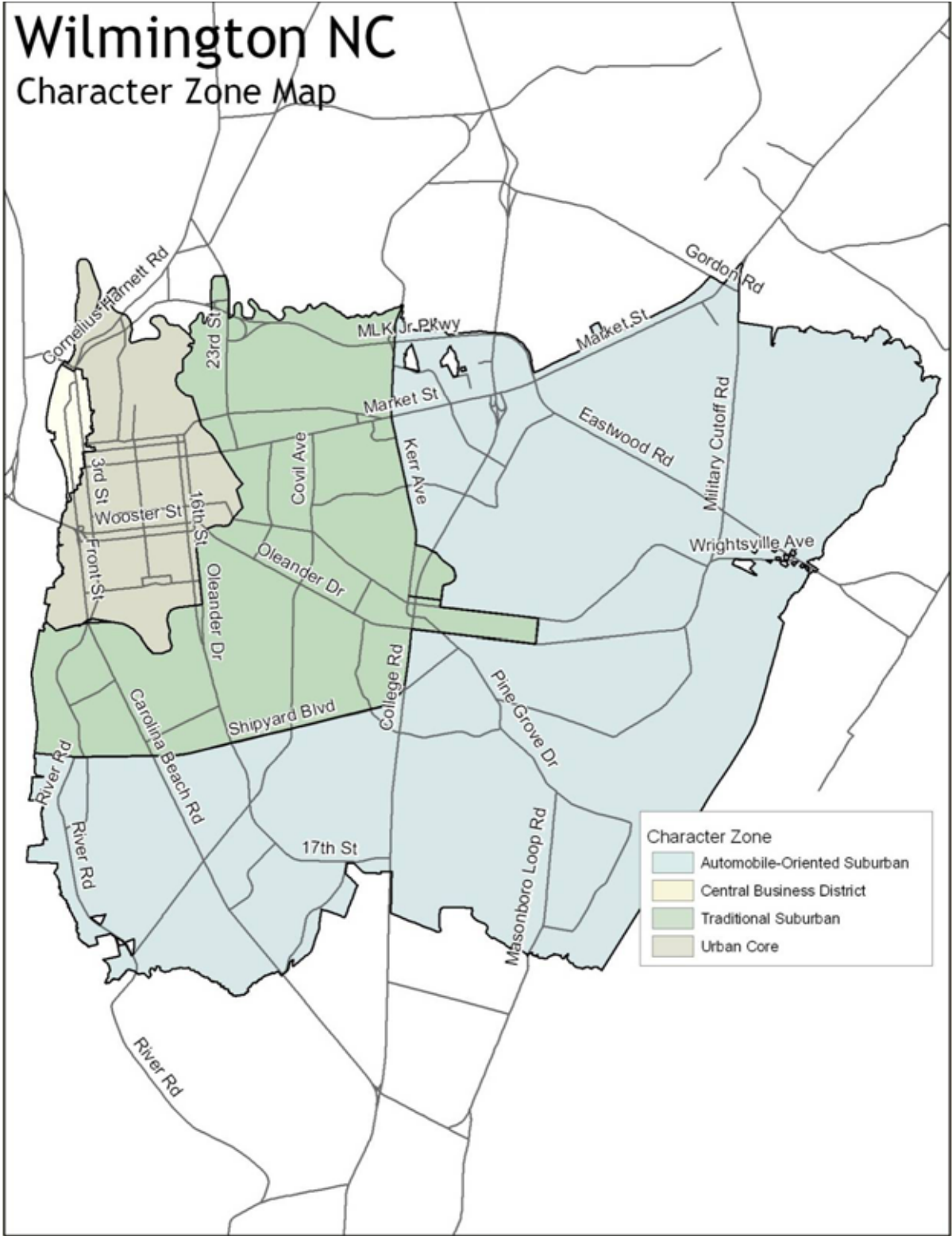


Figure 24 Wilmington Character Zone Map



## Connectivity

When viewed from the perspective of a pedestrian, connectivity refers to the completeness of the walking network. In other words, are there facilities that get the pedestrian where they want to go? In order to serve as a viable option for even short trips, the pedestrian network should be comfortable and easy to use, and should provide direct connections to destinations. Most pedestrian trips are to and from schools, shopping areas, libraries and community centers, work places, recreational opportunities and transit. Sidewalks and street crossings should be designed so people can easily and comfortably find a direct route to a destination, and delays are minimized.

Connectivity is one of the most difficult and yet most important elements of transportation planning. People need to be able to access their destinations directly and safely. Missing sidewalks or crossing facilities may make walking trips difficult and deter people from choosing this transportation mode. In Wilmington, the pedestrian system generally provides good connectivity, but outside of the downtown, sidewalks, trails, and other walking facilities provide inconsistent functionality. This challenge can be observed in neighborhoods where residents may be able to walk to parks, schools and other institutions within the neighborhood, but may not be able to walk to other neighborhoods and destinations. Along the city's commercial arterials there are many areas that have decent sidewalk systems but provide poor crossing opportunities due to either long separations between crossings or the absence of marked crosswalks and pedestrian signals at intersections. As a consequence, many trips that could be taken on foot are done in motor vehicles. These short car trips add congestion on the region's roads and contribute emissions into the air.

60% of the pollution created by automobile emissions is created in the first few minutes of operations before pollution control devices begin to work effectively. National data show that 26.6% of all automobile trips are less than one mile in length.

Public input revealed a number of specific concerns regarding connectivity in Wilmington:

- *No sidewalks along many roads or missing gaps in the sidewalk system.*
- *Cracks, uneven surfaces, and raised sections of sidewalk that pose major impediments and safety hazards to individuals with mobility and visual impairments.*
- *Few, if any crosswalks for long distances along most major arterials.*

Approximately two years ago, the city's Public Services Department conducted an exhaustive survey of the city's sidewalk network, and they now have a reasonably accurate database with

the location of all sidewalks across the city. A map showing this network is located later in this chapter. It is easy to see that more streets have sidewalks in the city's downtown and surrounding neighborhoods than in other parts of the city. Many areas have sidewalks on one side, but not both sides of the street. Many major arterials do not have sidewalks, or have discontinuous sidewalks along a given block.

Many pedestrians will make their trips in spite of the absence of sidewalks. This is obvious from the worn paths or "goat trails" seen all over the city in areas where sidewalks do not exist, or may not be located ideally to serve most pedestrian trips. Through the public input process, a number of people indicated that gaps in the sidewalk network made trips difficult or deterred them from making more trips without a vehicle and 23% indicated that missing or poorly maintained sidewalks were the most critical issue facing pedestrians in Wilmington.

### **Street Crossings**

Street crossings present one of the greatest safety hazards for pedestrian travel. When crossing the street, pedestrians are entering into the realm of motor vehicle traffic and are most exposed to danger. Pedestrians must contend not only with cross traffic (cars and trucks passing along the cross street) but must also be aware of vehicles turning left or right across their path.

Street crossings should be designed to provide maximum protection to the pedestrian through clear markings, appropriate signage or signalization, and adequate crossing time, pedestrian refuges (in certain cases) and other important elements. Signage and markings should provide clear guidance to both pedestrians and motorists as to their respective responsibilities at the crossing.

Sixty-seven percent of respondents to the online survey conducted as part of this plan indicated that **unsafe street crossings** are the most critical issue facing pedestrians in Wilmington. Through the public participation process and field observations, a number of specific concerns were raised related to street crossings in Wilmington. Due to the complexity of street crossings, this discussion is divided into two sections: crossing operation or the functionality of the crossing and crossing amenities, which deals with the design of the crossing. Proposed solutions to many of these concerns are detailed elsewhere in this plan. It should be noted that these conditions are not necessarily universal, but do occur often enough to warrant inclusion in this list:

#### **Crossing Operation**

- *Motorist behaviors, including stopping within the crosswalk or pedestrian crossing area, failing to stop or yield for pedestrians, running red lights and exceeding posted speed limits significantly increase safety hazards for*

*pedestrians. Turning motorists are often in conflict with pedestrians crossing major arterials.*

- Do signals provide the minimum amount of time needed for a pedestrian to cross? Typical approaches assume pedestrians walk between 3.5 and 4.0 feet per second. However, this may be inadequate for people do not enter the crossing at the beginning of the WALK signal or slower pedestrians (including people with strollers or small children, or wheelchair or other assistive device users).*
- Many pedestrian signals have a long delay (over 60 seconds) between the time the push button is depressed and the WALK signal is displayed. This delay can lead to a lack of compliance.*
- Pedestrians often fail to use legal crossings, cross against the light, or step into the roadway without checking for oncoming traffic. These behaviors put pedestrians at risk of being struck by motor vehicles.*



Figure 25 South College Road and Randall Parkway

#### **Crossing Amenities**

- Many signalized intersections do not have pedestrian signals or marked crosswalks. Where present, the crosswalks may not be on all 'legs' (sides) of the intersection. This is most prevalent on multi-lane arterials.*
- Multi-lane arterials carry substantial vehicle traffic and create wide intersections and long crossings for pedestrians. For example, at the main entrance of UNCW, pedestrians crossing South College Road must cross eight lanes (approx. 100').*
- Throughout the city, stop bars at major signalized intersections appeared to be located within the legal pedestrian crossing area.*
- Long distances between signalized intersections on major arterials (up to one mile separation) either discourages crossing or promotes crossing away from an intersection. Crossing treatments that improve functionality and pedestrian comfort, such as high visibility crosswalks, median refuge islands, and curb ramps that meet ADA requirements are lacking in many locations.*
- Additional safety measures are needed around schools (such as crossing guards, signs and traffic calming).*



Figure 26 Shipyard Boulevard and Carolina Beach Road

## ***Quality of Facility***

The quality of walking facilities relates to the condition and functionality of sidewalks, curb ramps and crosswalks. Sidewalks that are too narrow or are in poor condition are less comfortable for pedestrians to use, and may discourage walking in that area. Conversely, a well designed and maintained sidewalk allows pedestrians to walk where they want to go in a comfortable setting. Pedestrian facilities that are in very poor condition, with large cracks, uneven surfaces, or under designed pathways may be inaccessible for pedestrians with certain disabilities. For example, a curb ramp that is too steep may not be mountable by a wheelchair user.

## ***Accessibility***

Accessibility refers to the suitability of the walking network for people with disabilities. The availability, design and condition of a particular sidewalk or curb ramp is important for any person but it is critical for a person with a disability who may need more time crossing a street or is in a wheelchair. Furthermore, a facility that is accessible to a person using an assistive device is almost certainly more usable by a person pushing a stroller, a small child, or someone who just needs a good walking surface. The following two sections describe some of the issues specific to two categories of pedestrians with disabilities.

### ***Wheelchair Users***

In 2002, 2.7 million Americans identified themselves as wheelchair users for the U.S. Census.<sup>6</sup> Wheelchair and scooter users often travel much faster than walking pedestrians, especially on level surfaces or downgrades, but they can be much slower when traveling uphill. In addition, their stability and control can be affected by surfaces with cross-slopes, grades, or rough terrain. Wheelchair and scooter users require a wider path of travel than ambulatory pedestrians. Therefore, sufficient passing space should be provided to allow wheelchair users to pass one another and to turn around.

Furthermore, people who are unable to pull backward on their wheelchair wheels require a larger maneuvering space than those who can move one wheel forward and the other backward while turning. The turning diameter of a wheelchair or scooter is dependent upon the length of its wheelbase. Powered wheelchairs and scooters are generally longer than manual wheelchairs.

Because wheels are difficult to propel over uneven or soft surfaces, wheelchair and scooter users need firm, stable surfaces and structures such as ramps or beveled edges to negotiate changes in

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<sup>6</sup> United States. US Census Bureau. Disability Tables. Feb. 2008. Nov, 2008. <<http://www.census.gov/hhes/www/disability/disabtables.html>>

level. Curb ramps allow wheelchair users to negotiate curbs more easily. Because cross-slopes tend to cause wheelchairs and scooters to veer downhill, manual wheelchair users must perform additional work to continue traveling in a straight line over areas such as driveway crossings. Severe cross-slopes can cause wheelchairs to tip over sideways, especially during a turn.

### *Walking-Aid Users*

People who employ walking aids include those who use canes, crutches, or walkers to ease their ability to travel. According to the 2002 U.S. Census, 9.2 million adult Americans reported having used a cane for longer than sixth months<sup>7</sup>. Surface quality significantly affects ease of travel for walking-aid users. Grates and cracks wide enough to catch the tip of a cane can be potentially dangerous for walking-aid users. Uneven surfaces can also be hazardous because they further reduce the already precarious stability of walking-aid users. Additionally, people who use walking aids tend to travel more slowly than other pedestrians. As a result, they benefit from longer pedestrian signal cycles at intersections and the presence of passing spaces to allow others to travel around them. A rapid change in cross-slope can also cause people with walkers to stumble. The potential limitations of walking-aid users include the following:

- Difficulty negotiating steep grades
- Difficulty negotiating steep cross-slopes
- Decreased stability
- Slower walking speed
- Reduced endurance
- Reduced ability to react quickly to dangerous situations
- Reduced floor reach

### *Streetscape*

Streetscape refers to roadway design and condition as it impacts street users and nearby residents. Generally, the streetscape is considered to be the aesthetic quality of the public space, between building fronts. The streetscape includes building placement and façade design, street plantings and street furniture, parking location and design and the design of the roadway.

Because pedestrians move so much more slowly than cars, they are very aware of the surrounding environment. People tend to want to walk in settings that are attractive and visually interesting. Conversely, areas that are unattractive or are designed without consideration for the person walking by are unappealing and may make people feel unsafe.

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<sup>7</sup> Ibid

Streetscaping recognizes that streets are places where people engage in various activities, including walking, bicycling and driving. Streetscapes are an important component of the public realm (public spaces where people interact), which help defines a community's aesthetic quality, identity, economic activity, health, social cohesion and opportunity, not just its mobility.

### *Central Business District Zone*

The *Central Business District Zone* extends roughly from the Cape Fear River east to North 4th Street and from Ann Street north to the Isabel S. Holmes Bridge. This is the historic business district for the city and many of buildings date back to Wilmington's early days as a busy port for the southeastern part of the county in the 1800s. Most of the structures are three to five stories tall and there is a significant amount of customer



Figure 27 Pedestrian Crossing North Front Street

oriented retail (bank tellers, restaurants, shops, etc.) on the first floor with office and residential above. There is a lively cultural and entertainment scene and there are a number of galleries, restaurants, clubs and bars in this area. Most tourists to Wilmington spend at least part of their trip in the *Central Business District Zone* taking advantage of these opportunities and they stay in one of the many hotels or inns in the area.

Cape Fear Community College is also located in this zone. This institution occupies a number of buildings clustered around Red Cross Street and North Front Street and draws nearly 7,600 students. Because it is a commuter school, students live in other parts of the region and travel to the campus daily by private vehicle, WAVE Transit, on foot or by bicycle.

In general, pedestrians in the *Central Business District Zone* have access to some of the best pedestrian facilities in the city. Streets are relatively narrow and low speed with moderate amounts of traffic. Especially near the riverfront, the sidewalks are prevalent and well maintained. Nearly anywhere vehicles have access; there are also sidewalks for pedestrians. During events, some of the major streets are closed to vehicles so that pedestrians can have more room to safely enjoy the area.



Crossing the short blocks is relatively easy because there are crosswalks at every intersection. Nearly all of those intersections have pedestrian signal heads as well. Pedestrian-activated signal buttons are installed at an appropriate height so that children and the physically handicapped can easily reach them. It should be noted that although nearly every signal has a pedestrian signal, the pedestrian signals along North 3<sup>rd</sup> Street and North 4<sup>th</sup> Street must be activated by a pedestrian, as opposed to being incorporated into the signal cycle, as they are on North Front Street and North 2<sup>nd</sup> Street. This means that if a pedestrian waiting to cross does not press the button in time; that pedestrian will not receive a walk signal and will not have adequate time to cross during the parallel green signal phase.

The *Central Business District Zone* also has some of the most inviting streetscapes for pedestrians. There are benches and trees that make walking for both leisure and transportation easy and comfortable. There is ample lighting and clear signage to help you reach your destination.



Figure 28 Residential Street in Older Neighborhood

North 3<sup>rd</sup> Street is somewhat different from other streets in the *Central Business District Zone*, primarily because it is a relatively wide five-lane arterial with narrower sidewalks. It is owned and maintained by NCDOT. The street is a major transportation corridor and connects US Highways 76 and 421 at the southern end to US Highway 74 and NC 133 at the north. Vehicles can be observed traveling at relatively high rates of speed in comparison to the somewhat more sedate pace closer to the river. Vehicles traveling in the north-south direction generally have longer green signal phases than on streets closer to the river. As a result, pedestrians must contend with wait times of 60 seconds or more, even when no vehicles are present.

The North 3<sup>rd</sup> Street streetscape project, which is currently in design, will dramatically change the pedestrian realm. The \$5-million bond-funded project will likely include a planted median with turning bays, crosswalk enhancements, and new traffic signals with pedestrian signal heads along North 3<sup>rd</sup> Street from the Martin Luther King, Jr. Parkway entrance (Davis Street) south to Market Street. The City of Wilmington will assume control of this roadway as part of this project. Construction on this project is scheduled to begin in 2009.

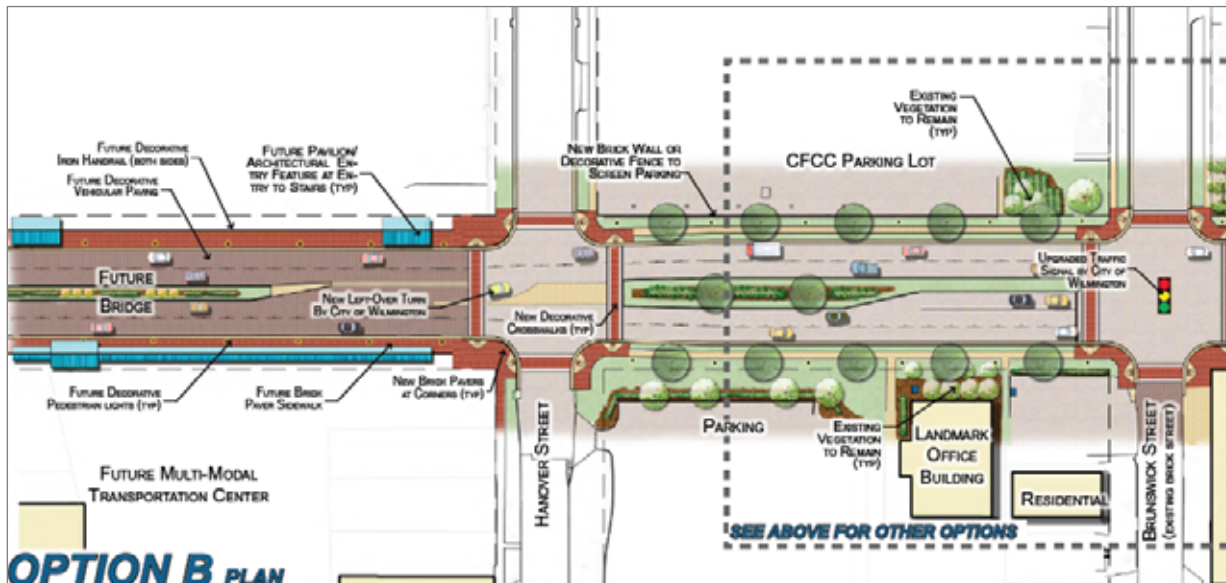


Figure 29 Design Concept for North 3rd Street Streetscape Improvements (Kimley-Horn/URS)

### Urban Core Zone

The *Urban Core Zone* extends roughly from Greenfield Park north to Smith Creek and from the *Central Business District Zone* boundary and the Cape Fear River east to Burnt Mill Creek.

The *Urban Core Zone* is home to many of Wilmington's older residential neighborhoods and the streets are generally laid out in a traditional grid pattern. Blocks tend to be a little longer than in the *Central Business District Zone*, but most local streets have relatively narrow pavement widths.

There are several significant east-west arterials that carry vehicle traffic between the *Central Business District Zone* and the bridges that cross the Cape Fear River to the rest of the city. Dawson Street, Market Street, South 3<sup>rd</sup> Street, South 16<sup>th</sup> Street, South 17<sup>th</sup> Street and Wooster Street are some of the busiest roadways in this area.

Generally, there are good pedestrian accommodations along neighborhood streets. Most areas have sidewalks on two sides of the roadway, and traffic volumes and speeds are relatively slow, creating comfortable environments for people walking.

Pedestrian accommodations along many of the major arterials are inconsistent. This may be due in part to a pattern of successive roadway widening without adequate consideration for pedestrian accommodations. For example, a pedestrian walking along Dawson or Wooster Streets in the southern end of the character zone may find that sidewalks are missing. Furthermore, the streetscape is visually unappealing in many places, and walkers are forced to pass vacant lots littered with trash and other debris. In this heavily travelled corridor, there are long distances between signalized intersections and pedestrians were frequently observed crossing the roadway at unmarked midblock locations, often using such risky measures as standing in a travel lane waiting for cars to pass in the next lane before completing their trip. Recommendations included in the recently completed *Dawson and Wooster Corridor Plan* are designed to ameliorate many of these shortcomings. Most of the signal controlled intersection in this zone lack marked crosswalks and pedestrian signal heads, despite relatively high observed levels of pedestrian activity.

The *Urban Core Zone* has an example of one of the city's uncontrolled crosswalks accompanied by a pedestrian-activated blinking signal. Solomon Towers, located at the intersection of South Front Street and Castle Street is a large senior citizen public housing facility. Many of the residents rely on public transit for their local travel needs. Additionally, several use assistive devices such as wheelchairs, scooters or canes. The northbound bus stop is located on the east side of South Front Street, which means that residents from the apartment building must cross South Front Street to access the transit stop.

The city has installed a pedestrian activated crossing signal that combines both overhead signals and pedestrian warning signs and flashers on the side of the road. This is designed to increase awareness of crossing pedestrians while the signal is activated. However, many motorists were observed disregarding the flashing lights and illegally failing to yield to pedestrians, resulting in delays to cross the street. Some pedestrians were observed crossing halfway and waiting for a break in traffic before completing the crossing. It should be noted that the activation button is not ADA-compliant as it is located away from the paved sidewalk. Subsequently, it may be difficult for pedestrians using wheelchairs, walkers or other assistive devices to reach.



Figure 30 Pedestrian Crossing and Flashing Signal Activation Button



### Traditional Suburban Zone

This area is home to many of Wilmington's older residential neighborhoods, including County Club, Devon Park, East Wilmington, Forest Hills, Princess Place and Sunset Park. Inside the neighborhoods, the rectilinear grid of streets found in the *Urban Core Zone* gives way to a modified grid pattern. Sidewalk coverage is not as extensive as within the *Urban Core Zone*, with roughly one third of the streets having sidewalks on at least one side of the roadway. Many neighborhoods are bordered by major NCDOT arterial roadways, such as Market Street, Oleander Drive, Carolina Beach Road and North and South Kerr Avenue.



Figure 31 Pedestrian with Stroller in Forest Hills Neighborhood

The Forest Hills neighborhood has the Wilmington Walks Forest Hills Loop mapped walking route. Small kiosks within the neighborhood identify distances and major destinations (park, school, and YMCA). This project was an initiative of the city's Parks, Recreation and Downtown Services Division.



Figure 32 Forest Hills Loop Kiosk

Sidewalk coverage and intersection crossings do not provide the same consistent level of accommodation as may be found in the *Central Business District* and *Urban Core Zones*. Pedestrians must contend with some of the widest pavement crossings in the city. For example, the intersection of Shipyard Boulevard (US Highway 117) and Carolina Beach Road (US Highway 421) requires pedestrians to cross up to eight lanes of traffic (approximately 110 feet). The case study section in Chapter 6, Pedestrian Facility Recommendations, provides an analysis of this intersection and recommends improvements to increase pedestrian safety and comfort.

### Automobile-Oriented Suburban Zone

The city's southern and eastern areas are included in the *Automobile-Oriented Suburban Zone*. This includes many of the city's newer developments, including Mayfaire and the Autumn Hall mixed-use developments. This area is also home to many neighborhoods annexed into Wilmington from New Hanover County. Subsequently, the character of the area is mixed. The

newer developments built under the city's more stringent regulations typically provide sidewalks, curb and gutter. However many of the older neighborhoods built under the New Hanover County's regulations do not have sidewalks or curbs, making them difficult and costly to retrofit with pedestrian facilities. Fortunately, traffic speeds and volumes within neighborhoods tend to be fairly low compared to adjoining arterial roadways and many pedestrians feel comfortable walking in the street, as is evidenced by the numerous pedestrians seen walking throughout the neighborhoods within this zone.

Unfortunately, lack of sidewalk connectivity often means that residents wishing to walk outside of their neighborhoods to nearby stores, libraries, schools, etc. cannot comfortably make these trips. Similarly, longer trips for exercise or recreation may also be difficult. The trail within Halyburton Park is a very popular destination for walkers and joggers, but most users must drive to the park from their neighborhoods because pedestrian linkages are few and far between. When completed, the Cross-City



Figure 33 Halyburton Park

Trail will improve connectivity to surrounding communities, but the individual neighborhoods that are located along the trail must be provided with safe and comfortable connections in their own right. Currently, there are no marked and signaled crossings along Eastwood Road and Military Cutoff Road that afford cross-street access to the newly opened Military Cutoff Trail and Cross-City Trail. During a very brief observation period, pedestrians were observed attempting to cross from the new Mayfaire development over to the Military Cutoff Trail, in spite of the lack of pedestrian accommodations across Military Cutoff Road. Therefore, the city and NCDOT should assess the condition and convenience of community and neighborhood connections to the River to the Sea Bikeway, Cross-City Trail and Military Cutoff Trail at the same time design plans are developed for a given section of trail, as these trails will likely become major attractions for walking and bicycling as the system expands.

## Summary

A table assessing these various elements across the city's character zones follows. Within the table, the various elements of the pedestrian environment are given a ranking based on relative quality or adequacy of a given element in comparison to other areas within the city. For purposes of this section, the rankings are ascribed as follows:



- **Excellent:** *These elements provide high levels of accommodation for pedestrians, such as sidewalks on both sides of the street, curb ramps are constructed to ADA standards, crossings have stop bars and crosswalks, intersections have pedestrian signals and the facilities provided are well-maintained. Little if any improvement is recommended for sections with this ranking.*
- **Good:** *These elements provide adequate levels of accommodation for pedestrians, such as sidewalks on at least one side of the street, pedestrian signals are provided but have a modest delay to obtain the walk signal,, and the facilities are somewhat maintained. Curb ramps may be poorly constructed or aligned. Some improvements to these sections are recommended for sections with this ranking.*
- **Fair:** *These elements provide minimal levels of accommodations for pedestrians. There may be gaps in the sidewalk network. Curb ramps may be missing. Pedestrian crossing accommodations may be provided at some but not all signalized intersections. Maintenance of facilities is generally inconsistent; sidewalks may be well maintained in portions of the section while others need repair. Significant improvements are recommended for sections with this ranking.*
- **Poor:** *These elements provide few or no accommodations for pedestrians. Sidewalks have significant gaps in the pedestrian network. Of the sidewalks that do exist, they are interrupted by many driveways and other vehicle pathways. There are long crossing distances that are generally devoid of crossing facilities such as crosswalks and pedestrian signals. Significant improvements are recommended for sections with this ranking.*

Table 2 Summary of Pedestrian Conditions In Wilmington's Zones









Character Zone		Connectivity	Crossing Operation	Street Crossings Amenities	Sidewalk Quality	Accessibility	Streetscape Design
<b>Central Business District Zone</b>							
Arterial roadways 4- to 5- lanes. Relatively high traffic volumes but generally low speeds. Numerous stoplights slow traffic.		Very Good- sidewalks on almost all arterials. Numerous protected crossing opportunities.	Fair- Relatively long delay to obtain walk signal after pressing pedestrian crossing button. This delay may contribute to jaywalking.  Turning vehicles may prevent pedestrians from crossing when they do have the WALK signal.	Very Good- Marked crosswalks on all four legs of an intersection. Pedestrian signals at almost all arterial intersections.	Very Good- Sidewalks and crosswalks are well-maintained and are of adequate width to accommodate all users.	Very Good- Sidewalks are in good repair. Curb ramps at intersections and meet ADA requirements for grade and surface. Pedestrian push buttons are generally accessible by users in wheelchairs. However audible signals are not in use. Allotted crossing times may not be sufficient for some users given the crossing distance.	Good- arterials in the CBD generally provide an attractive walking environment with interesting building frontages and street furniture. The pending streetscape improvement of North 3rd Street will dramatically improve this corridor.
Non-arterial roadways 1- to 2- lanes. Modest traffic volumes and slow speeds. Stoplights, stop signs, and road geometry slows traffic.		Very Good- sidewalks on almost all roadways. Lacking some pedestrian connections to CFCC area such as sidewalks and clear, logical pathways.	Good- Modest delay to obtain walk signal after pressing pedestrian crossing button. Frequent signal changes (or 'cycles') reduce the amount of time a pedestrian must wait for a WALK signal.	Very Good- Crosswalks at most intersections. Unsignalized mid block crossings along 2nd Street create comfortable environment. Crossings connecting to CFCC area may be uncomfortable for some users.	Very Good- Overall, sidewalks are in good repair and provide adequate width to accommodate the volume of users. Street furniture (plantings, signage, benches, trash cans, etc.) may infringe on pedestrian travel way.	Very Good- Sidewalks in good repair. Travel path generally clear from obstructions. Curb ramps meet ADA requirements.	Very Good- North Water Street is closed for festivals. Historic building frontages and narrow streets provide attractive and comfortable setting. Riverwalk along Cape Fear River provides scenic views for pedestrians.
<b>Urban Core Zone</b>							
Arterial roadways 4- to 6- lanes. Higher speed traffic and heavy volumes (e.g. Dawson & Wooster, Market St.)		Fair/Poor- Sidewalks along most arterials, however some arterials have long separations between crossings.  Relatively short crossing times for the user given the road width.	Fair- Relatively long delay to obtain walk signal after pressing pedestrian crossing button. This delay may contribute to jaywalking.  Turning vehicles may prevent pedestrians from crossing when they do have the WALK signal.	Fair- Generally, long crossing distances. Pedestrian crossing accommodations provided at some, but not all signalized intersections.	Fair- In some areas, sidewalks and crosswalks are well-maintained and are of adequate width. However, other areas have sidewalks in poor condition.	Fair- Where present, sidewalks are in good repair. Curb ramps at most, but not all intersections with pedestrian facilities. Pedestrian push buttons may or may not be easily accessible by users in wheelchairs. Audible signals are not in use. Allotted crossing times may not be sufficient for some users given the crossing distance.	Fair- Some arterials provide an attractive environment, while others may be very unappealing to pedestrians in conjunction with strip commercial or light industrial development. The pending Dawson and Wooster streetscape improvements will significantly improve this corridor.
Non-arterial roadways 2-lanes. Lower traffic volumes and speeds. Stoplights, stop signs and traffic calming slows traffic.		Very Good- sidewalks on almost all roadways. Curb ramps present on almost all intersections.	Good/Fair- Lower traffic speeds allow for more comfortable crossing operation, although failure of motorists to yield to pedestrians may contribute to vehicle/pedestrian conflicts.	Fair - Crosswalks and pedestrian signals at some larger signalized intersections.  Crossings are relatively narrow. However, motorists were frequently observed stopping in the pedestrian crossing area.	Good/Fair- Overall, sidewalks are in good repair, although overgrowth infringes into the travelway in some areas effectively reducing the width of the travelway.	Good/Fair- Many sidewalks in good repair. However, debris and vegetation overgrowth onto the sidewalk in some areas effectively narrows the available width below minimum ADA requirements.	Very Good- Generally, secondary roadways are located in residential neighborhoods with attractive streetscapes and buffers between the sidewalk and adjoining roadway.

Table 2 Summary of Pedestrian Conditions in Wilmington's Zones

Character Zone		Connectivity	Crossing Operation	Street Crossings Amenities	Sidewalk Quality	Accessibility	Streetscape Design
<b>Traditional Suburban Zone</b>							
Arterial roadways 6- to 8- lanes. Higher speed traffic and heavy volumes (e.g. Carolina Beach Road, Independence Street, Market Street.)		Fair/Poor- Sidewalk sections along several arterials, however some arterials provide limited crossing options for pedestrians or relatively short crossing times for the user given the road width. Several arterials provide sidewalks on only one side for relatively short lengths. Generally, poor connections from neighborhoods to arterials.	Fair- Drivers observed failing to yield to motorists. High volumes of turning traffic can make road crossings difficult. Long distances between intersections. Even longer distances between signalized intersections in some cases.	Fair- Generally, long crossing distances. Very few median pedestrian refuges. Relatively few pedestrian signals and almost no intersections with crosswalks on all four legs of intersection.	Good- Where present, sidewalks are in serviceable condition. Good- Greenfield Lake Trail (part of the East Coast Greenway).	Fair- Sidewalks are in good repair. Curb ramps at some intersections (including some where no sidewalk is present). Most ramps meet ADA requirements for slope. Pedestrian push buttons may not be easily accessible by users in wheelchairs. Allotted crossing times may not be sufficient for some users given the crossing distance.	Poor- Many curb cuts and driveways to contend with. Many sidewalks directly about the back of road curb. Many sidewalks directly about surface parking lots. Few street trees or other landscaping.
Non-arterial roadways 2-lanes. Lower traffic volumes and speeds. Few stoplights, stop signs and traffic calming slow traffic.		Good/Fair- Sidewalks on many roadways. Many incomplete sidewalks extend for two or three blocks and then end. Poor connections from neighborhoods to arterials and between nearby neighborhoods	Good/Very Good- Relatively low traffic volumes and speeds, combined with neighborhood layouts that deter cut-through traffic create many crossing opportunities inside neighborhoods	Very Good- Generally, crosswalks not provided, nor are they warranted. However, average road widths within neighborhoods allow comfortable crossing for most pedestrians.	Very Good- In some neighborhoods, sidewalks are found on one side of street only. Overall, sidewalks are in good repair and provide adequate width to accommodate the volume of users.	Good/Fair- Generally, curb ramps are in good repair. However, some older neighborhoods (e.g. Audubon and Sunset Park) have missing curb ramps at intersections.	Very Good- Within neighborhoods, moderate building setbacks and presence of buffer strips contributes to comfortable pedestrian environment.
<b>Automobile-Oriented Suburban Zone</b>							
Arterial roadways 6- to 8- lanes. Higher speed traffic and heavy volumes (e.g. Oleander, College Road, Market St.)		Poor- Very incomplete sidewalk network. Many arterials do not provide any sidewalks. Long distance between signalized intersections. Good- Eastwood Road and Military Cutoff Road provide 10-foot wide side path on one side for bicycling and walking. However, there are few crossings to get to the other side of the road.	Poor- Long crossing distances and expanses of pavement. Relatively high volumes of turning vehicles (many intersections have multiple turn lanes).	Poor- Many intersections do not provide pedestrian signals or crosswalks. Many roadways do not provide median refuges, in spite of long crossing distances. Many signs of latent demand including 'goat paths' along many arterials.	Fair- Where present, sidewalks and crosswalks are in fair condition and are of adequate width to accommodate all users.	Poor- Lack of sidewalks and crossing amenities impairs the mobility of many users.	Fair- many developments are separated from the sidewalk (and roadway) by large surface parking lots. Many curb cuts and driveways. Relatively few planted buffer strips.
Non-arterial roadways 2-lanes. Lower traffic volumes and speeds. Stoplights stop signs, and traffic calming slow traffic.		Fair- relatively few sidewalks, but lower traffic speeds and volumes results in adequate internal circulation. Relatively poor external circulation or connections between neighborhoods. Mayfaire and new Autumn Hall developments are exceptions to this.	Good/Very Good- Relatively low traffic volumes and speeds, combined with neighborhood layouts that deter cut-through traffic create many crossing opportunities inside neighborhoods	Good- Generally, crosswalks not provided, nor are they warranted. Average road widths within neighborhoods appear to be wider than in Traditional Suburban Zone neighborhoods.	Good- where present, sidewalks are in adequate condition.	Poor- Lack of sidewalks requires users of assistive devices to travel in roadway or along shoulders.	Good- Within neighborhoods, moderate building setbacks and presence of buffer strips contribute to comfortable pedestrian environment. Some areas do not have sidewalks; however roadways are relatively low speed/volume.

## ***Walking Along/Across Major Arterials***

Wilmington's arterials are in a special category, as they traverse the downtown, suburbs, coastal communities and the northern edges of the city. NCDOT owns and manages most arterials in Wilmington, and many are designated as North Carolina or United States highways. These are the primary vehicular routes, as there is only one freeway within the city. Subsequently, these streets carry the highest speeds and highest volumes of vehicular traffic. Many roads are four- or six-lanes wide, some with medians, center turn lanes or other elements. Typical speed limits on these arterials range from approximately 35 mph in the city's central business district to 55 mph in the suburbs. Up until early 2009, Eastwood Road had a speed limit of 55 mph. Shipyard Boulevard currently has a speed limit of 50 mph.

In spite of the all of these characteristics, many of Wilmington's arterials are also significant pedestrian thoroughfares because much of the commercial development and many schools, libraries, and other destinations are located along these major roadways. For example, Codington Elementary is located on Carolina Beach Road a four-lane divided arterial with a 45 mph speed limit. Although there is a sidewalk along the front of the school and a residential neighborhood on the other side of Carolina Beach Road, there are no convenient crossing locations for students and the sidewalk ends at the school property line.

Almost all neighborhoods share at least one border with a major arterial. Therefore, anyone wishing to walk for any significant distance in Wilmington must eventually walk along or across an arterial roadway. When traveling along these arterials, pedestrians may have difficulty reaching their destinations. There are often no sidewalks along one or both sides of the roadway. In some places, sidewalks are in poor repair. Pedestrians must cross numerous driveways, increasing their exposure to cars turning onto or off of the adjoining arterial.



Figure 34 Codington Elementary School  
Located on Carolina Beach Road- a four lane  
divided arterial- 45 mph speed limit

Equally problematic are the long distances between crossing facilities. Throughout the city at any given moment, there are pedestrians crossing mid-block in locations that have not been designed to increase pedestrian safety, visibility and comfort. It is not uncommon to see people standing on the center turn lane on Market Street waiting to cross, dashing across when a break in traffic occurs. On Oleander Drive, between Hawthorne Drive and Greenville Avenue/Greenville Loop Road, there is approximately 1.5 miles between the signalized intersections. Mid-block crossing is difficult because there are many lanes of high-speed and high-volume traffic. There are no medians or other refuges for pedestrians to use for two-stage crossings. Pedestrians take unsafe risks running across the busy roads so that they do not have to walk a long distance out of their way.

In addition to the long distances between signalized intersections, there are relatively few places where pedestrian crosswalks and signals are provided on four legs of a signalized intersection. Sometimes no pedestrian accommodations are found. In spite of the fact that an implied crosswalk legally exists at the intersection of any two streets, when pedestrian signals are absent, pedestrians must navigate complex movements and negotiate right of way with vehicles.

Arterial streetscape elements are also not inviting to pedestrians. Wide roadways and proximity to relatively fast moving traffic increase the perception of exposure, whether or not there is a real increase in danger. Storefronts are located far from the road, separated by deep parking. Because of this, pedestrians have further to walk to access buildings and must often navigate through parking lots using driving aisles that were not designed to accommodate pedestrian travel.

## PEDESTRIAN CRASH STATISTICS

The NCDOT Division of Bicycle and Pedestrian Transportation collects many statistics on bicycle and pedestrian crashes and injuries, including crash numbers, severity, cause, time of day and several other pieces of information. According to this data, Wilmington is one of the top ten North Carolina cities with highest numbers of pedestrian crashes.<sup>8</sup> As Table 3 illustrates, only 2.7% of all pedestrian crashes in North Carolina occur in Wilmington. However, the number of crashes per 10,000 people is almost 33. This means that Wilmington ranks second in the state for pedestrian crashes when adjusted for population.

NCDOT uses an index for typing crash severity. Severity falls from “K” which stands for a fatal crash, to “O” which indicates no reported injury. More information on the NCDOT crash severity index can be found online at:

[www.ncdot.org/doh/PRECONSTRUCT/traffic/TEPPL/Topics/N-13/N-13\\_d.pdf](http://www.ncdot.org/doh/PRECONSTRUCT/traffic/TEPPL/Topics/N-13/N-13_d.pdf).

Table 3 Top 10 North Carolina Cities for Pedestrian Crashes (2001-2005)

	Number of Crashes	Percent of NC Total	Population	Crashes as Percentage of City Population	Crashes per 10,000 People
<b>Asheville</b>	246	2.02	71,119	0.35%	<b>34.59</b>
<b>Wilmington</b>	<b>324</b>	<b>2.66</b>	<b>99,623</b>	<b>0.33%</b>	<b>32.52</b>
<b>Gastonia</b>	220	1.81	67,776	0.32%	<b>32.46</b>
<b>Charlotte</b>	1,730	14.20	671,588	0.26%	<b>25.76</b>
<b>Greensboro</b>	595	4.88	247,183	0.24%	<b>24.07</b>
<b>Durham</b>	510	4.18	217,847	0.23%	<b>23.41</b>
<b>Raleigh</b>	840	6.89	375,806	0.22%	<b>22.35</b>
<b>Fayetteville</b>	343	2.81	171,853	0.20%	<b>19.96</b>
<b>High Point</b>	171	1.40	86,211	0.20%	<b>19.84</b>
<b>Winston-Salem</b>	298	2.45	215,348	0.14%	<b>13.84</b>

Figure 35 illustrates crash trends for the City of Wilmington for the years 1997 through 2005. Over this time period, the City of Wilmington experienced 567 total pedestrian-related crashes, 20 of which were type K (fatalities), 45 resulted in type A (disabling) injury, 207 resulted in type

<sup>8</sup> Source: Table 3. Ten NC cities with highest numbers of pedestrian crashes from 2001-2005, “Pedestrian Crash Facts Summary Report, 2001-2005”, NCDOT Division of Bicycle and Pedestrian Transportation, downloaded from: [http://www.pedbikeinfo.org/pbcat/pdf/summary\\_ped\\_facts5yrs.pdf](http://www.pedbikeinfo.org/pbcat/pdf/summary_ped_facts5yrs.pdf), July 8, 2008.



