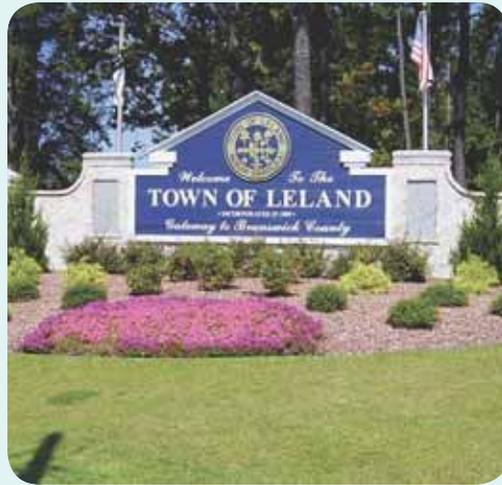


Comprehensive
**Bicycle
Plan**



for Leland, NC



Presented to:
Town of Leland

Presented by:
WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation



Executive Summary

In 2006, the Town of Leland was awarded a Comprehensive Bicycle Planning Grant from the North Carolina Department of Transportation (NCDOT) Division of Bicycle and Pedestrian Transportation. The Comprehensive Planning Grant Initiative is a matching grant program administered by the NCDOT Division of Bicycle and Pedestrian Transportation and the NCDOT Transportation Planning Branch with local matching funds provided by the locality.



The purpose of this Comprehensive Bicycle Plan (Plan) is to develop a dynamic and comprehensive bicycle planning tool for the Town of Leland (Town). This Plan will provide the Town with a planning tool which will assist in the expansion, promotion and funding of safe and efficient bicycle facilities and programs and initiatives throughout the Town.

An important part of developing a successful and implementable Comprehensive Bicycle Plan is to integrate ample citizen input into the planning process and project prioritization. To gather input from the public, the project team utilized four strategies:

1. Developed a Steering Committee
2. Held the "Leland Bicycle Fest", a one-day bicycling event
3. Held two public meetings
4. Distributed a public survey

At the beginning of the planning process the Leland Bicycle Plan Steering Committee (BPSC) developed a vision statement and a list of goals for this plan. These goals served as the guide for the entire planning process.

Goal #1: Safety

Increase and enhance the Safety of bicyclists.

Goal #2: Public Awareness

Enhance public awareness and education of bicycling in the Town of Leland.

Goal #3: Connectivity, Coordination, and Continuity

Adopt policies that promote Connectivity, Coordination and Continuity throughout the Town of Leland.

Goal #4: Quality of Life

Enhance quality of life of the citizens of Leland.

Goal #5: Maintenance and Implementation

Develop a Maintenance and Implementation Plan

*Vision:
To establish bicycling as a
viable, convenient and safe
transportation choice
throughout Leland.*

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Due to the rural background of the Town of Leland, many of the roadways within the Town still maintain a rural character, with narrow to moderate widths, and narrow or no shoulders. As new development has occurred in the Town, particularly residential development, the facilities within the developments have typically been constructed in a manner that is accommodating to cyclists, but often connections between adjacent developments have not been made. Additionally, the US 74/76 and US 17 corridors provide barriers to inexperienced cyclists.

Given the rural character of much of the Town, biking in Leland is a popular recreation choice among residents and tourists, even with the lack of designated bike routes. Outside of residential developments, recreational cycling is typically performed by more serious on-road cyclists who travel moderate to long distances on roads that border the Town.



As evident in the vision statement, the public, the Bicycle Plan Steering Committee, and Town staff have indicated that the residents of the Town desire that all groups of individuals be accommodated within the Town. This study provides the framework and actions needed to create designated bicycle routes and develop the supporting facilities and programs necessary to ensure that bicycling is not only for recreation, but is a viable

choice for a wide variety of trips within the Town.

To accommodate recreational as well as utilitarian cyclists, this plan proposes a wide range of facilities shown in the following figure. These facilities include loops, which have been identified as locations where recreational cyclists typically ride; connections, which are locations that have been identified as having the potential to open up large or important areas to non-motorized travel; and focus corridors, which are sections of roadway within or adjacent to the Town that would provide significant connectivity and mobility if constructed to accommodate cyclists.

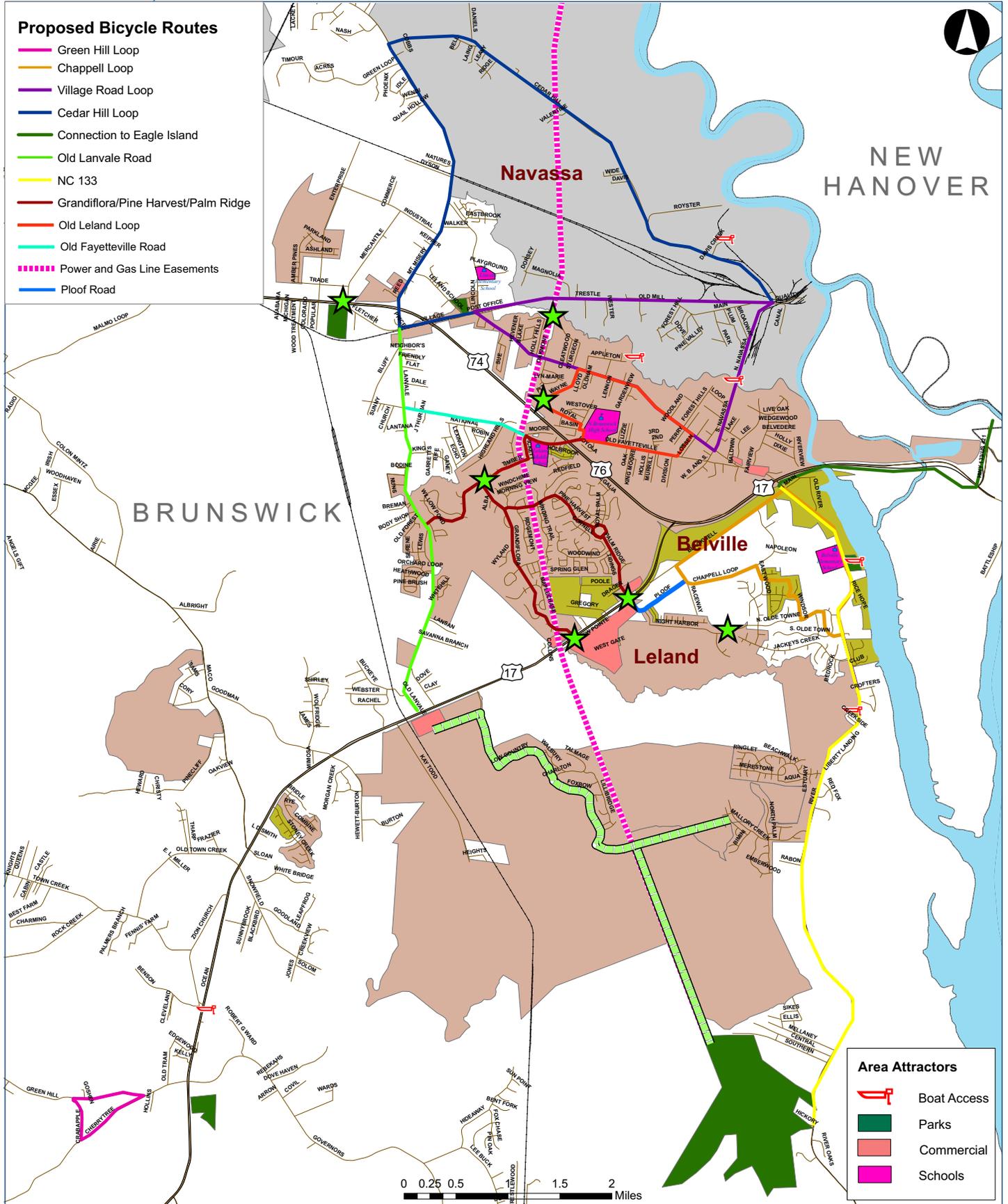
This plan also recommends programs and policies meant to increase public awareness of cycling, promote safety among cyclists and motorists, and to encourage pedestrian friendly roadway and development projects. Specifically, the Town should use its website and a multi-lingual bicycle route map to provide information such as route maps, points of interest along routes, WAVE Transit stops, route conditions, and bicyclist and pedestrian traffic laws and safety tips. Additionally the Town should work with local groups such as the Cape Fear Cyclists to provide education to motorists and cyclists and to hold local bicycling events such as the "Leland Bicycle Fest," and national groups to promote national activities such as "Bike to Work Day" and "Car Free Day."

The Town of Leland is experiencing a large amount of growth in both the residential and retail sectors. The establishment of sound, reasonable development policies can be a mechanism for ensuring that adequate bicycle facilities are provided as the Town grows. This plan recommends that bicycle facilities be integrated into all new development and roadway planning, design, and construction projects. One area of emphasis should be on connections between developments. The Town should require greenway or sidewalk connections between cul-de-sac termini and nearby roadways and developments and

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Proposed Bicycle Routes

LEGEND

Primary Roads	Railroads	Leland	Navassa	Proposed Greenway
Other Roads	County Boundary	Belville	Water Bodies	Proposed Connections

Figure EX.1



between adjacent commercial and office developments. These connections should be made to allow users to move throughout the Town without having to enter a vehicle, as well as to promote more recreational opportunities by opening larger areas of the Town to non-motorized travel.

In order to obtain the vision outlined by the Bicycle Plan Steering Committee, this document also outlines bicycle facility standards and guidelines to use when amending the Town's design standards, and for use in planning future projects. Additionally this document uses criteria established by the steering committee to prioritize the recommendations outlined in this plan. The facility recommendations are grouped into short term (less than 5 years), medium term (5 to 10 years) and long term (greater than 10 years) priorities, while the programs and policies are grouped into first, second, and third priorities in order to allow the Town staff to make intelligent decisions regarding where to spend their valuable time and resources.

The short term priorities were primarily focused on two objectives 1) Improving bicycle access and safety in "Old Leland" and 2) making connections between existing facilities to open up larger portions of the Town to bicycle travel within neighborhoods and local roads. The projects that fell into this group are:

-  Village Road Loop
-  Old Leland Loop
-  Fletcher Road / Northwest District Park Connection
-  US 17 Superstreet Connections
-  Leland Greenway
-  Wayne Street / Royal Street Connection
-  Night Harbour Drive / Old Town Wynd Connection
-  Grandiflora / Palm Ridge Drive Connection
-  Ploof Road

The medium term priority projects were those that fell within the Town boundaries, but that were more difficult to construct and provided less benefit to residents of the Town. The projects that fell into this group are:

-  Holly Hills Drive / Sturgeon Drive Connection
-  Eagle Island Connection
-  NC 133
-  Lanvale Road

The remainder of the projects fall into the Long term priorities. The projects lie almost solely outside of the Town limits and serve primarily medium to advanced recreational cyclists. The desire to have bicycle facilities on these routes should be considered as the area develops. The projects that fall into this group are:

-  Chappell Loop
-  Cedar Hill Loop
-  Green Hill Loop
-  Old Fayetteville Road

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With regard to the policy and program recommendations, the first priority should be updating the Town's land development code and to coordinating with NCDOT regarding on-going projects. The second priority should be given to providing education to the public and promoting bicycle safety. Finally, the Town should focus on developing a maintenance plan, increased enforcement for motorists and cyclists, and applying for grant money to implement the recommendations in this plan.

In summary, this plan is a visionary, yet practical approach towards making Leland a better place to live and bike in the coming years. Many thanks to the Town staff, North Carolina Department of Transportation (NCDOT), Wilmington Area MPO, local bike clubs, and the citizens of Leland who participated in the planning process and who will work to make the recommendations in this plan a reality.

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Chapter 1

INTRODUCTION



WilburSmith
ASSOCIATES



Division of
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Chapter 1 - Introduction

1.1 INTRODUCTION

In 2006, the Town of Leland was awarded a Comprehensive Bicycle Planning Grant from the North Carolina Department of Transportation (NCDOT) Division of Bicycle and Pedestrian Transportation. The Comprehensive Planning Grant Initiative is a matching grant program administered by the NCDOT Division of Bicycle and Pedestrian Transportation and the NCDOT Transportation Planning Branch with local matching funds provided by the locality.



The purpose of this Comprehensive Bicycle Plan (Plan) is to develop a dynamic and comprehensive bicycle planning tool for the Town of Leland (Town). This Plan will provide the Town with a planning tool which will assist in the expansion, promotion and funding of safe and efficient bicycle facilities, and programs and initiatives throughout the locality. Generated from this Plan will be an Implementation Plan (Constructability Analysis) which will become the 'handbook' for local officials and staff to reference when securing funds, budgeting and allocating local resources for improving the bicycle transportation system in the Town.

The following represents the outline for this plan:

Chapter 1: Introduction

- Introduction
- Study Area
- Public Involvement
- Vision, Goals, and Objectives
- Benefits of Bicycling

Chapter 2: Existing Conditions

- Overview
- Community concerns, needs and priorities
- Bicycle Friendliness Assessment of the Local Transportation System
- Current Usage and User Demographics
- Inventory and Assessment of Existing Facilities
- Bicycle Statutes and Local Ordinances

Chapter 3: Recommendations

- Programs
- Policies
- Facilities

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Chapter 4: Bicycle Facility Standards and Guidelines

- 🚲 Wide Outside Lanes
- 🚲 Wide Paved Shoulders
- 🚲 Bicycle Lanes
- 🚲 Bicycle Crossings along “Superstreet” Corridors
- 🚲 Highway Edgelines
- 🚲 Shared-Use Paths (Greenways)
- 🚲 Bicycle Routing
- 🚲 Bicycling on Sidewalks
- 🚲 Drainage Grates
- 🚲 Bikeway Signing
- 🚲 Bicycle Parking Guidelines
- 🚲 Access Management

Chapter 5: Implementation

- 🚲 Prioritization of Projects
- 🚲 Funding Sources

1.2 STUDY AREA

Known as “The Gateway to Brunswick County,” the Town of Leland is located in northeast Brunswick County immediately west of the Cape Fear and Brunswick Rivers. Three highways: US 74, US 76, and US 17 provide access from the east and west, while NC 133 provides access from the south. A variety of two-lane roads provide access to the Town from the north.

Brunswick County is ranked 41st in the fastest growing counties in the nation, with much of the growth occurring near the Town of Leland. The area within the town limits north of US 74 is typically known as “Old Leland.” Much of the new growth in the Town has been occurring south of US 74, with a particular focus along the US 17 corridor.

Figure 1.1 illustrates the study area for this project. While this document is focused on projects and benefits to the Town of Leland, with the rapid growth occurring in the area and the pace at which the Town is annexing new subdivisions, it is appropriate to consider the rural areas just outside of the Town limits as well as the connections to nearby Belville and Navassa.

1.3 PUBLIC INVOLVEMENT

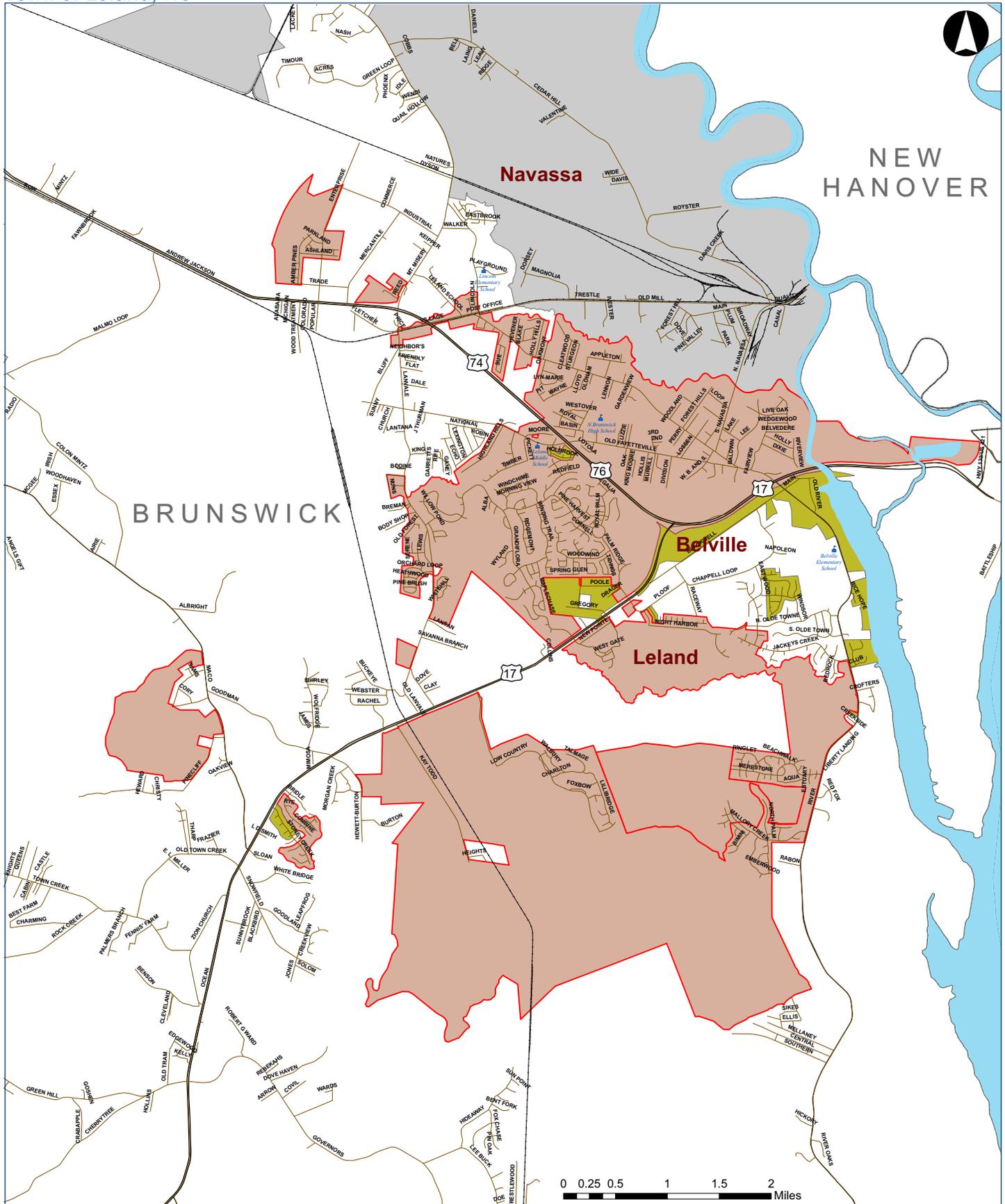
An important part of developing a successful and implementable Comprehensive Bicycle Plan is to integrate ample citizen input into the planning process and project prioritization. To gather input from the public, the project team utilized four strategies:

1. Developed a Steering Committee
2. Held the “Leland Bicycle Fest”, a one-day bicycling event
3. Held two public meetings
4. Distributed a public survey

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Study Area

Primary Roads	Railroads	Leland	Navassa	Study Area
Other Roads	County Boundary	Belville	Water Bodies	

Figure 1.1



Steering Committee

The Town of Leland staff formed the Leland Bicycle Plan Steering Committee (BPSC) to assist and provide guidance in the development of the Comprehensive Bicycle Plan. The BPSC met four (4) times over a period of one year and provided the ideas and guidance and identified the public needs for bicycle improvements in Leland which were incorporated into this plan. Minutes and notes from each of these BPSC meetings are included in this plan in Appendix A.

The following residents of the Leland area and representatives from the WMPO and NCDOT participated in the Leland Comprehensive Bicycle Plan Steering Committee:

Name	Agency
John Vine-Hodge	North Carolina Department of Transportation
Chuck Bost	Town of Leland Police Department
Steven Spruill	Town of Leland
Niel Brooks	Town of Leland Planning Department
David Staebler	Cape Fear Cyclists
Brian Ennis	Town of Belville
Michael Kirkbride	Town of Carolina Beach
Jackson Provost	North Carolina Department of Transportation
Samuel Richardson	Leland Parks & Recreation Board
Joshuah Mello	Wilmington Urban Area Metropolitan Planning Organization
Sam Miller	Leland Parks & Recreation Board
Kirstie Dixon	Brunswick County Planning
Jane Gilbert	Leland Parks & Recreation Board
Robert Ernest	Town of Leland Police Department
Bethel Paris	Cape Fear Cyclists

Leland Bicycle Fest

To promote cycling in Leland and to gather information for the Comprehensive Bicycle Plan, the Town of Leland held the Leland Bicycle Fest on Saturday, June 30, 2007 at Leland Middle School. This event featured a raffle for free bicycles and bicycle equipment, bicycle inspections, safety



education, helmet fittings, a bicycle rodeo, food vendors, a radio broadcast, and culminated in a 7.3 mile cruise through the town led by the Leland Police Department. WSA staff manned an information booth to introduce the public to the project, identify and confirm existing conditions in Leland by interfacing with participants, to distribute the

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public surveys, and to seek comments and input from the community regarding the bicycle plan project and program needs.

Public Meetings

Another important part of the Comprehensive Bicycle Plan planning process was to allow the general public in Leland an opportunity to review and provide input on the draft Plan and maps. Two public meetings were conducted over the one year planning process. The purpose of the first meeting, held on Tuesday September 25, 2007, was to introduce the public to the project, discuss how the planning process was conducted, review the responses to the public survey, identify and confirm existing conditions in Leland, present draft project recommendations, and seek comments and input from the community regarding the bicycle plan project and program needs and expectations.

The second public meeting was held on April 29, 2008 and the Draft Comprehensive Bicycle Plan was presented to the public to review. This meeting provided the public with the Draft Final recommendations, proposed projects and programs, policies and implementation schedule.

During both public meetings, the attendees were encouraged to provide comments on the draft plan. The public was also given an opportunity to review draft maps including existing conditions, priority projects, bicycle accident locations, and activity centers in addition to several other informative maps. At the conclusion of both public meetings, the public participated in question and answer sessions.

1.4 VISION, GOALS, and OBJECTIVES

At the Leland Bicycle Plan Steering Committee meeting held in May 2007 (see Bicycle Plan Steering Committee (BPSC) meeting minutes in Appendix A), participants noted that the need exists for both improved bicycle facilities as well as for supportive goals that will educate residents and increase awareness of bicycle usage and safety. The Leland area does not currently have an institutional framework to support bicycle transportation, but such a framework is necessary to enable positive, continuing change to occur.

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BPSC members noted that bicycle facilities in Leland will not reach their full potential if local residents are not educated about bicycle usage and safety. If Leland residents (bicyclists and non-bicyclists alike) are not aware of bicycle transportation issues, the local support that is needed to spur additional development of bicycle facilities will not exist. Therefore, goals and objectives to support bicycle transportation that go hand-in-hand with the development of bicycle facilities and the policies and strategies described in Chapter 3 serve as a foundation for improving the bicycling environment in the Leland area.

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Overall goals developed by the Leland BPSC members include the following five major subject areas:

1. Safety
2. Public Awareness
3. Connectivity, Coordination, and Continuity
4. Quality of Life
5. Maintenance and Implementation

Goal #1: Safety

Increase and enhance the safety of bicyclists.

Objectives

- 🚲 Improve bicyclists accessibility across US Highways 17 and 74/76 and other congested areas that are not currently bicycle friendly.
- 🚲 Promote increased enforcement of bicycle-related violations on the part of both motorists and bicyclists.
- 🚲 Ensure that the NCDOT Basics of Bicycling Curriculum Bicycle Safety Program is taught to all elementary school children in Leland.

Goal #2: Public Awareness

Enhance public awareness and education of bicycling in the Town of Leland.

Objectives

- 🚲 Support Safe Routes to School efforts that include educational and incentive programs to encourage more students to bicycle or walk to school.
- 🚲 Improve bicycle handling and operational skills through bicycle rodeos, class room instruction, physical education classes and bicycle fairs.
- 🚲 Provide the public with bicycle route mapping and information regarding local bicycle clubs.
- 🚲 Encourage local groups to provide informational workshops to educate both motorists and bicyclists.

Goal #3: Connectivity, Coordination, and Continuity

Adopt policies that promote Connectivity, Coordination, and Continuity throughout the Town of Leland.

Objectives

- 🚲 Integrate bicycle facilities into all new developments and roadway planning, design and construction projects.
- 🚲 Identify a network of bike lanes, bike routes, and shared use paths that serve all bicycle user groups, including commuting, recreation and utilitarian trips.
- 🚲 Improve the continuity of on-street networks by overcoming the negative impacts of existing barriers.
- 🚲 Utilize innovative designs, where appropriate, to improve bicycle usage, and safety.
- 🚲 Identify potential off-road multi-use paths to improve connectivity throughout Leland.