B (evident) injury, and 240 resulted in type C (possible) injury. Twenty-nine crashes involved property damage only (type O).

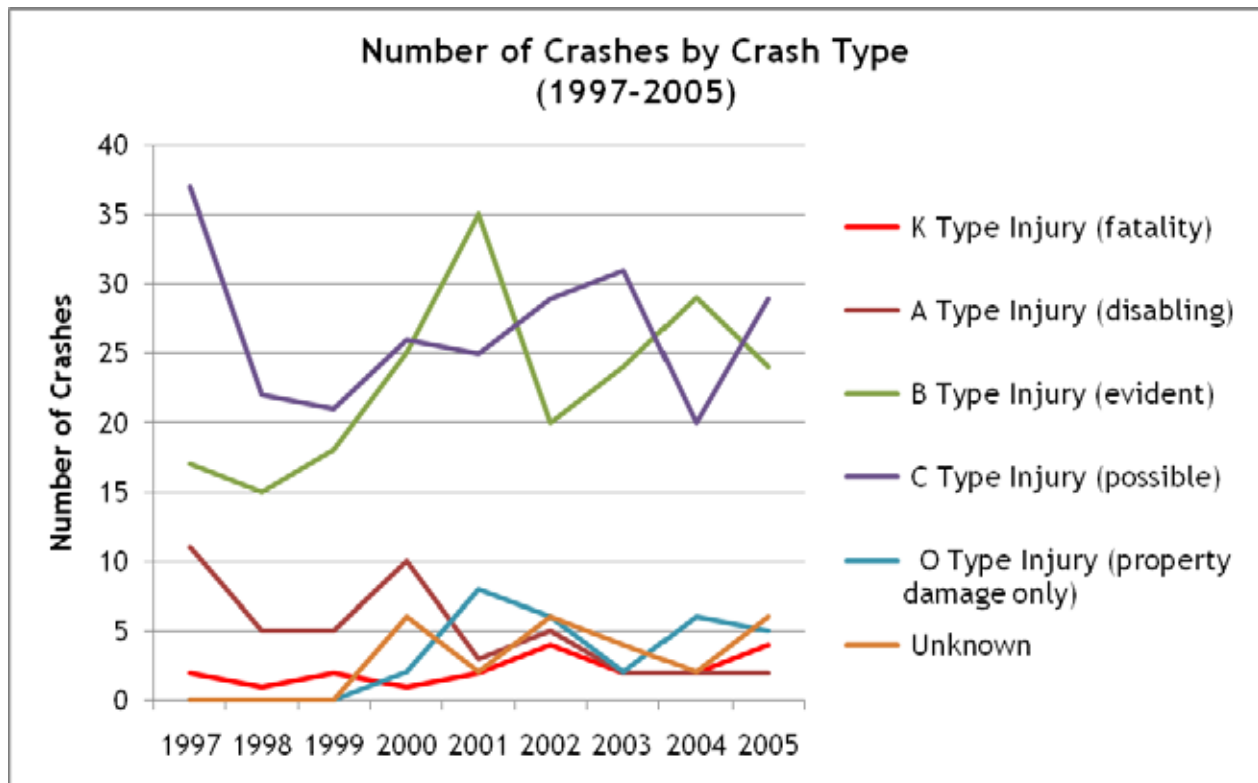


Figure 35 Trends in Pedestrian Crash Frequency by Type.

Source: "Pedestrian Crash Facts Summary Report, 2001-2005", NCDOT Division of Bicycle and Pedestrian Transportation, downloaded from: [http://www.pedbikeinfo.org/pbcat/pdf/summary\\_ped\\_facts5yrs.pdf](http://www.pedbikeinfo.org/pbcat/pdf/summary_ped_facts5yrs.pdf), July 8, 2008.

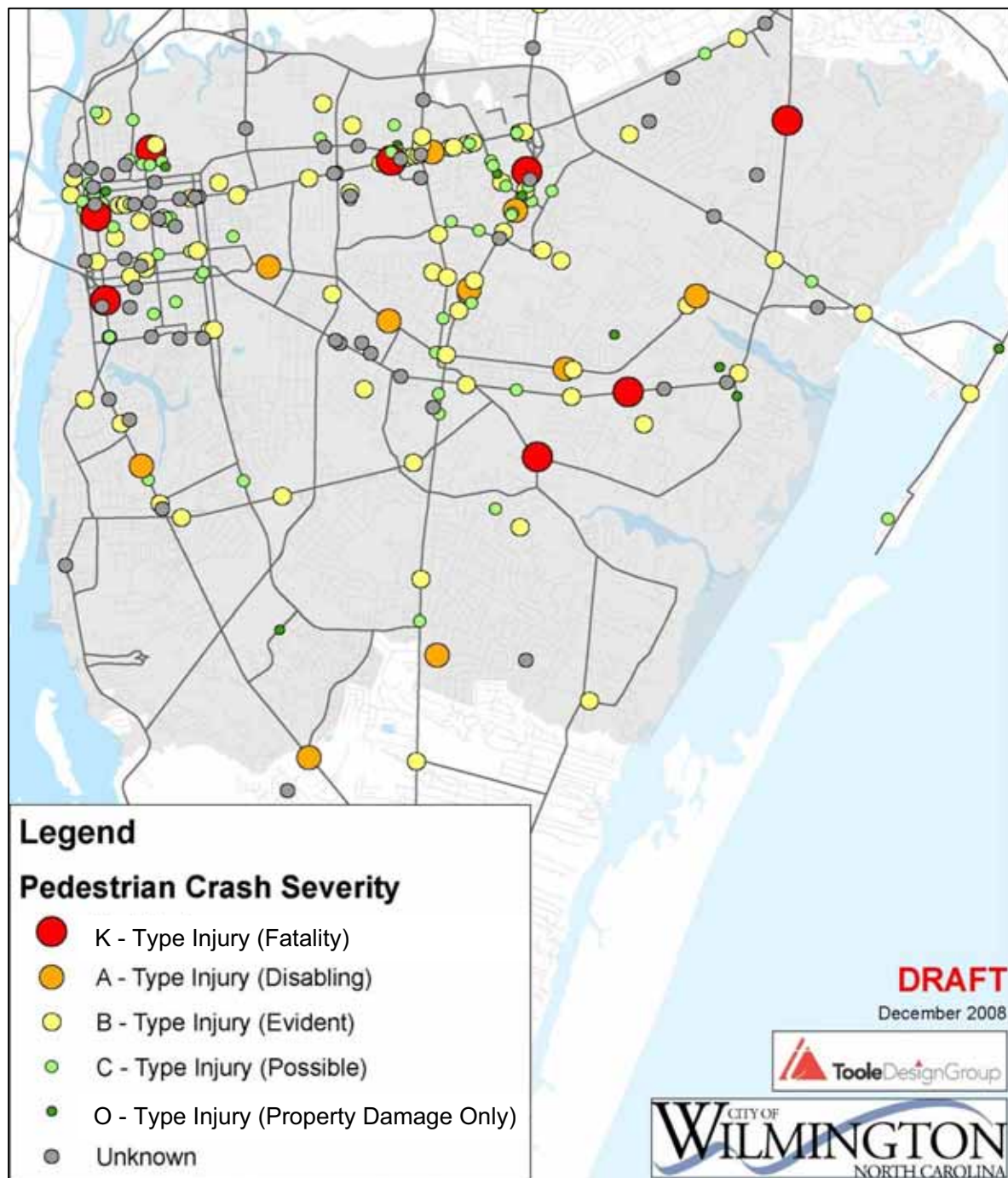


Figure 36 Map of Pedestrian Crashes in Wilmington 2003-2006

Source: Pedestrian crash data obtained from Wilmington MPO April, 2008

Figure 36 shows the distribution of pedestrian crashes around the city between 2003 and 2007. This map clearly illustrates the fact that most crashes resulting in fatality and disabling injury occur on Wilmington's major roadways, although the majority of crashes overall are more evenly distributed between local roads and major roads.

It is important to emphasize that a concentration of crash points does not directly indicate that a particular location is inherently worse for pedestrians than other areas. This information must be considered in the context of pedestrian volumes, accident reporting uniformity across the city and other factors.

When looking at the larger context, Wilmington scores somewhat better than the state overall. As indicated in Table 4, the percentage of total crashes that are fatal or disabling is approximately half the figure for the state. However, it ranks about six percentage points higher for 'possible' injuries where no trauma is readily apparent to the reporting officer.

Table 4 Crash Severity Comparison (1997-2006)

Injury Type	Percent of Total Crashes	
	Statewide	Wilmington
<b>K Type Injury (fatality)</b>	6.9%	3.5%
<b>A Type Injury (disabling)</b>	14.5%	7.9%
<b>B Type Injury (evident)</b>	35.4%	36.5%
<b>C Type Injury (possible)</b>	36.9%	42.3%
<b>O Type Injury (property damage only)</b>	3.8%	5.1%
<b>Unknown</b>	2.5%	4.6%
<b>Totals</b>	<b>100.0%</b>	<b>100.0%</b>

### Cost of Crashes

In addition to the direct impact to the victims and family of a crash involving a pedestrian, it is eye-opening when the cost to the Wilmington economy is examined. Every year, NCDOT Traffic Safety Unit conducts an analysis of the cost of traffic crashes to the state. The injury costs include estimates of medical costs, public services, loss of productivity, employer cost, property damage and change in quality of life. The crash costs include the cost associated with the average number of injuries in each crash type. This information can be attributed to the pedestrian crash data for the city. The numbers are telling- between 1997 and 2005, the cumulative impact of pedestrian fatalities to the city's economy was \$84 million and the impact of all pedestrian crash types combined was over \$118 million.<sup>9</sup>

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<sup>9</sup> NCDOT Memorandum: 2007 Standardized Crash Cost Estimates for North Carolina. Brian G. Murphy, PE Traffic Safety Project Engineer, September 3, 2008. Obtained from: <http://www.ncdot.org/doh/preconstruct/traffic/Safety/ses/costs/costs.html>, September 6, 2008.

Table 5 Cost of Wilmington Pedestrian Crashes (1997-2005)

Injury Type	Cumulative Injuries 1997-2005	Cost per Injury <sup>1</sup>	Total
<b>K Type Injury (fatality)</b>	20	\$4,200,000	\$ 84,000,000
<b>A Type Injury (disabling)</b>	45	\$240,000	\$ 10,800,000
<b>B Type Injury (evident)</b>	207	\$71,000	\$ 14,697,000
<b>C Type Injury (possible)</b>	240	\$35,000	\$ 8,400,000
<b>O Type Injury (Property Damage Only)</b>	29	\$4,800	\$ 139,200
<b>Unknown</b>	26		
<b>Totals</b>	<b>567</b>		<b>\$ 118,036,200</b>

<sup>1</sup>Note: Costs are 2007 estimates. Incidents occurring in earlier years may have different estimated costs.

## RECENT DEVELOPMENTS

Several recent projects within the City of Wilmington have made significant improvements for pedestrians and can act as models for other similar locations throughout the city.

### *Wrightsville Avenue Streetscape Project*

In 2000, sections of Wrightsville Avenue were reconfigured to slow vehicular traffic and improve pedestrian comfort and safety. Within the Carolina Place and Ardmore neighborhoods, Wrightsville Avenue was converted from two-way to one-way operation. Streetscape improvements included street trees, new sidewalks, and decorative crosswalks. According to the city transportation planners, the mitigation efforts have worked so well that other neighborhoods around Wilmington are clamoring for similar projects.



Figure 37 Streetscape Improvement at Wrightsville Avenue and Wolcott Avenue

### ***Sunset Park Gateway Treatment***

The city recently installed gateway treatments along Burnett Boulevard at the entrances to the Sunset Park neighborhood. South of the neighborhood, Burnett Boulevard serves many industrial uses and has significant amounts of heavy truck traffic. The center chokers were installed to prevent these large vehicles from entering the neighborhood. The gateway treatment also provides a visual cue to all motorists that they are leaving an industrial area and entering a residential area where slower vehicle speeds are warranted.



Figure 38 Gateway treatment on Burnett Boulevard

### ***Safe Routes to Schools***

In early 2008, Wilmington successfully applied for a Safe Routes to Schools (SRTS) grant from NCDOT. During summer 2008, the city also spent approximately \$44,000 in its own funds to construct sidewalks and walkways, and install crosswalks and bicycle lanes around two schools.

- **Bradley Creek Elementary:** The city has constructed a walkway from Kingston Road to the rear of the school property. In addition, the city has received a \$211,800 grant that will be used to fund construction of a 3,100-foot-long sidewalk on Greenville Loop Road, crosswalk improvements, a new bicycle rack and various education and encouragement activities.
- **Holly Tree Elementary:** The city constructed a 360-foot-long sidewalk along Greenhowe Drive, installed three crosswalks and marked shoulders along Kirby Smith Drive. The Wilmington Police Department has also been enforcing a no stopping zone at the rear of the school to limit pedestrian and bicyclist conflicts with motor vehicles.
- **Rachel Freeman Elementary School:** The city constructed an 800-foot-long sidewalk along Princess Place Drive, connecting the Creekwood neighborhood to the school.

### ***Neighborhood Traffic Management Program***

The city's Neighborhood Traffic Management Program (NTMP) was created in 2004. Prior to that, the city installed speed humps throughout the city's neighborhoods based on resident



interest. The program places a greater emphasis on the analysis of street networks within a defined area, so as to provide solutions that benefit the neighborhood as a whole, as opposed to focusing on one particular street. Since its inception, city staff have conducted studies in 18 areas and held 36 meetings with over 1,600 participants. Interim improvements, including speed limit reductions and pavement markings, have been implemented in most of the study areas. Construction of the long-range improvements (i.e. mini-circles, center chokers, curb extensions, and impellers) has been completed in three neighborhoods: Windemere, Sunset Park and Creekwood.

### ***WAVE Transit Route Restructuring***

WAVE Transit recently restructured its entire fixed-route bus system. Two additional transfer stations were constructed on Columb Drive behind Target and on Independence Boulevard in front of the Independence Mall. The station on Columb Drive is temporary and will be replaced by the permanent facility on Cando Street, just north of Ringo Drive. Almost all of the new routes run in one-way loops, requiring most passengers to cross the street when boarding or alighting. Many of the redundant stops were removed and buses no longer travel through private parking areas, further reinforcing the need to improve pedestrian accessibility to and from WAVE Transit stations and stops.

### ***River to the Sea Bikeway Dawson Street Pedestrian Refuge Island***

In late 2008, NCDOT constructed a concrete pedestrian refuge island at the intersection of Dawson Street and the River to the Sea Bikeway. This project also narrowed the roadway from four lanes to three. Together, these two changes shorten the crossing distance and provide a protected location for pedestrians to cross. The project also includes new crosswalk markings. This project was co-funded by the Division of Bicycle and Pedestrian Transportation and NCDOT Division 3 at a cost of \$40,000.



Figure 39 New Pedestrian Refuge on Dawson Street at the River to the Sea Bikeway Crossing



### ***Cross-City Trail***

The city officially opened the first section of the Cross-City Trail along Eastwood Road between Military Cutoff Road and Cardinal Drive. This section of trail will soon connect to the Military Cutoff Trail along Military Cutoff Road and will eventually consist of 10-miles of multi-use paths for bicyclists and pedestrians extending from James E.L. Wade Park to Wrightsville Beach.



Figure 40 New Section of Cross-City Trail

### ***NCDOT Spot Safety Project at South College Road and New Centre Drive***

As part of the NCDOT Spot Safety Program, NCDOT has added an additional left-turn lane along northbound South College Road (US Highway 117/NC 132) onto New Centre Drive. Even though curb ramps and sidewalks are present on all four corners of the intersection, no pedestrian crossing accommodations (signals or crosswalks) existed before the intersection improvement, and none have been added as a result of the project.

Although the change may result in more vehicle capacity through the intersection, it may degrade the comfort and safety of pedestrians crossing South College Road. Now, people crossing South College Road are in the intersection for a longer period of time.

Also, the raised concrete median along South College Road has been significantly narrowed. Although this median was not specifically designed or intended to function as a refuge, it did provide some accommodation for pedestrians prior to the completion of this project. At approximately 16 inches in width, the resulting median is too narrow to adequately serve this function.



Figure 42 South College Road Median (Before)



Figure 42 South College Road Median (After)

### ***Riverwalk Expansion***

The City of Wilmington has continually extended that Riverwalk north and south using both public and private funding. As identified in the *Vision 2020* plan, the Riverwalk will eventually stretch from the Isabel S. Holmes Bridge at the north to the Cape Fear Memorial Bridge at the south. Recent extensions have included the section between Ann Street and Nun Street. The section adjacent to the new convention center is under construction. In 2006, the Riverwalk was designated as part of the East Coast Greenway by the East Coast Greenway Alliance.

### **UPCOMING DEVELOPMENTS**

In addition to current development activities, Wilmington has a number of pending projects that will provide significant benefits to pedestrians in the Port City. These have been intentionally designed to improve the public space and subsequently the pedestrian experience. Some developments, such as North 3<sup>rd</sup> Street streetscape project have been discussed elsewhere in this chapter. Other improvements that will provide pedestrians with either direct or indirect benefit are highlighted below.

### ***Traffic Signal System Upgrade***

The City is in the process of upgrading all existing traffic signal controllers, which will permit increased customization at intersections. This will allow the city to incorporate many pedestrian-friendly features into signal operations, including:

- Decreasing wait times during peak demand periods.
- Leading pedestrian interval (LPI) timing (see Chapter 4).
- Pedestrian activation controls on median refuges, allowing slower moving pedestrians to stop halfway across a crossing and complete the trip during a succeeding phase.
- Decreased wait times for vehicles if no pedestrians are present.

### **Scramble Intersection in Downtown Wilmington**

Pedestrian scrambles are intersections where the traffic signal is programmed to stop vehicular traffic in all directions to allow pedestrians an opportunity to cross the intersection in any direction including diagonally.

Wilmington is currently considering piloting a pedestrian scramble signal phase in the downtown area. The intersection of North and South Front Street and Market Street may be an ideal location. Pedestrian scramble signal phases have been used for a number of years in Europe, Asia, Canada, and have recently been deployed in several cities in the United States.

Opinions on scrambles are mixed, but they are generally most appropriate for intersections with high volumes of pedestrian traffic and high volumes of turning vehicles. Theoretically, functionality for both pedestrians and cars is improved as there are reduced conflicts between turning cars and pedestrians than occur during normal signal operation.

It will be important for the city to carefully consider the operational characteristics of the intersection and incorporate this information into the pilot program. Additionally, the city must ensure that adequate advance educational outreach occurs to ensure that both drivers and pedestrians are informed about their respective responsibilities once the scramble is operational. An ongoing education campaign is important in downtown Wilmington because many drivers and pedestrians will be tourists, and this may be the first time they have encountered a scramble intersection and may not understand how to navigate it properly.

### **Cross-City Trail (John D. Barry Drive to Cameron Art Museum)**

This project, currently let for bid, will construct a 10-foot-wide multi-use path along South 17th Street between John D. Barry Drive and the existing multi-use path in Halyburton Park and another segment of path between Halyburton Park and the Cameron Art Museum. The City of Wilmington is funding this project with bond funds authorized by voters in 2006 in partnership with NCDOT Division 3.



Figure 44 Pedestrian Scramble  
Source: Pedsafe.org



Figure 44 Pedestrian Scramble Sign  
Source: FHWA Publication No. FHWA-RD-01-102 Pedestrian Facilities Users Guide-Providing Safety and Mobility

### ***Lake Avenue Sidewalks***

This project, currently in the construction phase, will include a sidewalk along Lake Avenue between 41st Street and South College Road. The City of Wilmington is funding this project with bond funds authorized by voters in 2006.

### ***North 3<sup>rd</sup> Street Streetscape Project***

This project, currently in the design phase, will reconstruct North 3rd Street between Market Street and Davis Street. The project will likely include asphalt resurfacing, black decorative mast-arm traffic signals, underground utilities, pedestrian safety improvements, landscaped median, street trees, and other aesthetic improvements. The City of Wilmington is funding this project with bond funds authorized by voters in 2006.

### ***South 3<sup>rd</sup> Street and Ann Street Pedestrian Safety Improvements***

Design for pedestrian safety improvements at the intersection of South 3<sup>rd</sup> Street and Ann Street are currently underway. City staff has selected the single crosswalk alternative, which will likely consist of three decorative stamped asphalt crosswalks, a refuge island and a push button activated flashing warning beacon on the South 3<sup>rd</sup> Street approaches. The city has budgeted \$70,000 for the project in fiscal year 2008. Residents of the Old Wilmington neighborhood association have also pledged \$7,000 toward the improvements.

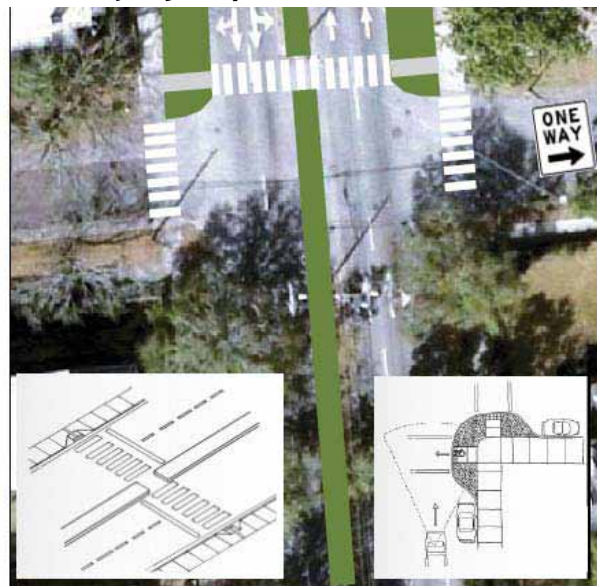


Figure 45 South 3rd Street and Ann Street Proposed Improvements

### ***North Front Street Streetscape Project***

This project, currently in the design phase, will reconstruct North Front Street between Market Street and North 3rd Street. The project will likely include asphalt resurfacing, black decorative mast-arm traffic signals, underground utilities, pedestrian safety improvements, landscaped median, street trees, and other aesthetic improvements. City staff is currently studying the feasibility of removing some of the existing traffic signals along North Front Street and installing four-way stops. This would lower the project costs and potentially improve the pedestrian environment. The City of Wilmington is funding this project with bond funds authorized by voters in 2006.

### ***Dawson Street and Wooster Street Pedestrian Safety Improvements***

As identified in the *Dawson & Wooster Corridor Plan*, the City of Wilmington plans to make pedestrian safety and aesthetic improvements to the Dawson Street and Wooster Street corridor. These improvements include decorative stamped asphalt crosswalks, pedestrian signal heads and landscaping at the intersections with South 5th Avenue, South 8th Street, South 10th Street, South 13th Street, South 16th Street and South 17th Street. The South 10th Street intersection has been identified as a priority, due to the amount of school-related pedestrian traffic.

### ***Wooster Street Sidewalks***

This project, currently in the design phase, will fill-in the gaps in sidewalk along Wooster Street between South 3rd Street and Oleander Drive. The City of Wilmington is funding this project with bond funds authorized by voters in 2006.

### ***Independence Boulevard Widening Phase II***

Phase II of the widening of Independence Boulevard between Shipyard Boulevard and Carolina Beach Road has been designed and should be let for bid in early 2009. This project will widen Independence Boulevard from two lanes to a four-lane divided facility. A southbound bicycle lane will be provided for the entire project length, while the northbound roadway will include a wide, outside lane. Sidewalks will be provided on the west side between Shipyard Boulevard and Carolina Beach Road and on the east side between Museum Drive and Carolina Beach Road. A 10-foot-wide multi-use path will be constructed on the east side between Croquet Drive and Museum Drive. This path will be part of the Cross-City Trail. Marked and signalized pedestrian crossings will be provided at South 17th Street. The City of Wilmington is funding this project with bond funds authorized by voters in 2006.

### ***Randall Parkway Widening***

The widening of Randall Parkway between Independence Boulevard and South College Road has been designed and should be let for bid in early 2009. This project will widen Randall Parkway from a two-lane divided facility to a four-lane divided facility. Bicycle lanes will be provided in both directions for the entire project length. Sidewalks will be provided on the north side between South College Road and Collegiate Drive and between South Kerr Avenue and Independence Boulevard and on the south side between South College Road and South Kerr Avenue. A 10-foot-wide multi-use path will be constructed on the south side between Independence Boulevard and South Kerr Avenue. This path will be part of the Cross-City Trail. Marked and signalized pedestrian crossings will be provided at South Kerr Avenue. This project funded through a congressional earmark.



### ***NCDOT Wrightsville Avenue Widening***

The widening of Wrightsville Avenue between Forest Hills Drive and Wilshire Boulevard is currently under construction. This project will widen Wrightsville Avenue from two lanes to four lanes, and add additional left- and right-turn lanes. The City of Wilmington has programmed \$22,000 to add sidewalks to the entire length of the project. The city and the WMPO have requested that NCDOT provide marked and signalized pedestrian crossings at the intersection of Wrightsville Avenue and Wilshire Boulevard, and these were included in the project design. This crossing is part of the Cross-City Trail.

### ***NCDOT Kerr Avenue Widening***

The widening of North and South Kerr Avenue between Martin Luther King, Jr. Parkway and Randall Parkway is currently in the design phase. NCDOT plans to begin construction in fiscal year 2012. This project will widen North and South Kerr Avenue from three lanes to a four-lane divided facility. The City of Wilmington has programmed \$1.1 million to add bicycle lanes and sidewalks to the entire length of the project. The city and the WMPO have requested that NCDOT provide marked and signalized pedestrian crossings at all signalized intersections included in the project, as well as pedestrian refuge islands where feasible.

### ***Yield to Pedestrian Signage***

Wilmington plans to install yield to pedestrian signage on several city-maintained roadways. These new signs are intended to increase the visibility of pedestrians to motorists (see *Yield to Pedestrian Signage* policy in Chapter 4). NCDOT has agreed to study the signs impact at the planned locations. The new signs will be located adjacent to right turn lanes at the following intersections:

- Racine Drive at New Center Drive
- Racine Drive at Oriole Drive



## NCDOT State Transportation Improvements Plan (STIP)

The 2009-2015 State Transportation Improvements Program (STIP) has identified several projects in the Division 3 Transportation Improvements Plan (TIP) with the potential to impact Wilmington's pedestrian network. As per the state's policy of accommodating pedestrian and bicycle travel, sidewalks, crossings and other pedestrian amenities should be included in these projects to the extent possible to accommodate existing and future demand. A list of the Division 3 TIP projects follows:

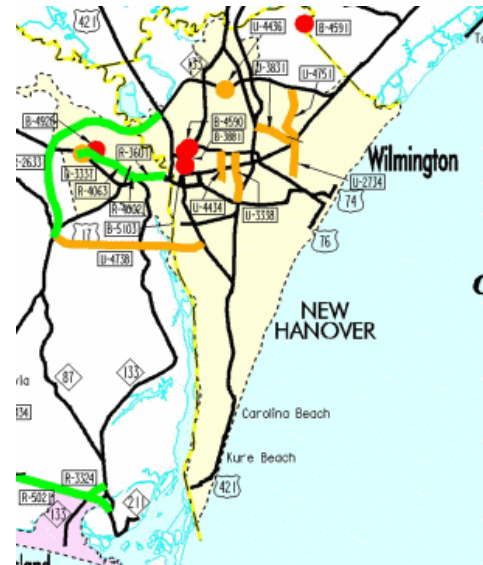


Figure 46 Division 3 STIP FY2009-2015

Table 6 NCDOT Division 3 STIP FY2009 - 2015

Project Number	Description
U-4751*	SR 1409 (Military Cutoff Road) to US 17. Multi-lanes on new Location. (4 miles)
U-4738*	US 17 to Independence Boulevard/Carolina Beach Road intersection. Construct a new facility with structure over the Cape Fear River. (9.5 miles)
U-4902	Colonial Drive to SR 1402 (Porters Neck Road). Access management improvements. (8.6 miles)
U-4903	Independence Boulevard to 17 <sup>th</sup> street. Mill and resurface. (1.4 Miles)
U-3338	SR 1175 (Kerr Avenue), Randall Parkway to SR 2649 (Martin Luther King, Jr. Parkway). Widen to multi-lanes. (3.1 miles)
U-4718	US 76 (Oleander Drive) and NC 132 (College Road). Intersection Improvements.
U-3831	SR 2048 (Gordon Road), NC 132 interchange ramp to west of US 17 business (Market Street). Widen to multi-lanes. (2.4 miles)
U-5017	Wilmington computerized signal system.
U-4436*	SR 1318 (Blue Clay Road) and US 17 (Wilmington Bypass). Construct an interchange.
U-4920	Randall Parkway, Independence Boulevard-Covil Avenue to South College Road.
B-4590	Smith Creek. Replace bridge no. 29
B-5103	Abandon railroad. Replace bridge no. 35
E-4516	US 74 (Eastwood Road), SR 1409 (Military Cutoff Road) to Cardinal Lane. Construct multi-use trail.
E-4749	Construct a bike path connecting the River To Sea Bikeway to the Eastwood road path.
SF-4903D	NC 132 (College Road) and SR 1272 (New Center Drive). Intersection Improvements.
W-5104	NC 132 (College Road), US 117 (Shipyard Boulevard) to US 421 (Carolina Beach Road). Various safety improvements. (4.4 miles)

## LARGE COMMERCIAL PROPERTIES

During the development of this plan, many large scale commercial properties were assessed for pedestrian accommodation. There were some examples of properties providing good levels of accommodation, such as sidewalks and marked walkways leading through parking lots and across drive aisles and connections between adjoining buildings. Mayfaire Town Center is one recent project that provides relatively good accommodations for non-vehicular travelers. This particular property even provides sidewalks that extend to the edge of the NCDOT right-of-way on Military Cutoff Road, even though no sidewalk exists along Military Cutoff Road.

However, most large commercial properties are more typically characterized by large expanses of parking, which do not provide dedicated areas for pedestrians. The only connections to the interior of a development from the road are along the internal roadways and drive aisles. These parking lots act as barriers to people wishing to access the building from surrounding sidewalks.

Some of the policy strategies in Chapter 4 include recommendations for improving the overall design and layout of these large scale commercial projects.

## PUBLIC TRANSPORTATION

WAVE Transit operates regularly scheduled bus service in Brunswick and New Hanover Counties. The transit system also provides a free downtown trolley and the Seahawk Shuttle, which serves the campus of UNCW and surrounding neighborhoods. The entire WAVE Transit fleet is equipped with bicycle racks.

In addition to its regularly scheduled service, WAVE Transit provides on-call paratransit services that provide curb-to-curb service. According to the transit system's website, no assistants or aides are provided by WAVE Transit. This means that all users must be able to navigate to the curb in order to access the vehicle.

Bus stops in Wilmington were assessed as part of this project. Observations indicated that bus stop suitability is not consistent throughout the city. In some areas, bus stops were located on the shoulder of a roadway without appropriate landing areas or pedestrian accommodations leading to the bus stop. Sidewalks and street crossings in the vicinity of a bus stop were frequently absent.

Bus stops are currently located on the near- and far-side of intersections, as well as mid-block. When bus stops are on the near-side of an intersection, pedestrians often cross in front of the bus and are exposed to adjacent traffic. When appropriate, bus stops should be moved to

controlled crossings and to the far-side of intersections. Far-side bus stops can reduce the crash risk to pedestrians as they encourage pedestrians to cross behind the bus at a signalized intersection and are more visible to other motorists.

The City of Wilmington should collaborate with WAVE Transit on the development of a policy for the installation and maintenance of pedestrian accommodations at and near transit stops.

## INTERAGENCY COORDINATION

At the state and regional level, there are a number of agencies and plans that address transportation improvements which have a direct impact on pedestrian facilities in the city of Wilmington. Streets are either owned by the North Carolina Department of Transportation (NCDOT) or by the City of Wilmington, but all sidewalks in the public right-of-way are owned and maintained by the city. The following discussion summarizes the roles and responsibilities of these agencies. More detailed descriptions of the agencies and their plans that affect Wilmington's pedestrian network are located in the Appendix.

### *Transportation Policy Boards and Departments*

#### **Wilmington Metropolitan Planning Organization (WMPO)**

The WMPO is charged with adopting the federally-mandated Long-Range Transportation Plan and the state-mandated Comprehensive Transportation Plan; the Metropolitan Transportation Improvement Program (MTIP) for road, transit, bicycle, and pedestrian investments; and the Unified Planning Work Program. After appropriate planning, engineering, and public input, the WMPO adopts specific alignments for proposed thoroughfares and transit corridors.

#### **North Carolina Board of Transportation**

The governor of the State of North Carolina appoints the members of the North Carolina Board of Transportation. The board adopts the State Transportation Improvement Program (STIP), the seven-year investment program determining how state and federal transportation funds will be spent statewide.

#### **North Carolina Department of Transportation (NCDOT)**

Almost 20% of the roadways in Wilmington are owned and maintained by NCDOT. Local NCDOT maintenance and operations are performed at the division level, and Wilmington is in Division 3. The Division of Bicycle and Pedestrian Transportation (DBPT), headquartered in Raleigh, is a central resource for bicycle and pedestrian planning in North Carolina.

## Chapter 4. Policies, Codes and Ordinances

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Existing policies, codes and ordinances regulate the infrastructure that both public and private entities construct in Wilmington, and ultimately determine the quality of the pedestrian environment. The Land Development Code (LDC) and the Technical Standards and Specifications Manual are the principal documents that include the policies, codes and ordinances for the construction and maintenance of facilities that impact pedestrian travel.

A review of existing standards was conducted to ensure that pedestrians are appropriately accommodated in city policies. Recommendations to update or improve policies and standards follow the most current research on pedestrian safety and the best practices of other jurisdictions across the country.

The following pages include a review of and recommendations for amending Wilmington's current pedestrian-related codes, ordinance and policies. Each policy review includes: a reference to the city's existing policy or standard on the topic; national best practice examples from other jurisdictions; and recommendations for updating or amending the Wilmington's policies or standards.

The recommended policy and regulatory changes included in this section are intended to address some of the more problematic issues. The 2003 NCDOT publication, "Guidelines for the Investigation and Remediation of Potentially Hazardous Bicycle and Pedestrian Locations" ([www.ncdot.org/doh/PRECONSTRUCT/traffic/conference/reports/pb1.pdf](http://www.ncdot.org/doh/PRECONSTRUCT/traffic/conference/reports/pb1.pdf)) is an additional resource that should be considered for specific issues that are not covered in the following pages. This document presents best practices for a variety of pedestrian safety and comfort design elements.

### 4.1. DEVELOPMENT REGULATIONS

#### **4.1.1 Land Development Code Document Organization and Structure**

As currently structured, the LDC contains a significant amount of requirements relating to sidewalks and pedestrian facilities. However, it appears that an applicant must draw information from several different places in the 600+ page document to get a complete picture of certain key provisions relating to pedestrian accommodations. For example, a developer or applicant unfamiliar with the city LDC would have difficulty finding one area that provides guidance on the provision of pedestrian facilities in parking lots.

## **Recommendation**

Identify key provisions that are typical to many different types of developments and consolidate all of these in one section. Include cross references to this section where necessary in the ordinance. This has several potential benefits:

- The LDC may become a shorter document
- LDC users would have one place to go for information
- The potential for contradictory provisions could be reduced
- Modifications to the LDC would be easier because the relevant information is all in one place.

### **4.1.2 Requirements for Sidewalks**

During interviews with the City of Wilmington staff, a common concern from several interviewees involved with plan and development review related to the city's requirements for providing sidewalks. Many interviewed felt that current regulations did not provide enough guidance to staff regarding the application of sidewalk requirements to redevelopment or expansion projects. Furthermore, some felt that it was too easy for a developer to obtain a waiver from the sidewalk requirements because the guidelines for granting waivers provided excessive latitude to applicants.

## **Current Practice**

*Land Development Code: Article 7, Sec. 18-376. Sidewalks, walkways, and bikeways.*

- (a) Sidewalks, walkways and other pedestrian ways shall be provided by the subdivider within or adjacent to a subdivision, as deemed necessary by the subdivision review board, upon reasonable evidence that the sidewalks, walkways or other pedestrian ways would be essential for pedestrian access to community facilities, that such is necessary to provide safe pedestrian movement outside the street or street rights-of-way area or that such is an extension or could reasonably become an extension of existing sidewalks, walkways and other pedestrian ways. All sidewalks, walkways, and other pedestrian ways shall be aligned as required by the subdivision review board and designed and constructed to conform to the City's Technical Standards and Specifications Manual. Sidewalks shall be indicated on all preliminary plans.
- (b) Sidewalks shall be required to be constructed in the following circumstances:

1. On a minimum of one side of the right-of-way of all thoroughfares such as freeways, expressways, arterials or collector streets, which are adjacent to the property to be developed.
2. On each side of the right-of-way of all thoroughfares such as freeways, expressways, arterials or collector streets that run through property to be developed if the subdivider intends to construct any portion of the thoroughfare as access to his development.
3. On each side of the right-of-way of all local streets extending through the property to be developed.

(c) The subdivision review board may exempt sidewalk installation in specific cases upon a finding that sidewalks are unnecessary for the protection of the public safety or welfare due to conditions peculiar to the site, to avoid impacting wetlands, or as part of a low impact design development plan.

*Land Development Code: ARTICLE 9, OFF-STREET PARKING AND LOADING; DRIVEWAYS*

Article 9 of the LDC provides guidance for the general layout and design of off-street parking facilities, as well as the number of spaces required. Wilmington should be recognized for requiring bicycle parking spaces on most new parking lots. However, this article does not contain clear guidance *mandating* pedestrian connections from building entrances to the adjoining sidewalk network.

Sec. 18-529. *Off-street parking design*, does require the applicant to show the proposed pedestrian circulation system in the plan, but it does not provide guidance on what that network should be.

*Wilmington Design Preferences Manual*

The 2005 Design Preferences Manual developed by the Development Services Department provides simple, clear guidance in a graphic form on preferred design elements for new development projects. Pictures are accompanied by brief list of key information. The guide does stress the importance of providing “landscaped pedestrian walkways” but it does not discuss where those walkways should go or what their function should be.

**State of the Practice**

*Durham Unified Development Ordinance*

Durham’s land development regulations- subdivision and zoning- are consolidated in a single Unified Development Ordinance (UDO). Section 12.4, Pedestrian and Bicycle Mobility of the UDO provides clear guidance for the installation of sidewalks. One important aspect is that all



new developments and redevelopments of existing property are required to comply with the requirements of this section.

Street Type	Rural Tier	Suburban Tier	Urban Tier	Compact Neighborhood/ Downtown Tiers
Freeways	None	None	None	None
Major/Minor Thoroughfare	None	Both Sides	Both Sides	Both Sides
Collectors	None	Both Sides	Both Sides	Both Sides
Nonresidential Street At least 2,000 daily trips (post development)	None	One Side	Both Sides	Both Sides
Less than 2,000 daily trips (post development)	None	One Side	One Side	Both Sides
Residential Street	None	One Side	One Side	Both Sides
Cul-de-Sac 400 or more linear feet	None	One Side	One Side	Both Sides
Less than 400 linear feet	None	None	One Side	Both Sides

Figure 47 Durham UDO Sidewalk Requirements Matrix

In the Durham example, sidewalk requirements are based on a combination of road classification, traffic volume, and zoning category.

Section 12.4.4 C. of the Durham UDO mandates that “Pedestrian and bicycle connections shall be made to any existing or proposed off-site pedestrian and bicycle facilities.”

Section 12.4.5 A. of the Durham UDO requires sidewalks to be constructed with a planting strip of three feet or more.

#### Asheville Unified Development Ordinance

Asheville’s UDO provides very clear criteria for the inclusion of sidewalks on public and private streets, as well as conditions under which sidewalk requirements may be waived. Applicability provisions cover both new development as well as redevelopment.

#### *Section 7-11-7. Sidewalk requirements.*

1. Sidewalks shall be required for all new construction and for renovations, additions and/or expansions to existing structures which fall into one of the following categories:
  - a. All new single family residential development which consists of 20 or more single family homes;
  - b. All new multi-family residential development, except for the construction of less than ten units;
  - c. All new office, institutional, commercial, and industrial development;

- d. All existing office, institutional, commercial, and industrial development additions or expansions to structures where the expansion results in an increase of more than 50 percent value of the structure as defined in section 7-11-2(b)(1)a of this chapter.
  - e. All new streets, improved streets or extension to streets.
2. Additional conditions for requiring sidewalks. Notwithstanding (1) above, the following findings must be made prior to the city engineer/designee requiring the construction of a new sidewalk or a "fee in lieu of" constructing a sidewalk for an applicable project. One of the following conditions must be met, as determined by the city engineer/designee.
- a. The applicable project area, including the street frontage, is identified as a needed pedestrian linkage within an adopted City of Asheville transportation or corridor plan, including but not limited to such plans as the Transportation Improvement Program (TIP), greenway, small area, pedestrian thoroughfare plans.
  - b. The current or projected (within five years) average daily traffic count (ADT) for the street is 300 vehicles per day or more as determined by the city Traffic Engineer. Traffic generated from the applicable project or any additions to the applicable project will be included in calculating the ADT for this condition.
  - c. In the event that sidewalk is not required, the developer must provide a recorded easement, if necessary, for the future development of the sidewalk. The developer wherever practical shall grade for the future development of a sidewalk.
3. Public and private streets. Sidewalks shall be constructed along all public and private street frontages that meet the requirements of section 7-11-7(2) of the lot for which the development is proposed.

City of Charlotte Zoning Ordinance

Charlotte's zoning ordinance provides unambiguous requirements for the provision of sidewalk connections from the entrance of any commercial development to the adjoining street network, except for freeways and expressways.

*Chapter 12, Section 12.529. Sidewalk connections to public streets, including within commercial developments.*

In order to promote and encourage pedestrian circulation, it is important to provide safe and adequate sidewalk facilities. Therefore, sidewalk connections will be required as described below for new commercial development, except for the following exceptions:

- a. A change of use in an existing building from a commercial use to another commercial use.
  - b. Expansions of less than 5% of the building area or 1,000 square feet, whichever is less.
  - c. Facade improvements to existing buildings.
  - d. Individual uses within a shopping center or a unified complex are not required to provide separate sidewalk connections as long as the entire center or complex as a whole provides common sidewalk connections.
1. Sidewalk connections shall be required after the effective date of this amendment between certain commercial buildings and all adjoining public streets except for freeways or expressways.

### **Recommendations**

- The City of Wilmington should revise its LDC to ensure that sidewalk requirements apply to new development as well as redevelopment or expansion of existing properties. Asheville's approach provides very clear objective criteria for determining sidewalk applicability.
- The city should revise its LDC to clarify that pedestrian and bicycle connections are required to off-site pedestrian bicycle facilities (existing or planned) from the entrance of the proposed structure (or existing in the case of building modification or expansion). Charlotte's approach is a good example for these provisions.
- The city should require sufficient right-of-way dedication to ensure adequate space for a minimum two-foot grass buffer or planting strip between the back of curb and the sidewalk, similar to the process used in Asheville, NC. This requirement is currently located in the city's Technical Standards Manual (see "plaza"), but it may not be incorporated into roadway design if the applicant is not familiar with the Technical Standards Manual and does not plan on installing sidewalks at the time of development.
- The city should revise Article 9 of the LDC should provide clear guidance governing the provision and design of pedestrian circulation facilities within parking lots.

- The city should revise the Design Preferences manual to clearly illustrate that sidewalks should connect buildings with the surrounding pedestrian network. Also, pedestrian facilities should be designed within parking lots that provide customers with safe comfortable accommodations while traveling to and from their cars, a bus stop or adjoining sidewalks.

### **4.1.3 Sidewalk Maintenance**

Sidewalk maintenance falls in to two categories- repairs to the sidewalk surface and clearing of debris and vegetation to make sidewalks passable.

#### **Current Practice**

With almost 300 miles of existing sidewalk and 450 miles of proposed sidewalk improvements, sidewalk pavement maintenance is a critical issue. Sidewalks within city owned rights-of-way are maintained by the Wilmington Streets Division. Sidewalks located in private developments are generally maintained by the property owners association. NCDOT generally does not maintain sidewalks along state-owned roads, instead turning responsibility over to the city.

Generally, sidewalk repairs are initiated based on complaints received by the Streets Division, although the city identified several sidewalk repair projects during a windshield survey conducted in 2007. Although the city has a pavement management system for tracking and planning roadway repair projects, it does not extend to sidewalks. The city has identified \$750,00 over five years in the Capital Improvements Plan for sidewalk repair and maintenance.

Clearing of vegetation, debris and other similar obstacles typically falls to the adjacent property owner (Wilmington Zoning Code, Sec. 11-56). In some parts of the city, shrubs, grass and other overgrowth effectively blocked sidewalks, rendering them virtually impassible for some users- especially those with disabilities that limit movement.

#### **Recommendations**

There is a sentiment amongst city staff that the current complaint-driven maintenance approach is insufficient for the city's expanding pedestrian network. The city should incorporate sidewalks into the city's roadway pavement management program so that repairs can be approached in a more systematic manner. This concept is supported by city staff.

Regarding routine maintenance and clearing of obstacles, more vigorous enforcement by the city's Code Enforcement officials will increase the likelihood that property owners will fulfill their responsibilities to keep sidewalks passable.

#### **4.1.4 Fee in Lieu of Constructing Sidewalks**

Fee in lieu provisions allow applicants to contribute money for the cost of providing a required piece of infrastructure instead of building the infrastructure at the time of development. Although the LDC does provide guidance for a fee in lieu for certain infrastructure, it is not clear if this approach can be used for sidewalks and other pedestrian amenities. The city clearly allows developers to pay a fee in lieu of providing required street trees in plazas (planting strips). Developers are also permitted by the city to use fee in lieu for parks and recreation requirements.

Fee in lieu programs can provide the city with more control over the timing of pedestrian facility construction. Furthermore, it can allow increased flexibility as to where the funds will be spent.

#### **State of the Practice**

##### Asheville

Section 7-11-7 of the Asheville UDO provides clear guidance to the city engineer on when fee in lieu may be used in place of sidewalk construction.

1. *Fee in lieu of construction.* Where a new sidewalk is required to be constructed, the city engineer/designee may waive the requirement that a sidewalk be constructed provided that the applicant makes a written request to the city engineer/designee for a waiver. The waiver will be granted under the conditions that the city engineer/designee determine that one of the following conditions exists and that the applicant pays a fee in lieu of constructing the sidewalk as described in the Fees and Charges Manual.
  - a. The pedestrian facility is not identified in the current Pedestrian Thoroughfare Plan as a needed pedestrian linkage.
  - b. The sidewalk is proposed to be constructed within an existing right-of-way where sufficient right-of-way or easement width does not exist or cannot be dedicated to build the sidewalk.
  - c. The pedestrian facility is identified on the Pedestrian Thoroughfare Plan but is a part of a NCDOT or city-funded project that includes sidewalks.

In no case shall the fee in lieu of constructing the sidewalk exceed 15 percent of the total cost of the approved project. The total cost of the project shall include all construction costs associated with the improvement as approved by the City of Asheville.

In the event that a fee in lieu of constructing a sidewalk is approved, the developer must provide a recorded easement if necessary for the future development of the sidewalk. The developer wherever practical shall grade for the future development of a sidewalk.

The fee in lieu of construction will not apply to level three projects unless specifically approved by the city engineer/designee. The fee in lieu of construction will not apply to new or reconstructed streets unless condition (e) (2) above applies.

2. *Use of fees.* All fees collected by the city pursuant to these provisions shall be accounted for separately from other monies, shall be expended only for the construction or rehabilitation of sidewalks or other pedestrian improvements in the same area as the development is located as defined by the city engineer/designee, and shall be expended within a reasonable amount of time after completion of the development (not to exceed five years) or returned to the developer.

### **Recommendation**

- The City of Wilmington should consider developing a fee in lieu program to ensure that sidewalks are provided in the areas of highest need. Such a program will also provide the city with increased flexibility should unique site characteristics preclude the installation of sidewalks on that site.
- The city should consider crafting language that allows the approving authority to consider the installation of sidewalks in other, off-site locations if on-site improvements will not work due to peculiar site characteristics.



### 4.1.5 Pedestrian Benefit Zones

Pedestrian Benefit Zones are used by some cities to augment limited sidewalk construction funds in specific areas. This approach is similar to the fee-in-lieu program mentioned earlier, except that clearly defined “benefit zones” are developed that target the expenditure of funds. The City of Salisbury, NC has developed a program that identifies seven discrete benefit zones around the city.

#### Salisbury Land Development Ordinance

##### *Section 4.9 Payment in Lieu Program*

When the approving authority determines that the construction of a required sidewalk is unfeasible due to special circumstances, including, but not limited to: impending road widening, significant street trees, or severe roadside conditions; the approving authority shall require either: 1) payment in lieu of sidewalk construction, 2) construction of an equal linear foot of sidewalk elsewhere in the applicable Pedestrian Benefit Zone, or 3) a combination of the previous.

Payments received in lieu of construction shall be assigned to one of eight (8) Pedestrian Benefit Zones (see Figure 48) based on the location of the development seeking use of the payment in lieu program. These zones are areas in which the payments shall be spent for the safety and convenience of pedestrians utilizing the sidewalk or pedestrian network within that zone.

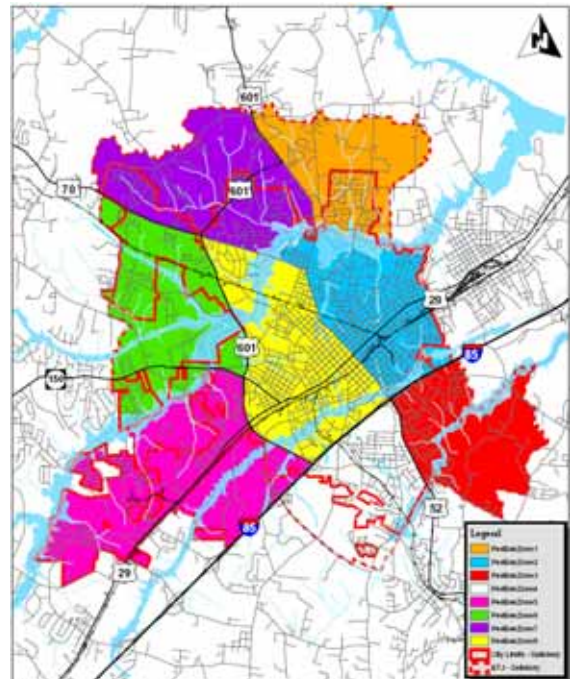


Figure 48 Salisbury, NC Pedestrian Benefit Zones

### **Recommendation**

- The City of Wilmington should explore the development of pedestrian benefit zones that will help ensure that funds collected will be spent to serve the contributors of that fee. If these zones are drawn too large, the city may risk court challenges if it is found that funds are not being spent to benefit the people paying the fee.

It is recommended that these benefit zones be roughly two square miles in area. The City should also consider benefit zones corresponding to the following:

- Market Street
- North and South College Road
- Shipyard Boulevard
- South 17<sup>th</sup> Street
- Carolina Beach Road
- Oleander Drive
- Military Cutoff Road
- Corridor benefit zones should focus on improving sidewalk continuity along corridors, roadway crossing improvements (including curb ramps, pedestrian signals, pavement markings, and pedestrian refuges) and streetscape improvements.

The following map illustrates the pedestrian benefit zone concept as it might be applied to Wilmington. Zones are for illustrative purposes only and a more detailed analysis would be required to determine the actual extents and fees associated with any zone (see Figure 49)



Figure 49 Conceptual Pedestrian Benefit Zones Map



## ***Policy Requesting Sidewalks on All NCDOT Roads***

WMPO and the City of Wilmington should adopt a resolution requesting pedestrian and bicycle accommodations on all state road projects within the city and urbanized area.

### **Current Policy or Practice**

#### *City of Wilmington*

The City of Wilmington does not have a formal policy for requesting sidewalks and crossing facilities on all state road projects.

#### *WMPO*

WMPO does not have a formal policy for requesting sidewalks and crossing facilities on all state road projects.

### **State of the Practice**

The MPO for the Charlotte area has recently adopted the *Mecklenburg-Union Planning Organization (MUMPO) Resolution Requesting NCDOT Include Sidewalks and Accommodations for Bicycles on All State Road Projects in the Mecklenburg-Union Metropolitan Planning Organization*.

This resolution states that:

- Sidewalks and on-street bicycle accommodations be included on all non-freeway transportation projects in the MPO;
- MUMPO recognizes that sidewalks are as much a part of a roadway project as the vehicle travel lanes;
- MUMPO is striving to become a truly multi-modal area and the accommodation for bicycles and pedestrians is essential in this effort;
- MUMPO requests NCDOT include full funding for sidewalks and on-street accommodations for bicycles as essential elements of all State Transportation Improvement Projects in the MPO area.

### **Recommendation**

WMPO should work with its member municipalities to adopt resolutions requesting pedestrian facilities on all state road projects. The City of Wilmington should adopt a resolution requesting pedestrian facilities on all state road projects.

## 4.2. STREET CROSSING POLICIES

### 4.2.1 Crosswalk Marking Guidelines

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### **Current Policy or Practice**

The City of Wilmington has not established a policy detailing when and how to mark crosswalks. The following observations were made during field analysis:

- Crosswalks are marked at controlled locations only when there is a demonstrated pedestrian demand of one pedestrian present per cycle (on average)
- Marked crosswalks are only installed in combination with pedestrian signals and pushbuttons
- The marked crosswalks are generally placed where the crossing conflicts least with turning traffic
- Marking crosswalks across all legs of an intersection is rare except in the downtown area
- Stop line placement varies, but on local streets is typically set back beyond the sidewalk or pedestrian crossing area
- Standard details for intersection design do not show crosswalks or sidewalks to provide guidance on stop bar or signal detection placement.

#### **State of the Practice- Uncontrolled Crossings (a.k.a. Mid-Block Crossings)**

Other jurisdictions such as Raleigh, Durham, and Charlotte are adopting crosswalk marking policies for uncontrolled intersections and midblock locations based upon research completed by FHWA in 2005 which showed:

- On two-lane roads, of any traffic volume, marked crosswalks may be utilized
- On multi-lane roads, with raised medians, and over 15,000 vehicles per day, marked crosswalks alone increase the crash risk for pedestrians to cross the roadway
- On multi-lane roads, without raised medians, and over 12,000 vehicles per day, marked crosswalks alone increase the crash risk for pedestrians to cross the roadway
- Medians are recommended on roadways with 2 or more lanes
- Studies have shown that marked crosswalks attract pedestrians to cross within the designated crossing area

#### **State of the Practice- Controlled Crossings**



Other jurisdictions such as Raleigh, Durham, and Charlotte utilize marked crosswalks at all signal controlled intersection crossings.

### **Recommendation**

Wilmington should:

- Develop and adopt crosswalk marking guidelines
- Modify standard design details to show pedestrian accommodations
- Modify current high-visibility marking design to reduce maintenance
- Modify standard design details to show pedestrian crosswalks and stop bar locations
- Install pedestrian signals on signalized crossings greater than two lanes
- Mark crosswalks at signalized intersections across all crossings

A proposed replacement detail for crosswalk markings and stop bar location may be found in Chapter 5, Design Standards.

#### 4.2.2 Advance Yield Lines at Uncontrolled Marked Crosswalks (a.k.a. Mid-Block Crossings)

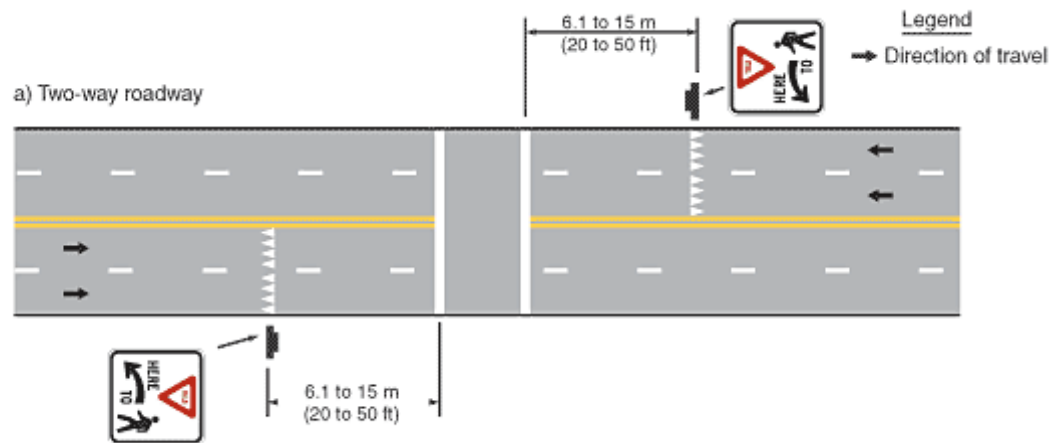


Figure 50 Advance Yield Lines at Uncontrolled Marked Crosswalks

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### Current Policy or Practice

##### City of Wilmington

The city has adopted the MUTCD which defines the placement of advance yield lines. Advance yield lines do not appear to be in use in Wilmington.

##### NCDOT

NCDOT has adopted the MUTCD which controls the placement of advance yield lines. Advance yield lines do not appear to be in use in Wilmington. The NCDOT Midblock Pedestrian crossing warrant specifies the use of an advanced yield line for multi-lane crossings.

##### The Manual on Uniform Traffic Control Devices

Section 3b.16 defines yield lines in the MUTCD. The current wording of the MUTCD implies advanced yield lines are to only be utilized for uncontrolled, midblock crossings. This is in accordance with the North Carolina law requiring motorists to yield to pedestrians within marked crosswalks at uncontrolled crossings. Proposed changes to the 2009 edition of the MUTCD include improvements to the text to allow the placement of advanced yield line at uncontrolled crosswalks located midblock and at intersections.

#### Recommendation

##### City of Wilmington

Wilmington should adopt the proposed 2009 MUTCD language for advance yield lines.

##### NCDOT

NCDOT should adopt the proposed 2009 MUTCD language for placement of advance yield lines.

### 4.2.3 Pedestrian Scramble Phase

#### Current Policy or Practice

##### City of Wilmington

The City of Wilmington has not established a policy on the use of the pedestrian signal scramble phase.

##### NCDOT

NCDOT has not established a policy on the use of the pedestrian signal scramble phase.

#### State of the Practice

The pedestrian scramble phase is used in cities throughout the United States, such as Seattle, New Orleans, Pasadena, and Denver. The locations where the timing is utilized have high volumes of pedestrian traffic with a corresponding diagonal demand.

#### Recommendation

##### City of Wilmington

It is recommended the City of Wilmington develop a policy for utilizing the pedestrian scramble phase which will restrict its use to high pedestrian volume locations that exhibit a high diagonal crossing demand. It is recommended that Wilmington pilot study one or two intersections in the downtown area to assess the feasibility of this signal operation.

##### NCDOT

Where a requested pedestrian scramble phase is located on an NCDOT maintained roadway, it is recommended that NCDOT collaborate with the local entity to pilot study the project.

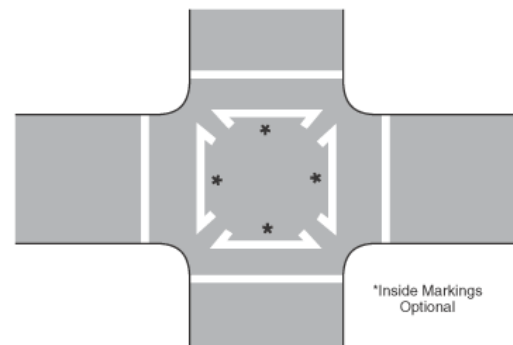


Figure 51 MUTCD Figure 35-17- Crosswalk Markings for Exclusive Phase that Permits Diagonal Crossing

## 4.3. INTERSECTION AND ROADWAY DESIGN POLICIES

### 4.3.1 Island Channelization and Pedestrian Refuge Islands at Intersections

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### **Current Policy or Practice** *City of Wilmington and NCDOT*

The City of Wilmington and NCDOT currently employ median islands on many arterial roadways. The city and NCDOT do not typically utilize island channelization for right-turn lanes.



Figure 52 – Dual Median Islands on New York Avenue at Bladensburg Road Intersection in Washington, DC

#### **State of the Practice**

A number of research studies have shown that pedestrians receive a safety benefit from raised medians. Pedestrian refuge islands are also beneficial as they can potentially reduce exposure to motor vehicles. When utilized at signalized intersections, channelizing islands separating right-turn lanes from through-lanes can shorten cycle lengths by reducing the pedestrian crossing time.

#### **Recommendation** *Wilmington should:*

- Provide median refuge islands on all roadways with four or more travel lanes
- Encourage NCDOT to provide median refuge islands on all roadways with four or more travel lanes (provide additional funding if necessary)
- Provide island channelization between through and turning traffic
- Encourage NCDOT to provide island channelization between through and turning traffic (provide additional funding if necessary)

#### *NCDOT should:*

- Develop cross sections and standards for roadways in urbanized areas that include median refuge islands
- Provide median refuge islands on all roadways with four or more travel lanes (provide additional funding if necessary)
- Provide island channelization between through and turning traffic (provide additional funding if necessary)

A proposed replacement detail for median refuge islands may be found in Chapter 5, Design Standards.

### 4.3.2 Turning Radius and Intersection Size

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### Current Policy or Practice

##### City of Wilmington

The City of Wilmington currently requires a 35-foot curb radius at all roadway intersections.

The curb at street corners shall be constructed on a thirty-five (35) foot radius unless otherwise directed. At driveways, the curb and gutter shall be constructed on a three (3) foot radius.

##### NCDOT

NCDOT has not established a policy on the use of augmenting turning radius or intersection size for traffic calming purposes.

#### State of the Practice

When roadways are constructed without consideration of the actual required turning radius of the vehicles utilizing them, the curb radius may be constructed to be larger than necessary which lengthens pedestrian crossing distances and increases vehicle turning speeds.

#### Recommendation

Wilmington should:

- Codify the allowed flexibility in choosing appropriate curb radii based upon the required effective curb radius of the design vehicle
- Develop criteria for the use of curb extensions

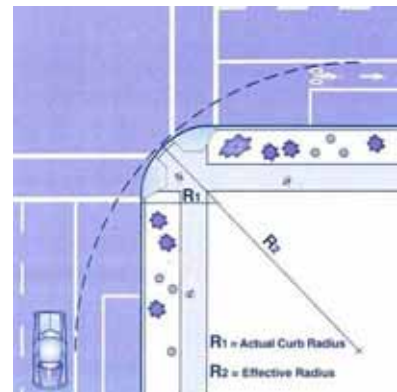


Figure 53 – Illustration of Actual Curb Radius vs. Effective Curb Radius from Oregon Pedestrian and Bicycle Design Guide.

### 4.3.3 Dual Turning Lanes

#### Current Policy or Practice

There are examples of dual right- and left-turn lanes at several intersections throughout the city. For example, NCDOT has just installed a second left-turn lane from northbound South College Road on to New Centre Drive and there are two right-turn lanes from northbound Wrightsville Avenue on to eastbound Wrightsville Avenue at the intersection with Eastwood Road.



Figure 54 Dual Right Turns on to eastbound Wrightsville Avenue from Northbound Wrightsville Avenue

#### State of the Practice

Dual right turns are used in locations where a single turning lane does not have the capacity to handle the turning traffic volumes through an intersection. The Federal Highway Administration's (FHWA) report, "Signalized Intersections: Informational Guide FHWA-HRT-04-091" provides guidance on the use and design of dual right turn lanes. It states that right turn on red should only be allowed from the outside (rightmost) lane. Furthermore, it does advise that "a double turn lane will result in a wider footprint for the intersection and increase the distance pedestrians must cross, which increases their exposure to potential conflicts with vehicular traffic." The report also raises the challenges posed for on road cyclists traveling through the intersection as they try and navigate the multiple turning vehicle movements. Table 7, extracted from the FHWA report, summarizes the issues related to double-right turn lanes.

Table 7 Summary of Issues for Double Right-Turn Lanes		
Characteristics	Potential benefits	Potential Liabilities
<b>Safety</b>	Separation of right-turn vehicles.	Potential for sideswipes.
<b>Operations</b>	Higher right-turn capacity. Shorter green time. Less delay for following through vehicles.	Off-tracking of large vehicles.
<b>Multimodal</b>	<b>None identified.</b>	<b>Longer pedestrian crossing distance, time, and exposure.</b>
<b>Physical</b>	Potentially shorter intersection footprint than needed for single turn lane.	Wider intersection footprint.
<b>Socioeconomic</b>	None identified.	Right-of-way costs. Access restrictions to property.
<b>Enforcement, Education, and maintenance</b>	None identified.	None identified.



Dual turning lanes present particular challenges for visually impaired pedestrians. Without being able to see the intersection, a blind person may not be aware that the traffic pattern at the intersection is not typical. Extra precautions should be taken, such as audible pedestrian signals (APS) to maximize the information conveyed to all pedestrians.

## Recommendations

### City of Wilmington

Wilmington should consider other options before installing dual right turn lanes. Consideration must be given to all modes of transportation through the intersection. Dual right turn lanes are discouraged in the *Central Business District Zone*, *Urban Core Zone*, and *Traditional Suburban Zone* and other places where consistent pedestrian volumes are likely.

If dual right turn lanes must be used, pedestrian signals must be installed. A dedicated pedestrian phase on the parallel leg of the intersection is preferred. If a dedicated pedestrian phase cannot be used due to cycle length, then a leading pedestrian interval is strongly recommended.

### NCDOT

NCDOT should consider other options before installing dual right-turn lanes. Consideration must be given to all modes of transportation through the intersection. Dual right turn lanes are discouraged in the *Central Business District Zone*, *Urban Core Zone*, and *Traditional Suburban Zone* and other places where consistent pedestrian volumes are likely.

## 4.3.4 Driveway Design

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

### Current Policy or Practice

#### City of Wilmington

The City of Wilmington and NCDOT currently utilize driveway designs that allow for higher speed right turns from the roadway by motorists across the driveway. The Wilmington Standard SD8-02 provides the optimal pedestrian sidewalk design by carrying an approximately level sidewalk through the driveway.

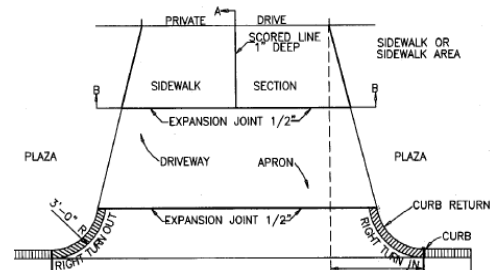


Figure 55 – Wilmington Standard Driveway Detail (SD 8-02)

Driveway crossings may put pedestrians at risk of a crash due to cars turning in and out of the driveway. Drivers must focus on oncoming traffic, navigating the driveway entrance, and vehicles exiting or entering the driveway. All of this activity may reduce the likelihood that a driver would see a pedestrian. Subsequently, the number of driveway/sidewalk intersections a pedestrian must cross should be reduced to the extent possible. Access management is included

in the City's Technical Standards and Specification Manual (page 7-11 – 7-15). The current regulations provide clear guidance on required spacing between driveways and the number of driveways allowed. Furthermore, the regulations clearly require non-compliant driveways to be removed or brought into compliance.

### NCDOT

NCDOT currently stipulates that a paved driveway turnout (Std. No. 848.04) shall be used for commercial type entrances that generate 500 ADT or more. A 25 foot minimum curb radii is recommended with a 20 foot minimum driveway width. Uses

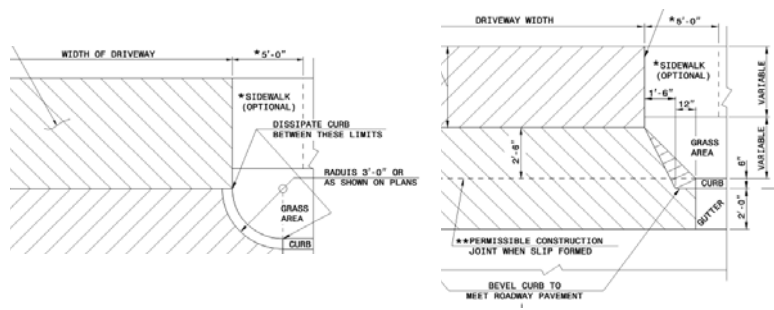


Figure 56 – NCDOT Std 848.02 and 848.03

that generate less than 500 ADT may use NCDOT Std. No. 848.02 or Std. No. 848.03 utilizing the 3 foot minimum curb radii.

### **State of the Practice**

Urban areas such as Charlotte; Washington, DC, Boston, Raleigh and Durham utilize curb radii for the driveway/roadway corner or a small triangular approach limited to the driveway ramp area preceding the apron (typically 3.5 foot maximum). The curb radii specified allows for increases in radii to serve the appropriate design vehicle.

### **Recommendation**

#### Wilmington should:

- Identify opportunities to improve existing driveways
- Develop more flexible driveway design standards
- Require all new driveways to conform to Wilmington standards for vertical alignment and construction materials
- Continue to identify opportunities to reduce the number of driveways pedestrians must cross.

A proposed replacement detail for SD 8-02 may be found in Chapter 5, Design Standards.

### NCDOT

NCDOT should continue to apply driveway design standards appropriate to the ADT of the site as it does in its current policy.

### 4.3.5 *Pedestrian and Bicyclist Cut-Throughs on Cul-de-Sacs and Adjoining Streets*

There are several examples in Wilmington where two cul-de-sacs come within short distances of each other but do not have any connection between them. Similarly, there are several streets that essentially dead end into each other but a barricade or some other obstacle blocks through traffic. Both of these situations present opportunities for increasing pedestrian and bicyclist connectivity.



Figure 57 Potential Cut-Through near Codington Elementary

#### **Current Policy or Practice**

Currently, Wilmington does not have a policy requiring pedestrian or bicycle connectivity between neighborhoods or developments.

#### **State of the Practice**

Charlotte recently conducted an exhaustive survey that identified many, if not most of the city's dead end streets in an effort to locate opportunities for increased bicycle and pedestrian connectivity between neighborhoods. Through that study, they identified 15 connections that were then improved by the city with aesthetically pleasing pass-throughs that allowed pedestrian and bicycle access by blocked automobile traffic.

Now, Charlotte requires full street interconnectivity between neighborhoods. In cases where full modal connectivity cannot be provided, the city will consider bicycle and pedestrian connections in lieu of a full street.



Figure 58 Conceptual Design- Pedestrian Cut Through. Merry Oaks Court, Charlotte, NC. *Source: Charlotte, NC*

### **Recommendations**

Wilmington should identify all potential locations within the city that may be candidates for retrofitting bicycle and pedestrian connections between neighborhoods and developments. Once these locations have been identified, the city should work with the local neighborhoods to develop designs that address neighborhood concerns about vehicle traffic while allowing the free flow of cyclists and pedestrians.

The city should require bicycle and pedestrian connections between neighborhoods on all future developments.

Note: Figure 76 through Figure 79, Recommended Pedestrian Facility Improvements starting on page 154 illustrate potential pedestrian cut through locations throughout the city.

## 4.4. SIGNALS AND SIGNAGE POLICIES

### 4.4.1 Turning Vehicles Yield to Pedestrians Sign

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### Current Policy or Practice

##### City of Wilmington

The City of Wilmington has adopted the MUTCD which currently utilizes a word only version of the sign. There are no installations of this sign in Wilmington at present. However, Racine Drive will soon have these signs.

##### NCDOT

NCDOT uses the current version of the MUTCD as well and does not appear to have a provision allowing for the graphic version of the sign.

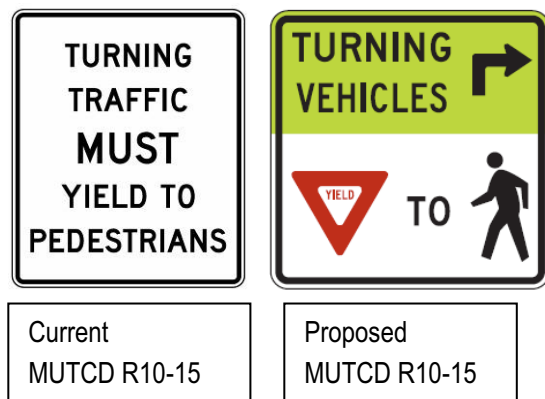


Figure 59 Yield to Pedestrians Signs

#### State of the Practice

Based upon research showing this sign to be effective at reducing conflicts between turning motorists and crossing pedestrians, this sign has been proposed for inclusion into the 2009 MUTCD.

#### Recommendation

##### City of Wilmington

The City of Wilmington should adopt the *Turning Vehicles Yield to Pedestrians* sign proposed for the 2009 MUTCD and utilize at locations with conflicts between turning vehicles and pedestrians.

##### NCDOT

NCDOT should adopt the *Turning Vehicles Yield to Pedestrians* sign proposed for the 2009 MUTCD and utilize at locations with conflicts between turning vehicles and pedestrians. However, NCDOT should study the sign's effectiveness at Racine Drive for use throughout the city.



#### **4.4.2 Leading Pedestrian Interval Signal Timing**

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

##### **Current Policy or Practice**

The City of Wilmington does not currently have a policy for using the leading pedestrian interval (LPI) at traffic signals.

##### **State of the Practice**

LPI is a signal phasing strategy used to improve pedestrian visibility to motorists in locations with heavy volumes of turning traffic and frequent pedestrian crossings. During the LPI, all motor vehicle flows are stopped for two to four seconds while pedestrians are given the WALK signal. This is designed to allow pedestrians to begin crossing in advance of vehicular turning movements which makes them more visible to motorists.



Figure 60 Leading Pedestrian Intervals Give Pedestrians a “Head Start” Before Turning Traffic Receives a Green Light.

##### **Recommendation**

###### City of Wilmington

The City of Wilmington should develop a policy for the use of LPI at signalized intersections. The city should pilot LPI in high pedestrian demand areas (such as North 3<sup>rd</sup> Street at Chestnut Street and North 3<sup>rd</sup> Street at Princess Street, and along North Front Street). The city should also use LPI in cases where there is high potential for auto/pedestrian conflicts, such as at intersections with dual right turn lanes (where pedestrians are not provided with a dedicated phase).

###### NCDOT

NCDOT should collaborate with the City of Wilmington on the pilot study of LPI in high pedestrian demand areas.



### 4.4.3 Pedestrian Actuated Signals and Push Button Locations

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

#### Current Policy or Practice

##### City of Wilmington

The City of Wilmington currently utilizes pedestrian push buttons to activate pedestrian signals at all locations where crosswalks are marked in conjunction with traffic signals, except on North Front Street, North 2<sup>nd</sup> Street and the intersections of Market Street and 16<sup>th</sup> Street and 17<sup>th</sup> Street). In these select locations, ‘concurrent’ signal operation is used. This means that pedestrians receive a walk signal at the same time as the auto traffic travelling in the same direction, without having to press a button.



Figure 61 Pedestrians Jaywalk During Midweek Evening with Low Traffic Volume on North 3rd Street at Chestnut

##### NCDOT

Most pedestrian signals on NCDOT maintained roadways in the City of Wilmington use the pedestrian push buttons to activate pedestrian signals.

#### State of the Practice

Pedestrian actuated signals should be used in cases where pedestrians are not routinely provided sufficient time to completely cross a roadway before the signal changes, and there is not sufficient pedestrian demand to warrant a WALK signal every cycle.

Concurrent pedestrian signals should be used in peak demand areas where the volume of pedestrians is sufficiently high that there is a likelihood that pedestrians will be crossing during most traffic cycles. Candidate locations include in Wilmington’s *Central Business District Zone*, near the New Hanover Regional Medical Center, and near UNCW.

#### Recommendation

##### Wilmington should:

- Adopt 2009 MUTCD Guidance for Signal Siting and Design
- Reposition and upgrade older non-compliant push buttons
- Use concurrent signal operation in peak demand areas without push buttons

##### NCDOT

NCDOT should use concurrent signal operation in peak pedestrian demand areas without push buttons to activate pedestrian signals.

#### 4.4.4 Signs for Uncontrolled Crossings

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

##### **Current Policy or Practice**

###### City of Wilmington

The City of Wilmington has adopted the MUTCD which allows the use of the R1-6 in-street bollard and the W11-2 pedestrian warning sign at uncontrolled crossings. At present, there are no installations of the in-street bollard. The W11-2 warning sign is utilized at a number of pedestrian crossings in Wilmington.

###### NCDOT

NCDOT has adopted the MUTCD which provides for the use of the R1-6 or W11-2.

##### **State of the Practice**

The use of the W11-2 is standard practice in the majority of communities in the United States. Unfortunately, despite this uniformity of use, the sign has proven to be ineffectual at improving motorist compliance with “yield to pedestrians in crosswalk” laws. Jurisdictions have begun experimenting with a new uncontrolled crosswalk sign based upon the approved MUTCD in-street bollard. Experiments have shown the in-street bollard and the modified side-of-street sign to be effective at increasing motorist compliance rates with the yield to pedestrians in crosswalk laws where utilized.

##### **Recommendation**

###### Wilmington should:

- Adopt a standard side-of-street uncontrolled crosswalk sign design
- Develop an uncontrolled crosswalk signing policy
- Evaluate uncontrolled crosswalk signing policy and effectiveness
- Upgrade uncontrolled crossing locations across the city to comply with new policy

###### NCDOT

NCDOT should collaborate with the City of Wilmington to develop a policy for marking uncontrolled crosswalks within the city on NCDOT maintained roadways.



Figure 62 –Side of Street Uncontrolled Pedestrian Crossing Sign in Boulder, CO

#### 4.4.5 Flashing Warning Beacons (Rapid Flash Beacons)

(Note: a more detailed discussion of this policy may be found in the Appendix of this document)

##### Current Policy or Practice

###### City of Wilmington

The City of Wilmington uses the conventional flashing beacon. The city has adopted the MUTCD which defines where these may be used. The city has not adopted a policy for rapid flashing beacons.

###### NCDOT

NCDOT uses the conventional flashing beacon. NCDOT has adopted the MUTCD which defines where these may be used. NCDOT has not adopted a policy for rapid flashing beacons.



Figure 63 Flashing Beacon at Castle Street and South Front Street

##### State of the Practice

The Rapid Flash Beacon is a device using LED technology (instead of the traditional incandescent bulbs) in combination with crosswalk warning signs. The RFB design differs from the flashing beacon by utilizing:

- A rapid flashing frequency (60 times per second vs. 1 per second)
- Brighter light intensity
- Ability to aim the LED lighting



Figure 64 Rapid Flash Beacon and Accompanying Sign

*Note: Sign has not been approved by FHWA*

RFB effectiveness has been tested by a number of jurisdictions and the results indicate that this device increases motorist compliance to a much higher percentage than the standard flashing beacon. RFBs have been used in St. Petersburg, FL, Washington, DC and Boulder, CO.

The Federal Highway Administration has developed an interim approval notice authorizing the RFB without the accompanying signage.

RFBs should be considered for roadways with relatively short crossing distances, such as two lane roads or roads with wide medians. For roadways with longer crossing distances, pedestrian hybrid signals or fully signalized intersections should be considered.

## **Recommendation**

### Wilmington should:

- Develop a policy based upon the FHWA interim approval recommendation for use of the rapid flash beacon with the exception of the sign design.
- Develop a standard detail for the design of the sign.
- Develop a policy for restricting the use of the standard flashing beacon at uncontrolled pedestrian crossings.

### NCDOT

NCDOT should:

- Collaborate with the City of Wilmington and other jurisdictions within North Carolina to pilot test the rapid flash beacon.
- Develop a policy based upon the FHWA interim approval recommendation for use of the rapid flash beacon with the exception of the sign design.
- Develop a standard detail for the design of the sign.
- Develop a policy for restricting the use of the standard flashing beacon at uncontrolled pedestrian crossings.

## **4.4.6 Pedestrian Hybrid Signals**

(note: a more detailed discussion of this policy may be found in the Appendix of this document)

To provide a balance between pedestrian crossing needs and vehicular movement, some jurisdictions around the country have adopted the pedestrian hybrid signal, otherwise known as the HAWK (High-intensity Activated CrossWalk) signal. The signal stops traffic when pedestrian activated, and is appropriate in locations where a full signal may cause unnecessary traffic delay by stopping traffic for the entire pedestrian phase.



Figure 65 HAWK Signal in Tucson Arizona

This pedestrian activated signal is a combination of a flashing beacon and a traffic signal with pedestrian pushbuttons and pedestrian signal heads. It controls traffic on the main road using a combination of red and yellow signal lenses, while the minor approach is controlled by pedestrian signals and a stop sign for vehicles. This signal has been approved for inclusion into the MUTCD by the national committee and is included in the proposed language for the 2009 MUTCD. This signal may also be used at mid-block locations.

### Current Policy or Practice

Wilmington and NCDOT have adopted the MUTCD which defines the pedestrian warrant for traffic control devices. Neither entity has a current policy for Pedestrian Hybrid Signals.

### State of the Practice

The City of Tucson, AZ has used the HAWK signal, combined with a media campaign, to generate a high motorist yield rate, increasing compliance from 30 percent under normal conditions to 93 percent over an eight-month study period. This treatment is profiled in ITE's *Traffic Control Devices Handbook*. The signal has proven to be a successful tool to assist pedestrian crossings of multi-lane arterials with high vehicular volumes while minimizing vehicular delay to the arterial and discouraging minor roadway cut-through traffic.

Proposed language for the 2009 MUTCD defines the HAWK signal operation, provides warrants for its use, and provides installation guidance.

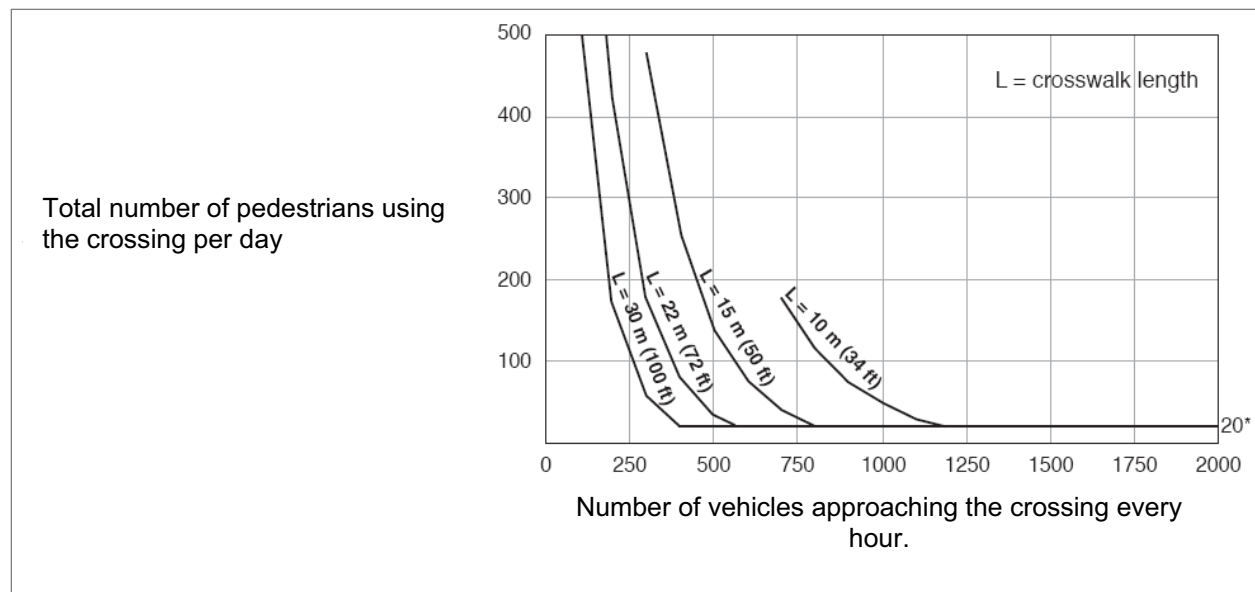


Figure 66 Chart providing guidelines for the installation of pedestrian hybrid signals on roadways with speeds of more than 35 mph. Source: *Figure 4F-2, 2007 notice of proposed amendments for the Manual on Uniform Traffic Control Devices*.