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- Incorporate this plan into the NCDOT Comprehensive Transportation Planning process.
- Coordinate with adjoining communities and NCDOT to ensure future bicycle facility plans are compatible.
- Develop standards for new developments that will help ensure that consistent bicycle facilities are constructed as the Town of Leland grows.

Goal #4: Quality of Life

Enhance quality of life of the citizens of Leland.

Objectives

- Highlight and promote scenic areas and public recreational facilities with bikeways throughout Leland.

Goal #5: Maintenance and Implementation

Develop a Maintenance and Implementation Plan.

Objectives

- Ensure that bicycle facilities are routinely maintained (such as street sweeping, pavement painting and striping, pavement surface maintenance, tree trimming, and other maintenance as necessary) for the safe operation of bicycles.
- Develop an evaluation matrix that evaluates existing facilities to ensure that facilities adequate for bicycle use are being provided in Leland and to identify appropriate routes for bicycle travel.

1.5 BENEFITS OF BICYCLING

Creating alternatives to our current automobile-centered transportation system that are safe and welcoming can have profound encouraging influences on the quality of life in Leland. By becoming more bicycle and pedestrian-friendly, the Leland community can realize significant economic, environmental, and social benefits.

The Town of Leland is not unlike most American communities where the automobile dominates transportation. The proliferation of the automobile in our public and private spaces is the greatest obstacle to the provision of safe, efficient and pleasurable walking and biking. The ability to travel under human-powered means, regardless if it is by foot, bicycle, wheelchair, stroller or skateboard, remains an essential part of our daily way of life.

In order to enjoy this quality of life, it is essential that we accommodate and promote walking and bicycling. These modes should not be used only when a practical necessity, but should also be used in order to enjoy the important economic, environmental and social benefits that increased bicycle and pedestrian activity affords.

Economic Benefits of Making Leland More Conducive to Bicycling

One of the most economical forms of transportation in terms of cost is undoubtedly bicycling. Bicycling is relatively low cost and readily available to most residents of the Brunswick County region. In contrast, the expense required to maintain and operate a

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motor vehicle is very high and out of the realm of possibility to many that cannot afford the additional expense.

The average cost of operating a car for one year is approximately \$7,800, as opposed to the cost of operating a bicycle for a year of only \$120⁽¹⁾. The average family has to work for more than 9 weeks to pay a year's car expenses, compared to less than one day needed to pay for a year's bicycle expenses⁽²⁾. On average, the typical family makes ten trips by motor vehicle per day. Each of these trips is a one-way drive between two points by one person. The average American spends approximately 26 8-hour workdays behind the wheel of a car every year⁽³⁾. The average motorist loses \$625 per year in wasted time and fuel while idling in traffic⁽⁴⁾. The result is lost productivity and worsening air quality due to the large increase in noxious emissions and greenhouse gases.

Previous development patterns in Leland have forced residents to rely on the family car for almost every trip. On the other hand, innovative and effective policies and safer, attractive facilities that support improved walking and bicycling can begin to make an impact on the number of car trips.

It has become self-evident that there is economic benefit in providing safe and convenient access for customers to the many commercial and activity centers located throughout Leland. Enhanced bicycling activity is likely to produce various other indirect economic benefits, as well as an increase in the quality of life. When new commercial interests are surveying a region for future development, they will often consider quality of life issues when selecting a location to invest in. Having access to multi-use trails, greenways and bicycle friendly roadways have been shown to have a positive effect on property values⁽⁵⁾.

According to a study prepared by NCDOT⁽⁶⁾, approximately \$6.7 million in public funds were used to construct the special bicycle facilities in the northern Outer Banks. The annual economic impact of cyclists (\$60 million) is estimated to be almost nine times greater than the one-time expenditure of public funds to construct the bicycle facilities. Therefore, excellent bicycle and pedestrian facilities can attract tourists to the Leland area, both as a stop en route and as an end destination.

Environmental Benefits of a Bicycle Friendly Community

The two major non-fuel-consuming, non-polluting forms of transportation in America are bicycling and walking. There are millions of Americans that ride bicycles and/or walk for a wide variety of purposes such as commuting to work, conducting personal business, shopping, or recreation. For many of these individuals, bicycling or walking are the prime means of transportation.

The greatest environmental benefit of bicycling, by far, is a reduction of fossil fuel consumption to which our society has become so dependent. Bicycling does not contribute to the environmental damage inherent in extracting, transporting, processing

¹ Pedestrian and Bicycle Information Center (www.bicyclinginfo.com).

² U.S. Census, 1998 median family income figures.

³ U.S. Census Bureau Census 2000 File 3.

⁴ Road Information Program, Stuck in Traffic, May 2001.

⁵ www.walkinginfo.org/engineering/trails-development.cfm

⁶ The Economic Impact of Investments in Bicycle Facilities: A case study of the North Carolina Northern Outer Banks.

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and burning petroleum or other fossil fuels. Bicycling can displace the short trips that would otherwise involve a motor vehicle. These short trips are the least fuel-efficient and generate the most pollution per mile traveled.

Bicycling is an underappreciated mode of mobility in the United States. Reports show that motor vehicle emissions account for 31% of total carbon dioxide, 81% of carbon monoxide, and 49% of nitrogen oxides released into the atmosphere in the United States⁽⁵⁾. It is important to continue to encourage individuals to bicycle when making short trips to help cut down on harmful auto emissions. For example, substituting a four-mile round trip by motor vehicles for a trip by bicycle keeps about 15 pounds of pollutants out of the atmosphere. In urban areas with poor air quality, asthma is becoming a more significant health concern⁽⁶⁾. Decreasing the number of trips made by car will also result in less wear and tear on personal vehicles and the need for replacement of both parts and the car itself. Reduced traffic levels also reduce noise pollution.

Social and Health Benefits of Promoting Bicycling

Although subjective, the social benefits of improved bicycle facilities are no less compelling. Public space gives the community a lively atmosphere that can generate more social and commercial activity. This is accomplished simply by having more people outside. In a community that is dominated by the automobile, contact between friends and neighbors is often reduced to a wave from the inside of an automobile. Improved bicycle facilities can provide residents the opportunity to gain a deeper understanding and appreciation of the region's built and natural environment.

As a result of all of these transportation-related improvements, communities can become more cohesive. Streets that are attractive and safe for all users encourage social interaction. They encourage children to ride bicycles to their friends' houses and adults to cross the street to talk to neighbors. Efficient public transit systems allow those without cars – the young, the poor, the elderly, and the handicapped – to participate more fully in civic life, giving them a degree of independence they would not otherwise have. By understanding and addressing the unique needs of many different socioeconomic groups through early, inclusive, and meaningful public involvement, transportation facilities can be designed that fit more harmoniously in communities.



North Carolina has the 15th highest level of adult obesity in the nation at 24.0 percent, and the 11th highest overweight high school student level at 12.5 percent. The state

⁷ The Green Commuter, A Publication of the Clean Air Council.

⁸ Harvard University School of Public Health.

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spent an estimated \$254 per person in 2003 on medical costs related to obesity, which was the 28th highest amount in the nation ⁽⁷⁾.

The beneficial impact of regular physical activity on health, such as bicycling and walking, is far reaching. Its role in the prevention and management of coronary heart disease, hypertension, obesity, diabetes, osteoporosis and depression is well established. Increased bicycling and walking can have a positive effect on the overall health of a community. Living in a bicycle and pedestrian friendly environment can play a significant part in leading children to exercise more and to develop healthy habits for life.

Benefits of Mainstreaming Bicycle Facilities into the Overall Transportation System

Bicycle facilities are often viewed as attractive amenities, or non-essential add-ons, to expanding or redeveloping communities. However, with the current shift toward healthier, cleaner, and more economical modes of transportation, bicycle and pedestrian modes of travel are suddenly more attractive to visitors and residents alike. Thus mainstreaming these bicycle facilities into a community's General or Comprehensive Plan has become essential, instead of being considered only as an option.

Summary of Opportunities and Benefits

As previously stated, there are numerous economical, environmental, and social benefits of utilizing a bicycle system over a conventional automobile-centered infrastructure. However, it is the town or cities' elected official's decisions to ensure that the bicycle facility is an integral part of the Comprehensive Plan and can be mainstreamed into the daily decision making process. These changes will not only ensure the future development and revitalization of bicycle facilities, but aid in the Town of Leland's quality of life and help Leland and its residents flourish well into the future.

As evident in the vision statement and discussions with the public, the Bicycle Plan Steering Committee, and the Town staff, all have indicated that the residents of the Town desire that all groups be accommodated within the Town. This study provides the framework and actions needed to create designated bicycle routes and develop the supporting facilities and programs necessary to make bicycling not only attractive for recreation, but as a viable choice for a wide variety of trips within the town.

Leland is now one of the most sought-after vacation and relocation destinations on the southeast coast and will attract more populace if the Town provides convenient and safe bicycle routes that will facilitate cost-effective, healthy, and convenient transportation alternatives within the town. Biking will increase social interaction on streets and trails, offer alternatives to driving, and reduce pollution, which would eventually make Leland a better place to live.

⁹ Trust for America's Health Report on America's Obesity, August 2006.



Chapter 2

EXISTING CONDITIONS



WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation



Chapter 2 - Existing Conditions

2.1 INTRODUCTION

Surrounded by Brunswick River to the east and Sturgeon Creek to the south, the Town of Leland is located at the northeast corner of Brunswick County. Formed in 1898, Leland is located 3 miles west of the historic City of Wilmington. Historically, Leland was a railroad town, initially settled with the growth of plantations along the Cape Fear River and Brunswick River. The Town was officially incorporated in 1989 with a population of approximately 1,800. In the early part of the 21st century, the Town has seen a radical growth of population with additional geographic areas incorporated due to development. With the annexation and buildout of one of the largest communities in southeastern North Carolina, the 4,900 acre Brunswick Forest subdivision, the Town will double in size.

Brunswick County is ranked 41st in the fastest growing counties in the nation. Approximately 10,000 new residents are expected to reside in Brunswick Forest and several more thousand in planned subdivisions around Leland. The Town has also seen growth in non-residential land uses such as business, commercial, schools, and industries opening in the past few years, with many more under construction¹.

Due to the rural background of the Town of Leland, many of the roadways within the Town still maintain a rural character, with narrow to moderate widths, and narrow or no shoulders. As new development has occurred in the Town, particularly residential development, the facilities within the developments have typically been constructed in a manner that is accommodating to cyclists, but often connections between adjacent developments have not been made. Additionally, the US 74/76 and US 17 corridors provide barriers to inexperienced cyclists.

Given the rural character of much of the Town, biking in Leland is a popular recreation choice among residents and tourists, even with the lack of designated bike routes. Outside of residential developments, recreational cycling is typically performed by more serious on-road cyclists who travel moderate to long distances on roads that border the Town.

As evident in the vision statement, discussions with the public, the Bicycle Plan Steering Committee, and Town staff have indicated that the residents of the Town desire that all groups of individuals be accommodated within the Town. This study provides the framework and actions needed to create designated bicycle routes and develop the supporting facilities and programs necessary to ensure that bicycling is not only for recreation, but is a viable choice for a wide variety of trips within the Town.

Leland, now being one of the most sought-after vacationer and relocation destination in the south-east coast will attract more populace if the Town provides convenient and safe bicycle routes that will facilitate cost-effective, healthy, and convenient transportation alternatives within the Town. Biking will also increase social interaction on streets and

¹ Town of Leland Planning Department, Growth Projections for the Town of Leland

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

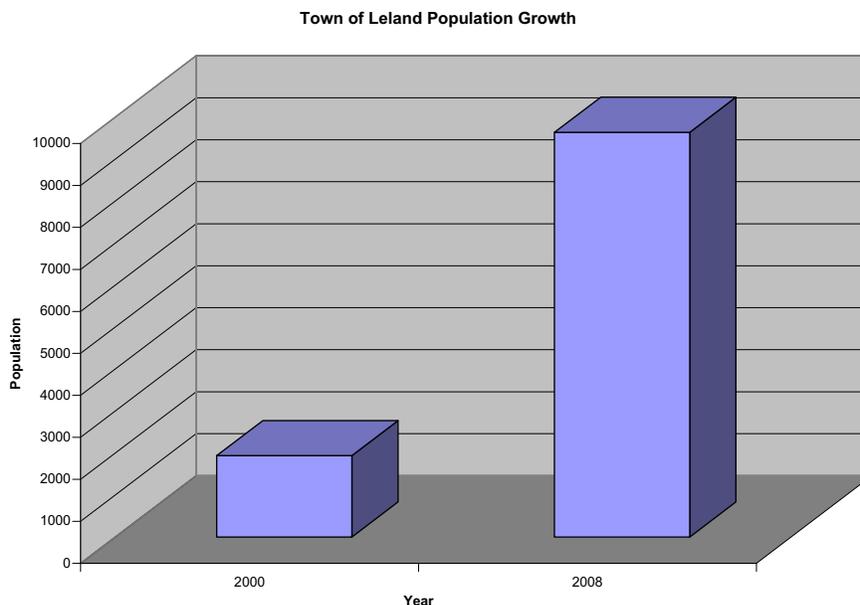


trails, offer alternatives to driving, and reduce pollution which would eventually make Leland an even better place to live.