The proposed guidance is based on a combination of pedestrian volumes, vehicle volumes and speed limits, and crossing distances. The chart illustrates the recommended width thresholds for installation of a pedestrian hybrid signal on a roadway with a speed limit of 35 mph or greater. For example, the maximum crossing distance for a crossing that carries roughly 200 people per day on a road carrying roughly 500 vehicles per hour is fifty feet. Crossings greater than this width are not recommended.

## Recommendation

Wilmington should adopt the proposed language for the 2009 MUTCD for both the pedestrian volume signal warrant and the pedestrian hybrid signal. The city should explore opportunities to pilot the pedestrian hybrid signal. Consideration should be given to locations that are along multi-lane arterials with relatively long distances (greater than four blocks or ¼ mile) between signalized intersections, and relatively high traffic volumes and vehicles speeds. Suggested locations are along major arterials such as Wooster Street or Market Street where there is considerable potential pedestrian demand and relatively long spacing between signalized intersections.

### 4.4.7 Posted Speed Limit Reductions

The speed of passing vehicles contributes directly to a pedestrian's sense of safety and comfort. The Pedestrian Level of Service<sup>10</sup> model incorporates the posted speed limit, traffic volume, separation distance between sidewalks and traffic and other factors into the calculation that predicts a pedestrian's sense of comfort along a particular roadway.

Many of Wilmington's arterial roadways have relatively high speed limits of 35, 45, even 55 mph. At the same time, many pedestrians were observed walking along and across these arterials. In many cases, pedestrians were observed walking or crossing in locations where no 'formal' pedestrian facilities such as sidewalks or crosswalks had been provided. The array of shopping opportunities, schools, restaurants and other destinations along the arterials contributes to the pedestrian activity along and across these roads. Unfortunately, these roads are also where many of the city's fatal pedestrian crashes occurred (see Figure 36, p. 55).

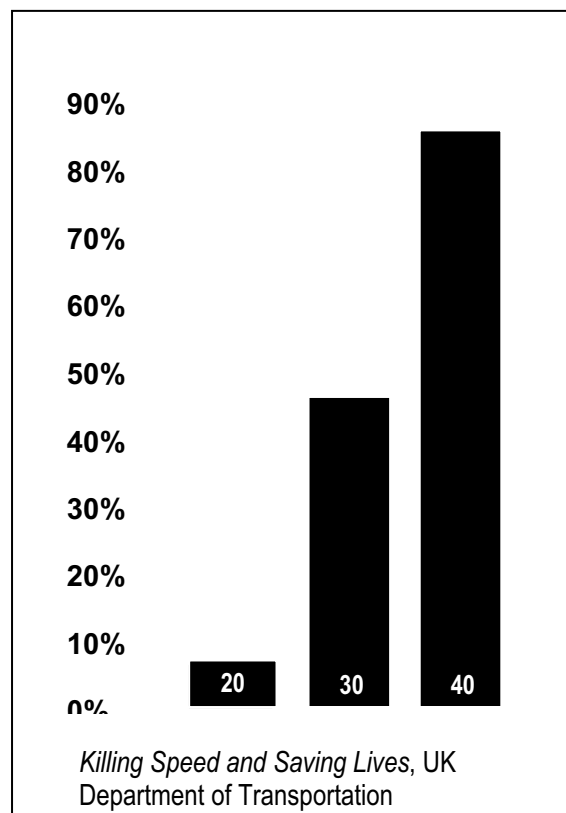


Figure 67 Pedestrian Fatality Related to Speed  
*Fatalities based on speed of vehicle. A pedestrian's chance of death if hit by a motor vehicle traveling at different speeds*

<sup>10</sup> "Modeling the Roadside Walking Environment: A Pedestrian Level of Service," Landis, et.al. TRB Publication No. 01-0511.



## Motor Vehicle Speeds

Higher motor vehicle speeds create a less comfortable environment for pedestrians, increase required stopping distance, and increase the frequency and severity of pedestrian crashes. A pedestrian hit by a motorist traveling 40 mph has a slim chance of survival compared to a pedestrian who is hit by a car that is traveling only 20 mph.

Specific facility recommendations include treatments to reduce motorist speeds, such as speed cameras, raised crossings, and reducing turning radii. Enforcement programs such as developing a photo radar program and increasing penalties for speeding infractions are described in Chapter 7 to reduce motor vehicle speeds.

## Current Policy or Practice

Wilmington currently does not have a policy for setting speed limits along major arterial roadways. According to discussions with WMPO staff, NCDOT generally uses the 85<sup>th</sup> percentile method of establishing speed limits on NCDOT-owned roads within the city, although there are cases where the city and NCDOT have negotiated a reduction in vehicle speed.

*“Section 20 141. Speed Restrictions, of the North Carolina General Statutes governs the establishment of speed limits within the State. Subsection (f) allows a municipality to request a lower speed limit along a state road if it can be determined upon the basis of an engineering and traffic investigation that the prevailing speed is “greater than is reasonable and safe.”*

## Recommendations

Wilmington should consider coordinating with NCDOT to change speed limits on some non-limited access state roads in the city. Modifications should be applied based on character zone. Roadway designers shall utilize the table below when determining design speeds for new roadways and improved roadways. Figure 68 on the following page illustrates the implications of the proposed speed limit modifications.

Table 8 Recommended Speed Limits

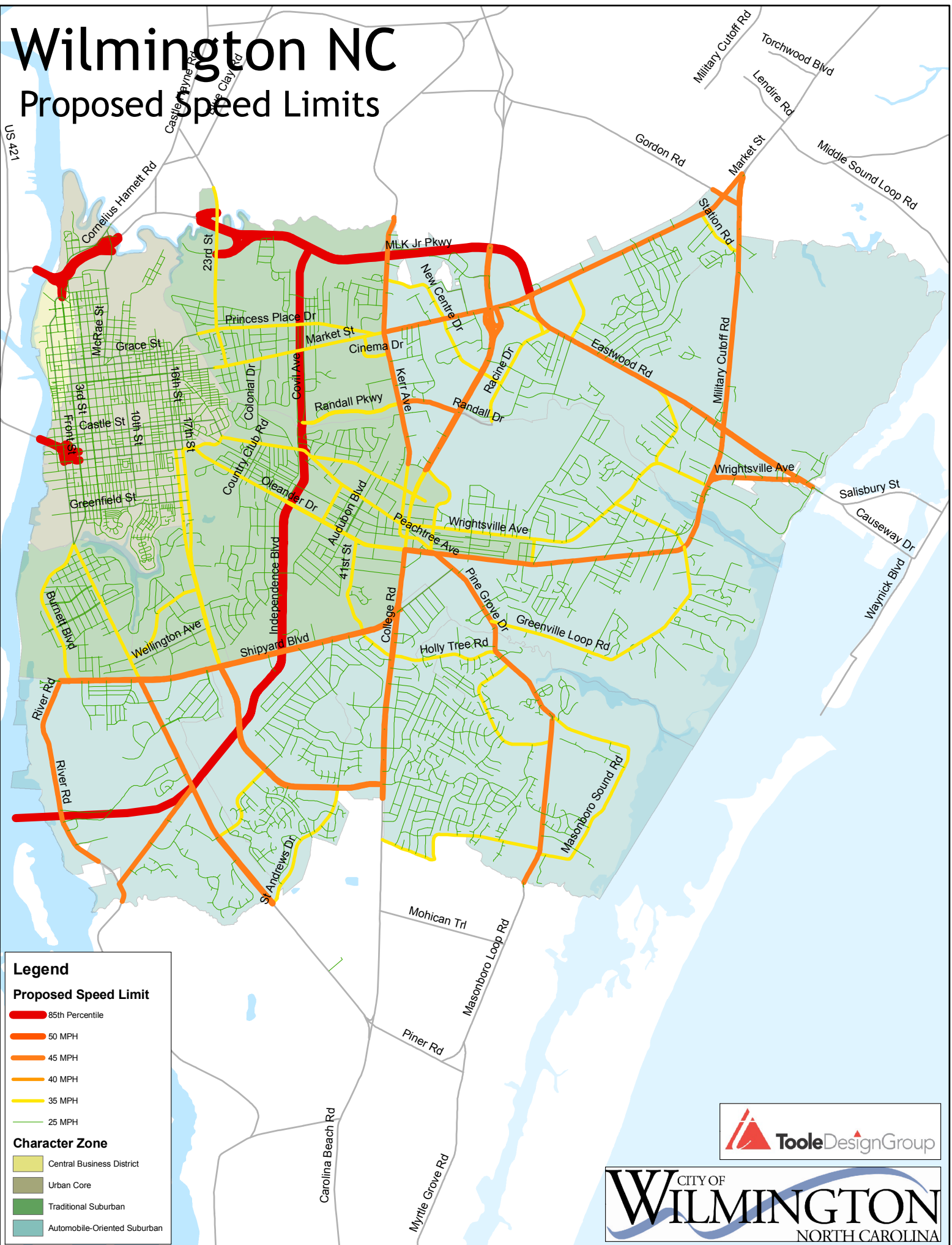
Character Zone:	WMPO Roadway Functional Classification:			
	Local or Neighborhood Collector	Urban Collector	Arterial	Limited-access Arterial or Freeway <sup>11</sup>
<b>Central Business District</b>	25 mph	25 mph	25 mph	85 <sup>th</sup> percentile
<b>Urban Core</b>	25 mph	25 mph	25 mph	85 <sup>th</sup> percentile
<b>Traditional Suburban</b>	25 mph	35 mph	35 mph	85 <sup>th</sup> percentile
<b>Automobile-Oriented</b>	25 mph	35 mph	45 mph	85 <sup>th</sup> percentile

<sup>11</sup> Includes Martin Luther King, Jr. Parkway and Independence Boulevard

# Wilmington NC

## Proposed Speed Limits

US 421



### Legend

#### Proposed Speed Limit

- 85th Percentile
- 50 MPH
- 45 MPH
- 40 MPH
- 35 MPH
- 25 MPH

#### Character Zone

- Central Business District
- Urban Core
- Traditional Suburban
- Automobile-Oriented Suburban



## 4.5. SIDEWALKS, SHARED USE PATHS AND MULTI-USE TRAILS

### 4.5.1 Shared Use Path Design

This report provides some basic information on the appropriate design of shared use paths (also termed “greenways” or “multi-use trails”). The designer should also consult with the AASHTO *Guide for the Development of Bicycle Facilities* and the *Manual on Uniform Traffic Control Devices* (MUTCD) for further information on many other aspects of pathway design, such as horizontal and vertical alignment, the proper design of pathway structures, intersection design and other pertinent topics. It is essential to refer to these resources, as they provide further guidance and standards that are needed in order to ensure proper pathway design.

Shared-use paths serve a wide variety of users, including pedestrians, bicyclists, people with disabilities, and in-line skaters. Shared use paths should be designed with the volumes, various speeds and space requirements of different user groups in mind. According to the AASHTO *Guide for the Development of Bicycle Facilities*, shared use paths should be a minimum of 10 feet wide with 2 foot-wide shoulders. This will enable the path to operate as a two way facility. In areas with high volumes of trail users, 12-14 foot widths are recommended.

In extremely constrained conditions, pathway width can be reduced to 8', however this is generally only appropriate for short sections of trails, and according the to the AAHSTO *Guide*, the following conditions should prevail: “(1) bicycle traffic is expected to be low, even on peak days or during peak hours, (2) pedestrian use of the facility is not expected to be more than occasional, (3) there will be good horizontal and vertical alignment providing safe and frequent passing opportunities, and (4) during normal maintenance activities the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage.” The MUTCD provides further guidance on the appropriate types and sizes of warning signs that can be used for narrow pinchpoints on pathways, as well as other pathway conditions that require warning signs.

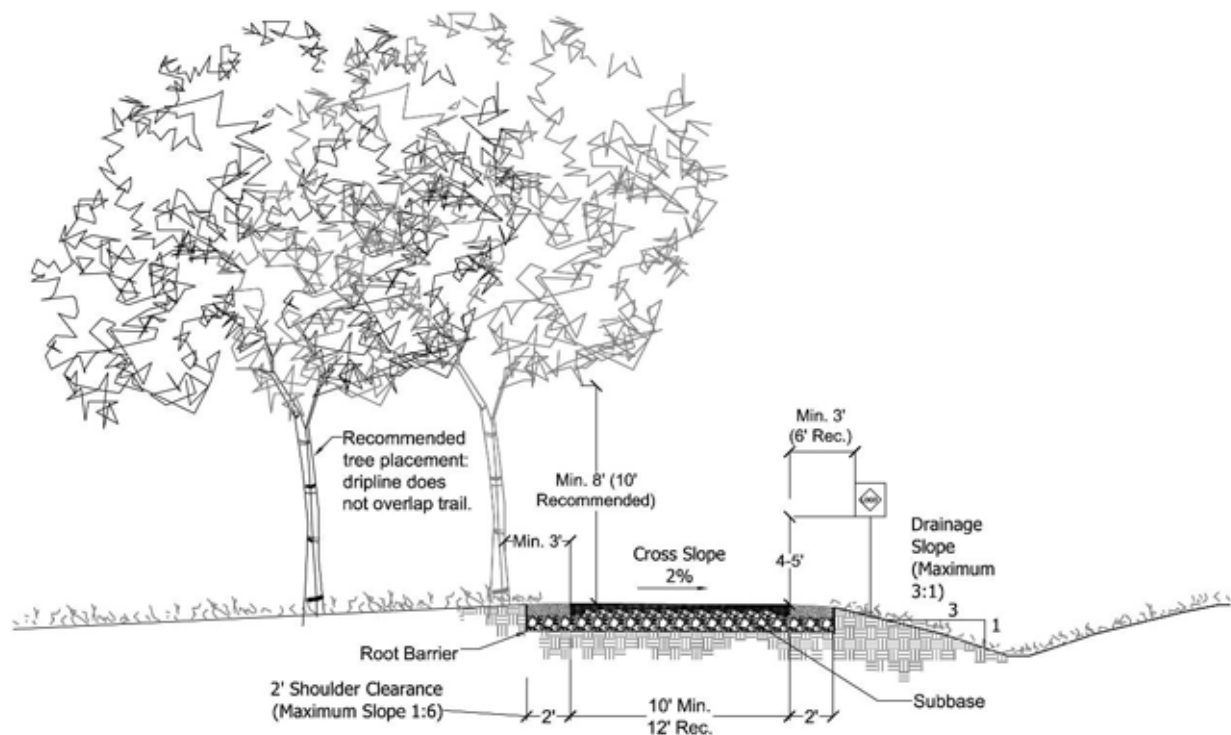


Figure 69 Shared Use Path Cross Section

### 4.5.2 Surface Types

Asphalt or concrete are the preferred surface types for multi-use trails. In some circumstances it may be appropriate to construct the path with a soft surface. Soft surface trails are generally not recommended in areas prone to flooding or where steep grades would cause the erosion of the trail surface. The surface should be designed to withstand loads transferred by the heaviest maintenance vehicle intended to travel along the pathway. The trail surface should be designed with appropriately compacted sub-grade, and the correct sub-base and pavement thickness in order to accommodate maintenance and emergency vehicles that will access the trail. Due to the wide variation in soil types and drainage conditions, the pavement structure and subsurface drainage should be designed to the specific conditions of each trail project.

### 4.5.3 Accessibility

Multi-use trails and sidewalks should comply with the provisions set forth in the Americans with Disabilities Act Accessibility Guidelines (ADAAG). Universal design principles should also be applied to all connections to the multi-use trail including parking lots, neighborhood connectors, adjoining roadways, and adjoining facilities (rest stops, buildings, restrooms, etc.)

Cross slopes on shared use paths should not exceed 2%. Running grades should be kept to minimum to provide for maximum accessibility. Every effort should be made to ensure running

grades are kept within ADA guidelines on shared use paths. In limited circumstances where achieving these grades would be prohibitively expensive or would denigrate a unique natural environment, exceptions can be made to running grade requirements. Making such an exception does eliminate the responsibility to meet ADA guidelines on all other aspects of trail design.

The following steps should be taken to mitigate steeper grades in these situations:

- Provide ADA compliant curb ramps at all intersections with sidewalks.
- Provide flat landings with benches to enable trail users to stop and rest if necessary
- Provide hand rails on the sides of the trail
- Widen the trail to allow more space for slower users
- Provide an alternative accessible route and use signage to direct people with physical disabilities to the route



Figure 70 Driveway Conflict on a Sidewalk

Steep downgrades are not recommended at roadway intersection approaches. Every effort should be made to keep intersection approaches at or below a 5% slope in order to reduce the possibility of a bicyclist or other wheeled user losing control and crashing into the intersection.

#### **4.5.4 Shoulders**

Two-foot wide graded shoulders should be provided along the entire length of the path unless right of way is constrained. The shoulders should typically be of some soft material to serve walkers and runners who prefer soft surfaces.

#### **4.5.5 Shared Use Paths Adjacent to Roadways**

Shared Use Paths adjacent to roadways, also known as sidepaths or wide sidewalks, can provide a more comfortable place for novice bicyclists and other people who are not comfortable riding on the road with traffic. However, shared use paths adjacent to roadways are most appropriate in corridors with few driveways and intersections. This is because these locations present a



safety problem due to conflicts between turning motorists and bicyclists. The photo to the left demonstrates such a conflict: the motorist in the driveway is looking to the left for breaks in traffic and does not see the bicyclist approaching from his right.

For the reasons described above, shared use paths adjacent to roadways should not be designated by signs or markings as bicycle facilities, and care should be taken in providing them as a facility intended to serve the needs of bicyclists. Along roadways with few driveways or intersections, shared use paths may be provided, however on-road bicycle facilities should also be provided as an alternative.

#### **4.5.6 Wayfinding Signage, Trailheads and Other Trail Amenities**

Wayfinding is very beneficial to pedestrians who are trying to navigate the city's streets and trails. This is especially important in areas where tourists and other people unfamiliar with an area are likely to be walking. There are several excellent sources for information on wayfinding signage, trailheads, and other amenities. For more information, refer to the following publications:

- *Signage and Wayfinding Design: A Complete Guide to Creating Environmental Graphic Design Systems*. Published by John Wiley & Sons, Inc, 2007. Author: Chris Calori.
- *Greenways: A Guide to Planning, Design and Development*. Published by Island Press, 1993. Authors: Charles A. Flink and Robert Searns.
- *Trails for the Twenty-First Century*. Published by Island Press, 2001. Authors: Charles A. Flink, Robert Searns, and Kristine Olka.

#### **4.5.7 Lighting**

Pedestrians are adversely affected by low-light conditions. Two-thirds of pedestrian fatalities occur between dusk and dawn. Lighting is important along sidewalks and walkways in commercial pedestrian districts such as historic downtown as well as at intersections and midblock crossings, particularly in locations near transit stops.

Preferred pedestrian-scale lighting is characterized by shorter light poles (i.e. 15-foot tall posts), lower wattages (except at crossings), shorter spacing between lamp posts, more even light distribution, and high pressure sodium vapor or metal halide lamps. Sodium vapor and metal halide lamps produce a better color definition and "white light" to areas with higher pedestrian volumes.



Shorter light poles may place the street light fixtures at eye level in the second floor bedroom window of high-density residential developments. The light fixtures should therefore be a full cut-off design with the bulb recessed within the fixture, or otherwise incorporate the appropriate shielding, in order to prevent light trespass.

Pedestrian light poles should be spaced as specified in the city's specifications (not reviewed for this plan). Pedestrian light fixtures should in-fill between street light poles. Distinctive pedestrian scale lamp posts could be used to improve the appearance of the streetscape in pedestrian oriented areas. Additional recommendations:

- Light poles should be placed either in the buffer zone, or on the far side of the sidewalk - and not within the through pedestrian zone.
- The required clear width must be maintained per the Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- Light fixtures should be placed within reach of a maintenance vehicle parked on the adjacent roadway, to avoid damage to the adjacent sidewalk and landscaped areas.
- Street lampposts, pedestrian lampposts, and landscape plans must be coordinated to assure that the lights are not engulfed in a canopy of trees.
- Crosswalks should be illuminated at each end by a standard street lamp.

#### **4.5.8 Transit Access**

The location and design of bus stops can significantly impact the safety and comfort of pedestrians accessing transit services.

##### ***Recommendation***

The City of Wilmington should coordinate with WAVE Transit to develop design guidelines for the location of bus stops, as well as accessibility and design of bus stops to increase pedestrian safety and the effectiveness of the transportation system.

##### **Bus Stop Location**

Care should be taken to place bus stops in locations that maximize pedestrian safety and convenience. Determining the best location for bus stops involves choosing among far-side, near-side, and mid-block placement. The table on the following page presents the advantages and disadvantages of each bus stop type.

Best practice research indicates that although each site is unique, generally bus stops should be located on the far side of intersections. Far-side bus stops have the safety benefit of encouraging pedestrians to cross the roadway at the intersection behind the bus. This increases the visibility of pedestrians to drivers traveling through or turning at the intersection. In contrast, pedestrians crossing the roadway in front of a near-side bus stop are not as visible to drivers approaching the intersection from behind the bus. The sight lines between pedestrians and these approaching cars are blocked by the stopped bus.

Mid-block stops can reduce the distance pedestrians need to travel however, they may encourage pedestrians to cross roadways at locations where there are fewer crossing treatments. When possible, bus stops should be located at controlled crossings. Where it is necessary to locate the bus stop mid-block, measures should be taken to improve the safety of the crossing.

Table 9 Bus Stop Location Characteristics

	Advantages	Disadvantages
<b>Far-Side Stop</b>	<ul style="list-style-type: none"> <li>Minimizes conflicts between right turning vehicles and buses</li> <li>Provides additional right turn capacity by making curb lane available for traffic</li> <li>Minimizes sight distance problems on approaches to intersection</li> <li>Encourages pedestrians to cross behind the bus</li> <li>Creates shorter deceleration distances for buses since the bus can use the intersection to decelerate</li> <li>Results in bus drivers being able to take advantage of the gaps in traffic flow that are created at signalized intersections</li> </ul>	<ul style="list-style-type: none"> <li>May result in the intersections being blocked during peak periods by stopping buses</li> <li>May obscure sight distance for crossing vehicles</li> <li>May increase sight distance problems for crossing pedestrians</li> <li>Can cause a bus to stop far side after stopping for a red light, which interferes with both bus operations and other traffic</li> <li>May increase number of rear-end accidents since drivers do not expect buses to stop again after stopping at a red light</li> <li>Could result in traffic queued into intersection when a bus is stopped in travel lane</li> </ul>
<b>Near-Side Stop</b>	<ul style="list-style-type: none"> <li>Minimizes interferences when traffic is heavy on the far side of the intersection</li> <li>Allows passengers to access buses closest to the crosswalk</li> <li>Results in the width of the intersection being available for the driver to pull away from curb</li> <li>Eliminated the potential of double stopping</li> <li>Allows passengers to board and</li> </ul>	<ul style="list-style-type: none"> <li>Increases conflicts with right-turning vehicles</li> <li>May result in stopped buses obscuring curbside traffic control devices and crossing pedestrians</li> <li>May cause sight distance to be obscured for cross vehicles stopped to the right of the bus</li> <li>May block the through lane during peak period with queuing buses</li> </ul>

	alight while the bus is stopped at a red light <ul style="list-style-type: none"> <li>Provides driver with the opportunity to look for oncoming traffic, including other buses with potential passengers</li> </ul>	<ul style="list-style-type: none"> <li>Increases sight distance problems for crossing pedestrians</li> </ul>
<b>Mid-Block Stop</b>	<ul style="list-style-type: none"> <li>Minimizes sight distance problems for vehicles and pedestrians</li> <li>May result in passenger waiting areas experiencing less pedestrian congestion</li> </ul>	<ul style="list-style-type: none"> <li>Requires additional distance for no-parking restrictions</li> <li>Encourages patrons to cross street at mid-block (jaywalking)</li> <li>Increases walking distance for patrons to cross at intersections</li> </ul>
Source: TCRP Report 19. <i>Guidelines for the Location and Design of Bus Stops</i> . Transportation Research Board, National Research Council. Sponsored by The Federal Transit Administration. 1996		

### Bus Stop Access

Transit stops should be designed to make boarding and alighting easy and safe for all passengers and must follow the ADAAG. ADA guidelines require a firm landing pad to be located at all bus stops to allow pedestrians to enter and exit the bus without entering the street. The landing pad must have a minimum length of eight feet (from the curb or roadway edge) and a minimum width of five feet.

Sidewalks should be constructed from the embarkation point (the landing pad where people enter/exit the bus) to the nearest intersection or to the nearest section of existing sidewalk. Streets within .25 mile of transit stops should have continuous sidewalks on both sides of the street, high-visibility crosswalk markings and other crosswalk safety features.



Figure 71 Level landing pad, Montgomery County, MD

## 4.6. BRIDGES

The NC Bridge Policy has three relevant sections as listed below and can be found at <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/bpe2000.doc>. The DBPT staff reviews all bridge projects and makes recommendations for wide shoulders, sidewalks and bicycle-safe railings according to potential usage by pedestrians (and bicyclists).

#### **4.6.1 Sidewalks on Bridges**

Sidewalks shall be included on new bridges with curb and gutter approach roadways that are without control of access; in some cases, only one side may warrant a sidewalk. Sidewalks should not be included on controlled access facilities. A determination on providing sidewalks on one or both sides of new bridges will be made during the planning process according to the NCDOT Pedestrian Policy Guidelines. When a sidewalk is justified, it shall be a minimum of 5'-6" wide. A minimum handrail height of 42" is required.

#### **4.6.2 Bridges Within Urban Area Boundaries**

Urban Area Boundaries represent the outer limit of potential urban growth over the planning period – generally 20 to 25 years – and include more than enough land to accommodate anticipated growth. The full approach curbed width is to be provided for bridges with existing urban – type roadway sections (curb and gutter). On urban – type roadways without control of access ADA acceptable sidewalks shall be provided on new bridges. Sidewalks will be provided on structures for non-control of access facilities crossing control of access facilities. Sidewalks shall be provided on one or both sides in accordance with the project Environmental Planning Document. If future roadway widening is anticipated, additional bridge width should be considered to accommodate the planned curbed width.

Bridges within the Federal-aid urban boundaries with rural-type roadway sections (shoulder approaches) may warrant special consideration. To allow for future placement of ADA acceptable sidewalks, sufficient bridge deck width should be considered on new bridges in order to accommodate the placement of sidewalks. As part of the planning process, the functional classification will be reviewed to determine if its planning designation is applicable for the facility over the 20-year design period.

#### **4.6.3 Bridges on Controlled Access Freeways**

Bridge replacement projects on controlled access freeways where bicyclists are prohibited by law will generally *not* include facilities to accommodate bicyclists. In cases, however, where a bridge replacement project on a controlled access freeway impacts a non-controlled access roadway (i.e. a new overpass over an arterial roadway), the project should include the necessary access for bicycles on the non-limited access roadway, including such elements as: paved shoulders and bicycle crossing improvements to associated ramps and intersections.

#### **4.6.4 Urban/Suburban Bridges (Closed Section)**

On urban and suburban bridge projects, shoulder width should be based on anticipated (20 year) traffic volumes. The standard sidewalk barrier parapet (42" tall) should be used.

#### **4.6.5 Bridge Retrofit Projects**

Bridges can be retrofitted to better accommodate pedestrians. There are a variety of ways of accomplishing this:

3. Reducing the width and/or number of travel lanes to create more space for sidewalks. For example, a narrow sidewalk can be widened to provide for a more comfortable pedestrian environment, while maintaining adequate shoulder width for bicycling.
4. Adding a pedestrian/bicycle structure to the existing bridge structure. In some cases, bridge footers may have been constructed in anticipation of a future roadway widening, or it may otherwise be possible to add an additional structure for pedestrians and cyclists. Bridge retrofit solutions require detailed structural analysis to determine if the bridge can accommodate the additional weight of new facilities without compromising its structural integrity. Note that adding a structure on only one side could potentially create safety concerns as pedestrians could end up on the road and have to cross to reach the facility or walk along the shoulder or in the travel lane.

#### **4.6.6 Bridge policy in the North Carolina Roadway Design Manual**

Applicable sections of NCDOT's bridge policy, excerpted from the North Carolina Roadway Design Manual, are included below. The full document can be found on NCDOT's website at: <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/RDM2001/part1/chapter6/pt1ch6.pdf>.

#### **4.6.7 Bridge Deck Railing**

All bridge railings shall conform to current AASHTO criteria and shall have been successfully crash-tested in accordance with FHWA guidelines. Generally bridges with no sidewalks or no anticipated sidewalks should have a Jersey barrier rail. When a sidewalk or designated bikeway is justified, appropriate railings shall be used.

## Chapter 5. Design Standards

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Design standards and guidelines regulate the infrastructure that both public and private entities construct in Wilmington, and ultimately determine the quality of the pedestrian environment. The City of Wilmington Technical Standards and Specification Manual is the principal document providing guidance for the design and installation of facilities that impact pedestrian travel.

There are several other documents that provide standards for facilities that affect pedestrian travel including:

- NCDOT Roadway Design Manual
- NCDOT Bicycle and Pedestrian Safety Manual
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
- Manual on Uniform Traffic Control Devices (MUTCD), Current Edition
- AASHTO Green Book
- Highway Capacity Manual

A review of existing standards was conducted to ensure that pedestrians are appropriately accommodated in city design standards and guidelines. Recommendations to update or improve standards follow the most current research on pedestrian safety and the best practices of other jurisdictions across the country.

A number of revisions are being proposed to the current MUTCD standards (2003 edition) which will be incorporated into a 2009 edition<sup>12</sup>. Many of the proposed changes provide additional clarity to existing pedestrian standards (i.e. criteria for marking crosswalks) or describe new tools or techniques to accommodate pedestrians (i.e. new crosswalk warning signs and the Pedestrian Hybrid Signals). Standards proposed for the 2009 edition of the MUTCD that were determined to be relevant and useful for improving pedestrian facilities within the City of Wilmington are recommended for eventual adoption by the city. These recommendations are included in the relevant policy discussion and are referred to as 2009 MUTCD changes.

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<sup>12</sup> These proposed changes were published in the Federal Register on January 02, 2008 by FHWA, and are will be open for comment until July 31, 2008.



## 5.1. PEDESTRIAN DESIGN PRINCIPLES

The following principles should be incorporated as the foundation of plans and projects related to the pedestrian environment. Many of these goals go beyond the realm of responsibility of the City of Wilmington, and will require coordination with NCDOT, developers and landowners in the city.

### ***The street environment should be safe for pedestrians and vehicles***

Sidewalks and street crossings should be free of hazards and should minimize conflicts with vehicular traffic. The need to accommodate vehicular traffic flow should be balanced with the need to provide for other users, including pedestrians and bicyclists. Street design policy should reflect this balance.

### ***The pedestrian network should be accessible to all***

Sidewalks and street crossings should provide access for all people, regardless of their physical abilities. Universal design is the foundation for all pedestrian design.

### ***The pedestrian network should be easy to use, and should provide direct connections to destinations***

The pedestrian network should provide continuous and direct connections between destinations, including homes, schools, shopping areas, public services, work places, recreational opportunities and transit. Sidewalks and street crossings should be designed so people can easily find a direct route to a destination, and delays are minimized.

Enhanced pedestrian facilities should be considered in high pedestrian areas.

### ***The street environment should feel comfortable and inviting to pedestrians***

Good design should enhance the comfort and appeal of the pedestrian environment. Consideration should be given to separating pedestrians from vehicular traffic by the use of street trees and other measures. Street trees should provide shade – a critical element for walking trips that are made during the warmer months in Wilmington. An ideal pedestrian environment might also offer resting places and visual elements (such as special paving, street furnishings) that provide a sense of place. The streetscape environment should be active and interesting.

## 5.2. DESIGN STANDARD RECOMMENDATIONS

The following pages include a review of and recommendations for amending the Wilmington Technical Standards and Design Manual to improve the design of infrastructure to better accommodate pedestrian travel.

One general comment is that many existing standards details do not show pedestrian facilities (sidewalks, crosswalks, curb ramps, etc) on the details or they depict geometric designs that can contribute to a hazardous or uncomfortable pedestrian environment. This can have the effect of implying that these facilities are not required or that the motorist has priority at all times.

### ***SD8-02 Standard Driveway Detail***

This existing driveway detail results in the installation of driveways that allow higher speed vehicular right turns across sidewalks. The triangular ramps on either side of the driveway also require much more surface area than more traditional curved curb return between the driveway and the roadway.

The existing detail correctly shows the proper way to slope transitions and to maintain a level sidewalk to meet ADA requirements.

The proposed replacement detail replaces the triangular approach and departure areas with a curved approach and departure. The detail specifies the designer must choose the curb radii based upon the effective vehicular turning radius.

### ***SD11-04 Pavement Markings Non-Signalized Intersections***

### ***SD11-05 Pavement Markings Non-Signalized Intersections***

### ***SD11-06 Pavement Markings Signalized Intersections***

These existing details depicting standard striping treatments do not show any pedestrian features nor do they provide guidance for locating stop lines behind existing or potential future crosswalks. This omission of pedestrian features also impacts the installation of in-pavement vehicle detection loops. Generally, the positioning of these loops is governed by the placement of the stop line. Subsequently, many detection loops in intersections throughout Wilmington are actually located within the pedestrian crossing area.

The proposed replacement details show sidewalks, curb ramps, and crosswalks. Stop lines are shown as being located behind all pedestrian crossing areas.

### ***SD11-15 Pedestrian Crossing Island***

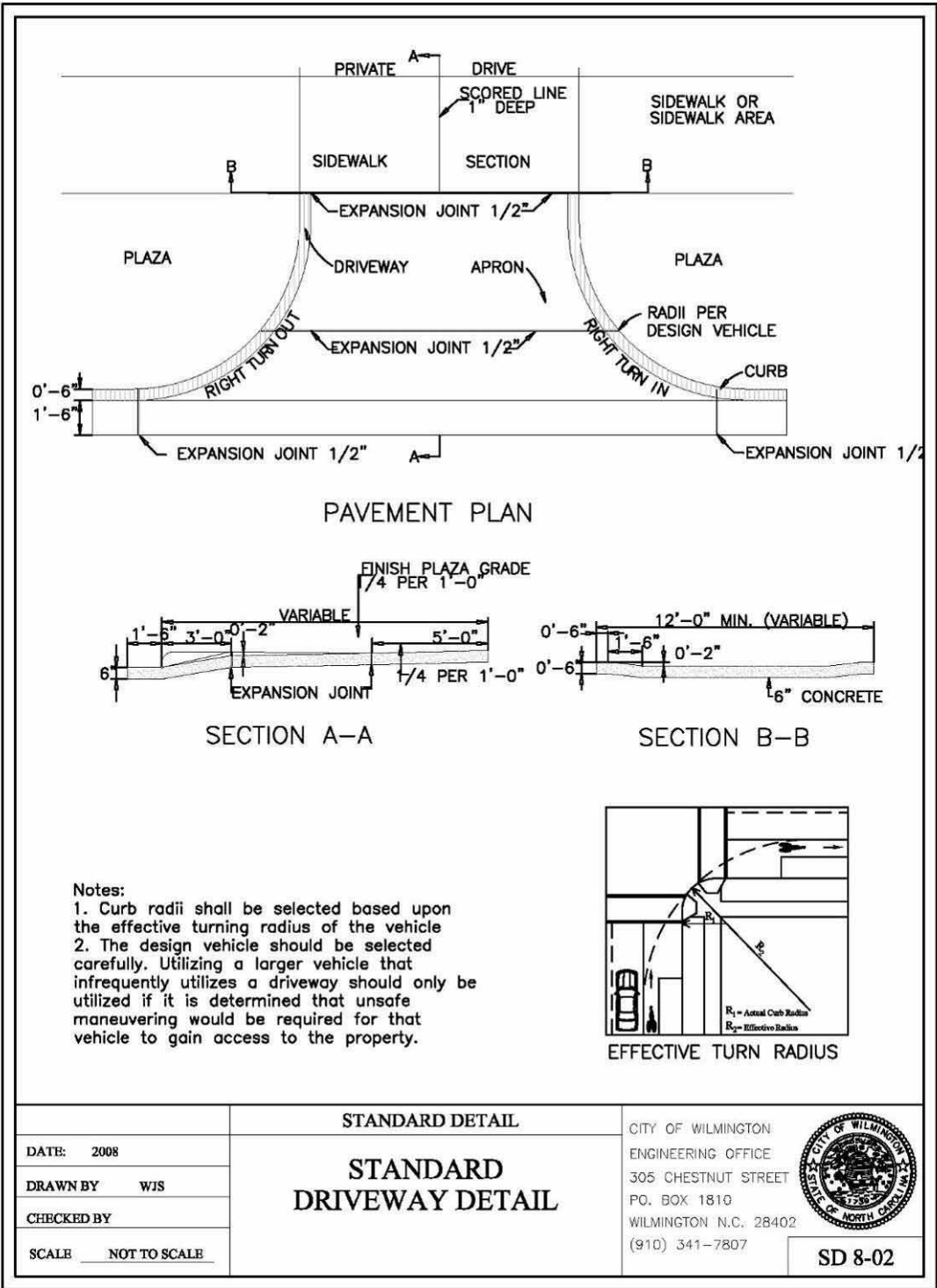
This proposed detail provides guidance for designing pedestrian crossing islands which deflect the pedestrian to face oncoming traffic and which are wide enough to store pedestrians and potentially bicyclists comfortably within the island. The detail was tentatively numbered SD11-15 and given a page number of 7-76 to be inserted after the roundabout pavement marking detail.

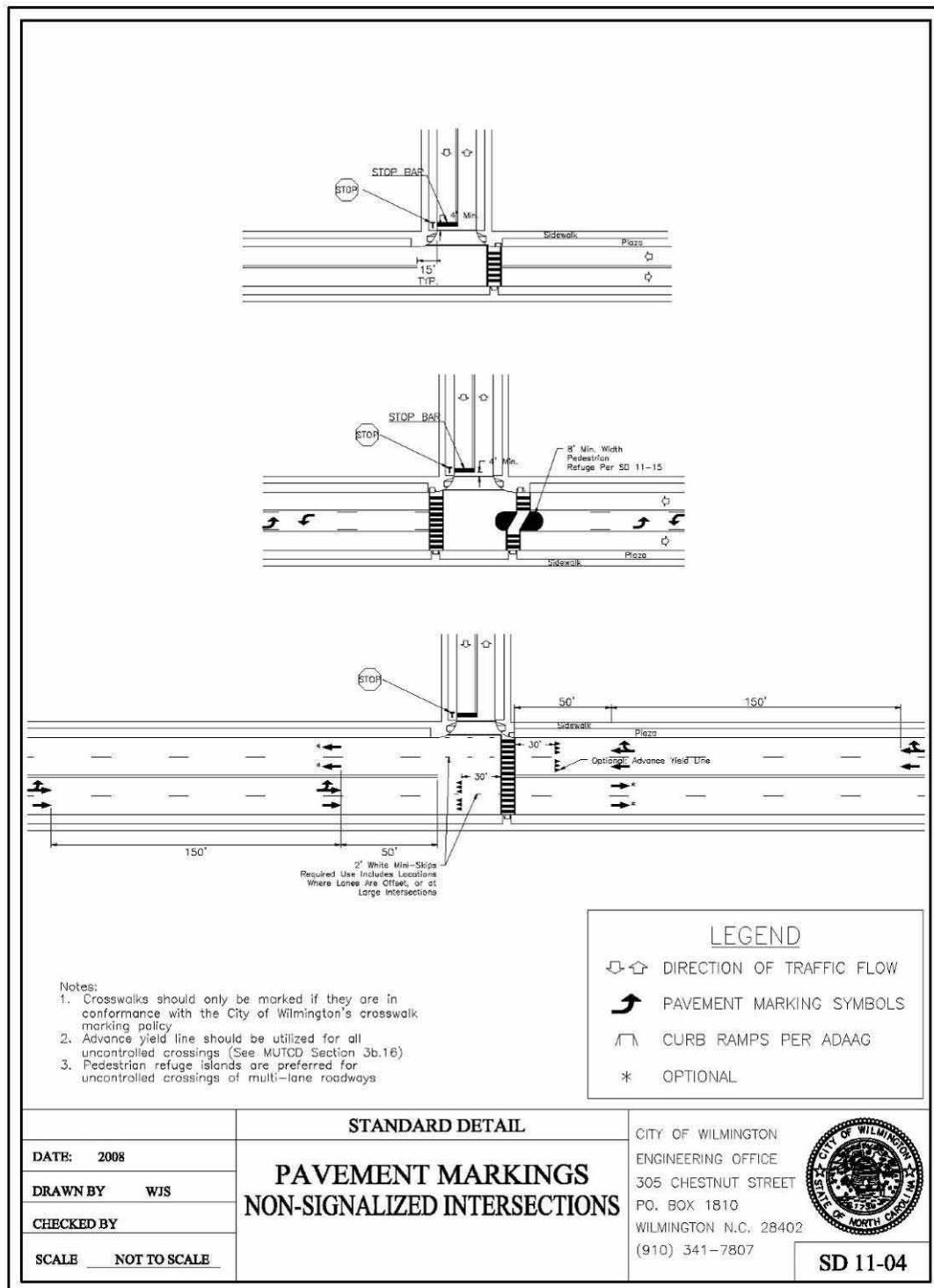
### ***SD15-11 Parking Facility Under 25 Stalls Paved or Unpaved***

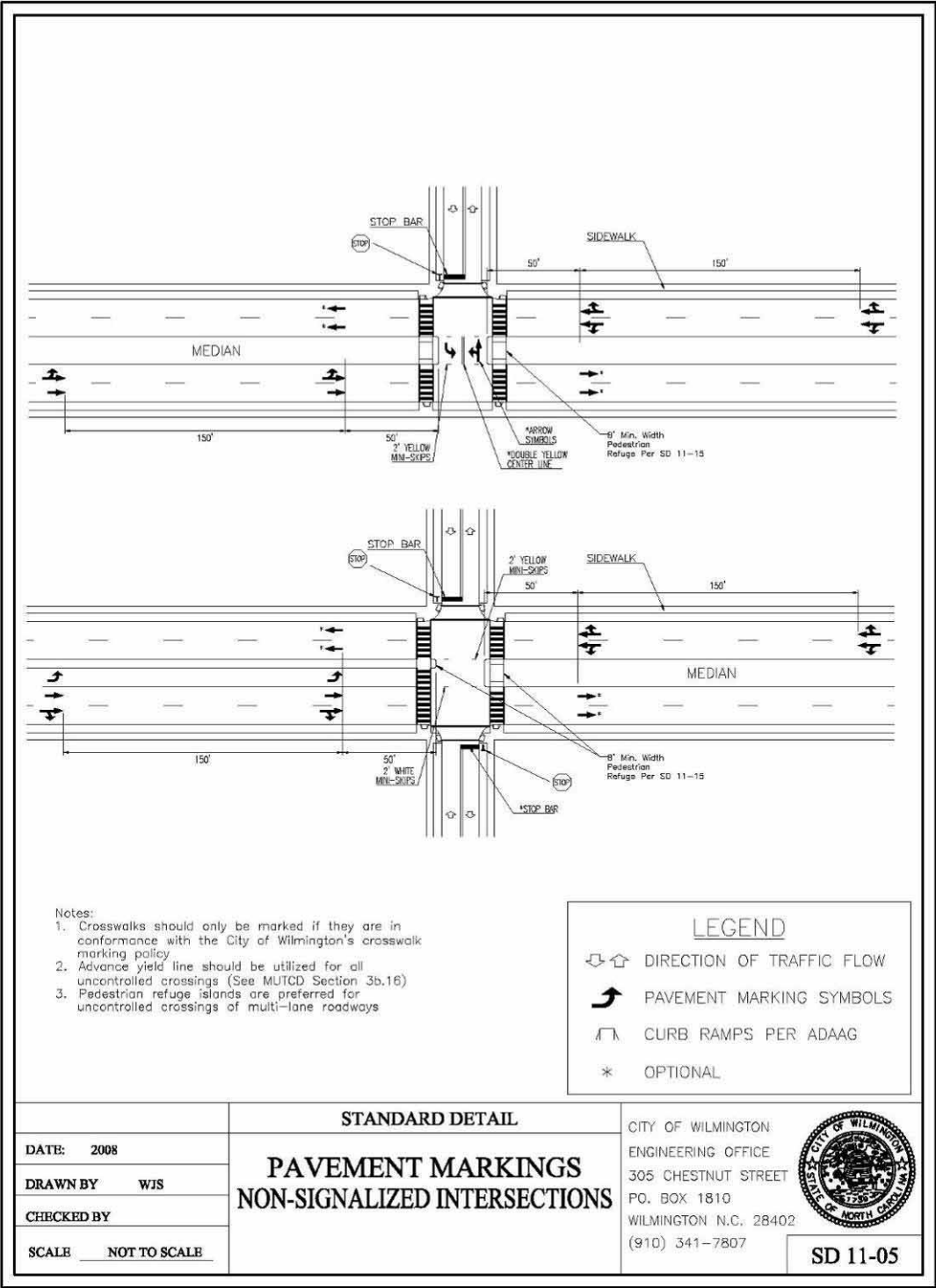
### ***SD15-12 Parking Facility Equal to or Greater Than 25 Stalls***

These existing details depicting standard striping treatments do not show any pedestrian features nor do they provide guidance for locating stop lines behind existing or potential future sidewalks.

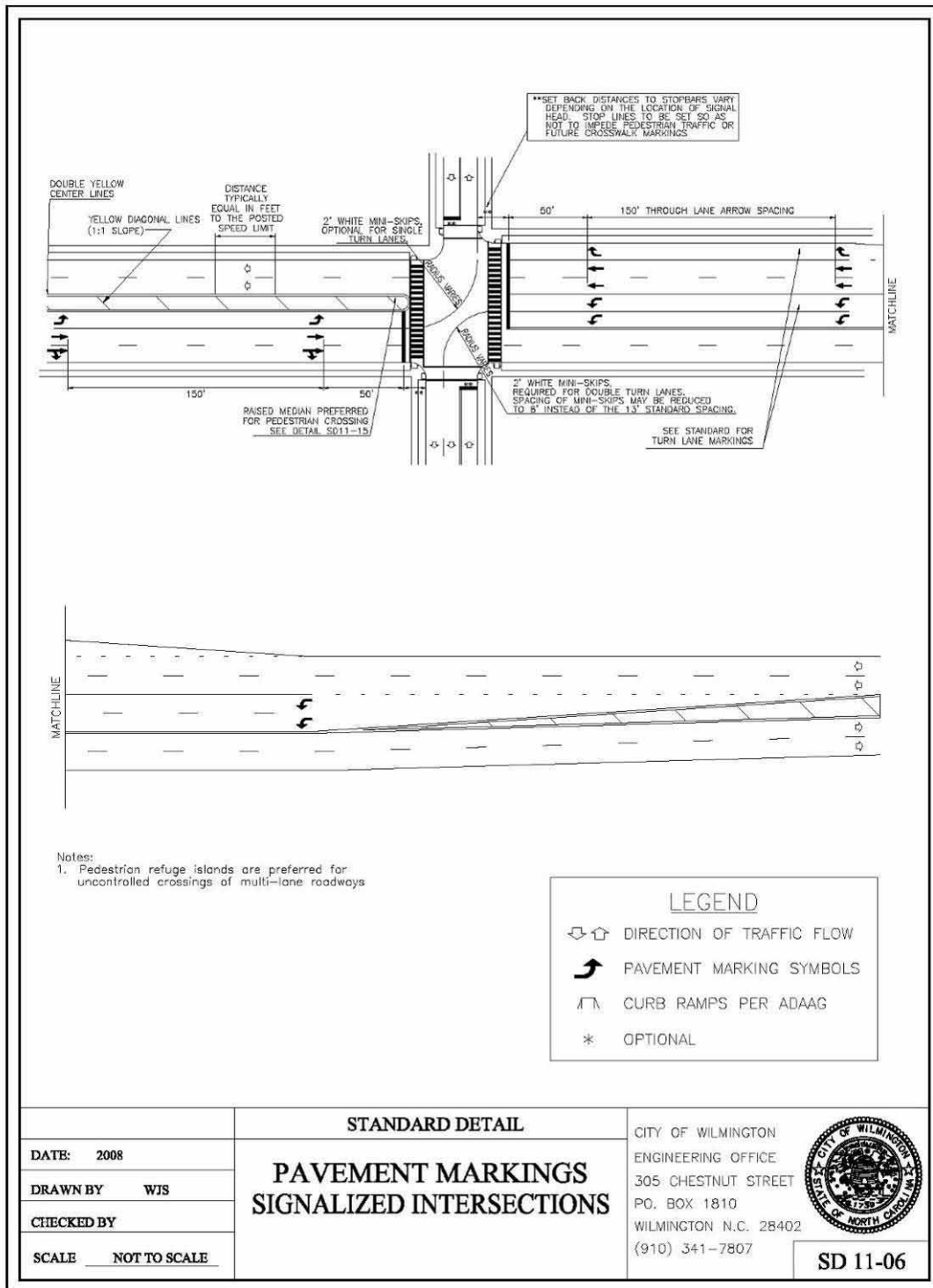
The proposed replacement details also show sidewalks, curb ramps, and crosswalks.

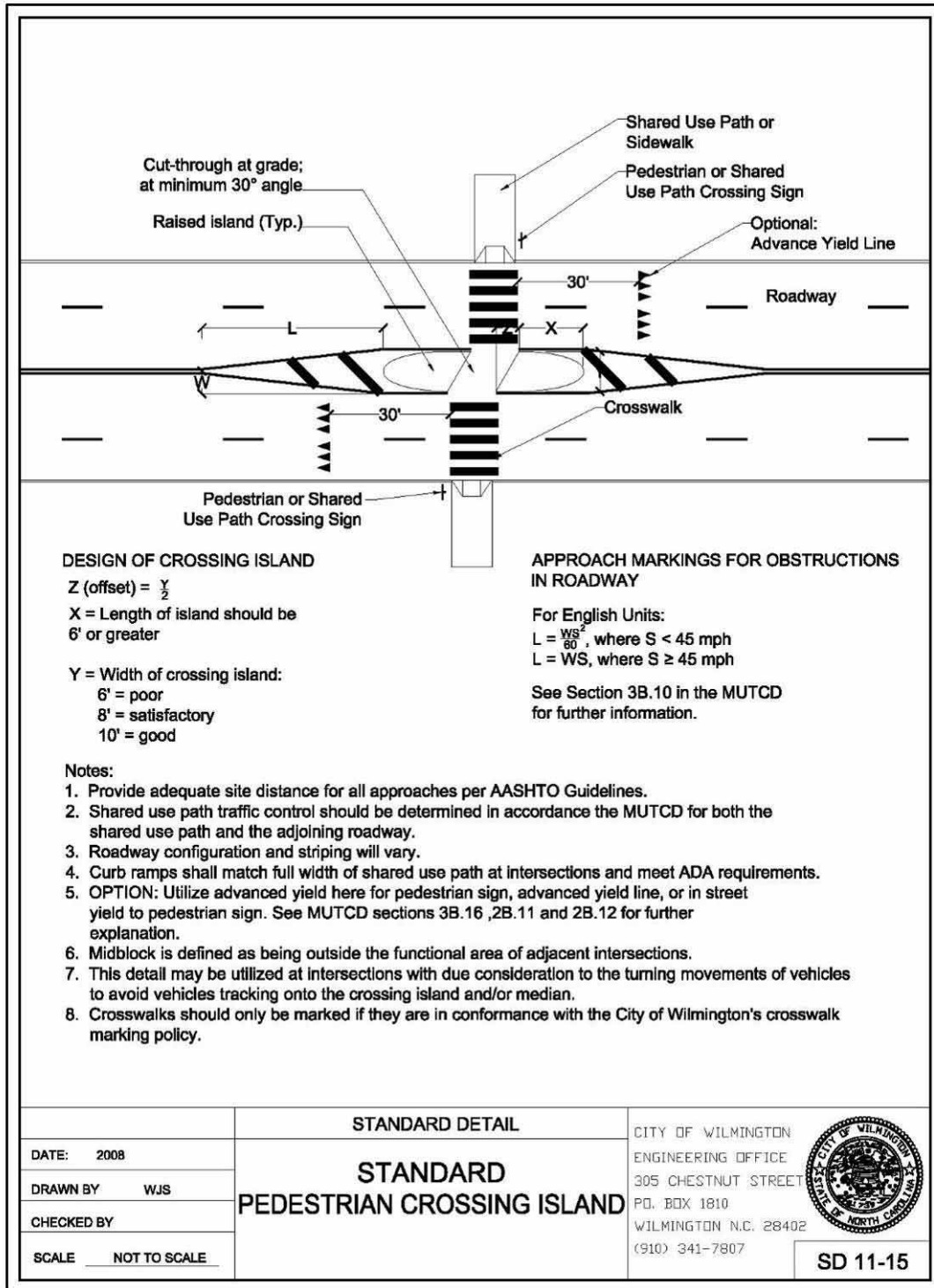




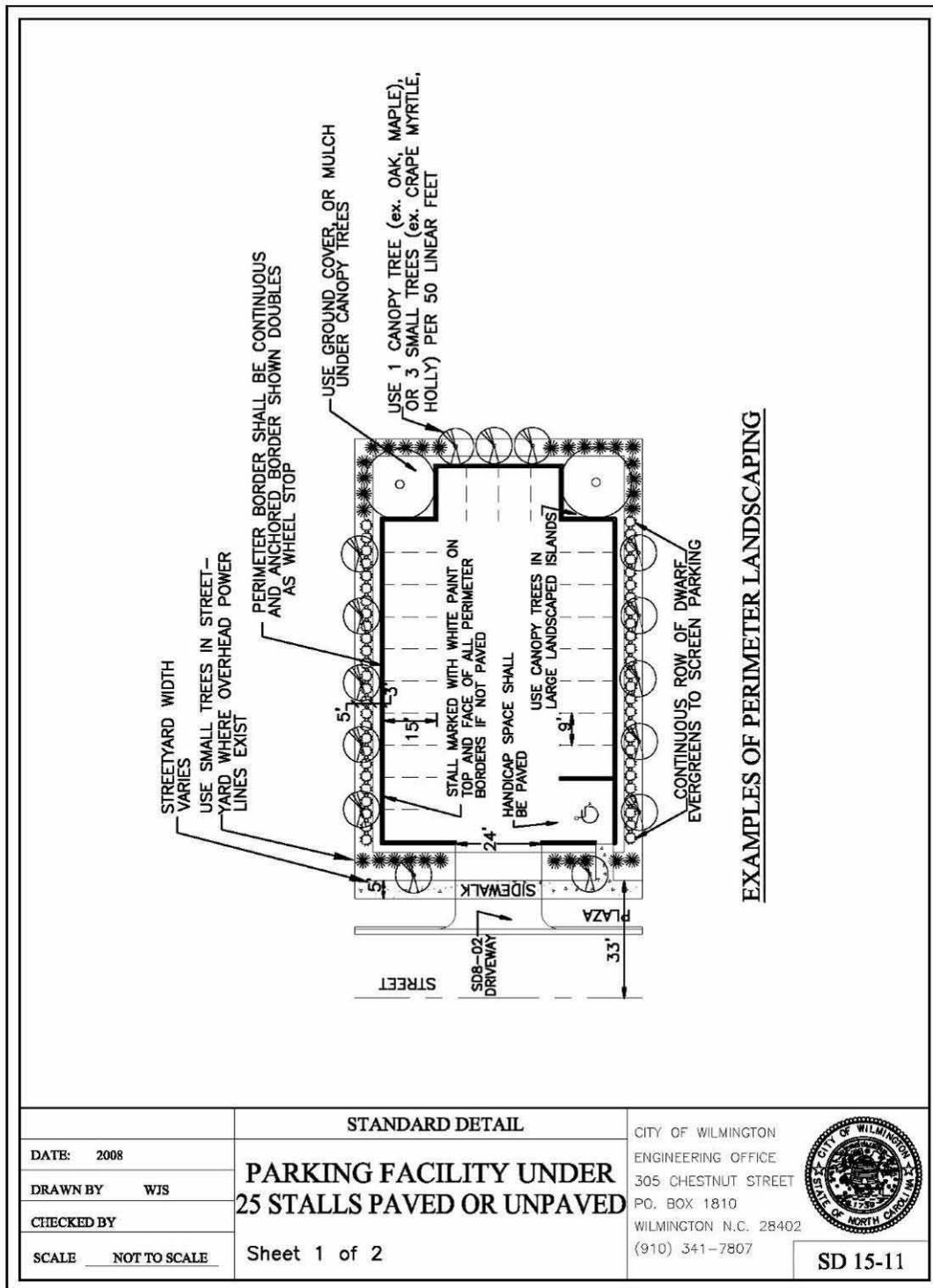


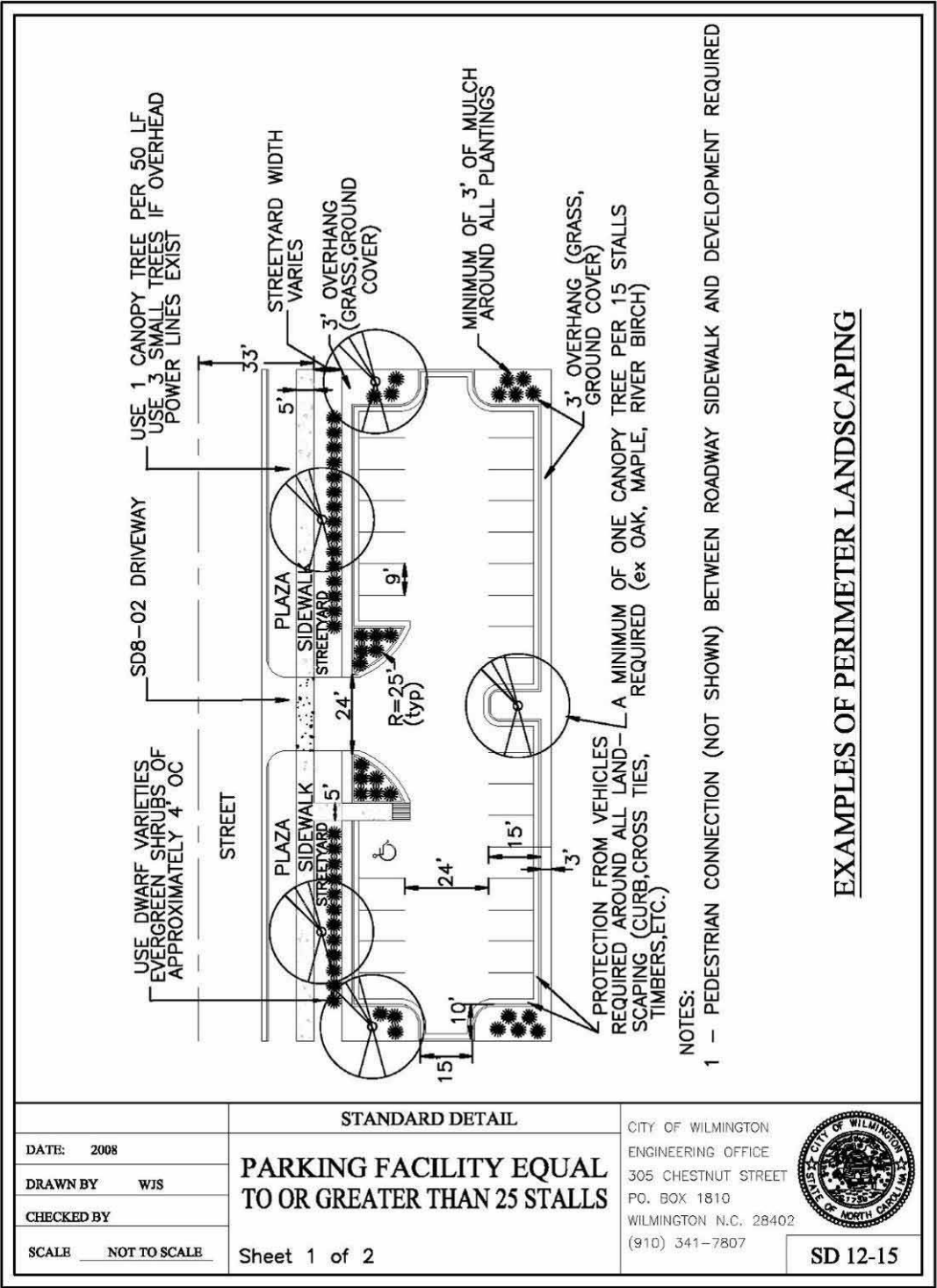


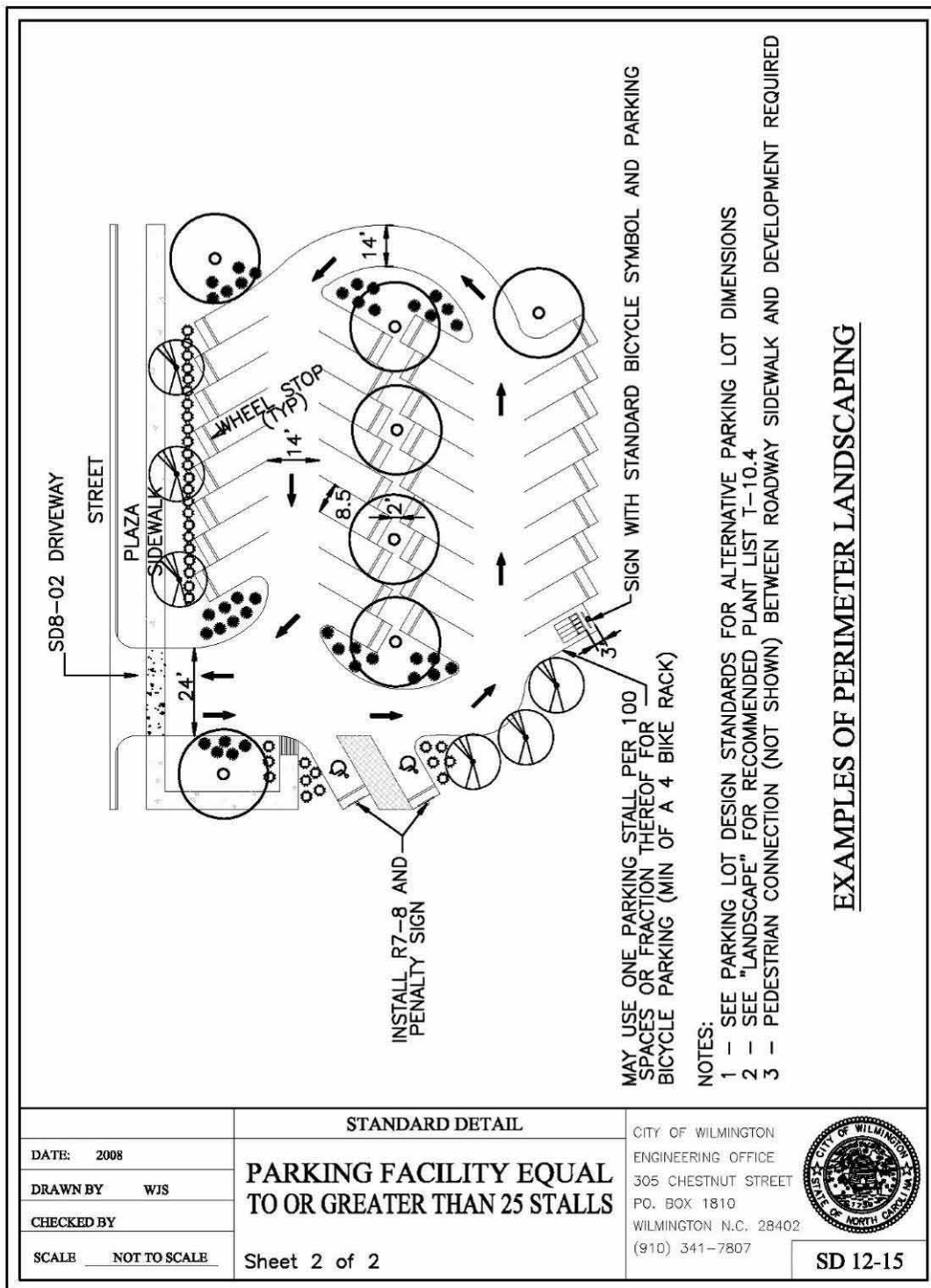




7-76









## Chapter 6. Pedestrian Facility Recommendations

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There are pedestrian facility improvement needs throughout the city. Because it is simply not feasible to complete all projects within one or two years, this plan distributes improvement recommendations over a twenty year planning horizon. This chapter describes the existing pedestrian facility network and the distribution of relative pedestrian demand around the city. By contrasting areas of high demand with deficiencies in the facility network, it is possible to prioritize locations where improvements should be completed first with the biggest benefit to current users.

### EXISTING PEDESTRIAN FACILITIES AND PEDESTRIAN DEMAND

#### ***Existing Pedestrian Facilities***

There are almost 290 miles of sidewalks in Wilmington. The overwhelming majority of these sidewalks are owned by the city (97%). Three percent of sidewalks are privately owned, although some of these privately owned sidewalks are located adjacent to public roads within master planned developments (e.g. sidewalks along Town Center Drive or Monument Drive in Mayfaire Town Center). The maps on the pages 131 through 134 illustrate the extents of the existing pedestrian network, based on data obtained from the City of Wilmington. It should be noted that this plan does not attempt to assess the quality or accessibility of individual pedestrian facilities. Such an effort is outside of the scope of this project.

The dark blue lines indicate the presence of existing sidewalks. The yellow dots indicate existing traffic signals with at least one set of pedestrian signal heads, although some signals have multiple pedestrian signal heads. Triangles adjoining the yellow dots illustrate the orientation or leg(s) of the pedestrian signal heads. If a yellow dot is surrounded by a black circle, it has pedestrian signal heads on all four legs of the intersection. Black dots indicate traffic signals with either no data or no pedestrian signal heads. The existing conditions information was obtained from city staff at the outset of this project.

The highest concentration of sidewalks is in the central business district and urban character zone. Fortunately, this is also the area with highest relative potential pedestrian demand. However, several other areas of the city that have a relatively high potential for pedestrian activity do not have a significant amount of sidewalks or signalized intersections with pedestrian signal heads. For example, the sidewalk and pedestrian signal infrastructure in the vicinity of UNCW is inconsistent, and the sidewalk along the South College Road frontage of the campus travels only a short distance and there are no sidewalks along Wrightsville Avenue on the southern edge of campus. This disconnect between potential pedestrian demand and available



pedestrian accommodations exists in several other parts of the *Traditional Suburban Zone* and *Automobile-Oriented Suburban Zone*.

Wilmington has two major multi-use trails that will provide users long-distance non-motorized connections when complete. The 10-mile-long Cross-City Trail will allow users to travel from James E.L. Wade Park in the southeast section of the city to Wrightsville Beach when complete. The trail will connect several significant destinations, including Halyburton Park, Cameron Art Museum, Empie Park, McCrary Park, UNCW and the new Autumn Hall development. In August 2008, a two-mile-long section of the trail was formally opened along Eastwood Road. The segment along South 17<sup>th</sup> Street between John D. Barry Drive and the Cameron Art Museum should be under construction by the spring of 2009. Trail completion is anticipated to take five to seven years. Crossing major arterials will be challenging for many users, and the Cross-City Trail plan calls for several intersection crossing improvements.

The River to the Sea Bikeway is a 12-mile-long bikeway that connects downtown Wilmington to Wrightsville Beach with a combination of on- and off-road bicycle facilities (although on-road portions are for cyclists only). The trail takes users through a variety of settings, including local streets in residential neighborhoods, commercial streets and major arterials. As with the Cross-City Trail, roadway crossings pose potential challenges for trail users. Plans currently under development address some of these crossings, including Dawson Street, Independence Boulevard, and South College Road. More information on these plans is available under the section “Upcoming Developments” later in this chapter.

### ***Pedestrian Demand***

When determining where to prioritize city investments and other improvement mechanisms, it is important to understand where there is the highest potential pedestrian demand. These are areas where it is most likely that people would walk if there were sidewalks, crosswalks and other pedestrian accommodations. There are several ways to approach this task. The most detailed method involves collecting pedestrian counts at locations throughout the city. However, this approach is very labor intensive and was not included in the scope of this project. A reasonable approximation of likely potential pedestrian demand can be modeled using readily available data in a geographic information system (GIS) format. For this project, the following data was used to model pedestrian potential demand:

Population density was calculated using the 2000 US Census block group data. It is reasonable to assume that areas with higher population density will have higher potential for pedestrian activity. The following weightings were used:

<u>Population per Square Mile</u>	<u>Score +</u>
302.9 - 1035.4	1
1035.5 - 1815.8	2
1815.9 - 2565.7	3
2565.8 - 3521.7	4
3521.8 - 4800.0	5
4800.1 - 7380.0	6

Buffer polygons were drawn around schools and parks. It was assumed that the closer one gets to a school or a park, the higher the potential demand for walking. The following weightings were used:

<u>SCHOOL PROXIMITY</u>	<u>Score+</u>
1/4 mile of school	3
1/2 mile of school	1
More than 1/2 mile	0

<u>Park PROXIMITY</u>	<u>Score+</u>
1/4 mile of park	2
1/2 mile of park	1
More than 1/2 mile	0

Wilmington zoning categories were used as a proxy for pedestrian potential. For this analysis, commercial and mixed use zoning categories were given higher pedestrian potential scores than uses such as industrial. Scores were attributed to each zoning district based on the allowable density range and pedestrian generation potential. The following weightings were used:

<b>Zoning Category</b>	<b>Pedestrian Generation Potential</b>	<b>Potential Population Density</b>	<b>Score+</b>
AI	Low	Low	2
CB	High	Medium	5
CBD	High	High	6
CS	Medium	Medium	4
HD	High	High	6
HD-MU	High	High	6
HD-R	High	High	6
IND	Low	Low	2
LI	Low	Low	2
MF-H	High	High	6
MF-L	High	Medium	5
MF-MH	High	Medium	5
MF-M	High	Medium	5
MHP	High	Low	4
MSMU	High	High	6

MX	High	High	6
O & I-1	Low	Low	2
PD	High	Medium	5
R-10	High	Medium	5
R-15	Low	Low	2
R-20	Low	Low	2
R-3	High	High	6
R-5	High	High	6
R-7	Medium	Medium	4
RB	Medium	Medium	4

This data was combined using GIS to develop a pedestrian potential map showing the relative levels of anticipated pedestrian potential demand in several areas throughout the city. The graphic results of the pedestrian potential calculations are illustrated on the maps on the following pages (131 through 134), along with existing pedestrian conditions.

#### Potential Pedestrian Demand

Areas with higher projected potential pedestrian demand are indicated by the darker color on the maps. As would be anticipated, most of the *Central Business District Zone* and *Urban Core Zone* have higher levels of projected potential demand than in the *Automobile-Oriented Suburban Zone* of the city. There is also a concentration of potential demand in the vicinity of UNCW, due in large part to the density of housing and mixture of land uses in the surrounding area. Because schools and parks are major factors in the model, there are several islands of relatively high potential pedestrian activity in the *Traditional Suburban Zone* and *Automobile-Oriented Suburban Zone*.

# Wilmington NC

Existing Conditions and  
Potential Pedestrian Demand  
Quadrant 1

Legend

Existing Traffic Signals

Pedestrian Signal Direction

North

South

East

West

Existing Sidewalk

Existing Cross City Trail

Existing Multi-Use Path

Road

Park

School

Potential Pedestrian Demand

High

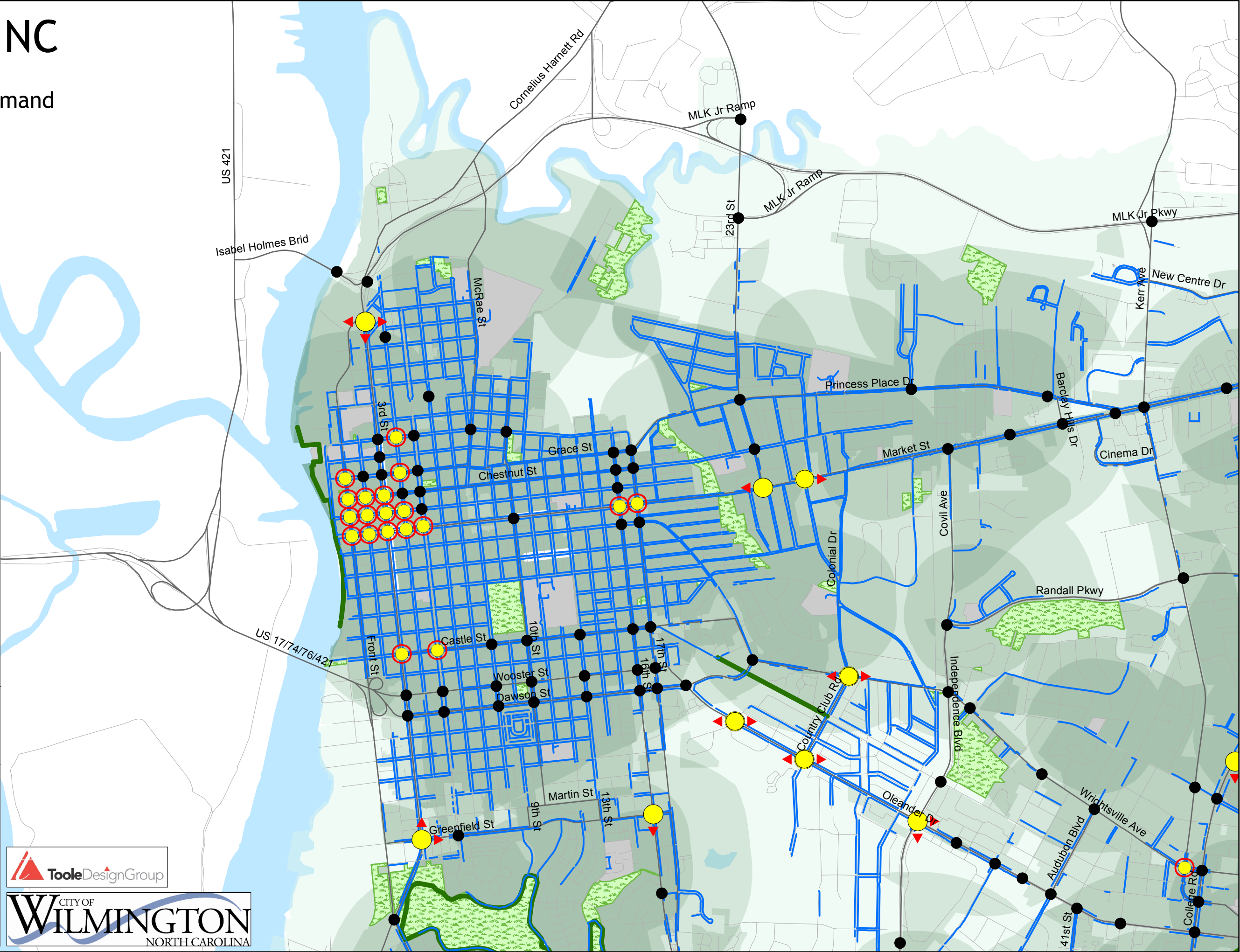
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CITY OF

WILMINGTON

NORTH CAROLINA





# Wilmington NC

## Existing Conditions and Potential Pedestrian Demand

### Quadrant 2

**Legend**

**Existing Traffic Signals**

Pedestrian Signal Direction

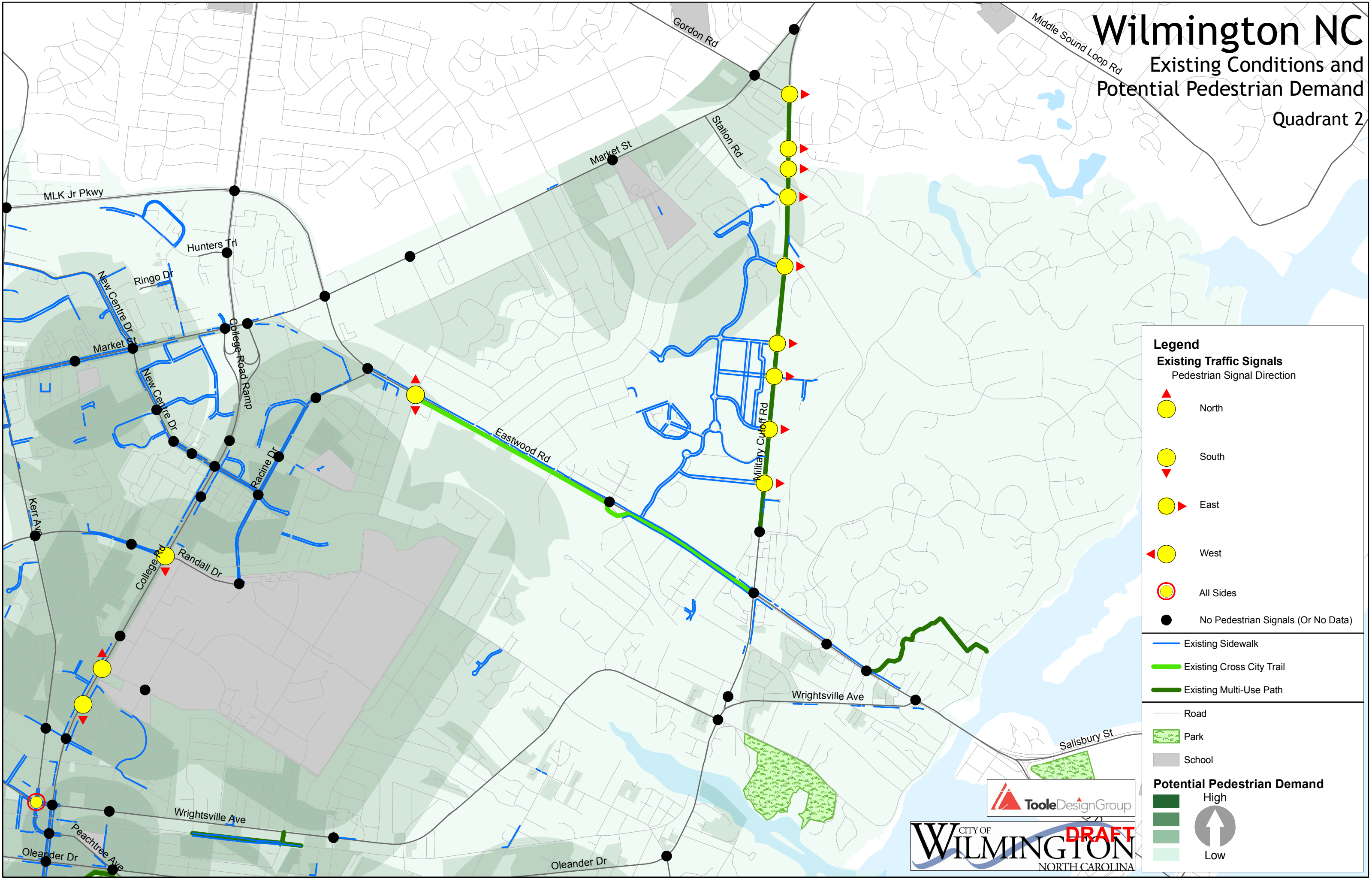
- North
- South
- East
- West
- All Sides
- No Pedestrian Signals (Or No Data)

- Existing Sidewalk
- Existing Cross City Trail
- Existing Multi-Use Path

- Road
- Park
- School

**Potential Pedestrian Demand**

- High
- Low



# Wilmington NC

## Existing Conditions and Potential Pedestrian Demand

### Quadrant 3

**Legend**

**Existing Traffic Signals**

Pedestrian Signal Direction

North

South

East

West

All Sides

No Pedestrian Signals (Or No Data)

Existing Sidewalk

Existing Cross City Trail

Existing Multi-Use Path

Road

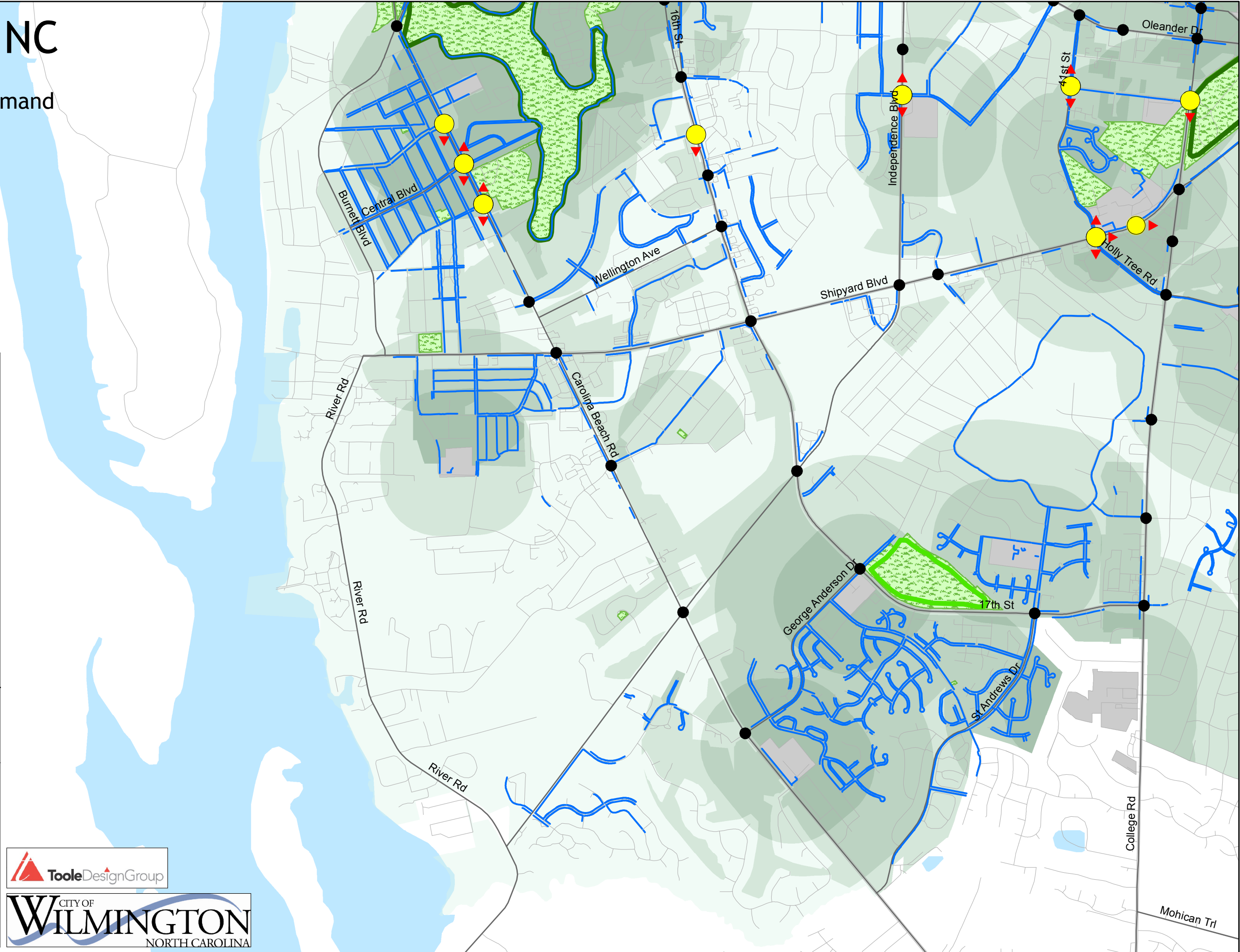
Park

School

**Potential Pedestrian Demand**

High

Low





# Wilmington NC







## Existing Conditions and Potential Pedestrian Demand




Quadrant 4




### Legend

#### Existing Traffic Signals



Pedestrian Signal Direction

-  North
-  South
-  East
-  West
-  All Sides
-  No Pedestrian Signals (Or No Data)

-  Existing Sidewalk
-  Existing Cross City Trail
-  Existing Multi-Use Path

-  Road
-  Park
-  School

#### Potential Pedestrian Demand

-  High
- 
-  Low



Low



## PEDESTRIAN DEFICIENCY ANALYSIS

Once the high pedestrian potential demand areas were identified, pedestrian deficiencies were analyzed. These are areas where the existing sidewalk and pedestrian signal infrastructure is inadequate to serve the needs of Wilmington's pedestrians. It would not be feasible to complete a detailed field survey of existing conditions throughout the city-wide study area given time and project scope constraints. Therefore, the following elements were incorporated into the deficiency analysis:

- Missing sidewalk information
- Stakeholder input (city and WMPO staff, NCDOT staff, plan steering committee, WMPO BikePed committee, etc.)
- Public comments (online survey, public outreach, etc.)
- Consultant field analysis




Through discussions with project staff and the plan steering committee, it was determined that the examination would focus on Wilmington's arterial and collector roadways. These roadways have significant levels of observed pedestrian activity and the majority of the city's pedestrian crashes occur along major thoroughfares. Furthermore, the relatively high vehicle speeds and width of these roadways detract from a pedestrian's comfort, which is only exacerbated when there are no sidewalks or pedestrian signal heads.