2.2 USER DEMOGRAPHICS

Population

The Town of Leland is the fourth fastest growing Town in North Carolina². Between 2000 and 2008 the Town of Leland's population grew 497% from 1,938 residents to an estimated 9,642 residents.



Between 2000 and 2005, Brunswick County grew 22.3% to an estimated 89,463 residents from 73,141. The Town of Leland accounts for approximately 5.8% of the county's overall growth.

Income

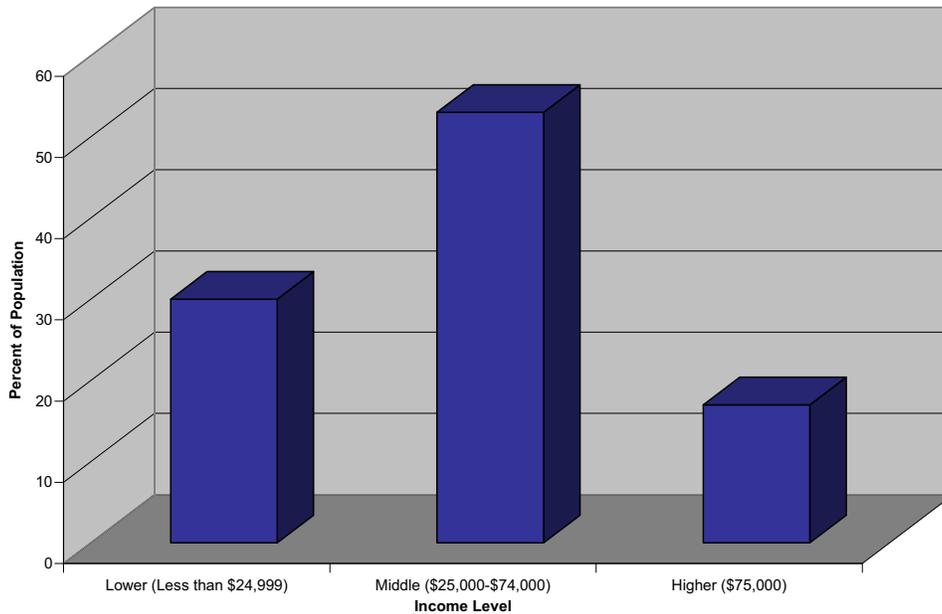
Income levels were used to reveal important demographic characteristics of Leland. In general, the high income groups (\$75,000 or more annual income) and the middle income groups (\$25,000 to \$74,000 in annual income) tend to be more active and participate in the more expensive types of activities, while using private personal vehicles for utilitarian transportation. However, the lower income groups (Less than \$24,999 in annual income) tend to rely on the availability of low cost transportation for utilitarian trips, if not all trips. Overall, middle income residents represent 53% followed by lower income residents representing 30% of Leland's population. The high income groups of Leland represent approximately 17% of the total population.

² North Carolina State Data Center

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Leland's Demographic Income Makeup



The Leland economy has experienced significant economic growth through most of the 2000's as a result of the increase in population and development. The Town has experienced growth while diversifying its economy. This is important since the quality of life Leland has to offer has tremendous effect on the diversification of the economy to fuel further economic growth. New businesses and industries that would potentially locate in Leland will base decisions to locate partially by the quality of life an area has to offer for its employees. Adequate recreational and utilitarian bicycle facilities play a key role in this consideration and have an important role in the future health of the economy of the Leland area.

Building Permits and Certificates of Occupancies for Leland

An analysis of building permits and certificates of occupancy issued by Leland Planning Department Staff indicates continued steady growth is expected for the foreseeable future⁽²⁾. Between 1997 and 2007, Leland's annexations averaged 1,103 acres per year for a total of more than 11,000 acres of newly annexed property into the Town of Leland over the last ten years. The Town currently encompasses approximately 12,620 acres of total land area within Leland's Planning Jurisdiction. Records indicate new subdivision approvals between 2003 and 2007 identify 444 acres of newly subdivided land per year. Further examination indicates this acreage consists of 827 single family lots and 1,214 multifamily units/lots annually, with more than 10,000 residential units developed in the past five years.

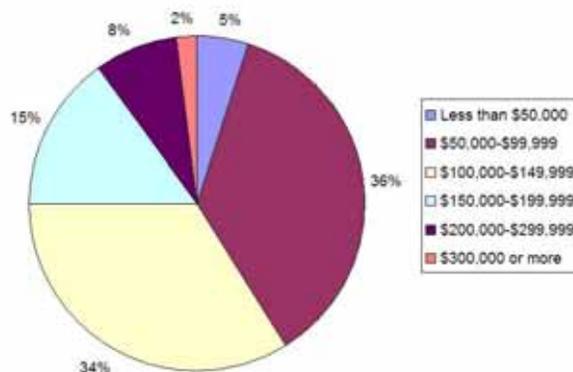
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Housing

Single-family homes and mobile home residential units comprise approximately 97% of the total housing units in the Town. According to 2000 U.S. Census data, approximately 36% of the total residential units were valued between \$50,000 and \$99,999 followed by 34% of residential units being valued between \$100,000 and \$149,999. The median value for housing units in Leland is estimated at \$114,100.

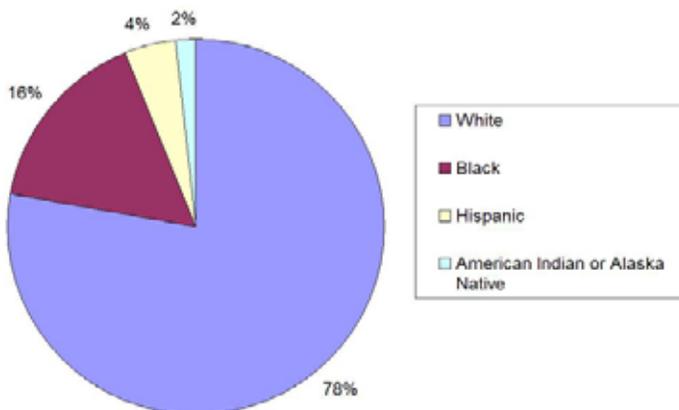
Leland's Housing Stock Values



Ethnicity

While ethnicity by itself does not reflect bicycle usage, many minority races have lower incomes, which does have a relationship with bicycle usage due to the greater need for low-cost utilitarian trip options.

Town of Leland Population Ethnicity



The population in Leland is predominately white (77.7%), but Leland is growing more diverse each year. In 2000, races other than white represent approximately 20% of the total ethnicity of Leland. The largest non-white group in Leland is African American (16.2%). Hispanic or Latino groups represent 4.4%, and American Indian and Alaskan Native and other races represent approximately 1.7% of Leland's total ethnicity.

2.3 PUBLIC SURVEY

As mentioned in Chapter 1, a public survey was conducted as part of the public involvement process. This survey, which is detailed in Appendix C, had 378 responses and provides valuable insight into the behaviors and needs of the residents of the Town of Leland. Highlights include:

- 🚲 The primary reason for bicycle usage is personal fitness/exercise, followed closely by leisure/recreation
- 🚲 Lack of facilities and narrow roadways were identified as the main obstacles that discourage people from cycling

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- Approximately 70% of respondents think that Leland does not have adequate bicycle facilities and feel that Leland will benefit if bicycle facilities are improved
- 74% of respondents support development policies that promote cycling
- 66% support public funding for improving bicycle accommodations in Leland
- 25% of respondents were not aware of safety and helmet regulations for riding their bike on public streets

These responses show that there is support for the funding and construction of bicycle facilities through developer regulations and public funding. While recreation and leisure were the greatest reasons that respondents indicated for cycling, it is still important to consider utilitarian trips. Finally, the responses indicate a need for education on bicycling rules and safety. The entire survey and details regarding each question can be found in Appendix C.

2.4 INVENTORY OF EXISTING CONDITIONS

As part of this project, a detailed roadway inventory and centerline mapping database was developed that was used as a base level mapping source for existing conditions. The data collection methodology was built on existing color orthophoto (2004) data from Brunswick County and included field mapping of required features using map-grade sub foot GPS. The following roadway characteristics were included in the data collection:

- Speed limits
- Roadway widths (Edge of pavement)
- Location and type of on-street parking
- Number of lanes
- Shoulder widths and type
- Lane widths
- Median type
- Curb and gutter locations
- Sidewalks
- Driveway intersection points
- Ditch lines

The centerline inventory data was processed and integrated into this Plan as a basemap resource.

As shown in **Figure 2.1**, the Town of Leland is split by two major transportation facilities, US 17 and US 74/76. US 17 is a four-lane median divided facility through the Town with access primarily provided at at-grade intersections. A super-street design (without pedestrian accommodations) provides access to retail and residential areas for approximately one mile through the Town. Traffic volumes just east of US 74/76 were reported to be 43,000 vehicles per day in 2007. US 74/76 is also a four-lane median divided facility through the Town, with access provided by one interchange at Lanvale Road. Traffic volumes on this facility were reported to be 25,000 vehicles per day in 2008.

The area along US 17 has emerged as the main commercial center for the Town. However, the area along Village Road remains a viable commercial center, with

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development continuing to occur, particularly in close proximity to the interchange with US 74/76 / US 17. There is also significant residential development along Village Road and Old Fayetteville Road. This area of Town is dominated by older residential developments, and is commonly referred to as “Old Leland.” Cyclists were observed traversing Village Road on several occasions, on what appeared to be utilitarian trips. As discussed later in this section, Village Road is planned to be upgraded to include wide outside lanes and a 5 ft. sidewalk. Within the surrounding residential developments, cyclists enjoy lower volume roadways, although connectivity is limited between some of the residential street.

Sandwiched between US 74/76 and US 17 are several large residential developments. These roadways typically carry lower traffic volumes and have wide or unmarked travel lanes, making them appropriate for recreational cycling. The largest issue with this area is the lack of connectivity across US 74/76 and US 17. Connectivity to “Old Leland” is provided only via the overpass at Old Fayetteville Road. Connectivity to the commercial areas south of US 17 is difficult for amateur cyclists due to the lack of pedestrian accommodations along US 17 in the section designed as a superstreet.