## PEDESTRIAN FACILITY PROJECT IDENTIFICATION

After the areas of high pedestrian deficiency were identified, they were contrasted with the pedestrian potential demand map to identify areas that exhibit both high potential pedestrian demand and high levels pedestrian deficiency. By combining these two pieces of information, areas with the highest need for pedestrian facility improvements were identified. This discussion will provide a general overview of recommended facility improvements divided into short-term (0-5 years), medium term (5-10 years) and long term (10-20 years) increments. A more detailed discussion of select roadway recommendations follows. The sidewalk and pedestrian signal improvements recommended in this Plan are not scheduled into the City's Capital Improvements Program. It is anticipated that during the annual capital projects prioritization process, these proposed projects will be considered for inclusion among other submittals from various City departments.

### 6.1.1 Sidewalk Recommendations

Approximately 450 miles of sidewalk improvement projects were identified along Wilmington's arterial and collector roadways. Even in the best of financial times, it is unrealistic to expect this amount of sidewalks to be constructed within the five-year planning horizon of this project. One of the objectives under *Goal 2: Transportation Choice*, of this plan calls for the construction of two miles of sidewalk per year. This length includes projects directly funded by the city and projects constructed through the private development process. Subsequently, a select subset of sidewalk improvement projects was identified based on the following planning factors: relative potential pedestrian demand, linkages to schools, linkages to parks, opportunities to expand existing sidewalk systems, linkages to existing signalized intersections and analysis of public comment.

Sidewalk projects are shown on the Recommended Sidewalk and Pedestrian Signal Improvements maps on the following pages (151 through 154). This plan recommends 26 miles of sidewalk projects to be completed in the short-term (0-5 years). These are shown by red  lines on the maps. Approximately 207 miles of sidewalk projects are recommended for construction in the mid-term (5-10 years). These are shown by the orange  lines. Approximately 223 miles of long term (10-20 years) sidewalk projects are shown by the yellow  lines on the maps. Tables summarizing short and mid-term sidewalk projects are included on the following pages. A table summarizing long-term sidewalk projects is included in the appendix. \

The calculated amount of sidewalk projects is based on the assumption that all arterial and collector roadways should have continuous sidewalk on both sides of the road. As seen on the maps, most of the sidewalk projects are located in the Traditional Suburban Zone and the Automobile-Oriented Suburban Zone.

Construction cost estimates were developed for the recommendations based on an estimated cost of \$5 per square foot for 4" thick, 5' wide poured in place concrete sidewalk. Because this is a city-wide plan and not a detailed project site design study, the costs are intended to be general and used for planning purposes only and do not include right-of-way acquisitions, curb ramp installation, new driveway aprons, grading, drainage improvements or retaining walls, and other elements. Construction costs will vary based on the ultimate project scope (i.e. potential combination of projects, or use of Wilmington or NC DOT labor) and economic conditions at the time of construction. Actual construction costs should be determined at the time of the project and should include estimates based on: sidewalk thickness and width, number of curb ramps required, driveway aprons, surface (if surface other than concrete is desired), drainage

improvements, curb and gutter or grassed swale, signage, right of way acquisition, demolition, engineering, utility relocation, mobilization, temporary access, bus stop improvements, street furniture and other project costs. A table showing approximate unit costs for various project elements may be found in the appendix.

Table 10 Short-term Sidewalk Recommendations					
Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
10th St	Ann St	Castle St	1,107	0.21	\$27,663
11th St	Hall St	King St	1,343	0.25	\$33,570
16th St	Wright St	Greenfield St	3,711	0.70	\$92,778
17th St	College Rd	Saint Andrews Dr	2,284	0.43	\$57,103
	Rankin St	Grace St	409	0.08	\$10,226
	Shipyards Blvd	Private Dr (North of Independence Blvd)	371	0.07	\$9,268
	Wooster St	Greenfield St	2,849	0.54	\$71,235
23rd St	Market St	Chestnut St	581	0.11	\$14,517
	Princess Place Dr	Belvedere Dr	649	0.12	\$16,233
Audubon Blvd	Oleander Dr	Peachtree Av	198	0.04	\$4,940
Barclay Hills Dr	Princess Place Dr	Market St	1,028	0.19	\$25,702
Bethal Rd	Brookview Rd	Waltmoor Rd	1,236	0.23	\$30,909
Carolina Beach Rd	Hart St	Parkway Blvd	5,593	1.06	\$139,827
Castle St	Colwell Av	Wrightsville Av	2,659	0.50	\$66,487
Cinema Dr	Market St	Private Drive	856	0.16	\$21,401
College Rd	Fountain Dr	Private Dr (North of Randall Dr)	4,093	0.78	\$102,315
		Wrightsville Av	3,111	0.59	\$77,776
Dawson St	Wrightsville Av	Oleander Dr	1,556	0.29	\$38,906
Delaney Av	Wellington Av	Glen Meade Rd	1,968	0.37	\$49,189
Eastwood Rd	Military Cutoff Rd	Marina St	424	0.08	\$10,603
Front St	Hanover St	3rd St	3,700	0.70	\$92,492
	Walnut St	Red Cross St	161	0.03	\$4,017
Greenfield St	3rd St	Lake Shore Dr	662	0.13	\$16,561
Harbour Dr	Troy Dr	17th St	2,366	0.45	\$59,155
Independence Blvd	Reston Ct	Canterbury Rd	2,166	0.41	\$54,142
Kerr Ave	Private	Market St	1,833	0.35	\$45,817
King St	Railroad St	11th St	1,868	0.35	\$46,700
MacMillan Ave	Pine Grove Dr	College Rd	6,701	1.27	\$167,516
Market St	Barnard Dr	23 Rd St	1,868	0.35	\$46,691
	Cinema Dr	Princess Place Dr	239	0.05	\$5,984
	New Centre Dr	Walton Rd	716	0.14	\$17,891
	Saint Marks Pl	21 St St	250	0.05	\$6,262
McRae St	Fanning St	Bladen St	306	0.06	\$7,649
	Nixon St	Bess St	942	0.18	\$23,542
New Center	Market St	Sigmon Rd	1,036	0.20	\$25,890
Oleander Dr	Hawthorne Rd	42 Nd St	5,090	0.96	\$127,258
	Pine Grove Dr	College Rd	2,102	0.40	\$52,554

Table 10 Short-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
	Wooster St	Mimosa Pl	2,928	0.46	\$73,204
Peachtree Ave	Pine Grove Rd	47th St	2,180	0.12	\$54,503
Pinegrove Dr	Oleander Dr	Peachtree Ave	2,463	0.34	\$61,576
Princess Place Dr	17th St	25 Th St	3,493	0.66	\$87,335
Randall Pkwy	Collegiate Dr	Kerr Av	2,424	0.46	\$60,593
Rankin St	17th St	16th St	385	0.07	\$9,615
Rosemont Av	Wilshire Blv	End of Street	2,109	0.40	\$52,723
Shipyard Blvd	Savannah Ct	Shipyard Blv	5,999	1.14	\$149,963
	Troy Dr	Vance St	3,782	0.72	\$94,547
Troy Dr	Harbour Dr	Wellington Av	680	0.13	\$17,008
Waltmoor Rd	Bethal Rd	College Rd	2,383	0.45	\$59,564
Wellington Ave	Carolina Beach Rd	17th St	7,607	1.44	\$190,174
Wilshire Blvd	Wrightsville Av	Rosemont Av	108	0.02	\$2,704
Wooster St	6th St	3rd St	2,177	0.41	\$54,416
	8th St	Oleander Dr	6,392	1.01	\$159,793
Wrightsville Ave	44 Th St	Independence Blv	9,669	1.83	\$241,734
	Castle St	Independence Blv	4,992	0.95	\$124,789
	College Rd	Hawthorne Dr	12,745	2.41	\$318,618
<b>Total</b>			<b>140,903</b>	<b>25.98</b>	<b>\$3,522,568</b>

Table 11 Mid-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
10th St	Martin St	Marstellar St	1,800	0.34	\$44,996
11th St	Lake Shore Dr	Greenfield St	1,331	0.25	\$33,272
13th St	Lake Shore Dr	Martin St	3,727	0.71	\$93,187
17th St	Independence Blv	John D Barry Dr	13,440	2.55	\$336,007
	Shipyard Blv	Independence Blv	4,830	0.91	\$120,752
23rd St	Shirley Rd	Private Drive (North of MLK PKY)	10,032	1.90	\$250,794
2nd St	End of St	Hanover St	1,126	0.21	\$28,143
3rd St	Willard St	Carolina Beach Rd	267	0.05	\$6,678
41st St	Shipyard Blv	Lake Av	1,564	0.30	\$39,099
42nd St	Wrightsville Av	Spirea Dr	4,133	0.78	\$103,313
5th St	Greenfield St	Meares St	1,542	0.29	\$38,551
6th St	Taylor St	Howard St	448	0.08	\$11,205
9th St	Greenfield St	Martin St	802	0.15	\$20,040
Airlie Rd	Oleander Dr	Causeway, 76	15,702	2.97	\$392,557
Amber Dr	Greenhowe Dr	Bethal Rd	9,104	1.72	\$227,588
Audubon Blvd	Wrightsville Av	Peachtree Av	1,470	0.28	\$36,739
Beasley Rd	Masonboro Loop Rd	Pine Grove Dr	15,416	2.92	\$385,399
Bess St	6th St	Mcrae St	2,250	0.43	\$56,239
Brenda Dr	Englewood Dr	Patricia Dr	4,057	0.77	\$101,421
Brookview Rd	Colony Cir	Bethal Rd	4,040	0.77	\$101,010
Brunswick St	4th St	3rd St	164	0.03	\$4,088



Table 11 Mid-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
	6th St	7th St	373	0.07	\$9,337
	Front St	2nd St	619	0.12	\$15,480
Burnett Blvd	Shipyard Blv	Front St	16,626	3.15	\$415,644
Camberly Dr	Tanbridge Rd	Long Leaf Acres Dr	2,431	0.46	\$60,764
Canterbury Rd	Live Oak Pkw	Echo Ln	1,895	0.36	\$47,380
Canterwood Dr	17th St	Medical Center Dr	2,987	0.57	\$74,673
Cardinal Dr	Clear Run Dr	Market St	8,472	1.60	\$211,793
Cardinal Extension Dr	Clear Run Dr	Market St	4,681	0.89	\$117,020
Carolina Beach Rd	Burnett Blv	Kentucky Av	145	0.03	\$3,633
	Independence Blv	Raleigh St	6,264	1.19	\$156,609
		Saint Andrews Dr	14,055	2.66	\$351,376
	Medical Center Dr	Southern Blv	1,816	0.34	\$45,405
Carolyn Dr	Brenda Dr	Clearbrook Dr	1,992	0.38	\$49,809
Causeway Dr	Military Cutoff Rd	Marina St	715	0.14	\$17,871
Chippenham Dr	Hearthside Dr	Saint Andrews Dr	1,426	0.27	\$35,653
Cinema Dr	Princess Place Dr	Market St	419	0.08	\$10,475
Clarendon St	Stanley St	King St	432	0.08	\$10,800
Clear Run Dr	College Acres Dr	Mallard St	9,041	1.71	\$226,023
Clearbrook Dr	Carolyn Dr	Greenville Loop Rd	4,057	0.77	\$101,432
College Acres Dr	Oriole Dr	Racine Dr	6,413	1.21	\$160,319
College Rd	17th St	Shipyard Blv	16,330	3.09	\$408,244
	Long Leaf Hills Dr	Oleander Dr	5,298	1.00	\$132,450
	Oriole Dr	New Centre Dr	842	0.16	\$21,050
	Pine Cliff Dr	17th St	3,629	0.69	\$90,718
Collegiate Dr	Market St	Greenway Av	1,467	0.28	\$36,668
	Randall Pkw	Lullwater Dr	607	0.12	\$15,181
Colony Cir	Brookview Rd	Brookview Rd	2,289	0.43	\$57,236
	Commons Way	Nottingham Ln	248	0.05	\$6,189
Columb Dr	Ringo Dr	New Centre Dr	796	0.15	\$19,890
Commons Way	Colony Cir	Kings Arm Ct	1,457	0.28	\$36,414
Covil Ave	Market St	Canterbury Rd	5,601	1.06	\$140,031
Crews Dr	Price Dr	Private	2,644	0.50	\$66,104
Cypress Dr	Wisteria Dr	Lake Shore Dr	1,026	0.19	\$25,660
Darlington Ave	Covil Av	Market St	3,420	0.65	\$85,508
Davis St	3rd St	4th St	950	0.18	\$23,738
Dawson St	Clear Run Dr	Wrightsville Av	79	0.02	\$1,983
	Oleander Dr	Wrightsville Av	134	0.03	\$3,341
	Price Dr	Crews Dr	1,377	0.26	\$34,421
	Rose Ave	Wrightsville Av	2,514	0.48	\$62,843
Denee Dr	Lennon Dr	Private Dr	2,094	0.40	\$52,348
Disney Dr	Colony Cir	Hampton Rd	1,308	0.25	\$32,708
Donald E Gore Dr	George Anderson Dr	Jeb Stuart Dr	3,083	0.58	\$77,074
Eagles Nest Dr	Amber Rd	Beasley Rd	5,544	1.05	\$138,611
Eastwood Rd	Bay Creek Dr	Hillsdale Dr	5,652	1.07	\$141,302
	Market St	Racine Dr	4,114	0.78	\$102,847



Table 11 Mid-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
	Military Cutoff Rd	Marina St	6,126	1.16	\$153,155
Echo Ln	Marwood Dr	Canterbury Rd	2,417	0.46	\$60,437
Englewood Dr	Oleander Dr	Clearbrook Dr	3,536	0.67	\$88,399
Floral Pkwy	Oleander Dr	Wrightsville Av	3,758	0.71	\$93,959
Fordham Rd	Canterbury Rd	Oleander Dr	2,723	0.52	\$68,080
Fountain Dr	Saint James Dr	Kerr Av	667	0.13	\$16,686
Front St	Queen St	Burnett Blv	9,833	1.86	\$245,826
George Anderson Dr	17th St	Summerlin Falls Ct	2,696	0.51	\$67,402
	Carolina Beach Rd	Breezewood Dr	728	0.14	\$18,203
	Robert Hoke Rd	Donald E Gore Dr	817	0.15	\$20,434
Glen Meade Rd	Marwood Dr	17th St	2,176	0.41	\$54,408
Gordon Rd	Military Cutoff Rd	North of Market St	2,077	0.39	\$51,930
Grace St	Nutt St	Water St	133	0.03	\$3,313
Green Meadows Dr	Amsterdam Way	Market St	3,879	0.73	\$96,975
	Market St	Toulon Dr	7,286	1.38	\$182,150
Greenfield St	9th St	16th St	3,020	0.57	\$75,497
	Front St	2nd St	567	0.11	\$14,179
Greenhowe Dr	College Rd	Amber Rd	6,103	1.16	\$152,585
Greenville Ave	Wrightsville Av	Military Cutoff Rd	8,437	1.60	\$210,928
Greenville Loop Rd	Pine Grove Dr	Oleander Dr	29,283	5.55	\$732,079
Greenway Ave	Kerr Av	Lullwater Dr	3,956	0.75	\$98,890
GREENWICH Ln	Nottingham Ln	Waltmoor Rd	1,856	0.35	\$46,402
Halifax Rd	Sweetbriar Rd	Lincoln Rd	5,568	1.05	\$139,206
Hamilton Dr	Macmillan Av	Riegel Rd	3,973	0.75	\$99,317
Hampton Rd	Kelly Rd	Disney Dr	3,369	0.64	\$84,219
Hanover St	4th St	3rd St	336	0.06	\$8,409
	Front St	3rd St	589	0.11	\$14,737
Harnett St	6th St	Love St	176	0.03	\$4,412
	Front St	3rd St	478	0.09	\$11,962
Hawthorne Dr	Wrightsville Av	Oleander Dr	2,427	0.46	\$60,666
Hinton Ave	Oleander Dr	Greenville Ave	5,102	0.97	\$127,561
Hoggard Dr	Hamilton Dr	Private St	812	0.15	\$20,293
Holly Tree Rd	Warlick Dr	Pine Grove Dr	1,986	0.38	\$49,649
	Web Trace	College Rd	1,628	0.31	\$40,697
Hooker Rd	Rose Av	Wrightsville Av	7,574	1.43	\$189,356
Hunters Tr	Ringo Dr	New Centre Dr	7,210	1.37	\$180,256
Hurst Dr	Hamilton Dr	College Rd	2,126	0.40	\$53,140
Independence Blvd	Carolina Beach Rd	Shipyard Blv	15,511	2.94	\$387,763
	Market St	Canterbury Rd	15,982	3.03	\$399,545
	River Rd	Carolina Beach Rd	10,924	2.07	\$273,100
	Shipyard Blv	Canterbury Rd	3,609	0.68	\$90,225
Jeb Stuart Dr	Donald E Gore Dr	Longstreet Dr	8,389	1.59	\$209,727
John S Mosby Dr	R L Honeycutt Dr	John D Barry Dr	685	0.13	\$17,117
Judges Rd	Albemarle Rd	Market St	3,129	0.59	\$78,214
Kelly Rd	Hampton Rd	Beasley Rd	6,136	1.16	\$153,408

Table 11 Mid-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
Kerr Ave	Market St	Private Drive (N of Alandale Dr)	11,928	2.26	\$298,202
	Randall Pkw	Franklin Av	3,413	0.65	\$85,322
	Randall Pkwy	Maple Av	12,091	2.29	\$302,280
King St	Clarendon St	Center St	775	0.15	\$19,371
Kirby Smith Dr	Waltmoor Rd	Greenhowe Dr	10,263	1.94	\$256,583
Lake Ave	College Rd	Halifax Rd	3,548	0.67	\$88,712
Lake Branch Dr	Lake Shore Dr	Greenfield St	1,037	0.20	\$25,918
Lake Shore Dr	Carolina Beach Rd	Willard St	23,556	4.46	\$588,910
Lansdowne Rd	Navaho Trl	College Rd	2,991	0.57	\$74,785
Lennon Dr	Market St	Hunters Tr	2,565	0.49	\$64,129
Live Oak Pkwy	Gillette Dr	Canterbury Rd	2,098	0.40	\$52,448
Long Leaf Acres Dr	Eastwood Rd	Toulon Dr	8,183	1.55	\$204,586
Long Leaf Hills Dr	College Rd	Pine Grove Dr	3,827	0.72	\$95,677
Longstreet Dr	Shipyard Blv	Pine Valley Dr	4,093	0.78	\$102,316
Lullwater Dr	Market St	Greenway Av	7,944	1.50	\$198,600
MacMillan Ave	Park Av	Wrightsville Av	285	0.05	\$7,134
Main St	Military Cutoff Rd	Town Center Dr	2,649	0.50	\$66,220
Mallard St	Clear Run Dr	Wrightsville Av	3,838	0.73	\$95,940
Market St	Gordon Rd	Martin Luther King Jr Pky	22,931	4.34	\$573,283
	Martin Luther King Jr Pky	New Centre Dr	5,776	1.09	\$144,410
Marlwood Dr	Glen Meade Rd	Echo Ln	1,716	0.33	\$42,911
Marsh Hawk Ct	College Rd	Amber Rd	2,449	0.46	\$61,218
Martin St	13th St	9th St	3,020	0.57	\$75,503
Masonboro Loop Rd	Masonboro Sound Rd	County Rd	3,603	0.68	\$90,069
	Pine Grove Dr	Masonboro Sound Rd	14,636	2.77	\$365,893
Masonboro Sound Rd	Masonboro Loop Rd	Pine Grove Dr	26,046	4.93	\$651,154
McRae St	Bess St	Nixon St	264	0.05	\$6,599
Medical Center Dr	Wisteria Dr	17th St	3,902	0.74	\$97,545
Midland Dr	Parkway Blv	Newkirk Av	2,390	0.45	\$59,758
Military Cutoff Rd	Gordon Dr	Airlie Rd	27,214	5.15	\$680,339
Navaho Trl	Masonboro Loop Rd	Lansdowne Rd	11,486	2.18	\$287,157
New Centre Dr	College Rd	Private Dr (East of College Rd)	235	0.04	\$5,874
	Hunters Tr	Kerr Av	2,308	0.44	\$57,707
	Private Drive (South of Dapple Ct)	Hunt Club Rd	1,700	0.32	\$42,512
Newkirk Ave	Shipyard Blv	Midland Dr	720	0.14	\$18,004
Nottingham Ln	Colony Cir	Greenwich Ln	732	0.14	\$18,297
Nutt St	Red Cross St	Hanover St	772	0.13	\$19,299
Oleander Dr	Airlie Rd	Greenville Ave	7,013	1.33	\$175,330
	College Rd	42 Nd St	2,452	0.46	\$61,300
	New Hanover Medical Park Dr	Savannah Ct	1,435	0.27	\$35,866
	Pine Grove Dr	Greenville Loop Rd	24,722	4.68	\$618,058

Table 11 Mid-term Sidewalk Recommendations



Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
Oriole Dr	College Rd	Cardinal Dr	7,543	1.43	\$188,576
Page Ave	Wrightsville Av	Wilshire Blv	2,260	0.43	\$56,496
Park Ave	Floral Pkw	Kerr Av	7,541	1.43	\$188,534
Parkway Blvd	Midland Dr	Carolina Beach Rd	1,075	0.20	\$26,869
Patricia Dr	Clearbrook Dr	Brenda Dr	1,904	0.36	\$47,598
Peachtree Ave	Kerr Av	42 Nd St	2,220	0.42	\$55,507
Pine Grove Dr	Kilarney Rd	Masonboro Sound Rd	8,318	1.58	\$207,957
	Mayberry Ct	Oleander Dr	12,160	2.30	\$304,000
Pine Valley Dr	College Rd	Beasley Rd	6,709	1.27	\$167,735
		Robert E Lee Dr	1,146	0.22	\$28,641
	Shipyard Blv	Robert E Lee Dr	5,179	0.98	\$129,486
Price Dr	Riegel Rd	Riegel Rd	8,980	1.70	\$224,489
Private St	Saint James Dr	Hoggard Dr	367	0.07	\$9,177
R L Honeycutt Dr	Jeb Stuart Dr	John S Mosby Dr	7,661	1.45	\$191,518
Racine Dr	Old Eastwood Rd	Eastwood Rd	391	0.07	\$9,774
Railroad St	Stanley St	King St	429	0.08	\$10,734
Raleigh St	Vance St	Carolina Beach Rd	8,155	1.54	\$203,876
Randall Dr	College Rd	Reynolds Dr	6,487	1.23	\$162,183
Randall Pkwy	Covil Av	Kerr Av	6,981	1.32	\$174,517
Red Cross St	Front St	Nutt St	150	0.03	\$3,745
Reynolds Dr	Randall Dr	Reynolds Dr	2,409	0.46	\$60,225
Ridgewood Heights Dr	Rose Ave	Wrightsville Av	4,350	0.82	\$108,742
Riegel Rd	Rose Av	Hamilton Dr	10,124	1.92	\$253,100
Ringo Dr	Columb Dr	Hunters Tr	3,694	0.70	\$92,352
River Rd	Sunnyvale Rd	Shipyard Blv	14,316	2.71	\$357,902
		South of Independence Blv	12,224	2.32	\$305,598
Robert E Lee Dr	Longstreet Dr	Longstreet Dr	13,092	2.48	\$327,298
Robin Hood Rd	17th St	Lake Shore Dr	4,026	0.76	\$100,654
Rogersville Rd	Wrightsville Av	Eastwood Rd	9,195	1.74	\$229,876
Rose Ave	Clear Run Dr	Wrightsville Av	12,890	2.44	\$322,260
Saint Nicholas Rd	Blair School Rd	Blair School Rd	5,059	0.96	\$126,468
Scientific Park Dr	Kornegay Av	23 Rd St	7,448	1.41	\$186,205
Shipyard Blvd	Holbrook Av	College Rd	18,078	3.42	\$451,951
	Hospital Plaza Dr	Willard St	4,104	0.78	\$102,608
	River Rd	East of Vance St	4,455	0.84	\$111,376
Southern Blvd	Carolina Beach Rd	Burnett Blv	2,453	0.46	\$61,323
Spartan Rd	Market St	Tanbridge Rd	6,834	1.29	\$170,840
Spirea Dr	41 St St	College Rd	5,156	0.98	\$128,889
St Andrews Dr	Carolina Beach Dr	Chippenham Dr	5,083	0.96	\$127,068
Stanley St	Railroad St	Clarendon St	3,178	0.60	\$79,458
Station Rd	Market St	Military Cutoff Rd	4,975	0.94	\$124,387
Steeplechase Dr	Chippenham Dr	17th St	1,147	0.22	\$28,670
Stokely Dr	Denee Dr	Ringo Dr	1,698	0.32	\$42,440
Sunnyvale Dr	River Rd	Carolina Beach Rd	14,961	2.83	\$374,031
Sutton Dr	Waltmoor Rd	Brookview Rd	1,400	0.27	\$34,993

Table 11 Mid-term Sidewalk Recommendations

Street Name	From	To	Linear Feet	Linear Miles	Approx. Cost
Sweetbriar Rd	Lincoln Rd	Halifax Rd	3,022	0.57	\$75,538
Tanbridge Rd	Eastwood Rd	End of Road	14,191	2.69	\$354,779
Toulon Dr	Green Meadows Dr	Long Leaf Acres Dr	1,316	0.25	\$32,911
Van Campen Blvd	Market St	Sigmon Rd	273	0.05	\$6,829
Vance St	Rutledge Dr	Raleigh St	3,225	0.61	\$80,626
Wagoner Dr	Hurst Dr	Randall Dr	6,252	1.18	\$156,294
Wallace Ave	Oleander Dr	Wrightsville Av	2,637	0.50	\$65,925
Waltmoor Rd	College Rd	Greenwich Ln	3,714	0.70	\$92,845
Water St	Nutt St	Walnut St	374	0.07	\$9,354
	Princess St	Ann St	1,797	0.34	\$44,922
Wells Rd	Tanbridge Rd	Windemere Rd	981	0.19	\$24,518
William and Mary Pl	Navaho Trl	Commons Way	1,267	0.24	\$31,685
Wilshire Blvd	College Rd	Rosemont Av	8,504	1.61	\$212,597
	Montclair Dr	Page Av	70	0.01	\$1,746
Windsor Dr	Arden Rd	Wrightsville Av	198	0.04	\$4,949
Wisteria Dr	Cypress Dr	Medical Center Dr	800	0.15	\$19,990
Wood Dale Dr	Wrightsville Av	Riegel Rd	4,963	0.94	\$124,081
Wrightsville Ave	Hawthorne Dr	Rogersville Rd	15,634	2.96	\$390,862
	Military Cutoff Rd	Eastwood Rd	7,774	1.47	\$194,353
	Oleander Dr	Rogersville Rd	5,891	1.12	\$147,266
<b>Total</b>			<b>1,092,698</b>	<b>206.94</b>	<b>\$27,317,447</b>

### 6.1.2 Multi-Use Path Recommendations

Ultimately, the Cross-City Trail will travel approximately 10 miles between Halyburton Park and Wrightsville Beach. The paved off-road trail will be at least eight feet in width, with striped crosswalks at all intersections and crossing signals at each major intersection. Recreational and cultural destinations along the trail will include Halyburton Park, Cameron Art Museum, the park behind Alderman Elementary, Independence Mall, Hanover Center, Empie Park, Ann McCrary Park, and Autumn Hall. Pine Valley Elementary School, Alderman Elementary School, Cape Fear Center for Inquiry, and UNC Wilmington are among the destinations.

Cross-City Trail elements are illustrated by the light green  lines on the Recommended Sidewalk and Pedestrian Signal Improvement maps (151 through 154). Existing trail segments are shown in a solid line and proposed segments are dashed. Other multi-use trails are shown by the dark green  lines on the maps. The Adopted Cross City Trail Plan (6/17/2008) is

illustrated on Figure 80. Table 12 Multi Use Path Recommendations shows approximate lengths and costs for the proposed trail segments.

Table 12 Multi Use Path Recommendations		
Path Segment	Linear Feet	Approx. Cost <sup>1</sup>
<b>CROSS CITY TRAIL</b>	<b>68,698</b>	<b>\$1,373,956</b>
Autumn Hall	7,414	\$148,278
Eastwood	5,775	\$115,491
Independence	20,466	\$409,323
McCrary Park	3,665	\$73,303
Museum	3,649	\$72,983
Peele	1,971	\$39,426
Randall	5,381	\$107,622
Rosemont	1,797	\$35,950
UNCW Connector	10,077	\$201,542
Waltmoor	8,502	\$170,039
<b>OTHER MULTI-USE PATH</b>	<b>90,583</b>	<b>\$1,811,661</b>
Burnt Mill Ck	9,687	\$193,748
Colwell	4,167	\$83,339
CSX North	10,013	\$200,251
CSX South	5,314	\$106,279
Masonboro Lp	9,245	\$184,907
Military Cutoff	21,489	\$429,787
Park	21,703	\$434,057
Riverwalk North	5,048	\$100,967
Riverwalk South	1,875	\$37,509
Summers Rest	2,041	\$40,818
<b>Grand Total</b>	<b>235,672</b>	<b>\$4,713,449</b>
<sup>1</sup> Note: Cost estimate assumes 8' wide asphalt path @ \$20 per linear foot		

### 6.1.3 Signalized Intersection Recommendations

In addition to identifying recommended sidewalk and trail improvement projects, this plan provides recommendations for pedestrian signal and associated street crossing improvements. As shown in the existing conditions maps (151 through 154), there are a number of existing signalized intersections in Wilmington that do not have pedestrian signal heads in all directions, and many intersections with relatively high pedestrian demand scores provide no pedestrian signalization. Furthermore, there are several intersections between existing or proposed multi-use paths and arterial or collector roadways. In order to improve pedestrian safety and comfort, as well as enhance the connectivity of the pedestrian system, pedestrian signals and crosswalks are recommended in several locations. The recommendations include a combination of



retrofitting pedestrian signals to existing signalized intersections, installing new traffic signals with pedestrian signals and crosswalks, and pilot testing rapid flash beacons and pedestrian hybrid signals.

Related pedestrian appurtenances must be considered with every new or retrofitted pedestrian signal, such as:

- marked crosswalks (see Crosswalk Marking Guidelines, p. 84),
- median refuge islands (see Island Channelization and Pedestrian Refuge Islands at Intersections, p. 88),
- curb ramps (see City of Wilmington Technical Standards)
- pedestrian push buttons (unless concurrent signals are warranted- see Pedestrian Actuated Signals and Push Button Locations, p. 97), and

appropriate signage (see Turning Vehicles Yield to Pedestrians Sign, p. 95).


When improving signals for pedestrian accommodation, the City must also consider the impact of the proposed changes on bicycle and vehicle traffic traveling through the intersection, as well as needed upgrades to related traffic control equipment such as in-ground vehicle detection loops and/or video detection devices (if present). These devices will likely need to be upgraded in conjunction with any signalization improvement.


There are 182 intersections identified for traffic signal improvements and 170 of those locations include retrofitting existing signalized intersections with pedestrian signals. Recommendations were prioritized based on the presence of existing or proposed sidewalks or side paths at an intersection, relative potential pedestrian demand and location on a likely pedestrian travel route, and proximity to schools. The plan recommends a variety of short-term project improvements. Pedestrian signal retrofits to existing signals are identified on the maps by red  dots. In some cases, there may be one or more existing pedestrian signals at an intersection, but more signals are recommended in order to ensure enhanced utility to pedestrians approaching the intersection from any side. Priority locations for new traffic signals with pedestrian appurtenances are identified on the map by purple  dots.

In addition to identifying opportunities for new traffic signals or retrofitting pedestrian signals to conventional traffic signals, this plan recommends that Wilmington and NCDOT consider installing a number of pedestrian hybrid signals and rapid flash beacons. These types of signals are not in widespread use in North Carolina and there are no existing examples of either signal type in Wilmington. Therefore, it is recommended that Wilmington and NCDOT pilot test the signals in a few locations to evaluate their effectiveness and refine installation guidelines and policies. This plan recommends four potential pilot test sites for pedestrian hybrid signals and



two pilot test sites for rapid flash beacons. All of the pilot test locations identified are within relative close proximity to an existing school and demonstrated a relatively high amount of potential pedestrian activity.

Short-term pedestrian hybrid signal recommendations are indicated with a blue  dot and are generally recommended for relatively high speed, high volume multi lane arterial roadways.

Rapid-flash beacons are identified on the maps by a green  dot and are recommended on narrower two lane arterial and collector roadways.

#### Pedestrian Hybrid Signal

Wilmington should consider pilot testing a pedestrian hybrid signal in one or more of the following locations:



- *Market Street between Colonial Drive and Covil Avenue or between Covil Avenue and North and South Kerr Avenue.* These are both ½ mile stretches of roadway without signalized crossings with the exception of the signal located at Barclay Hills and Princess Place. Market Street has five lanes through this section (four travel lanes, and one center turn lane). There are several side streets leading to the corridor from adjoining neighborhoods, and there is a relatively high potential pedestrian demand score in the area. A number of pedestrians were observed attempting to cross Market Street in this area. A median pedestrian refuge should be considered in addition to the pedestrian hybrid signal.
- *Greenville Loop Road or Oleander Drive between Wallace Avenue and Greenville Avenue.* Pedestrian hybrid signals should be considered along these roads if sidewalks are provided and no pedestrian signals are installed. Currently, these are both long stretches of high speed multi-lane roadway straddled by residential neighborhoods. There are also schools located near both roads that would be more accessible by foot or bicycle if safer and more comfortable pedestrian accommodations were provided.
- *Market Street at South 21<sup>st</sup> Street.* Pedestrian hybrid signals should be considered at this crossing connecting Bullock Park and Wallace Park. This is also the location where the planned Burnt Mill Creek multi-use path will cross Market Street. A pedestrian hybrid signal is recommended instead of a full stop signal as it will reduce the potential cut through traffic into nearby residential neighborhoods.


#### Rapid Flash Beacons

Wilmington should consider pilot testing rapid-flash beacons in the following locations:

- *Princess Place Drive near Rachel B. Freeman Elementary.* There is currently a marked crosswalk across Princess Place Drive directly across from the entrance to Rachel B. Freeman Elementary. There is a relatively high calculated pedestrian demand in this area, and the school is surrounded by neighborhoods. The presence of a relatively complete sidewalk network on both sides of the street makes this an ideal location to pilot test a rapid-flash beacon if it is determined that there is a problem with drivers failing to yield to pedestrians in the area.

- *Colonial Drive near Forest Hills Elementary.* Colonial Drive in the vicinity of Forest Hills Elementary is a relatively narrow two lane roadway with a fairly extensive sidewalk network. The road is bounded by a large residential neighborhood, making it an ideal setting for children to travel to and from the school on foot and by bicycle. This is an ideal location to pilot test a rapid flash beacon if it is determined that there is a problem with drivers failing to yield to pedestrians.





Mid-term signal improvements are identified by a grey  dot. There are a total of 47 locations identified for pedestrian signal retrofits to existing traffic signals. Long term signal improvements are shown with a white  dot. There are 28 locations identified where pedestrian signalheads should be added to existing traffic signals.






Several additional potential pedestrian signal enhancements are identified for locations along the planned Cross-City Trail, River to the Sea Bikeway and other multi-use paths. The signal recommendations are indicated with a yellow  dot. It is anticipated that these recreational trail facilities, when completed, will attract a significant number of users. Therefore, it is recommended that Wilmington consider installing pedestrian signals at key crossings concurrent with trail construction.

Wilmington should consider concurrent timing for pedestrian signals located in the Urban Core Zone and near major pedestrian attractors such as UNCW. Leading pedestrian intervals should be considered for locations with relatively high volumes of turning vehicles.

Table 13, Priority Pedestrian Signal Recommendations summarizes signal recommendations.


Because this plan did not include a detailed inventory and evaluation of existing facilities at each of the intersections recommended for improvement, the costs included are approximations of what an average intersection improvement would cost. Cost breakdowns for various elements associated with typical signal improvement projects are included in the appendix of this document.

Table 13 Pedestrian Signal Recommendations			
Pedestrian Signal Recommendations	Map Symbol	Number of Locations Proposed	Approx. Cost
<b>Short (0-5 years)</b>			\$4,475,000
Add Ped Signals (2 Legs)		1	\$20,000
Add Ped Signals (3 Legs)		9	\$540,000
Add Ped Signals (All Directions)		62	\$2,480,000
New Hybrid Signal		5	\$400,000
New Rapid Flash Beacon		5	\$75,000
New Signal		8	\$960,000

<b>Mid (5-10 years)</b>			<b>\$1,880,000</b>
Add Ped Signals (2 Legs)		3	\$60,000
Add Ped Signals (3 Legs)		3	\$180,000
Add Ped Signals (All Directions)		41	\$1,640,000
<b>Long (10-20 years)</b>			<b>\$1,070,000</b>
Add Ped Signals (1 Legs)		1	\$10,000
Add Ped Signals (2 Legs)		3	\$60,000
Add Ped Signals (3 Legs)		2	\$120,000
Add Ped Signals (All Directions)		22	\$880,000
<b>With Trail Construction</b>			<b>\$645,000</b>
Upgrade Signal With Trail		13	\$520,000
New Hybrid Signal		1	\$80,000
New Rapid Flash Beacon		3	\$45,000
		<b>Grand Total</b>	<b>\$8,070,000</b>

The locations identified on the following maps are conceptual and a detailed engineering study is required to determine the feasibility of the new signal equipment, including an assessment of the impact of the proposed pedestrian signal on vehicle traffic patterns. For more information on recommended signal timing approaches and signal siting strategies, see Chapter 4, Policies, Codes and Ordinances and the Appendix of this plan.

#### **6.1.4 Bicycle and Pedestrian Cut-Through Recommendations**

The maps also identify 68 potential bicycle and/or pedestrian connections between stub streets, cul de sacs, trail connections, and other opportunity locations. These are indicated on the maps by the black dots surrounded by concentric circles . These connection points have been identified by city staff over time through a number of different methods, including community input, field analysis, review of subdivision construction plans and other approaches.

Prior to completing any bicycle or pedestrian connection, it is recommended that the City work with affected stakeholders, including neighborhood residents, through-commuters, and adjoining property owners. For more information, see 4.3.5, Pedestrian and Bicyclist Cut-Throughs on Cul-de-Sacs and Adjoining Streets on page 93.

### Highlights of Key Corridor Recommendations

There are several corridors in Wilmington that have high observed levels of pedestrian activity and should therefore be priority candidates for improvements. The following discussion provides an overview of the recommendations intended to enhance the pedestrian experience in these busy corridors.