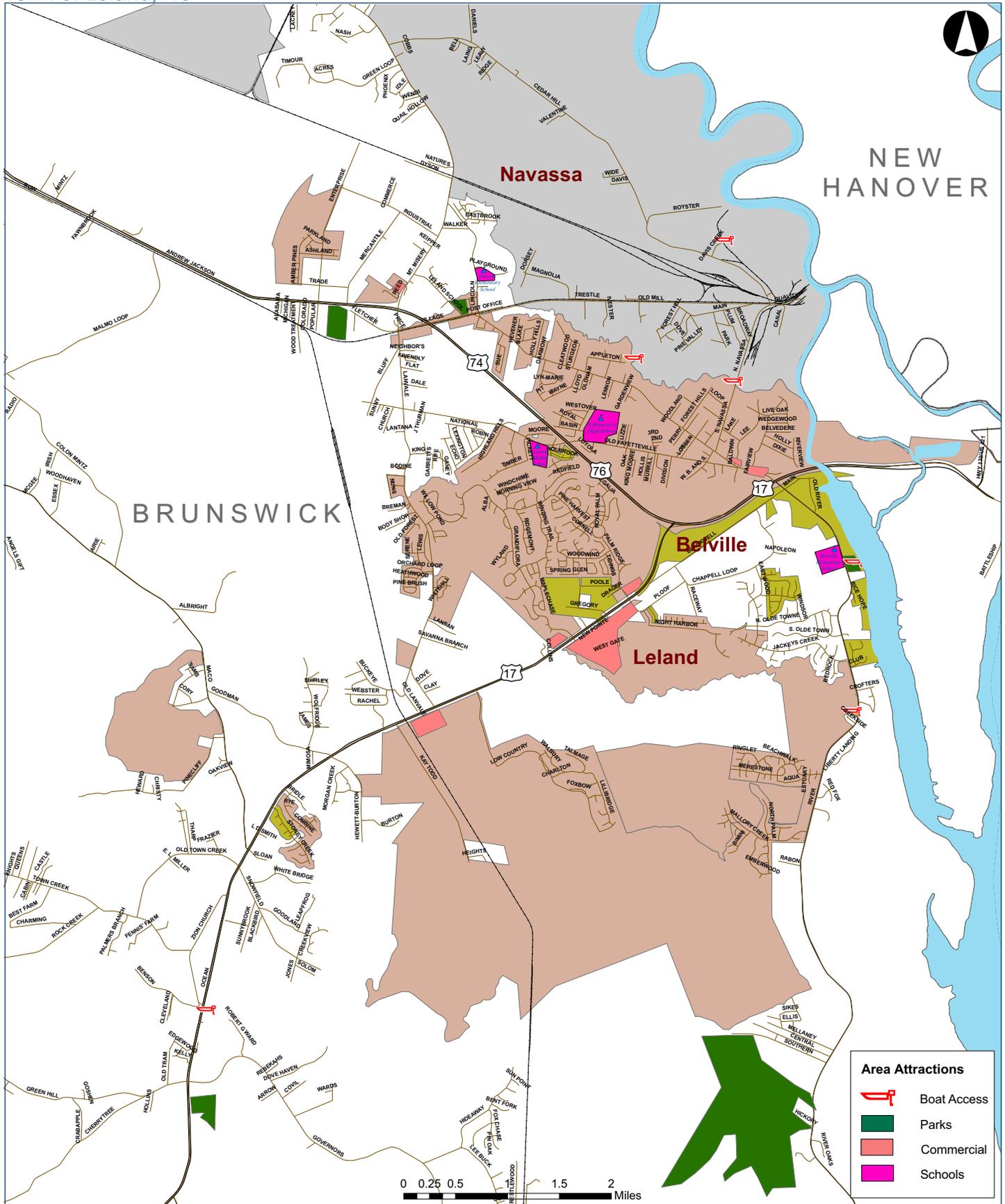
South of US 17 there are also several residential developments, including the partially constructed Brunswick Forest development. These lower volume roadways are also more accommodating to cyclists, although there is limited connectivity from the areas immediately south of US 17 to the developments along NC 133.

Local attractions possibly generating bicycle and walking trips in and around Leland are shown in **Figure 2.1**. These include the locations of boat access facilities, parks, commercial areas, and schools.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

Comprehensive Bicycle Plan

Town of Leland, NC



Local Attractions

LEGEND

- Primary Roads
- Other Roads
- Railroads
- County Boundary
- Leland
- Belville
- Navassa
- Water Bodies

Figure 2.1



Selected roadway information is shown in the table below:

Major Roadways Characteristics Within the Town									
Route	From	To	2007 Traffic Volumes (Vehicles per Day)	# of Lanes	Pavement Width (feet)	Notes	Shoulder	Sidewalk	Curb and Gutter
US 17	US 74/76	Wire Rd	43,000	4	27*	Superstreet section	Paved	-	-
US 17	Wire Rd	Lanvale Rd	--	4	27*	Limited access	Paved	-	-
Lanvale Rd	US 17	Village	5300-6300	2	22	Significant ditches close to roadway	Paved	-	-
Grandiflora Dr	US 17	Lanvale Rd	--	2	33	Low speed low volume residential roadway	-	Yes	Standard
Palm Ridge	Olde Waterford Way	Olde Village Circle	--	2	20	Low speed low volume residential roadway	-	Yes	Standard
Pine Harvest Dr	Olde Village Circle	Grandiflora Dr	--	2	20	Low speed low volume residential roadway	-	Yes	Florida
NC 133	Mallory Creek Dr	Blackwell Road	12000	2	30	High traffic volumes, higher speeds	-	-	-
NC 133	Blackwell Road	Village Rd	--	4	65	In interchange area	-	-	-
Village Rd	NC 133	Fairview Rd	28000	4	47	Commercial area	Paved	-	-
Village Rd	Fairview Rd	S. Navaassa Rd	--	3	34	Two way left turn lane	Paved	-	-
Village Rd	S. Navaassa Rd	Lanvale Rd	9800 - 6100	2	22	Mostly residential	Paved	-	-
Old Fayetteville Rd	Village Rd	Town Limits	4200	2	22	Provides access to North Brunswick HS and Leland MS	Paved	-	-
S. Navaassa Rd	Village Rd	Town Limits	5100	2	20	Narrow lanes	Paved	-	-

* Per Direction of Travel

2.5 CURRENT USAGE

No current bicycle count data that can be analyzed to determine current usage is available for the Town of Leland. However, recent observations by the Project Team and Town Staff during the Leland Bicycle Fest in June 2007, and numerous site visits to the Leland area indicate that bicycle usage exists. Most bicycle activity was observed along the Village Road and Old Fayetteville Road area. This is also evident by the bicycle and motor vehicle crash incidents that have been reported in these areas.

2.6 BICYCLE CRASH DATA

Bicycle crash data was collected from two available sources to analyze trends in crashes and to identify specific areas of concern. The Leland Police Department provided information on six reported bicycle/motorist crashes that occurred in Leland between 2001 and 2006. These crash locations are shown on **Figure 2.2**.

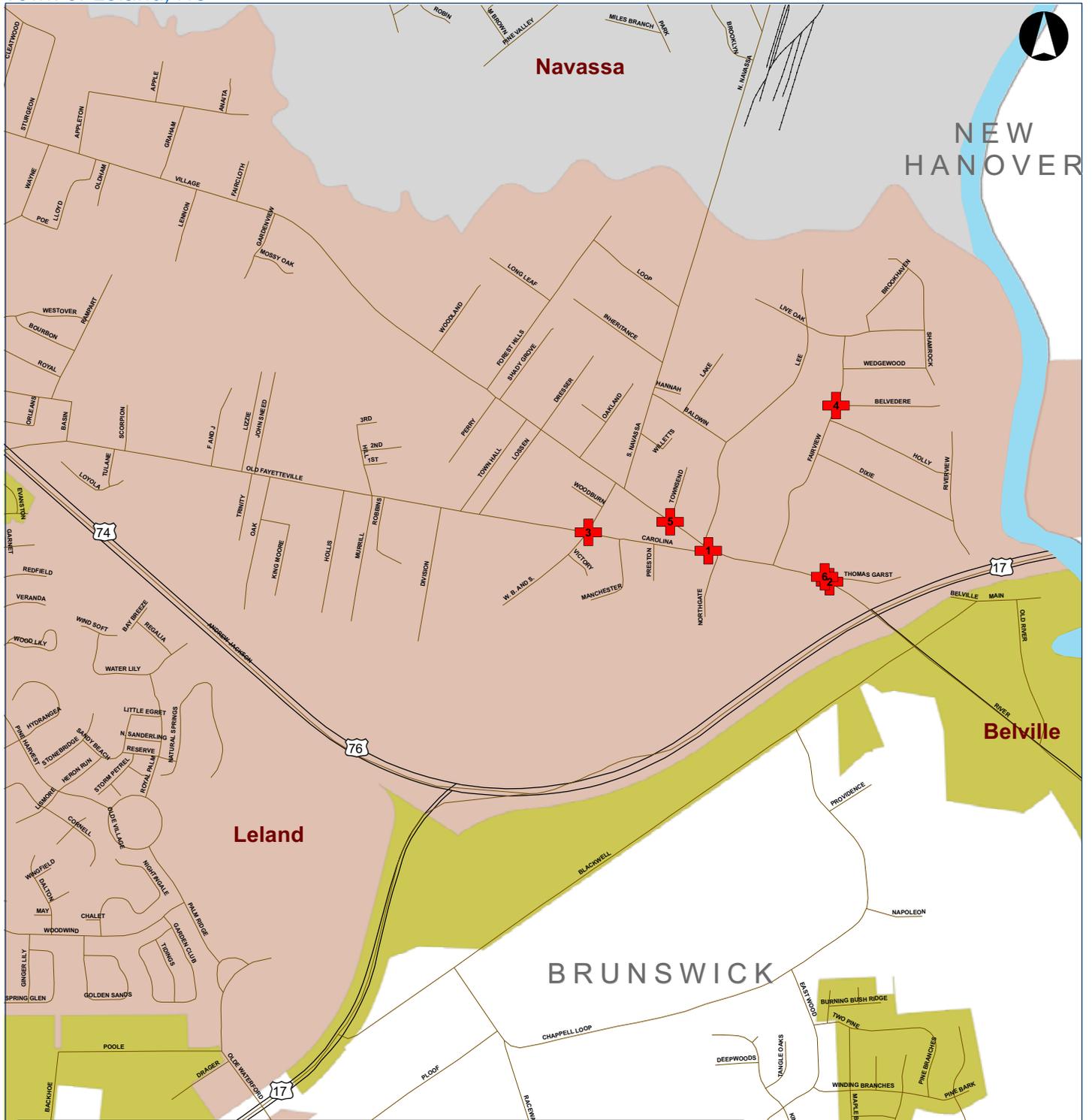
NCDOT's Division of Bicycle and Pedestrian Transportation link to the UNC Highway Safety Research Center's web based interactive bicycle crash database (<http://www.ncdot.org/transit/bicycle/safety/safety-crashdata.html>) was also analyzed to generate the following Exhibits. This database identified one additional incident that was not reported to the Leland Police Department. It is important to note that this database does not provide crash site locations.

According to the Leland Police Department, bicycle accidents occurred at the following locations. Note that 5 out of 6 crashes are located in the commercial area along Village Road.

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Comprehensive Bicycle Plan

Town of Leland, NC



Bicycle - Automobile Crash Analysis Summary 2001-2006

No:	Date of Crash	Time of Day	Crash Location	Level of Injury
1	August 5 2001	14:55	Village Rd and Old Fayetteville Rd	Possible
2	October 8 2001	22:53	Village Rd and Thomas Garst Lane	Evident
3	December 14 2001	22:59	Carolina Ave and WB&S Rd	Evident
4	March 24 2002	18:25	Fairview Rd and Belvedere Ct	Possible
5	October 28 2004	14:15	Village Rd and Walgreen Drug Store	Evident
6	July 2 2006	16:45	Village Rd and Thomas Garst Lane	No Injury

Source: Leland Police Department



Bicycle-Automobile Crash Location

- LEGEND**
- Primary Roads
 - Railroads
 - Leland
 - Navassa
 - Crash Location
 - Other Roads
 - County Boundary
 - Belville
 - Water Bodies

Figure 2.2

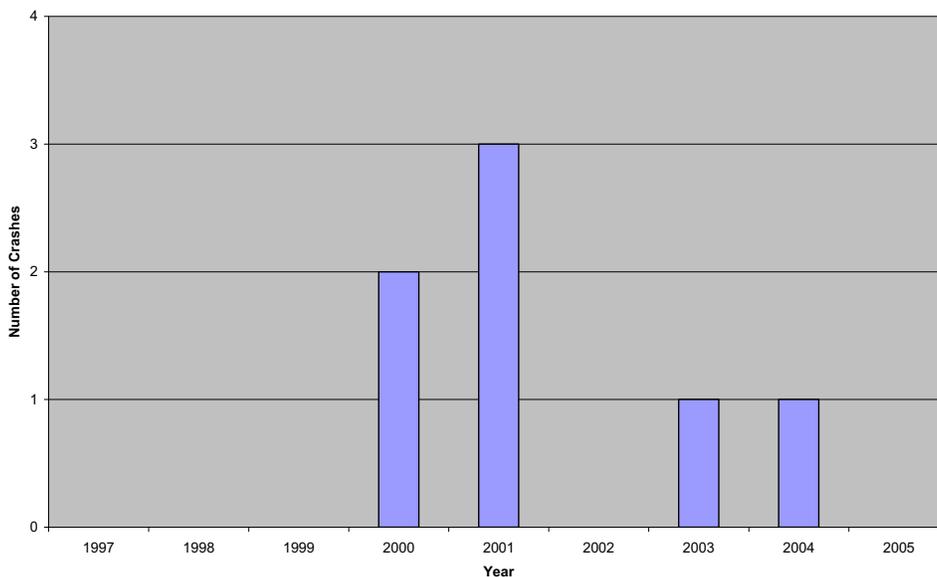


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5	October 28 2004	14:15	Village Road and Walgreen Drug Store	Evident
6	July 2 2006	16:45	Village Road and Thomas Garst Lane	No Injury

Source: Leland Police Department

Information on bicycle crashes in the Town of Leland collected by the UNC Highway Safety Research Center between 1997 and 2005 and available through their web based interactive bicycle crash database is illustrated in **Exhibits 2-1** through **2-6** below.

Exhibit 2-1: Total Bicycle Crashes by Year



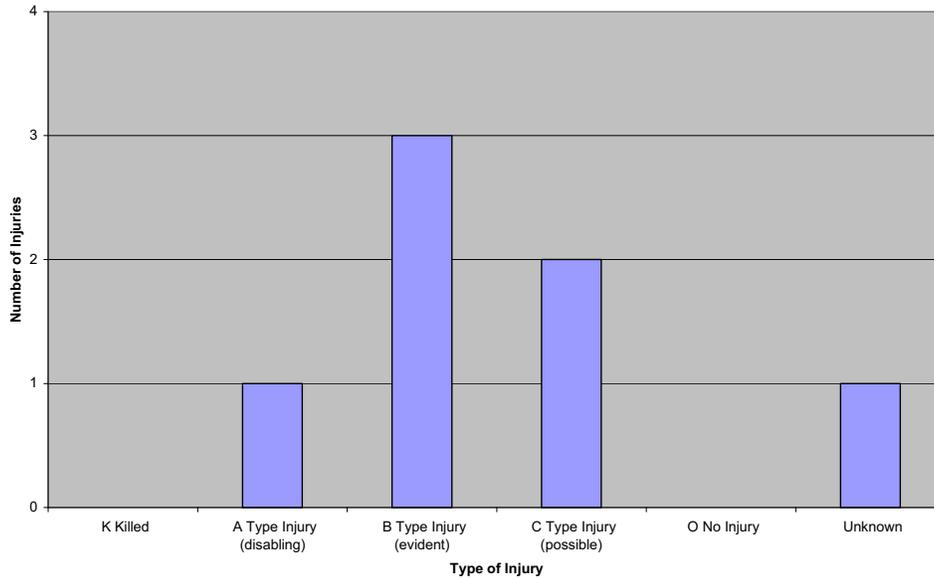
Source: UNC Highway Safety Research Center

The extent of injuries to bicyclists related to the reported crashes between 1997 and 2005 are shown in **Exhibit 2-2**. No fatalities were reported during this time period, although one crash was reported to result in a disabling injury.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



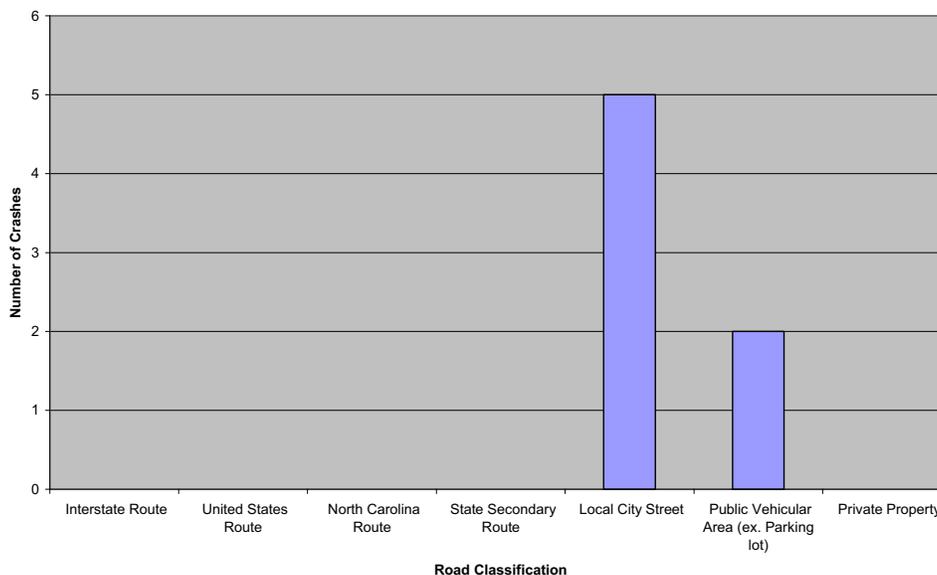
Exhibit 2-2: Bicycle Crashes by Type (1997-2005)



Source: UNC Highway Safety Research Center

Exhibit 2-3 indicates that all crashes between 1997 and 2005 occurred on local town streets or in public vehicular areas, such as parking lots.

Exhibit 2-3: Road Classification (Bicyclist Crashes 1997-2005)



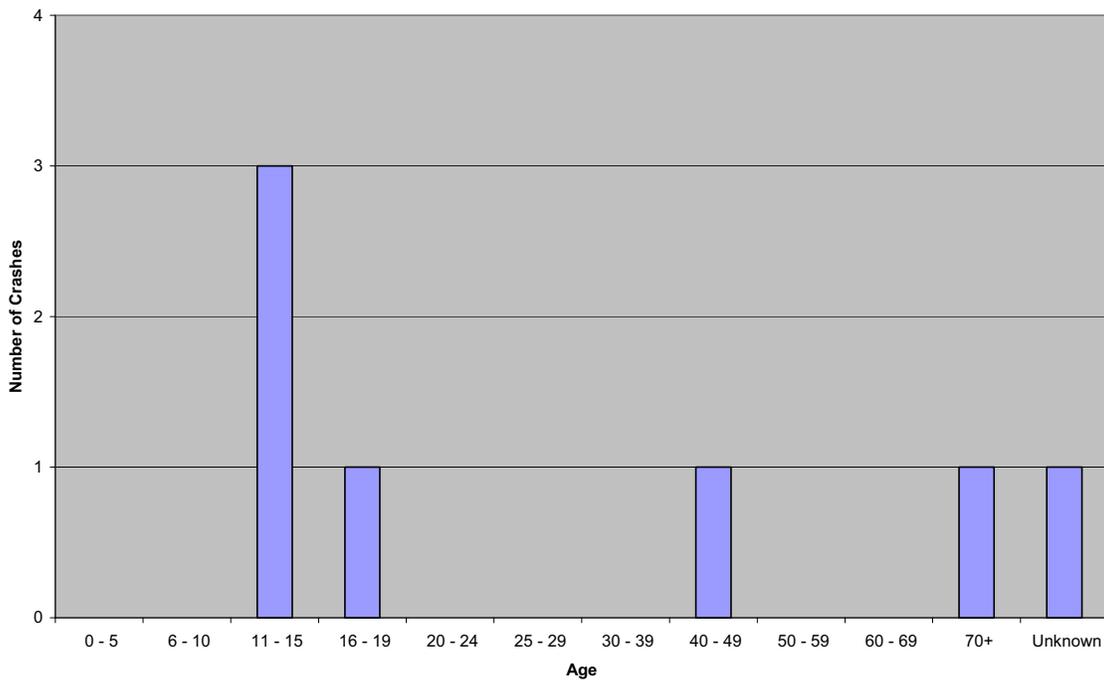
Source: UNC Highway Safety Research Center

The age of bicyclists involved in crashes is illustrated in **Exhibit 2-4**. Bicyclists between the ages of eleven and nineteen account for four out of seven of bicycle crashes occurring in Leland between 1997 and 2005. One might expect this since many teens are dependent on alternative transportation modes such as biking and walking.

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Exhibit 2-4: Crashes by Bicyclist Age 1997-2005



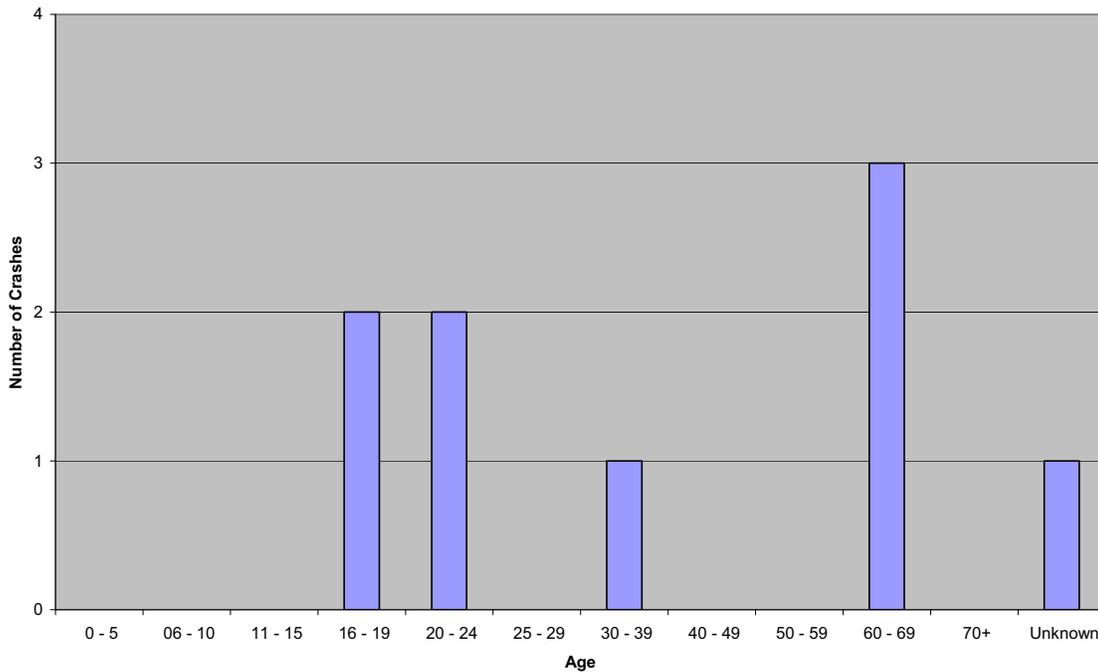
Source: UNC Highway Safety Research Center

Exhibit 2-5 indicates that motorists involved in bicycle collisions were primarily young or elderly. Four of the motorists involved in bicycle crashes in Leland were between the ages of sixteen and twenty-four while another three motorists involved in bicycle crashes were between the ages of sixty and sixty-nine. One motorist involved in a crash was between the ages thirty and thirty nine and one was an unknown age. This data supports the continued need to develop and expand bicycle safety and education programs aimed at younger and elderly drivers.

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Exhibit 2-5: Crashes by Motorist Age 1997-2005



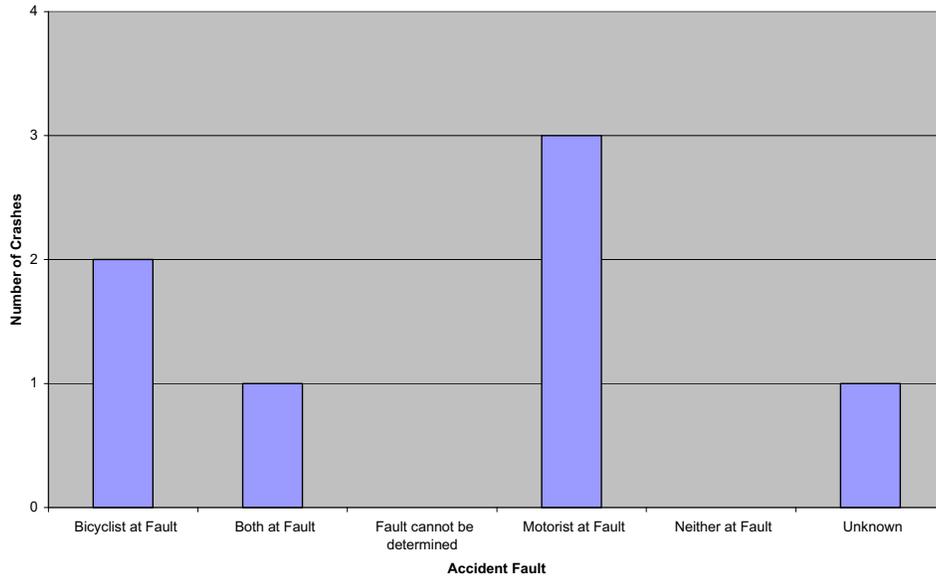
Source: UNC Highway Safety Research Center