- *Market Street.* Pedestrian signal heads are recommended for all existing traffic signals along Market Street within the Central Business District, Urban Core, and Traditional Suburban zones. The roadway currently has sidewalks for most of its length from the Central Business District Zone to the Traditional Suburban Zone, although the sidewalk coverage drops off in the Automobile-Oriented Zone. The roadway passes through several commercial areas with relatively high potential for pedestrian activity (and significant pedestrian activity was observed during field visits). In addition to the retrofit pedestrian signal heads, several relatively small sidewalk improvement projects are recommended to close gaps along the corridor. Wilmington should consider piloting at least one pedestrian hybrid signal in the stretch between Covil Avenue and North and South Kerr Avenue.
- *Military Cutoff Road.* Pedestrian signal heads are recommended for the following signalized intersections along Military Cutoff Road north of Eastwood Road: Eastwood Road, Parker Farm Road, Destiny Way, Monument Drive (pedestrian hybrid signal), Town Center Drive, Station Drive, Gordon Road. Currently, the pedestrian signals are designed to allow pedestrians to travel parallel to Military Cutoff Road, but they do not aid in crossing the busy arterial roadway. Although the calculated pedestrian potential is not as high as other areas of the city, the Military Cutoff Trail is likely to induce pedestrian demand to cross the road to and from the Mayfaire mixed use development. Furthermore, the calculations do not reflect the increased population density of the relatively new Mayfaire development. Once the connection between the Military Cutoff Trail and the Cross-City Trail link to Wrightsville Beach, there is likely to be a significant increase in demand due to a desire to ride a bicycle or walk to the beach. See the concept design study for this area at the end of this chapter for more information.
- *South College Road.* New sidewalks and pedestrian signals are recommended along South College Road in the vicinity of UNCW. The area has very high potential pedestrian demand, and there are several restaurants, shops and other commercial destinations frequented by students at the university that are within walking distance, but are not walkable due to the lack of adequate infrastructure. In addition to several proposed sidewalk improvement projects, pedestrian signal retrofits are recommended for existing traffic signals along the busy eight lane arterial roadway. See the concept design study for this area at the end of this chapter for more information.
- *Carolina Beach Road at Shipyard Boulevard.* Pedestrian crossing signals and new sidewalks are recommended for locations in the vicinity of this intersection. There are several low-income, transit-dependent residential neighborhoods in the area, as well as many restaurants, shops and other destinations that attract walkers. Several pedestrians were observed walking along shoulders and crossing away from the intersection in this area. This may be due to a concern for personal safety because

there are relatively high volumes of large turning vehicles. In addition to installing sidewalks and pedestrian signals (in coordination with NCDOT), the city should consider installing yield to pedestrian signs at this intersection to provide increased visibility for pedestrians to turning motorists. See the concept design study for this area at the end of this chapter for more information.

- *Dawson Street and Wooster Street.* Wilmington should implement the Dawson and Wooster Corridor Plan and install sidewalks along Wooster Street to close the network gaps. Currently, there is good connectivity along Dawson Street and along the several cross streets. Furthermore, the city should construct the traffic calming devices recommended in the Dawson and Wooster Plan and partner with NCDOT to manage vehicle speed in this area at no more than 35 mph. It appears that the current prevailing speed is well in excess of the posted speed limit, resulting in an environment that is uncomfortable for pedestrians to walk. There are several traffic lights along both roadways, but the GIS data indicates that there are no pedestrian accommodations (pedestrian signals), which can significantly hinder north/south circulation traffic between neighborhoods, bus stops, and the hospital. Pedestrian signal heads are strongly encouraged to allow protected pedestrian crossings of the corridor.
- *Oleander Drive.* retrofit pedestrian signals to all existing signals between Independence Boulevard and Pine Grove Drive within Traditional Suburban Zone. Consider adding pedestrian actuation to emergency signal at Wallace Avenue.



# Walk Wilmington

## Recommended Sidewalk and Pedestrian Signal Improvements

### Quadrant 1

**Legend**

**Short-Term Signal Improvement**

- New Traffic Signal (with Pedestrian Signal)
- New Hybrid Signal
- New Rapid Flash Beacon
- Add Pedestrian Signals To Existing Signal

**Mid-Term Signal Improvement**

- Add Pedestrian Signals To Existing Signal

**Long-Term Signal Improvement**

- Add Pedestrian Signals To Existing Signals

**Signal Improvement Concurrent with Trail Construction**

- Add Pedestrian Signals to Existing Signal
- New Hybrid Signal
- New Rapid Flash Beacon

**Potential Bicycle and Pedestrian Connections**

- Short-term Sidewalk Project
- Mid-term Sidewalk Project
- Long-term Sidewalk Project

**Cross City Trail**

- Existing
- Planned

**Other Multi-Use Path**

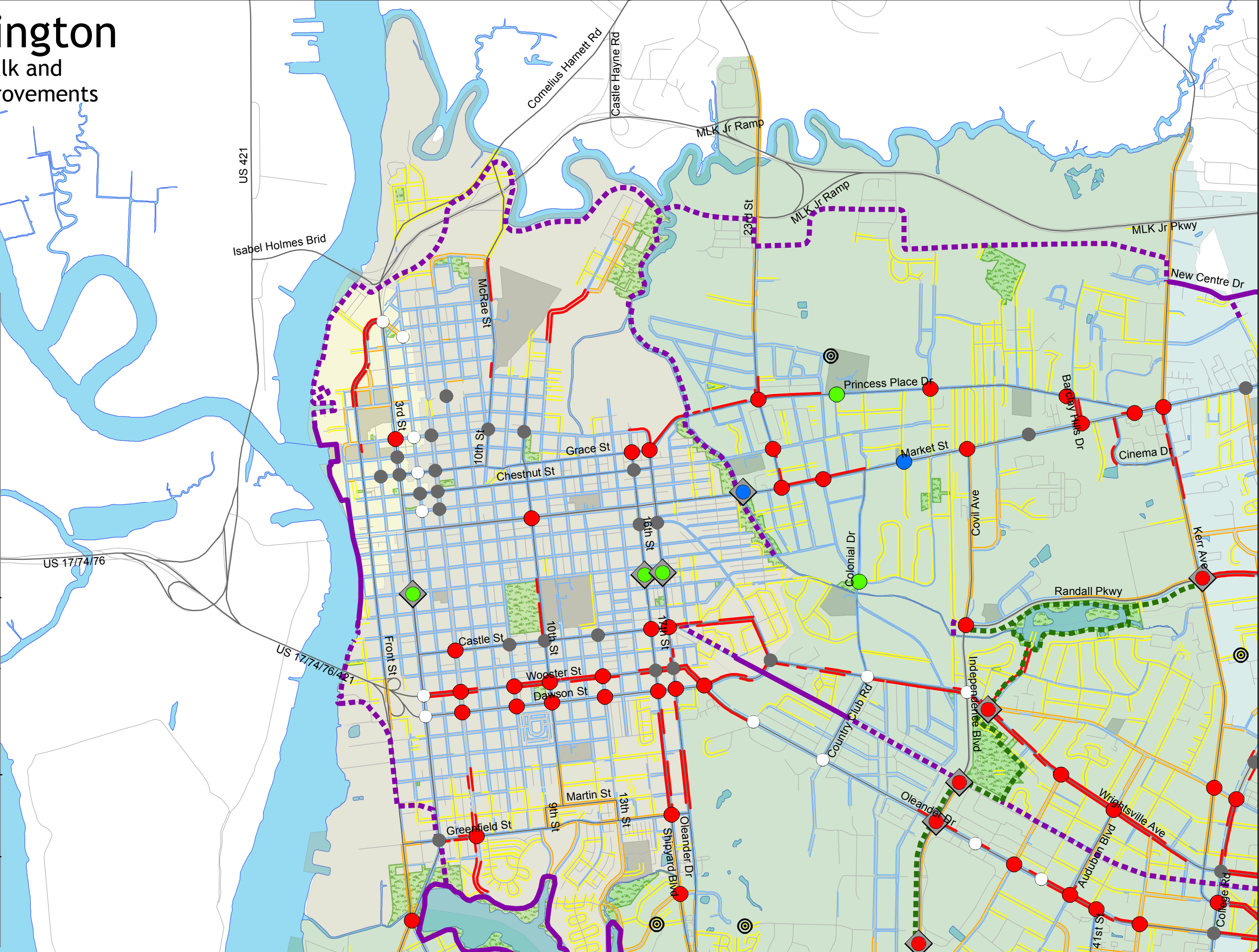
- Existing
- Planned

**Map Features**

- Existing Sidewalk
- Road
- School
- Park

**Character Zone**

- Central Business District
- Urban Core
- Traditional Suburban
- Automobile-Oriented Suburban

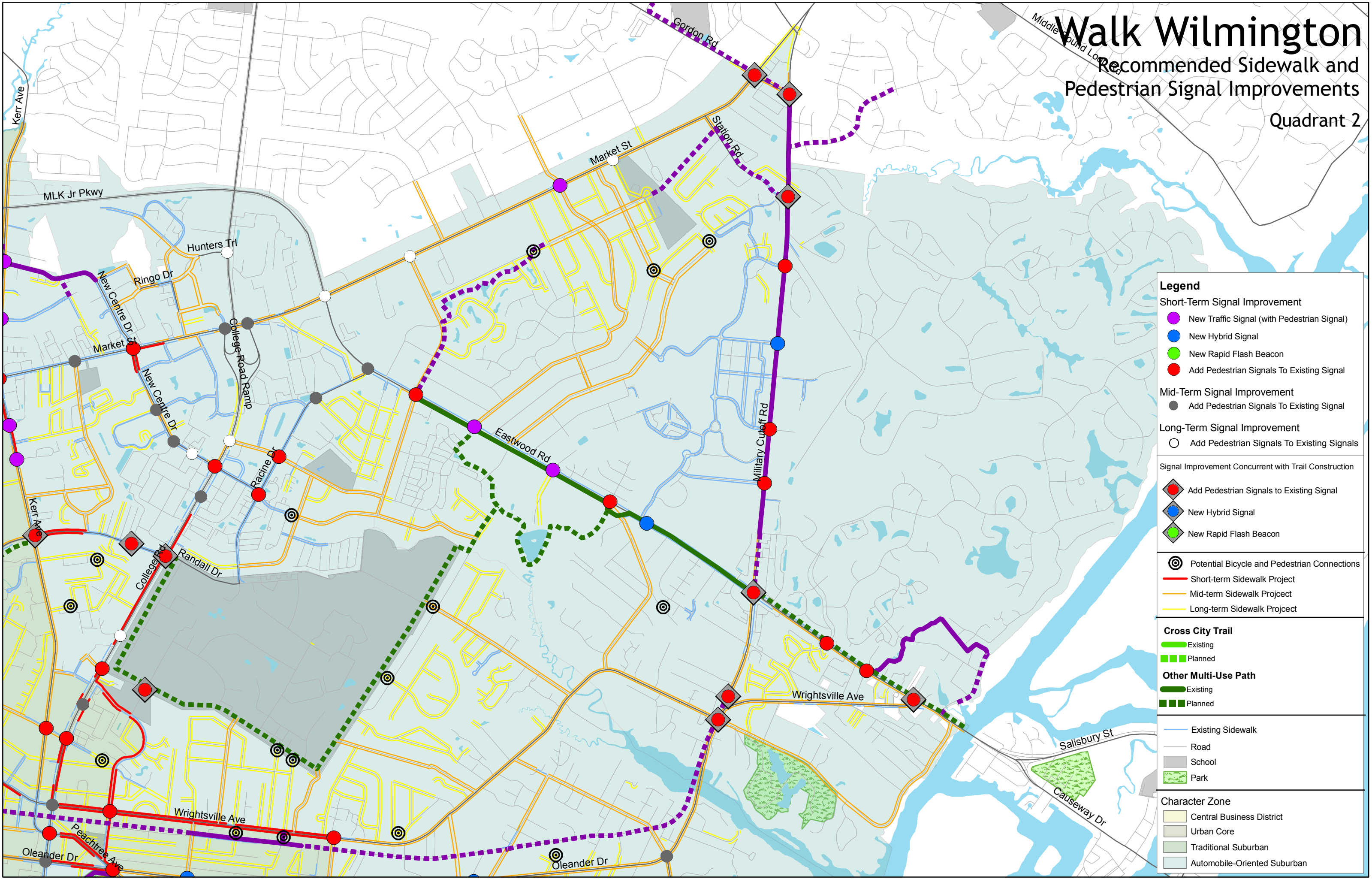




# Walk Wilmington

## Recommended Sidewalk and Pedestrian Signal Improvements

### Quadrant 2



**Legend**  
**Short-Term Signal Improvement**

- New Traffic Signal (with Pedestrian Signal)
- New Hybrid Signal
- New Rapid Flash Beacon
- Add Pedestrian Signals To Existing Signal

**Mid-Term Signal Improvement**

- Add Pedestrian Signals To Existing Signal

**Long-Term Signal Improvement**

- Add Pedestrian Signals To Existing Signals

**Signal Improvement Concurrent with Trail Construction**

- Add Pedestrian Signals to Existing Signal
- New Hybrid Signal
- New Rapid Flash Beacon

- Potential Bicycle and Pedestrian Connections
- Short-term Sidewalk Project
- Mid-term Sidewalk Project
- Long-term Sidewalk Project

**Cross City Trail**

- Existing
- Planned

**Other Multi-Use Path**

- Existing
- Planned

- Existing Sidewalk
- Road
- School
- Park

**Character Zone**

- Central Business District
- Urban Core
- Traditional Suburban
- Automobile-Oriented Suburban



# Walk Wilmington

## Recommended Sidewalk and Pedestrian Signal Improvements

### Quadrant 3

**Legend**

Short-Term Signal Improvement

- New Traffic Signal (with Pedestrian Signal)
- New Hybrid Signal
- New Rapid Flash Beacon
- Add Pedestrian Signals To Existing Signal

Mid-Term Signal Improvement

- Add Pedestrian Signals To Existing Signal

Long-Term Signal Improvement

- Add Pedestrian Signals To Existing Signals

Signal Improvement Concurrent with Trail Construction

- Add Pedestrian Signals to Existing Signal
- New Hybrid Signal
- New Rapid Flash Beacon

- Potential Bicycle and Pedestrian Connections
- Short-term Sidewalk Project
- Mid-term Sidewalk Project
- Long-term Sidewalk Project

**Cross City Trail**

- Existing
- Planned

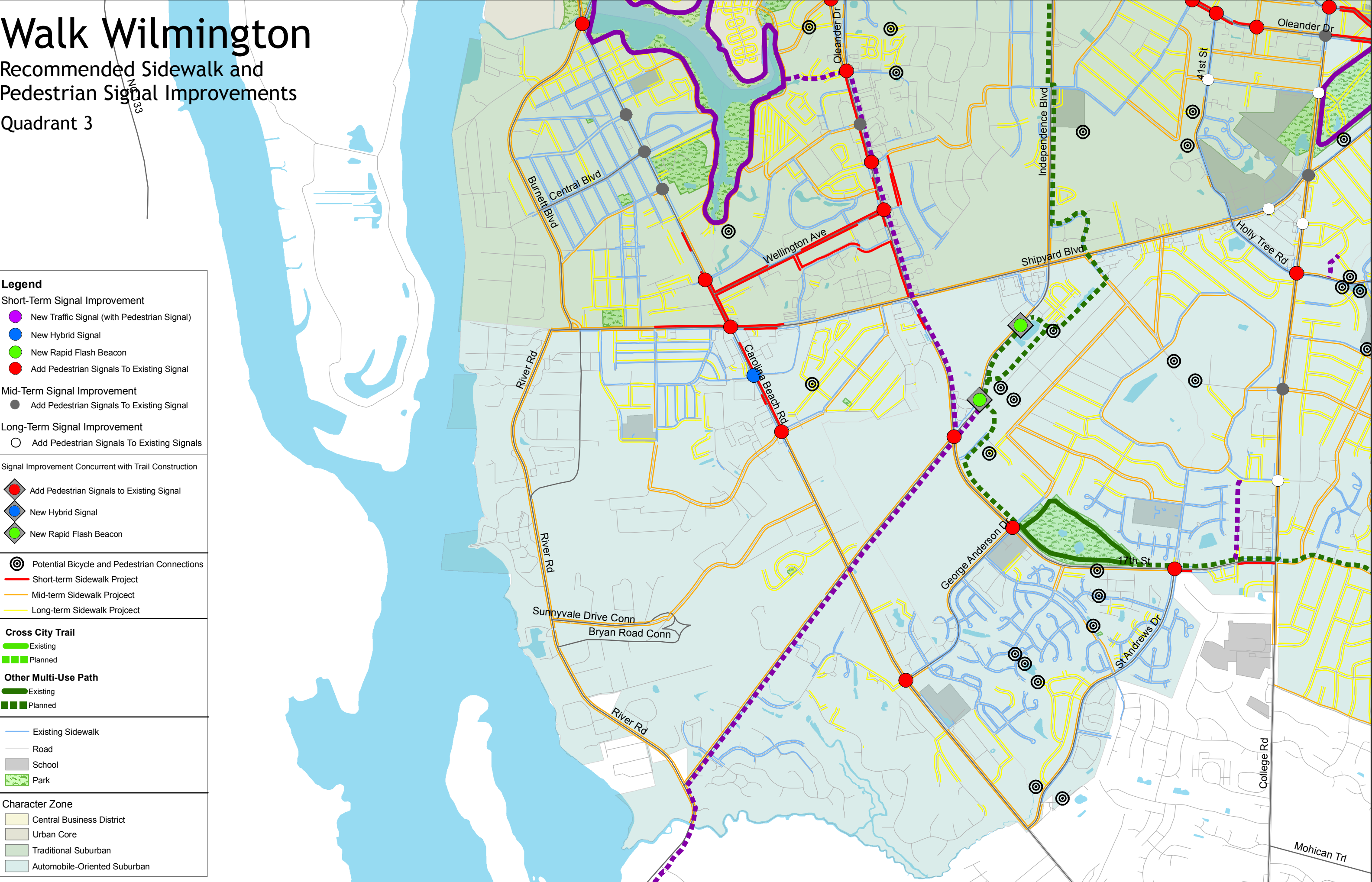
**Other Multi-Use Path**

- Existing
- Planned

- Existing Sidewalk
- Road
- School
- Park

**Character Zone**

- Central Business District
- Urban Core
- Traditional Suburban
- Automobile-Oriented Suburban





# Walk Wilmington

## Recommended Sidewalk and Pedestrian Signal Improvements

### Quadrant 4

**Legend**

Short-Term Signal Improvement

- New Traffic Signal (with Pedestrian Signal)
- New Hybrid Signal
- New Rapid Flash Beacon
- Add Pedestrian Signals To Existing Signal

Mid-Term Signal Improvement

- Add Pedestrian Signals To Existing Signal

Long-Term Signal Improvement

- Add Pedestrian Signals To Existing Signals

Signal Improvement Concurrent with Trail Construction

- Add Pedestrian Signals to Existing Signal
- New Hybrid Signal
- New Rapid Flash Beacon

- Potential Bicycle and Pedestrian Connections
- Short-term Sidewalk Project
- Mid-term Sidewalk Project
- Long-term Sidewalk Project

**Cross City Trail**

- Existing
- Planned

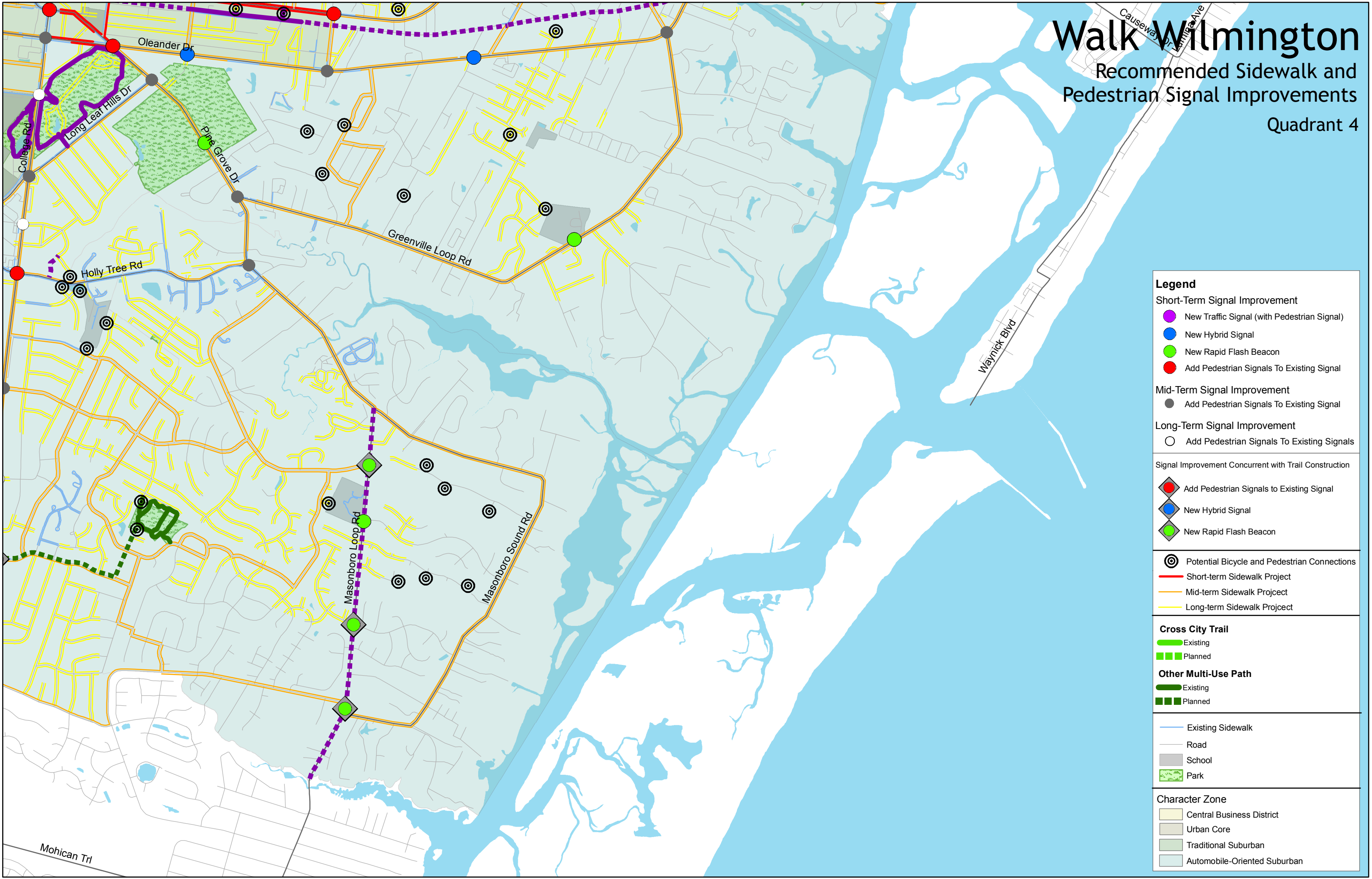
**Other Multi-Use Path**

- Existing
- Planned

- Existing Sidewalk
- Road
- School
- Park

**Character Zone**

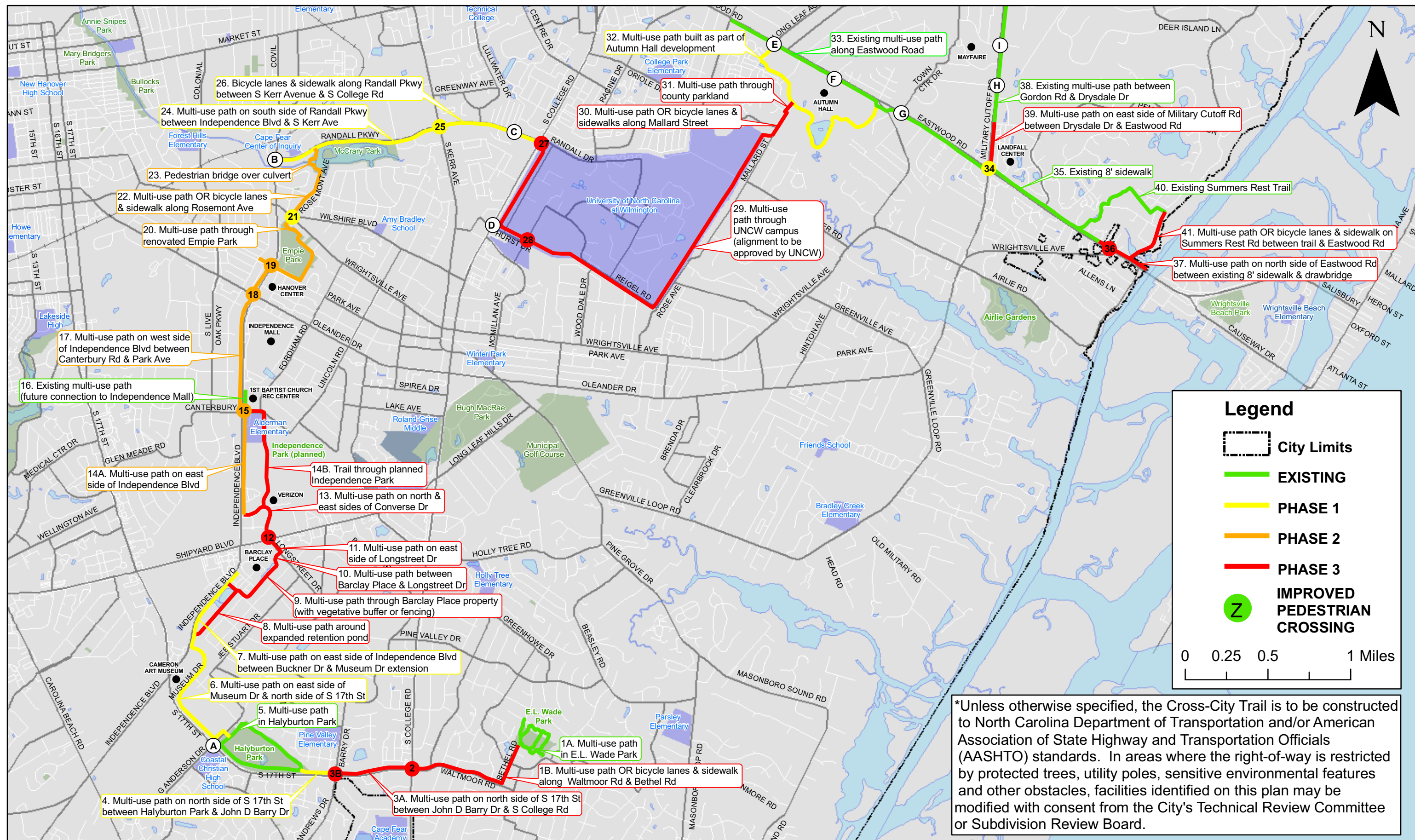
- Central Business District
- Urban Core
- Traditional Suburban
- Automobile-Oriented Suburban





# The Cross-City Trail Alignment

Adopted by Wilmington City Council on June 17, 2008  
Revised by Wilmington City Staff on April 23, 2009



## DESIGN STUDY AREAS

As part of this plan, three locations have been selected for further study to develop conceptual improvement plans to illustrate the benefits of implementing the recommendations detailed in this chapter. These areas have been identified for their similarity to the other parts of Wilmington. By selecting challenges that are fairly representative of conditions community-wide, the concepts illustrated may be readily adapted to other areas, and they will facilitate discussions to improve pedestrian conditions crossing NCDOT- maintained roadways. The three study areas identified are:

- Intersection of Shipyard Boulevard and Carolina Beach Road
- Intersection of Eastwood Road and Military Cutoff Road
- Intersection of South College Road and New Centre Drive

All of these intersections are located in the *Automobile-Oriented Suburban Zone*. The existing design of these intersections exemplifies the challenges for pedestrians associated with a transportation system that is designed almost exclusively around motorized vehicles.

The concepts illustrate the importance of re-evaluating lane width policy and speed limit to develop roadways that serve the multitude of users who require access. The existing practice of designing only for the convenience of motorized traffic is resulting in geometrics and operational conditions that make it expensive and difficult to accommodate pedestrians across these roadways. Maintaining 12-foot travel lanes and large curb radii will require widening at all of the intersections which will add significant cost to the project.

The concepts also illustrate the many low cost opportunities to significantly reduce the size of the intersections by recapturing unneeded roadway space and reducing travel lane widths to 11-feet. The reductions in pedestrian crossing distances will shorten the necessary pedestrian crossing times. This will make providing pedestrian facilities more palatable to NCDOT as it will reduce the overall traffic delay that would result if pedestrian facilities were provided with the existing geometrics at each intersection.



## ***Shipyard Boulevard and Carolina Beach Road***

### **Context**

This intersection is located in the southwest corner of Wilmington, close to the state port. Most of the development along both roads is automobile-oriented commercial. To the northwest of this intersection is the Sunset South neighborhood. This is a recent Hope VI project completed to provide affordable housing opportunities for many Wilmington residents who previously resided in traditional public housing projects. To the southwest of this intersection is the economically-depressed and transit-dependent neighborhood of Long Leaf Park. Due to the demographics of this area, it is reasonable to expect that many residents will walk to transit stops on Shipyard Boulevard or Carolina Beach Road and to the stores and restaurants located in the area.

### **Intersection Description**



Figure 81 Intersection of Carolina Beach Road and Shipyard Boulevard.

Note: Graphic does not reflect recent construction on southwest and northwest corners or new sidewalks.



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Carolina Beach Road (US Highway 421) connects downtown Wilmington and the Cape Fear Memorial Bridge to Monkey Junction and Pleasure Island. Shipyard Boulevard (US Highway 117) carries traffic from the state port on the Cape Fear River east to South College Road, which connects to Interstate 40. Both roads carry significant amounts of car and heavy truck traffic. At the intersection, Carolina Beach Road has five to six lanes and is undivided. Southbound Carolina Beach Road has dual left-turn lanes, a through-lane, and a shared through and right-turn lane. Northbound there is one left-turn lane, a through-lane, and a shared through and right-turn lane. At the intersection, eastbound Shipyard Boulevard has one left-turn lane, a through-lane, and a shared through and right-turn lane. A 20-foot-wide grass median divides it from the westbound lanes. Westbound Shipyard Boulevard has two through-lanes, dual left-turn lanes and a dedicated right-turn lane. A 4-foot-wide concrete median divides it from the eastbound lanes. Although there are sidewalks at the northwest, southeast and southwest corners of the intersection, crosswalks and pedestrian signals are not present.

Vehicle stop lines appear to be within the legally-defined pedestrian crossing areas on all legs of the intersection.



Figure 82 Pedestrian Crossing Shipyard Boulevard

### **Intersection Observations**

During a brief observation of this intersection, five pedestrians were observed crossing either Shipyard Boulevard or Carolina Beach Road. One pedestrian appeared to make an attempt to wait for a green light to cross, but there were no gaps in turning traffic. This pedestrian ended up crossing against the signal. No other pedestrians appeared to wait for green lights to cross, and three crossed to the median of Shipyard Boulevard or roadway centerline on Carolina Beach Road and waited for a break in traffic to complete the crossing.

The lack of pedestrian accommodations at the intersection makes it unclear when and where it is safe for pedestrians to cross the roadway. The stop bar position causes vehicles to stop in the location where pedestrians should be crossing. Traffic turning on a green signal must then negotiate right of way with pedestrians caught in the roadway. The positioning of stopped vehicles in the desired crossing area forces pedestrians to cross behind a stopped vehicle which limits their visibility to other drivers placing them at risk of a collision while crossing.

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## **Recommendations**

(Note: See Appendix for full graphic and memorandum describing proposed recommendations)

The following concept plan illustrates the proposed recommendations for improvements to this intersection. Highlights of the physical improvements include:

- Install high-visibility crosswalks on all four legs of intersection (note: this will require relocating the stop bar and vehicle detection loops in the pavement)
- Install high visibility crosswalks on right-turn slip lanes on Carolina Beach Road
- Install large traffic islands on northwest and southeast corners of intersection
- Install median pedestrian refuge island on Shipyard Boulevard. Widen eastern Shipyard Boulevard median from four feet to eight feet
- Narrow eastbound travel lanes on Shipyard Boulevard to 11 feet
- Install pedestrian countdown signals and activation equipment for all crosswalks
- Reduce right turn radius on northeast and southwest corners of intersection to 55' and 50' respectively
- Install sidewalk leading north and east from northeast corner of intersection
- Ensure all driveways are Wilmington standard "ramp" type. Close southern McDonald's driveway on Carolina Beach Road.

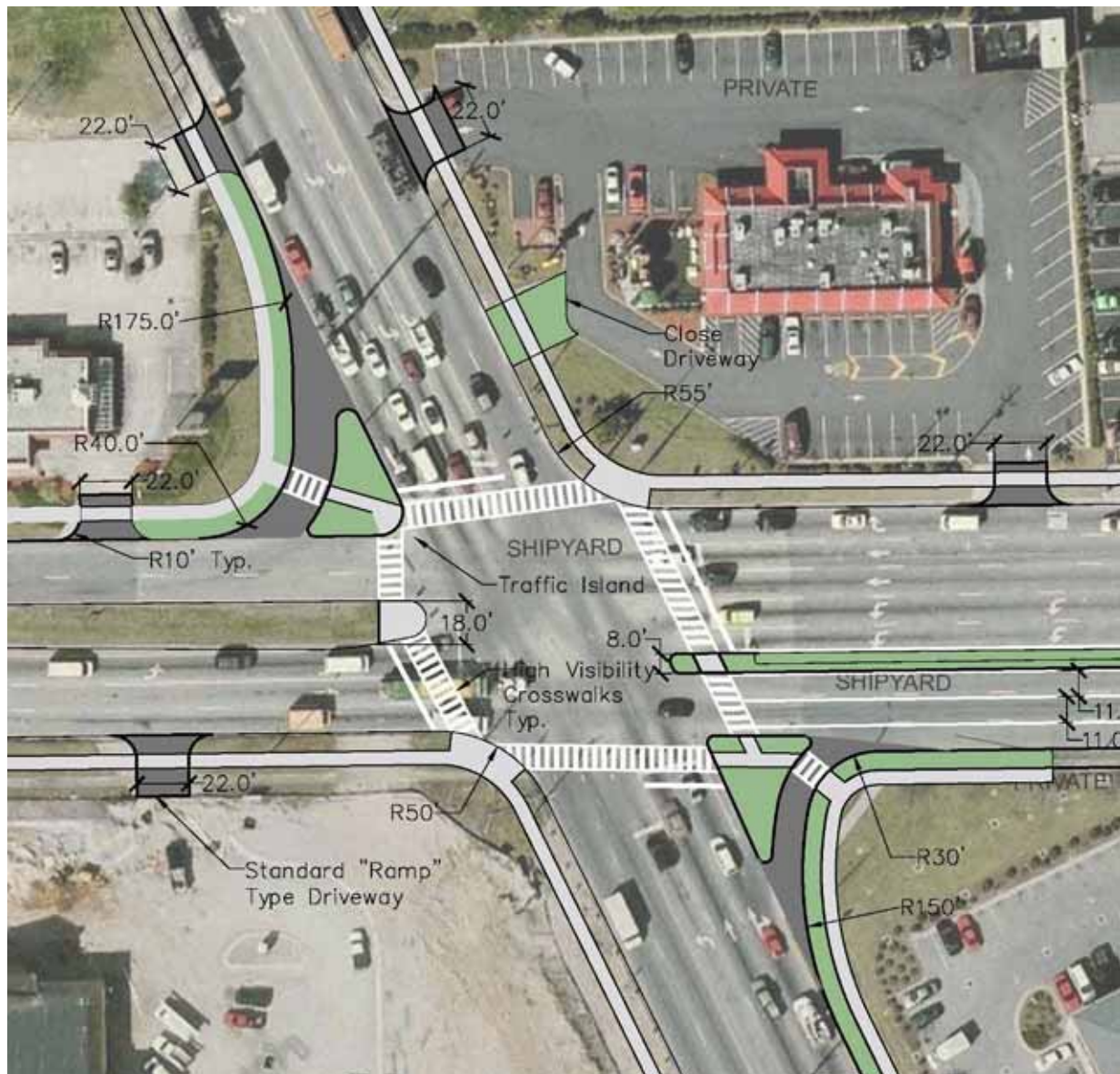


Figure 83 Shipyard Boulevard and Carolina Beach Road Partial Recommendations

Note: See Appendix for full size concept plan and accompanying descriptions memorandum



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## ***Intersection of Military Cutoff Road and Eastwood Road***

### **Context**

This intersection is located in the northeast corner of Wilmington, close to Wrightsville Beach. Most of the development along both roads is automobile-oriented commercial. To the northwest of this intersection is a medium density residential neighborhood. There is a branch of the New Hanover County Public Library to the northeast of the intersection, and the new Mayfaire mixed use development is approximately one-half mile to the north along Military Cutoff Road. There are large commercial developments on the southeast and southwest corners of the intersection. The Cross-City Trail along the south side of Eastwood Road currently terminates at the intersection. The Military Cutoff Trail begins to the north at the intersection of Military Cutoff Road and Drysdale Drive. The city plans to connect both to the eight-foot-wide sidewalk at the northeast corner.

### **Intersection Description**

Military Cutoff Road (US Highway 76) connects Oleander Drive (US Highway 76) to Market Street (US Highway 17 Business).

Eastwood Road (US Highway 74-76) carries traffic from Wrightsville Beach to North College Road, which connects to Interstate 40.

Both roads carry significant amounts of motor vehicle traffic. Eastbound and westbound Eastwood Road have narrow concrete medians, dual left-turn lanes, two through-lanes and dedicated right-turn lanes. At the intersection, southbound Military Cutoff Road has dual left-turn lanes, one through-lane and a shared through and right-turn lane. There is no median. Northbound Military Cutoff Road has dual left-turn lanes, two through-lanes, and a dedicated right-turn lane. There is no median.

Although there are sidewalks at the northwest



Figure 84 Existing Conditions of Military Cutoff Road Intersection with Eastwood Road



and southeast corners of the intersection as well as a 10-foot multi-use path at the southwest corner, crosswalks and pedestrian signals are not present.

### **Intersection Observations**

The intersection covers a large area due to generous turning radii and wide travel lane widths. Pedestrian crossings are difficult to navigate due to the placement of stop lines within the pedestrian crossing area, lack of pedestrian amenities (signals, ramps, crosswalks, sidewalks, etc), and long crossing distances. Although the Cross City Trail goes through this intersection, there are no crossing accommodations for trail users.

### **Recommendations**

(Note: See Appendix for full graphic and memorandum describing proposed recommendations)

The following concept plan (see Figure 85) illustrates the proposed recommendations for improvements to this intersection. Highlights of the physical improvements include:

- Install high-visibility crosswalks on all four legs of intersection (note: this will require relocating the stop bar and vehicle detection loops in the pavement)
- Install high visibility crosswalks on right-turn slip lanes on Military Cutoff Road
- Install large traffic islands on northwest and southeast corners of intersection to reduce the size of the intersection, length of pedestrian crossings, and to provide refuge for waiting pedestrians and cyclists.
- Install median pedestrian refuge on each approach with a preference for a minimum 8-foot width median to accommodate the Cross City Trail Traffic.
- Narrow all travel lanes to 11 feet to create necessary space to construct refuge islands.
- Install pedestrian countdown signals and activation equipment for all crosswalks
- Reduce right turn radius on northeast and southwest corners of intersection to induce yielding behavior into motorists and to slow them on the approach to the crosswalks.
- Install sidewalk leading to intersection on all approaches (except the western edge of Military Cutoff Road north of the intersection) and provide sidewalk connections to adjacent developments.

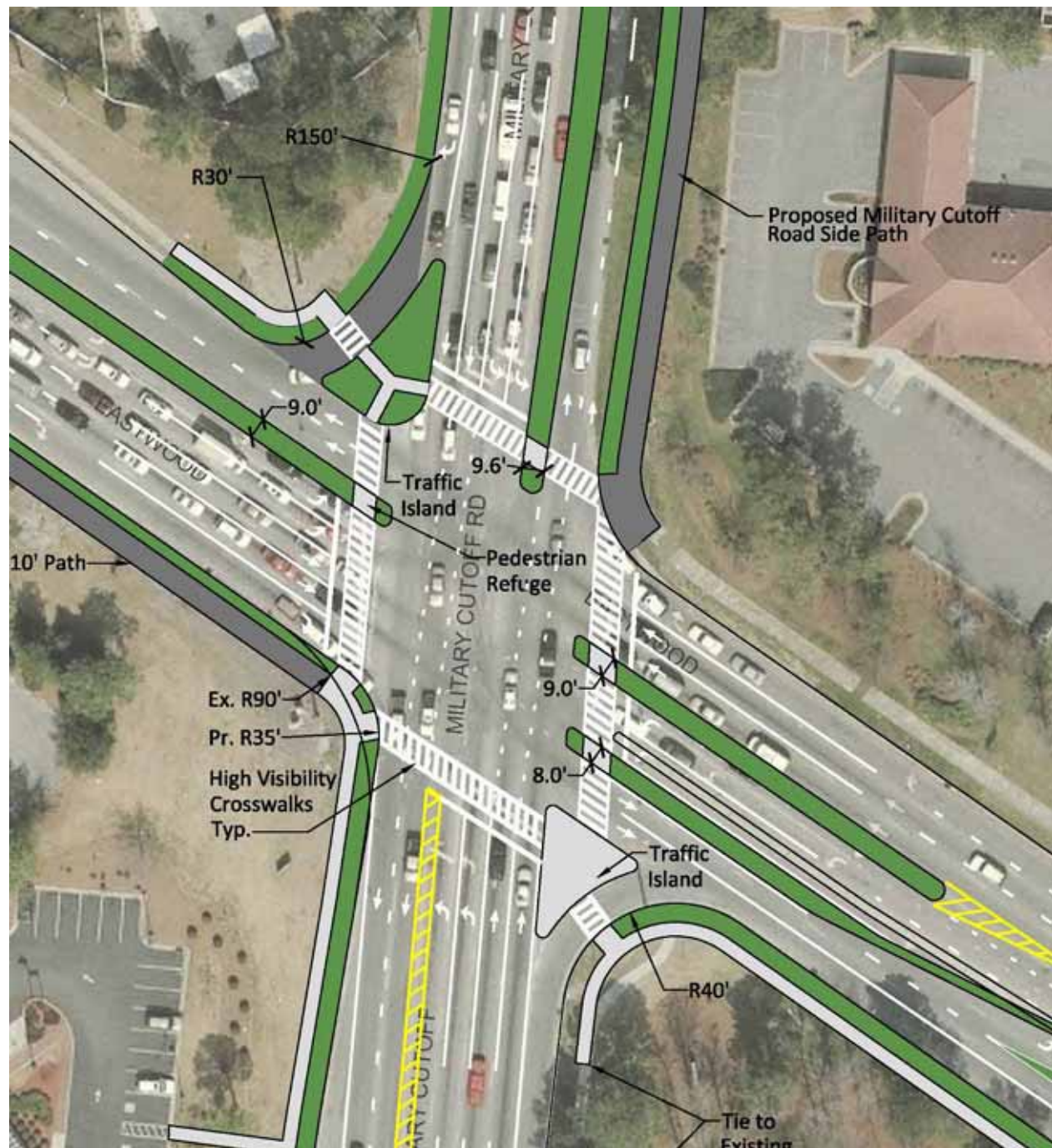


Figure 85 Proposed changes to Military Cutoff Road Intersection with Eastwood Road.