As shown in **Exhibit 2-6**, three crashes were the fault of the motorist while in two other cases, the bicyclist was at fault. In one case, both the motorist and bicyclist were at fault. This is another result that supports the development of safety and educational programs that are directed at both motorists and bicyclists. A concentrated effort to educate both motorists and bicyclists on motor vehicle and road use laws should be a priority.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



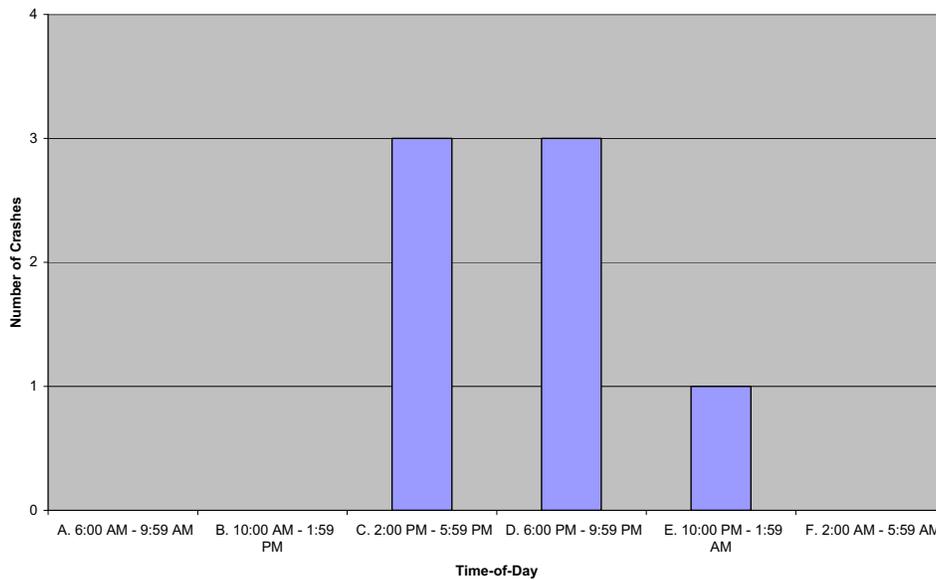
Exhibit 2-6: Accident Fault (Bicycle Crashes 1997-2005)



Source: UNC Highway Safety Research Center

Exhibit 2-7 indicates the number of bicycle crashes reported between 1997 and 2005 by the time-of-day when they occurred. The majority of crashes reported occurred during the late afternoon and early evening when visibility is reduced and it is more difficult for motorists to see bicyclists riding along the roadway. This data supports the need for developing educational programs for bicyclists and motorists to become more aware of bicyclist during times of limited visibility, as well as the need for bicyclists to ensure that they are highly visible and clothed in reflective clothing while riding along roads and streets.

Exhibit 2-7: Time of Day of Accidents (Bicycle Crashes 1997-2005)



Source: UNC Highway Safety Research Center

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Additional crash data is available through the annual WMPO crash report at <http://www.wmpo.org/traffic.html> and can be used as a resource for data on bicycle and pedestrian crashes. This report can be used by the planning staff in the future to identify problem areas that may need to be addressed by the Town.

2.7 EXISTING PLANS, PROGRAMS AND POLICIES

The Town of Leland currently possesses several approved planning documents, many of which have been integrated into this Plan. This section evaluates these plans, programs and policies that impact the bicycle transportation system in Leland. Highlights of these existing planning elements are listed below.

Parks and Recreation Open Space Plan

The Town of Leland is in the process of developing a Parks and Recreation Open Space (PROS) Plan. The purpose of this Plan is to identify future parks and open space facility needs, programs and initiatives. The Plan is expected to be completed in late 2008. As the PROS plan is being completed at the same time as this bicycle plan, the plans do share common elements, particularly the connections between various areas within the Town.

Greenway Plan

Brunswick County has developed a Greenway/Blueway Master Plan which will encompass the Town of Leland. Facilities that will be provided under the plan include additional parks, recreational areas, and water access points. The major goal of the master plan will be to connect Brunswick County to the East Coast Greenway while being multi-modal (boat, bike, and pedestrian).

An initial meeting has been held regarding a potential greenway between the Brunswick County Nature Park off of Highway 133 to the area of Leland just south of Highway 17. This meeting was focused on outlining a preliminary route and determining landowners that should be contacted regarding the greenway, as a cooperation of local landowners would be imperative for the creation of the greenway.

Comprehensive Plan

The Comprehensive Plan awaiting adoption by the Town includes the Comprehensive Plan Goals and Objectives which will address bicycle-friendly development policies and recommendations to promote all new developments to accommodate both bicyclists and pedestrians.

Collector Street Plan

In May 2005 the Wilmington Urban Area Metropolitan Planning Organization (WMPO) adopted the US 17 / NC 133 Collector Street Plan. The purpose of this plan was to identify a framework of ideas and a plan for the transportation network along US 17 and NC 133. As part of this planning process, the citizens of the area identified a need for biking and walking paths and identified the lack of shoulders along NC 133 as a problem for bicyclists and pedestrians. This plan recommended that the local municipalities and the County integrate future bikeway, greenway, and trail networks with the Collector Street Plan to create an interconnected network and that the local agencies pursue NCDOT Enhancement grant funding to install bike lanes on existing facilities.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



The Collector Street Plan recommends various cross sections for implementation on existing and future Town streets. Residential and Commercial Collector Type B cross sections include on-street accommodations for cyclists and should be considered for future roadways consistent with this plan.

Grow Greener in Leland Report

The Grow Greener in Leland Report was presented to the Town in December 2005. The purpose of this report was to provide a diagnosis of development standards and to provide near and long term recommendations. This report identified the provision of bicycle facilities as a priority and recommended requiring pedestrian and bicycle connections between subdivisions and bicycle parking in parking lots.

Roadway Project Plans

There are several NCDOT Transportation Improvement Program projects in and near the Town of Leland. R-4002 involves widening of Village Road between US 17 and Old Fayetteville Road and includes wide outside lanes. This project is planned for construction in 2009. R-4063 involves the widening of Village Road from South Navassa Road to Lanvale Road, planning and design is currently ongoing for this project. Right-of-way acquisition is planned for 2012 with construction occurring between 2013 and 2015.

R-3601 includes the replacement of the decks on the US 17/74/76 bridge over the Alligator River and the construction on an additional northbound and southbound lane. Right-of-way acquisition and utilities work is planned to occur in 2011 with construction beginning in 2012

R-2633A, the Wilmington Bypass is planned to connect I-40 in New Hanover County with US 17, just south of NC 87 and be a four lane divided freeway on new location. Construction is planned for 2012.

U-4738, the Cape Fear Skyway, is planned to connect US 17 to Independence Boulevard/Carolina Beach Road Intersection with a four lane divided freeway on new location. This project is an extension of R-2633A and is currently an unfunded project.

One bridge project is planned for the area, B-4928 the replacement of the Old Mill Road bridge over Mill Creek. This is currently an unfunded project.

The intersection of US 74/76 and Old Fayetteville Road is planned to be converted to a grade separated interchange as part of project U-3337. The planning and design is in progress for this project, with right-of-way acquisition planned for 2012. The construction for this project is currently unfunded.

Existing TIP projects are shown in **Figure 2.3**.

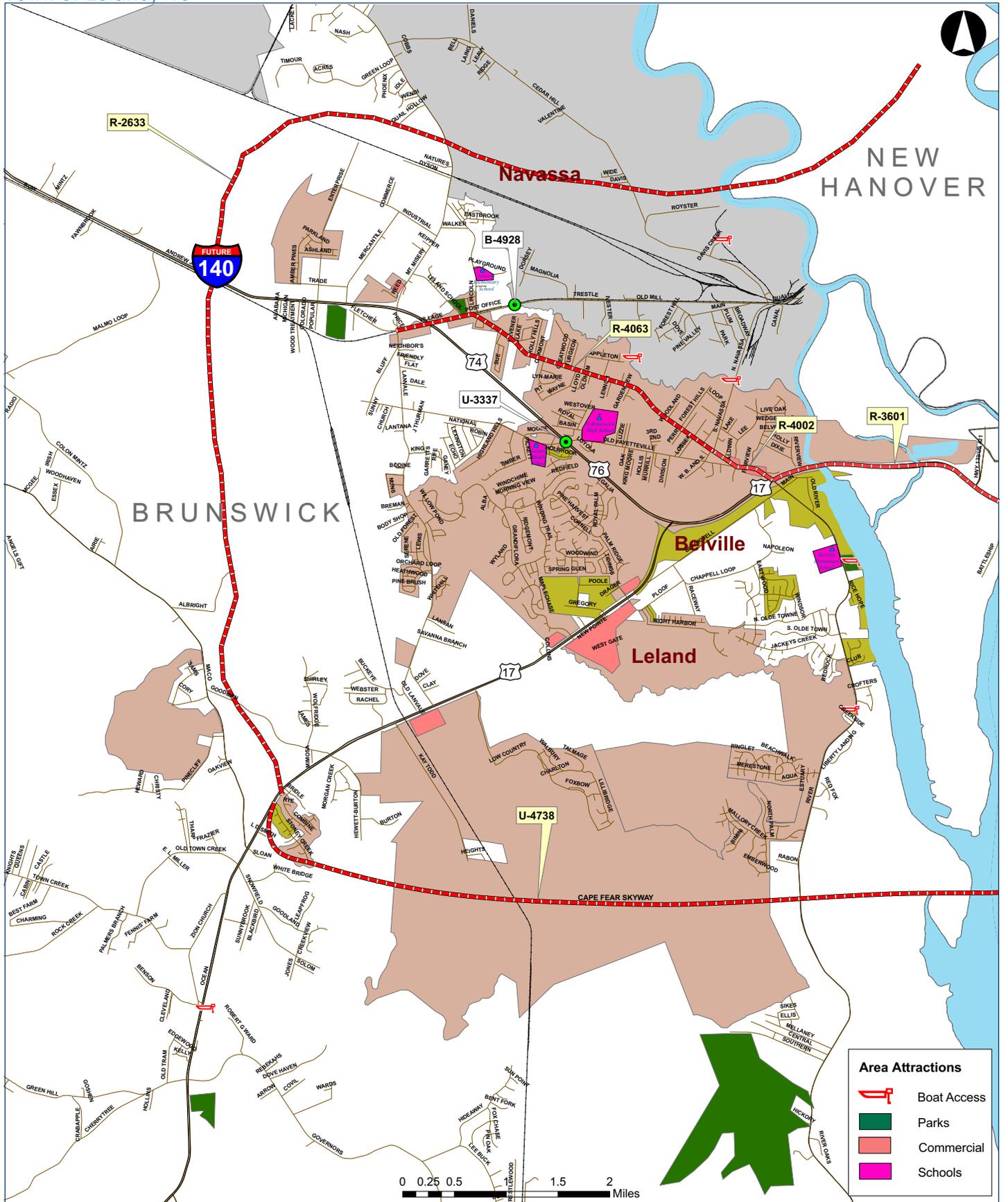
CAMA Land Use Plan

The Coastal Area Management Act requires each of North Carolina's 20 coastal counties to have a local land-use plan in accordance with guidelines established by the Coastal Resources Commission. The most recently approved plan for the Town is the 1999 plan.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

Comprehensive Bicycle Plan

Town of Leland, NC



NCDOT TIP Projects

LEGEND

Primary Roads	Railroads	Leland	Navassa	TIP Projects
Other Roads	County Boundary	Belville	Water Bodies	

Figure 2.3



There were no formal Town programs specifically aimed at cyclists identified during the performance of this study

2.8 EXISTING LAWS, REGULATIONS, AND POLICIES

Bicycle and Bikeway Act of 1974

(http://www.ncdot.org/transit/bicycle/laws/laws_bikewayact.html)

This Act marked the start of North Carolina establishing a state bicycle program which would later become a national model for other states. The legislation established the following provisions: supported a bicycle as a vehicle, defined bicycle facilities as a “bona fide highway purpose”, designated NCDOT to carry out the provisions of the article, as well as established the North Carolina Bicycle Committee.

Child Bicycle Safety Act of 2001

(http://www.ncdot.org/transit/bicycle/laws/laws_helmet.html)

In addition to the general laws that bicyclists must abide by, the Child Safety Act of 2001 requires that all bicycle operators under 16 years of age must wear a bicycle helmet on public roads and all child passengers under 40 pounds or 40 inches tall must be seated and secured in a child seat of a bicycle trailer.