Note: See Appendix for full size concept plan and accompanying descriptions memorandum



## ***Intersection of South College Road and New Centre Drive***

### **Context**

This intersection is surrounded on all sides by intensive automobile-oriented commercial development. Figure 86 illustrates the abundance of asphalt parking lots in the area. The UNCW campus is approximately one half mile to the south, along South College Road, and there are several higher density residential developments in the vicinity of the intersection. Over the course of the *Walk Wilmington* planning process, NCDOT added a second left-turn lane from northbound South College Road onto westbound New Centre Drive.

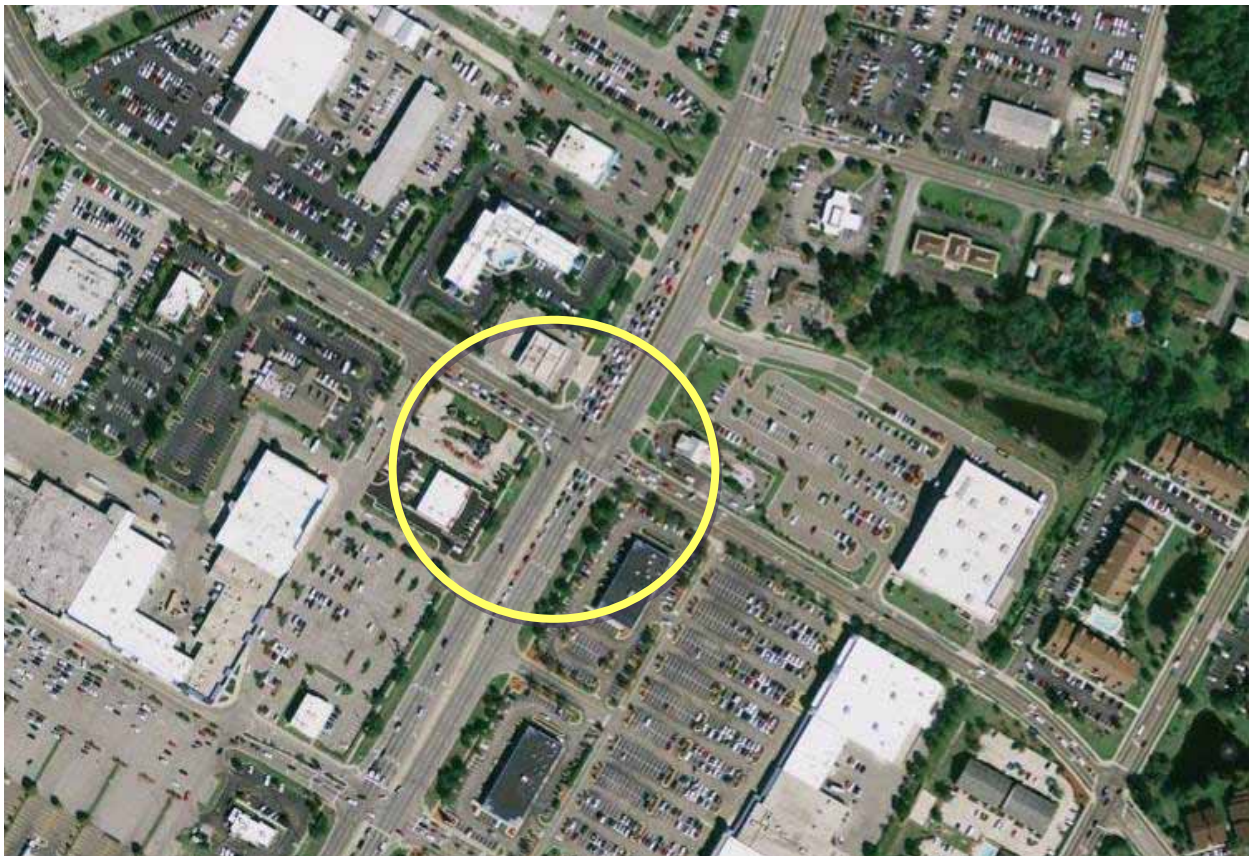


Figure 86 South College Road and New Centre Drive Context

### **Intersection Description**

South College Road (US Highway 117 & NC 132) connects Interstate 40 to UNCW and Pleasure Island. New Centre Drive carries local traffic from Racine Drive to North Kerr Avenue. Both roads carry significant amounts of motor vehicle traffic. Eastbound New Centre Drive has a dedicated left-turn lane, one through-lane and a dedicated right-turn lane. There is no median. Westbound New Centre Drive has a dedicated left-turn lane, one through-lane and a shared

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through and right-turn lane. There is no median. At the intersection, southbound South College Road has a narrow concrete median, one left-turn lane, three through-lanes, and a dedicated right-turn lane. Northbound South College Road has narrow concrete median, dual left-turn lanes (recent NCDOT addition), three through-lanes, and a dedicated right-turn lane.

Although there are sidewalks at all four corners of the intersection, there are no crosswalks or pedestrian signals.

### **Intersection Observations**

The intersection violates the traffic engineering principal of providing balanced lanes on the approach and departure to minimize confusion for motorists. Eliminating the lane imbalance created an opportunity to recapture space and shorten pedestrian crossings.

The intersection has consistent pedestrian demand which is not accommodated. This may leave pedestrians guessing if they have time to cross; and may encourage pedestrians to cross at



Figure 87 – New Centre Drive and South College Road

locations where they are not as visible to oncoming traffic. Pedestrians crossing must rely on watching the traffic signal to determine when they might have time to cross. Figure 87 shows a pedestrian crossing away from the intersection on New Centre Drive and along the stop line to cross South College Road

### **Recommendations**

(Note: See Appendix for full graphic and memorandum describing proposed recommendations)

The following concept plan illustrates the proposed recommendations for improvements to this intersection. Highlights of the physical improvements include:

- Install high-visibility crosswalks on all four legs of intersection (note: this will require relocating the stop bar and vehicle detection loops in the pavement)
- Install curb extensions and tighten curb radii to reduce the size of the intersection, length of pedestrian crossings, and to provide refuge for waiting pedestrians and cyclists.
- Install median pedestrian refuge on each approach with a preference for a minimum six-foot width median. Install dual medians on northbound South College Road to provide



slower moving pedestrians with a landing spot in case they cannot complete the crossing in one cycle.

- Narrow all travel lanes to 11 feet to create necessary space to construct refuge islands.
- Narrow driveway openings to reduce pedestrian crossing distances.
- Install pedestrian countdown signals and activation equipment for all crosswalks
- Reduce right turn radius on northeast and southwest corners of intersection to induce yielding behavior into motorists and to slow them on the approach to the crosswalks.
- Install sidewalk leading to intersection on all approaches and provide sidewalk connections to adjacent developments.

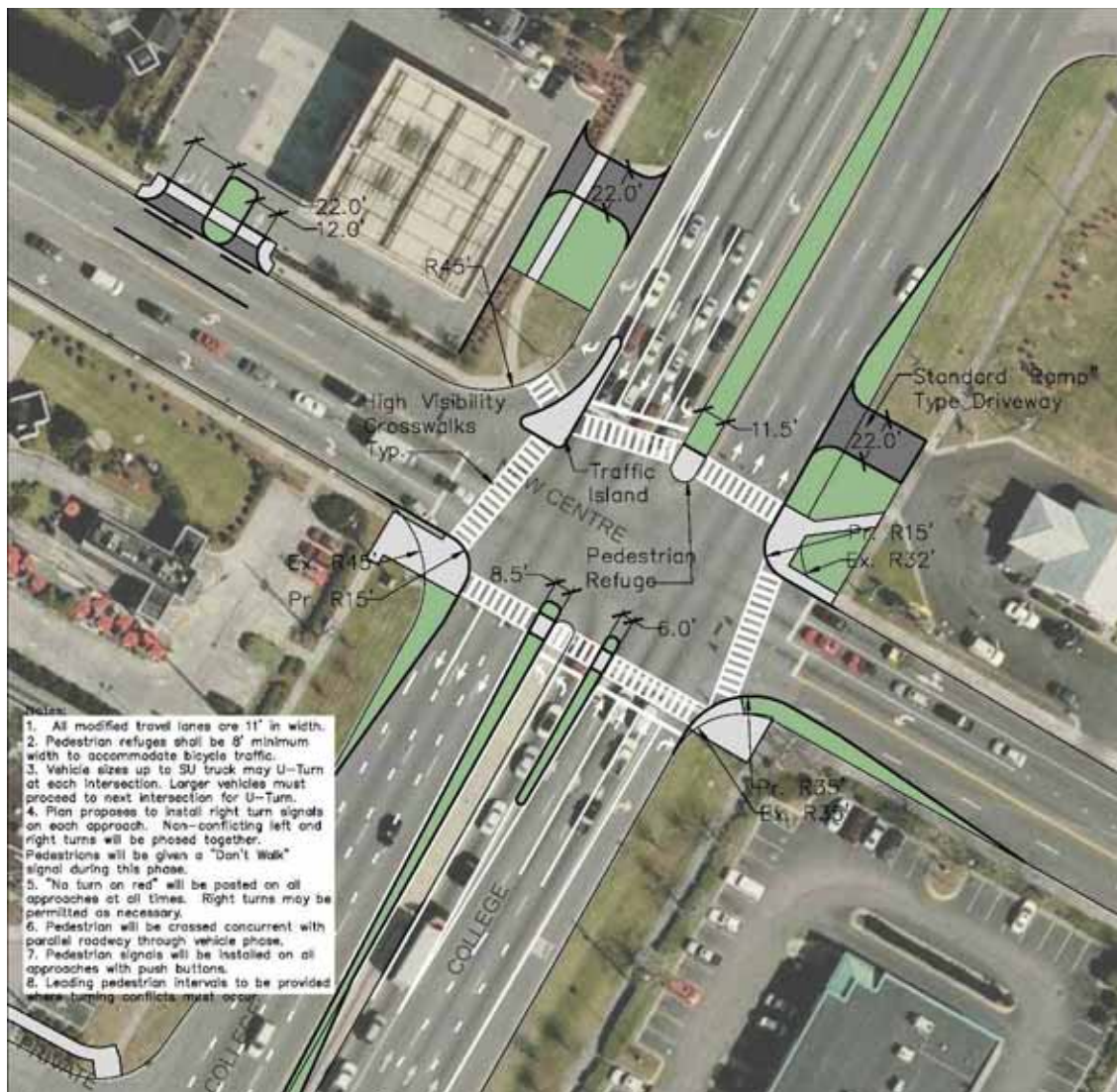


Figure 88 – Conceptual redesign of intersection to shorten crossing distances and recapture unnecessary roadway space to provide pedestrian accommodations.



# Chapter 7. Education, Encouragement and Enforcement

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## PLANNING OUTSIDE OF DESIGN

To create a successful walkable environment it is necessary to venture beyond design solutions. Several other factors must be considered. People need to understand the rules for travel, they need to feel welcome and valued as a pedestrian, and they need to be aware of the consequences of breaking the rules. Users' behavior can be influenced by design, but ultimately they need to be taught and encouraged to navigate their environment safely and effectively. This chapter describes several programs and strategies that complement policy changes or physical improvements described elsewhere in this plan.

### 7.1. EDUCATION

Everyone at some point is a pedestrian. For some people this is only when they are leaving their cars in the parking lot and walking towards their destinations. Regardless of the distance that people regularly walk, many are not aware of their rights and responsibilities as pedestrians. Therefore, it is important to inform both drivers and pedestrians. Studies have shown that the most successful education programs focus on teaching children, who then encourage their parents to set a proper example and follow the rules<sup>13</sup>. Educating children is an effective strategy for multiple reasons. The first is that children are less likely to develop bad habits if they are taught proper and safe pedestrian behavior early on. Additionally, by teaching children it is possible influence their parents to set proper examples. Parents generally will behave more cautiously when they know that their children are observing. Another reason to target younger audiences is language barriers connecting to households with adults who do not speak English. These adults are less likely to learn from television campaigns, radio commercials or written media. Adults who do not speak English also may not participate in community meetings unless there is a translator, which for many communities is difficult to provide. To achieve a wider reach, children should be considered a valuable resource.

#### 7.1.1 *Safe Routes to School*

Recognizing that there was a need to provide safe routes for children to walk to school, the U.S. Department of Transportation Federal Highway Administration established the National Center of Safe Routes to School in the summer of 2005 (<http://www.ncdot.org/transit/bicycle/saferoutes/SafeRoutes.html>).

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<sup>13</sup> [GET CITATION]

The National Center for Safe Routes to Schools, maintained by the University of North Carolina Highway Safety Research Center, offers resources to help communities get both the funding and the educational materials necessary to ensure safe routes for the students to walk to school.

Wilmington recognizes the potential of this program and has already undertaken several projects on behalf of this program. These are described in more detail in Chapter 3, The Pedestrian Transportation System.

**Local Success:** In 2008, Bradley Creek Elementary was awarded a \$211,000 grant for sidewalk improvements and pedestrian educational and encouragement programs.

The Safe Routes to School Program promotes consensus planning by encouraging all stakeholders to participate in the process from the beginning. Parents, neighbors, teachers, police officers and even policy makers are invited to discuss the barriers and challenges children face when walking to school. Although engineering projects such as extending sidewalks and striping crosswalks tend to get the most visible attention, a During kick-off meetings, the stakeholders are guided by Safe Routes to School Instructors on a walk to assess the existing walking conditions that students would face if they were to walk to school. During this walk parents, teachers and policy makers are instructed on how children would safely navigate their environment. It is important that both students and their adult role models follow the same rule sets to ensure safety for all.

Children also learn about pedestrian safety in class from their teachers and they reinforce those lessons at home with their parents. Parents are encouraged to practice these skills while conducting everyday activities such as during evening errands and on weekend excursions. Parents receive a refresher course and their children have the opportunity to practice with their parents and younger siblings.

### ***7.1.2 National Highway Traffic Safety Administration (NHTSA) National Safety Curriculum***

Until recently, pedestrian safety education was either the responsibility of states, schools or individual households. The National Highway Traffic Safety Administration (NHTSA) has recognized that this can lead to inconsistent or even nonexistent pedestrian safety education for children. In attempt to fix this problem, NHTSA is developing a curriculum that will be offered nationwide for all students in kindergarten through fifth grades. The curriculum, to be released in the 2010-2011 school year, will cover topics such as identifying safe places to walk, crossing streets safely, crossing intersections and driveways safely as well as bus safety skills. The curriculum includes lesson plans, skill-based activities as well as homework activities to be practiced with the parents. Essentially the teachers will have all the resources necessary to

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incorporate the safety skills and lessons into their syllabi. Students across the country will have more opportunities to learn everyday skills.

Just as with the Safe Routes to School Program and the pedestrian safety curriculum, students can influence their parents to model safe behavior. When this curriculum is made available it is recommended that Wilmington's schools take advantage of the resources and teach the course to their students.

### **7.1.3 Collaboration with the Media**

The local media can play a significant role in communicating with the public. The Wilmington Star News has demonstrated a commitment to covering the topic of pedestrian safety through regular articles on the subject. The City could capitalize on this opportunity by developing a series of educational pieces that address both safe driving and safe walking behaviors. These pieces could also cover the rules applicable to all users of public roadways.

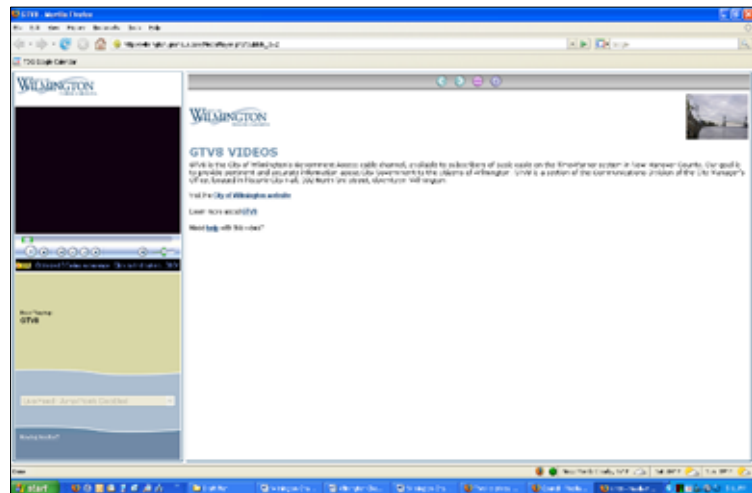


Figure 89 GTV8 Video Streaming Website

[http://wilmington.granicus.com/MediaPlayer.php?publish\\_id=2](http://wilmington.granicus.com/MediaPlayer.php?publish_id=2)

The city's cable access television station, GTV8, could be an excellent format for providing instruction on appropriate walking and driving behaviors. GTV8 is available both over the cable network as well as through streaming online content that can be viewed on personal computers. The city could develop an educational series that is targeted at certain audiences such as children, seniors, or non-English speakers.

## 7.2. ENCOURAGEMENT

Encouragement is not simply casting pedestrian travel in a positive light. Encouragement promotes awareness about walking as a form of transportation showing that it is not only achievable but also enjoyable.

### 7.2.1 *Wilmington Walks*

This program provides exercise and walking information for various neighborhoods throughout the City of Wilmington. Elements include brochures, signs, course markers and maps (see example) to establish walking paths and programs throughout the community.



The *Downtown Loop* is a mapped route in downtown Wilmington that takes walkers through some of the most scenic parts of the city, including the historic downtown and the Riverwalk. The *Forest Hills Loop* is another heavily utilized route in central Wilmington that incorporates parts of the River to the Sea Bikeway and local sidewalks and paths. Due to the popularity of this initiative, citizens have requested assistance through the Wilmington Walks program with developing local loop trail networks in several parts of the city. More information about the program may be found online at: [http://www.wilmingtonnc.gov/Portals/o/parksrec/wilm\\_walks.pdf](http://www.wilmingtonnc.gov/Portals/o/parksrec/wilm_walks.pdf).

### 7.2.2 *International Walk to School Day*

The National Center for Safe Routes to School organizes a one-time event for schools to encourage walking to school.<sup>14</sup> For one day (or week or month depending on the school), students walk to school with the encouragement and assistance of their school. The goal is for students and parents to see how fun and easy



Figure 91 Walk to School Day Parade- Holly Tree Elementary. Source: Joshua Mello, WMPO

<sup>14</sup> <http://www.walktoschool.org/index.cfm>

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walking to school can be. Parents can appreciate the healthy benefits of walk such as creating an outlet for exercise and a way to reduce car emissions, and the students gain a sense of independence.

To participate, schools from around the world register with the National Center for Safe Routes to School (free of charge) and receive access to resources to help facilitate their event. With the help of the resources, the schools get creative and make the event their own. Some schools station teachers at checkpoints to cheer on the walking students. Other schools that do not have safe routes for walking will instead walk around the track at the school. For many schools, the event stirs up awareness and appreciation for safe routes for walking.

This even helps the community to understand how to navigate the environment as a pedestrian. People may only be thinking about how to get children to and from school safely, but in doing so they are also evaluating the pedestrian transportation system throughout the community as a whole. This line of thinking makes for safer pedestrians and safer drivers.

Starting in 2001, eight counties (with a total of 23 schools) in North Carolina participated in the International Walk to School Day. Bradley Creek and Holly Tree elementary schools participated in 2008. And enthusiasm for the program is growing statewide. It is recommended that all of Wilmington's elementary schools participate in this event.

### **7.2.3 *Walking/Running Clubs***

Walking and/or running clubs are community organized groups that regularly walk or jog throughout the community. They can have basic purposes for social and exercise outlets. Alternatively, they can have more complex intentions of surveying existing conditions to be alerted to the maintenance agencies, neighborhood surveillance.

These clubs are helpful for the pedestrian transportation network for several reasons. Even if conditions are not ideal for walking, it is often safer to walk in a group. These groups can get people walking before recommendations from plans are implemented. These groups also make new and untried routes familiar quickly. People can test walking routes with groups that they can later choose to take on their own. Walking in groups also makes the pedestrians more visible to drivers. The more often drivers see groups of people walking the more likely it is that the drivers will anticipate pedestrians along the road in the future. Groups of pedestrians create a stronger presence than individuals alone. These groups can help maintenance and policing agencies by adding eyes on the route. The clubs do not necessarily need to participate in the maintenance and policing duties, but if they identify and report problematic conditions on the route that can be helpful for the agencies that are responsible for those duties.



### 7.3. ENFORCEMENT

Enforcement programs can be challenging. To be effective, the program should focus on awareness and education, rather than punishment. If people start to vilify the enforcer, the program may actually result in an increase of the undesired activity. Many drivers, pedestrians and even enforcement officials are simply unaware of the actual laws related to pedestrians and bicyclists. NCDOT has several resources that describe the rights and responsibilities of both drivers and pedestrians, including *NCDOT's A Guide to NC Bicycle and Pedestrian Laws* (<http://ncdot.org/transit/bicycle/laws/resources/BikePedLawsGuidebook-Full.pdf>).

Additional information is available online at:  
[http://ncdot.org/transit/bicycle/laws/laws\\_pedlaws.html](http://ncdot.org/transit/bicycle/laws/laws_pedlaws.html).

It is important to treat all parties fairly and consistently. In the context of this plan, it is important to address both vehicular and pedestrian offenders. There must be consequences for all infractions. Consequences should include warnings with short explanations and then a gradual increase in penalization. Also, the entire jurisdiction must buy-in to the enforcement program. Enforcers should not enforce differing rule sets in different parts of the city, as this can result in a “zone” mentality where people won’t exercise the same consideration citywide. Following the institution of increased penalties, progressive ticketing is recommended as it increases contact between motorists, pedestrians and police.

1. **Educating** — Establish community awareness of the problem. The public needs to understand that drivers are speeding and the consequences of this speeding on pedestrian safety. Raising awareness about the problem will change some behaviors and create public support for the enforcement efforts to follow.
2. **Warning** — Announce what action will be taken and why. Give the public time to change behaviors before ticketing starts. Fliers, signs, newspaper stories and official warnings from officers can all serve as reminders.
3. **Ticketing**—Finally, after the warning time expires, hold a press conference announcing when and where the police operations will occur. If offenders continue their unsafe behaviors, officers issue tickets.

*Source: Pedestrian and Bicycle Information Center. [www.walkinginfo.org](http://www.walkinginfo.org)*

Another important aspect of a successful enforcement program is to recognize the nature of the problem. If the majority of users practice unsafe behavior, there may be an issue with the physical design. Subsequently, it would be ineffective and costly to permanently station an

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officer at the site and issue citations. When the vast majority of users are breaking the law, it may be necessary to change the physical environment first.

It should be noted that enforcement alone does not usually achieve long-term effects. Enforcement needs to be partnered with strong education and encouragement efforts as well as physical improvements where necessary.

Cities throughout the country often require offenders (both drivers and pedestrians) to take a course on specific laws that relate to pedestrian and vehicular safety. It is beneficial for students to learn from people directly involved with enforcement process. Instructors of the course can include emergency trauma and medical staff, police officers, transportation advocates and even judges. In some communities the citation is removed after the offender take this course. It would be advantageous to create a publicly accessible citywide policy that explains when offenders have the option or are required to enroll in the course. This should be made available in English as well as Spanish.

### **7.3.1 Police Reporting of Pedestrian Crashes**

The Institute for Transportation Research and Education (ITRE) is currently developing a curriculum for police officers around the state that will promote awareness and understanding of pedestrian and bicycle laws. The curriculum is scheduled to be available soon, and trainings will be conducted around the state. The city should take advantage of this program to enhance the capacity of their police force in dealing with pedestrian safety and regulation. For more information, contact Mary Meletiou, Bicycle and Pedestrian Program Manager for ITRE.

### **7.3.2 Pedestrian Safety Awareness Campaign**

An example of an enforcement/education campaign is The Metropolitan Washington Council of Governments' (MWCOC) *Street Smart Campaign* which was launched in 2002. Wilmington initiated a similar campaign in January of 2009. The safety and education components consist of safety pamphlets and advertisements on radio, television, buses, and bus shelters in both English and Spanish. Different messages are directed at drivers, pedestrians, and bicyclists. Drivers are reminded to be aware of, and considerate to, the rights of pedestrians and bicyclists. One way that this was conveyed was during an evening demonstration where officers showcased the lengthy distances required for vehicles to come to a halt at different speeds. This illustrates that higher speeds are more lethal for pedestrians, and that drivers may not fully grasp how much time is actually necessary to stop when driving at fast speeds. Studies have proven that higher speed crashes are more lethal for pedestrians.

Pedestrians and bicyclists are reminded of traffic regulations and safety tips. This campaign has been coupled with pedestrian stings where a plain-clothes enforcement officer is sent into a crosswalk and drivers are monitored for compliance with the law to yield to pedestrians in a crosswalk.<sup>15</sup>



Figure 92 MWCOG launched *Street Smart*, a Pedestrian Enforcement/Education campaign, to improve the safety of all users. The image was advertised on Metrobus exteriors to increase pedestrian's awareness of their responsibilities.

There is no single approach to improving pedestrian safety. It is important to assess the problem, and identify the correct palette of tools that adequately address the nature of the problem and result in sustainable solutions.

## 7.4. INTERAGENCY COORDINATION

### 7.4.1 Coordination with NCDOT

Effective coordination with NCDOT is essential for implementing the *Walk Wilmington: A Comprehensive Pedestrian Plan* and developing a more multi-modal transportation system in Wilmington. A number of issues were identified related to the review of state roadway projects that hinder pedestrian travel in Wilmington. The following recommendations were developed to ensure that pedestrians and bicyclists are routinely accommodated in all roadway projects.

#### **Issue**

NCDOT designs for non-freeway roadway projects may not include sidewalks or other pedestrian accommodations. For each proposed project, Wilmington staff must present a defensible case to NCDOT staff to include sidewalks or other pedestrian accommodations.

#### **Recommendation**

NCDOT's existing policies state that *"bicycling and walking shall be a routine part of the NCDOT's planning, design, construction, and operations activities..."* NCDOT should ensure that all road design projects include accommodations for pedestrians as stated in their policy.

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<sup>15</sup> Rivara, F. P., Booth, C. L., Bergman, A. B., Rogers, L. W. & Weiss, J. Prevention of pedestrian injuries to children: effectiveness of a school training program. *Pediatrics* 88, 770-775 (1991)

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NCDOT staff involved in planning, design or implementation of state road projects should promote NCDOT's multi-modal policies and ensure integration of pedestrian facilities.

**Recommendation**

NCDOT should establish a staff person within each division to coordinate with the City of Wilmington and other municipalities and address the multi-modal needs of each project. While the central NCDOT Division of Bicycle and Pedestrian Transportation (in Raleigh) currently serves in this capacity, a regional contact would benefit all cities and towns.

**Recommendation**

NCDOT Project Development Environmental Analysis and Roadway Design staff should submit notifications of scoping or design plans for roadway projects to the WMPO coordinator and the NCDOT Division of Bicycle & Pedestrian Transportation with sufficient notice to allow for meaningful input on the design. This will make sure that WMPO staff can effectively participate in the design process and will ensure that opportunities to include pedestrian facilities are not missed.

**Issue**

NCDOT often resists funding pedestrian improvements on state roadways.

**Recommendation**

As NCDOT's policy is to routinely accommodate pedestrian travel on state roadways, therefore NCDOT should fund these improvements in urbanized areas.

**Recommendation**

The City of Wilmington and the WMPO should adopt a policy requesting NCDOT to build pedestrian and bicycle facilities on all state roads within the urbanized area.

***7.4.2 Coordination with WAVE Transit (Cape Fear Public Transportation Authority)***

Every time a person travels to or from a WAVE Transit bus stop, they are likely traveling as a pedestrian. Therefore, the pathways leading to the stop should be sufficient to allow people to travel with safety and comfort. This is especially important for travelers with disabilities or those traveling with small children. With over 125,000 passengers each month<sup>16</sup>, it is important for the Wilmington and WAVE Transit to coordinate regularly on bus stop siting decisions and access improvements. WAVE Transit recently completed a complete overhaul of many of the systems bus routes. One of the criteria used in the decision making process was the safety of

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<sup>16</sup> Crossroads: WAVE Transit Official Defends Bus Service, Wilmington Star News Online, accessed: <http://crossroads.starnewsonline.com/default.asp?item=2338981>, April 2' 2009.

pedestrians traveling to and from the stop. Nevertheless, some bus stops are still located in locations that are not served by facilities such as sidewalks and improved street crossings.

A comprehensive inventory and assessment of transit system bus stops was not conducted during the development of this pedestrian plan, although a small number of stops were looked at during the field work portion of the project. It is recommended that Wilmington collaborate with WAVE Transit to assess the condition of bus stops and pathways leading to the stops. Montgomery County, Maryland conducted a similar project in partnership with the county's RideON transit service that identified needed bus stop improvements. The county then developed a 5-year capital improvements plan for retrofitting bus stops.



## Chapter 8. Implementation and Funding

### IMPLEMENTATION

The *Walk Wilmington: Comprehensive Pedestrian Plan* establishes the city's goals and objectives for walkability, and presents recommendations and guidelines for improving pedestrian facilities throughout the Port City. This chapter includes a series of action items and recommended coordination to help the city prioritize next steps and implement the recommendations in the plan.

### RECOMMENDATIONS

The recommendations in the table below are intended to complement recommendations found elsewhere in this plan. Generally, they represent implementation guidance for the concepts discussed in Chapter 4, Policies, Codes and Ordinances and Chapter 6, Pedestrian Transportation System.

Table 14 Zone Recommendations	
Zone	RECOMMENDATIONS
<b>Central Business District Zone</b>	
Arterial roadways	Reduce speed limit to 25mph, except on limited access roads. Install recommended sidewalks along all roadways (see Chapter 6). Install recommended pedestrian signals (see Chapter 6). Pedestrian signals in the CBD should be concurrent with leading pedestrian intervals. Install high visibility crosswalks on all legs of intersections Install pedestrian signage at all crossings to alert motorists of pedestrians Install pedestrian oriented wayfinding signage per other Wilmington plans
Non-arterial roadways	Reduce speed limit to 25 mph, except on limited access road Install recommended sidewalks along all roadways (see Chapter 6). Pedestrian signals in the CBD should be concurrent with leading pedestrian intervals. Pilot scramble phase pedestrian signal. Install pedestrian oriented wayfinding signage per other Wilmington plans
<b>Urban Core Zone</b>	
Arterial roadways	Reduce speed limit to 25 mph except on limited access roads Implement Dawson and Wooster plan Install recommended sidewalks along all roadways (see Chapter 6). Install recommended pedestrian signals (see Chapter 6). Install button actuated pedestrian signals at all signalized intersections. Pilot hybrid pedestrian signal (consider Wooster Street) Use leading pedestrian intervals at intersections with significant turning volumes Pedestrian signals should be on all legs of an intersection Install pedestrian oriented wayfinding per other Wilmington plans
Non-arterial roadways	Reduce speed limit to 25 mph except on limited access roads Install standard crosswalks at all signalized intersections Install pedestrian signals at all signalized intersections

Table 14 Zone Recommendations

Zone	RECOMMENDATIONS
<b>Traditional Suburban Zone</b>	
Arterial roadways	<p>Reduce speed limit to 35 mph, except on limited access roads.</p> <p>Install recommended sidewalks along all roadways (see Chapter 6).</p> <p>Install recommended pedestrian signals (see Chapter 6).</p> <p>Install push button activated pedestrian signals at all signalized intersections</p> <p>Use leading pedestrian intervals at intersections with significant turning volumes</p> <p>Install high visibility crosswalks on all legs at signalized intersections</p> <p>Install pedestrian signage at all crossings to alert motorists of pedestrians</p> <p>Install median refuge islands at all signalized intersections with pavement widths of over 60 feet</p> <p>Consider installing signalized (using hybrid signals, rapid flash beacons or HAWK signals) mid block crossings with refuge islands at key locations (e.g. intersections with River to the Sea Bikeway or Cross-City Trail) or road segments with long distances (over ¼ mile between intersections)</p> <p>Implement access management and new driveway design standards</p>
Non-arterial roadways	<p>Reduce speed limit to 35 mph along all urban collectors and 25 mph along all local streets and neighborhood collectors.</p> <p>Install recommended sidewalks along all roadways (see Chapter 6).</p> <p>Install recommended pedestrian signals (see Chapter 6).</p> <p>Continue to implement the neighborhood traffic calming program throughout the city.</p> <p>Consider installing unsignalized mid block crossings with refuge islands at key locations (e.g. intersections with River to the Sea Bikeway or Cross-City Trail) or road segments with long distances (over ¼-mile between intersections).</p> <p>Identify opportunities to improve pedestrian connectivity through adjoining cul de sacs, dead end streets and other areas.</p>
<b>Automobile- Oriented Suburban Zone</b>	
Arterial roadways	<p>Reduce speed limit to 45 mph, except on limited access roads.</p> <p>Install recommended sidewalks along all roadways (see Chapter 6).</p> <p>Install recommended pedestrian signals (see Chapter 6).</p> <p>Install push button activated pedestrian signals at all signalized intersections (consider using concurrent phase at South College Road and Randall Parkway).</p> <p>Use leading pedestrian intervals at intersections with significant turning volumes.</p> <p>Install high visibility crosswalks at all signalized intersections.</p> <p>Install pedestrian signage at all crossings to alert motorists of pedestrians.</p> <p>Install median refuge islands at all signalized intersections with pavement widths of over 60 feet.</p> <p>Consider installing signalized (using hybrid signals, rapid flash beacons or HAWK signals) mid block crossings with refuge islands at key locations (e.g. intersections with River to the Sea Bikeway or Cross-City Trail) or road segments with long distances (over ¼ mile between intersections).</p>
Non-arterial roadways	<p>Reduce speed limit to 35 mph along all urban collectors and 25 mph along all local streets and neighborhood collectors.</p> <p>Install recommended sidewalks along all roadways (see Chapter 6).</p> <p>Install recommended pedestrian signals (see Chapter 6).</p> <p>Continue to implement the neighborhood traffic calming program throughout the city.</p> <p>Consider installing unsignalized mid block crossings with refuge islands at key locations (e.g. intersections with River to the Sea Bikeway or Cross-City Trail) or road segments with long distances (over ¼ mile between intersections).</p> <p>Identify opportunities to improve pedestrian connectivity through adjoining cul de sacs, dead end streets and other areas.</p>

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## FUNDING

Many actions, such as facility construction, will require funding to implement. Other actions, such as improved interagency coordination, are more procedural in nature and will subsequently have minimal fiscal impact. This plan identifies potential sources, such as NCDOT funding programs, the city budget and municipal bonds. Developer contributions through a Pedestrian Benefit Zone or “fee-in-lieu” program (see Chapter 4, Policies, Codes and Ordinance) or improvements during construction are also possible funding sources.

Where city funds are used, public outreach participants indicated a preference for hotel taxes or municipal bonds (see Chapter 2, Vision and Plan Development). Hotel taxes are typically born by visitors and generally do not directly impact Wilmington residents. Municipal bonds are approved by voters through the referendum process, and there are precedents in the city for this funding strategy. An exhaustive list of funding sources for pedestrian and bicycle projects may be found in the Appendix.

## RECOMMENDED ACTION ITEMS

The following action items are categorized into the goals presented in Chapter 2 of this plan, and indicate the agencies or divisions involved in carrying out each action. The first column describes the specific action. Column two indicates which goal(s) are supported by the specific action. The goals are:

- **Goal 1: Safety**
- **Goal 2: Transportation Choice**
- **Goal 3: Built Environment, Land Use, and Connectivity**
- **Goal 4: Education, Awareness and Enforcement**
- **Goal 5: Health**
- **Goal 6: Economic Development**

Column three provides the general timeframe for implementation. For certain actions, more than one timeframe may be indicated to reflect the fact that there may be a short-term action followed by ongoing or continuous activity. Column four identifies the parties with primary responsibility for implementing the specific action. Column five provides suggestions for funding sources for a particular action. Column six provides references to related sections in this plan or related Wilmington planning documents.

Recommended Action	Supports Goal?						Timeframe	Agency/Division	Funding	Plan Section Reference
	1	2	3	4	5	6				
1. Compile and analyze data related to pedestrian collisions throughout the City of Wilmington annually. Identify intersection and mid-block locations with higher incidence of pedestrian collisions; develop prioritized list of locations needing improvements.	X			X	X		Ongoing	Traffic Engineering, Police, Planning, NCDOT, WMPO	NCDOT Spot Safety & Hazard Mitigation Funds, SRTS, City Budget	
2. Identify countermeasures to reduce the number of pedestrian crashes	X			X	X		Develop policies within two years, review regularly	Traffic Engineering, Planning	City Budget, WMPO	Chapter 4 Policies, Codes and Ordinances, 0 Chapter 7 Education, Encouragement and Enforcement
3. Install recommended crosswalks and pedestrian signals.	X	X	X				Short-term (0-5 years) 90 signal improvements Mid-term (5-10 years) 47 signal improvements Long-term (10-20 years) 28 signal improvements	NCDOT, Traffic Engineering	NCDOT Spot Safety & Hazard Mitigation Funds, SRTS, City Budget, Pedestrian Benefit Zones	6.1.3 Signalized Intersection Recommendations
4. Install recommended sidewalks	X	X	X				Short-term (0-5 years) 26 miles Mid-term (5-10 years) 206 miles Long-term (10-20 years) 222 miles	NCDOT, Traffic Engineering, Planning, WMPO	Bonds, SRTS Funds, NCDOT Spot Safety & Hazard Mitigation, Construct with Development, Pedestrian Benefit Zones	6.1.1 Sidewalk Recommendations
5. Install recommended multi-use paths	X	X	X				Ongoing	NCDOT, Traffic Engineering, Planning, WMPO	Bonds, SRTS Funds, NCDOT Spot Safety & Hazard Mitigation, Construct with Development, Benefit Zones	6.1.2 Multi-Use Path Recommendations
6. Install median pedestrian refuges on all roads with pavements widths of greater than 60 feet	X	X	X				NCDOT Roads- ongoing coordination with NCDOT. City Roads- approximately two median improvements per year.	Engineering, Traffic Engineering, NCDOT	NCDOT Spot Safety & Hazard Mitigation Funds, Install w/ Road Improvement	4.3 Intersection and Roadway Design Policies 5.2 Design Standard Recommendations
7. Develop mid-block crossing installation guidelines	X	X					Within two years	Planning, Traffic Engineering		4.2 Street Crossing Policies
8. Reduce speed on Wilmington's arterial roadways	X		X	X	X		Within five years	NCDOT, Traffic Engineering, Planning, WMPO		4.4.7 Posted Speed Limit Reductions
9. Pilot test leading pedestrian interval signals	X	X					Within two years	Planning, Traffic Engineering		4.4.2 Leading Pedestrian Interval Signal Timing
10. Pilot test pedestrian hybrid signals and rapid flash beacons	X	X					Within two years	NCDOT, Planning, Traffic Engineering	NCDOT Spot Safety & Hazard Mitigation Funds, SRTS, City Budget	4.4.5 Flashing Warning Beacons (Rapid Flash Beacons), 4.4.6 Pedestrian Hybrid Signals,
11. Train enforcement officers on pedestrian and bicyclist safety laws, schedule ITRE Training Program in Wilmington	X	X		X			Ongoing, conduct ITRE training when available	Police, ITRE, WMPO	City Budget, officer education grants if available	7.1 Education, 7.3 Enforcement
12. Implement pedestrian safety education and enforcement campaign to educate drivers and pedestrians about proper behaviors and improve compliance with pedestrian laws	X			X			Within two years, then ongoing	Planning, Police, WMPO, NHCS	City Budget, SRTS,	7.1 Education, 7.3 Enforcement
13. Increase annual budget for new sidewalks from \$150,000/year to at least \$300,000/year. (Currently, less than four percent of the city's streets and sidewalks capital projects budget is spent on new sidewalk construction).	X	X	X				Immediately	Mayor and Council; Engineering; Streets	City Budget; Municipal Bonds	4.1.5 Pedestrian Benefit Zones
14. Collaborate with NCDOT to meet both agencies goals of creating more walkable streets on NCDOT-maintained roadways (except freeways).	X	X	X				Ongoing	Planning; WMPO; Mayor and Council		7.4 Interagency Coordination Coordination with NCDOT
15. Work with NCDOT to ensure the provision of pedestrian accommodations on state-maintained roadways. The city will work with NCDOT to create context-sensitive streets that include transit, bicycle-	X	X	X				Ongoing	Planning; Streets; Engineering; NCDOT; WMPO		Chapter 4 Policies, Codes and Ordinances, 0 7.4 Interagency Coordination Coordination with NCDOT

[illegible]