Safe Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU)

As stated in the Federal Highway Administration (FHWA) guidance on mainstreaming nonmotorized transportation (<http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm>):

SAFETEA-LU confirms and continues the principle that the safe accommodation of nonmotorized users shall be considered during the planning, development, and construction of all Federal-aid transportation projects and programs. To varying extents, bicyclists and pedestrians will be present on all highways and transportation facilities where they are permitted and it is clearly the intent of SAFETEA-LU that all new and improved transportation facilities be planned, designed, and constructed with this fact in mind.

While these sections stop short of requiring specific bicycle and pedestrian accommodation in every transportation project, Congress clearly intends for bicyclists and pedestrians to have safe, convenient access to the transportation system and sees every transportation improvement as an opportunity to enhance the safety and convenience of the two modes. “Due consideration” of bicycle and pedestrian needs should include, at a minimum, a presumption that bicyclists and pedestrians will be accommodated in the design of new and improved transportation facilities. In the planning, design, and operation of transportation facilities, bicyclists and pedestrians should be included as a matter of routine, and the decision to not accommodate them should be the exception rather than the rule. There must be exceptional circumstances for denying bicycle and pedestrian access either by prohibition or by designing highways that are incompatible with safe, convenient walking and bicycling.

NCDOT Board of Transportation Resolution

(http://www.ncdot.org/transit/bicycle/laws/laws_resolution.html)

On September 8, 2000 the North Carolina Board of Transportation adopted a resolution recognizing bicycling and walking as a critical part of the state’s transportation system

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and the making the commitment to integrating these elements into the long-range transportation system.

NCDOT Bicycle Policy

(http://www.ncdot.org/transit/bicycle/laws/laws_bikepolicy.html)

The NCDOT Bicycle Policy, initially developed in 1978 and updated in 1991 clarifies the responsibilities regarding the provision of bicycle facilities along the state-maintained highway system. All bicycle improvements undertaken by NCDOT are based on this policy.

NCDOT Administrative Process for Accommodating Greenways

(http://www.ncdot.org/transit/bicycle/laws/laws_greenway_admin.html)

In 1994, in an effort to ensure that existing or planning greenway corridors are not severed by transportation projects, NCDOT adopted administrative guidelines for considering greenways and greenway crossings during planning for highway or other projects. These procedures will be important to consider as planning progresses on the Leland greenway.

2.9 EXISTING TOWN POLICIES AND INSTITUTIONAL FRAMEWORK

Existing Local Ordinances

There are no existing Town ordinances that deal specifically with bicycles or bicyclists.

Subdivision design standards are included in Section 22-144 of the Town Municipal Code. This section states the need for vehicular and pedestrian circulation and the control and safety of street traffic. In addition, Section 22-145 details the specifications needed for appropriate street design for both thoroughfares and subdivisions, with the general requirement that roadways be designed in accordance with NCDOT, and AASHTO standards.

Section 30-313 that deals with planned unit developments states that ensured recreation/open space requires that if dedicated land is not contiguous and/or does not border an existing public street or easement that it be connected by a path between 30 and 60 feet in width.

Staffing and Committees

The Town of Leland does not currently have a dedicated bicycle coordinator on staff. The Leland Planning Department and Department of Parks, Recreation, and Environmental Programs staff will be responsible for the implementation of bicycle related projects identified in this plan. The Town of Leland Planning Board is made up of eight board members who in addition to the eight board members have partnerships with the Wilmington MPO and Brunswick County in identifying and developing transportation projects.



Chapter 3

RECOMMENDATIONS



WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation



Chapter 3 - Recommendations

The recommendations developed as part of this Comprehensive Bicycle Plan fall into three main categories; Programs, Policies, and Facilities. The Program recommendations deal primarily with education and enforcement of bicycle laws and the promotion of the Town and bicycling within the Town. The Policy recommendations are aimed at helping the Town establish new policies and laws to handle the large amount of development that is occurring in the area to ensure that the appropriate facilities and connections are being provided for cyclists. Finally, the Facility recommendations are aimed at the establishment of bicycle facilities and routes within and around the Town and new connections between existing Town facilities that will open portions of the Town to travel via bicycle.

3.1 PROGRAMS

Developing not only an effective bicycling facility, but a safe one, requires a fully comprehensive strategy that includes extensive education, enrichment, enforcement, and engineering. Recommended programs for promotion of bicycling include the following:

Promotion

The promotion of existing and future facilities and services, as well as the promotion of Leland as a “bicycle friendly community” may play an important role in achieving the vision set forth by the Bicycle Plan Steering Committee. To achieve this vision, WSA recommends the following:

-  **The Town’s web site should include a page (or pages) dedicated to bicycle and pedestrian travel.** The Web site could provide information such as route maps, points of interest along routes, route conditions, bicyclist and pedestrian traffic laws and safety tips, community events, links for local bicycle and pedestrian groups, and other related links. Special attention should be paid to educating cyclists on procedures to negotiate (cross) the super-street on US 17.



-  **A multi-lingual bicycle route map that indicates the location and types of bicycle facilities is a useful tool for encouraging bicycle ridership.** A series of biking loops proposed later in this chapter should be displayed on the map with their approximate length and estimated difficulty. The map may be designed to define the type of bike facility including on road facilities (bike lanes, bike shoulders, wide-outside lanes, and shared-use roadways) and greenways to accommodate all users. Inclusion of pertinent laws and safety information on the map is also suggested. The Town should also work with the Wilmington Urban Area MPO (WMPO) to ensure that local routes are included in the Wilmington, North Carolina Metropolitan Area Bicycle Maps produced by the WMPO.

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- 🚲 **The Town should promote the Wave Transit Brunswick Connector shuttle to local residents.** The entire Wave Transit fleet is equipped with bicycle racks that can accommodate two bicycles. Additionally, existing and future bus stop locations should accommodate cyclists through the provision of bicycle racks and/or other facilities, particularly the existing and future commercial areas along US 17. The Brunswick Connector shuttle travels through Leland at 1-hour intervals connecting Leland with Wilmington and surrounding areas.



- 🚲 **The Town should be proactive in highlighting and promoting scenic areas and public recreational facilities with bikeways.**
- 🚲 **The Town should continue to host the “Leland Bicycle Fest” on an annual basis,** possibly in conjunction with local groups such as the Cape Fear Cyclists, to promote cycling in the Town, to educate the public on cycling, and to gather additional input from the public regarding existing and future cycling facilities. The Town should consider holding this event during the school year to boost public participation.



- 🚲 **A way-finding system for bicyclists and pedestrians should be established by the Town,** including kiosks that provide route maps, transit information, tourist information, directions to destinations and end-of-trip facilities.
- 🚲 **The Town should participate in national activities,** such as:
Walk to School Day (www.walktoschool.org) – A national day to “bring community leaders and children together to create awareness of the need for communities to be walkable,”
Bike to Work Day (www.bikeleague.org/rpograms/bikemonth) – A national day promoted by the League of American Bicyclists to promote cycling in local communities
Car Free Day (www.worldcarfree.net/wcfd) - A national day that encourages people around the world to “get together in the streets, intersections, and neighborhood blocks to remind the world that we don’t have to accept our car-dominated society,”
Walking School Buses and Bicycle Trains (www.saferoutesinfo.org/guide/encouragement/walking_school_bus_or_bicycle_train.cfm) – Encourages groups of students accompanied by adults to walk or bicycle a pre-planned route to school.

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- 🚲 **The Town should establish a Bicycle Registration Program** that encourages bicyclists to register their bicycles with local law enforcement agencies to aid in their recovery in the event of theft.



- 🚲 **The Town should support Safe Routes to School (SRTS) efforts** that include educational and incentive programs to encourage more students to bicycle or walk to school. The NCDOT SRTS program includes a grant reimbursement program to fund infrastructure and non-infrastructure projects, a program to award consultant services to develop Action Plans, spot improvement project funds administered by the NCDOT Highway Divisions, and facilitator support for presenting community-based SRTS workshops at elementary and middle schools. This could be a potential funding source for spot improvements around Leland Middle School and perhaps funding for some of the connections recommended below.



Education

The education of citizens, Town Leaders, Town Staff, and local police is an important component of developing a viable, convenient, and particularly safe transportation system.

- 🚲 **The Town should work to improve bicycle handling and operational skills through bicycle events**, particularly in conjunction with the continuation of the “Leland Bicycle Fest” and other events such as “Founders Day”.
- 🚲 **The Town should coordinate with local bicycle groups to provide informational workshops** to educate both motorists and cyclists.
- 🚲 **The Town should work with local churches, schools, youth groups, Cub Scout troops, etc. to promote the material provided by NCDOT.** The NCDOT Division of Bicycle and Pedestrian Transportation have developed several resources to improve bicycle safety and to educate bicycle riders. The following key resources are available online at the NCDOT Division of Bicycle and Pedestrian Transportation Resources and Links webpage:
 - 🚲 Pamphlets and Handouts
 - 🚲 Tests
 - 🚲 Curriculum for Teachers
 - 🚲 Manuals/Guidebooks/Information Sheets
 - 🚲 Posters
 - 🚲 Video Library

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http://ncdot.org/transit/bicycle/safety/safety_materials.html

Of particular use is the Bicycle Smart Safety Tips. In North Carolina, bicycles are treated as vehicles and share the right and duties as all other vehicles on the road. Cyclists are expected to be responsible and obey road signs and rules for interacting safely with other roadway users. A general Safety Tips poster is available through the NCDOT Division of Bicycle and Pedestrian Transportation website that explains the legal requirements for cyclists and offer guidelines for preventing crashes and protecting the rider in traffic. The key safety tips are:

- Bicycle = Vehicle
- Basic Traffic Riding Techniques
- Bike Handling Skills
- Share the Road
- Wear a Helmet
- Dealing with Hills



<http://www.ncdot.org/transit/bicycle/laws/resources/BikePedLawsGuidebook-Full.pdf>

Another great resource is the Basics of Bicycling Curriculum developed by NCDOT DBPT and the National Center for Bicycling and Walking. This curriculum includes 7 lessons covering high risk situations, getting ready to ride, bike handling skills, and traffic skills, and includes all instructions for laying out the course and conducting the lessons. More information is available at: http://www.ncdot.org/transit/bicycle/safety/programs_initiatives/curriculum.html



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- **The Town should focus a major part of its education efforts on visibility.**
The majority of crashes reported in the Town between 1997 and 2005 occurred during the late afternoon and early evening when visibility is reduced and it is more difficult for motorists to see bicyclists riding along the roadway. North Carolina law states that when riding at night, all bicycles must be equipped with proper front and rear lighting equipment, specifically for the front, a lighted lamp visible from a distance of at least 300 feet and for the rear, a red reflex mirror or lamp that is visible from a distance of at least 200 feet.
- **The Town should continue to educate its staff (such as planning, engineering, and law enforcement) regarding bicycle and pedestrian rules, regulations, and safety.** *A Guide to North Carolina Bicycle and Pedestrian Laws* is just one of the NCDOT publications that can help local police officers and Town Staff interpret the law correctly. This publication can be easily stored in police officer's vehicles as well as in police bike bags.

Enforcement

Enforcement is also an important component of a comprehensive transportation system, and is very important to protect cyclists and plays a role in educating cyclists and motorists on rules that pertain to cycling.

- **The Town should promote increased enforcement of bicycle-related violations on the part of both motorists and bicyclists,** particularly in the commercial centers along Village Road.
- **Law enforcement personnel should pay particular attention to motorists who intentionally attempt to distract bicyclists as they pass.**
- **Animal control should be promoted in the Town to protect cyclists from attacks by stray animals.**
- **The Town should establish a Bicycle Enforcement Hotline** which would allow residents to call in and speak with a live operator or leave a message about any illegal activity that they witness.

Maintenance

A bicyclist rides on two very narrow, high-pressure tires. What may appear to be an adequate roadway surface for automobiles (with four wide, low-pressure tires) can be treacherous for cyclists. Fairly small rocks can deflect a bicycle wheel, a minor ridge in the pavement can cause a spill, and a pothole can cause a wheel rim to bend. Wet leaves are slippery and can cause a bicyclist to fall. The gravel that gets blown off the travel lane by vehicular traffic accumulates against the curb, in the area where bicyclists ride. Bikeways will always be subject to debris accumulation and surface deterioration. Thus, it is important to properly maintain existing facilities. Adequate maintenance will help to protect the investment of public funds in bikeways, so they can continue to be used safely. Poorly maintained facilities will become unusable and may become a legal

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liability. Cyclists who continue to use them may risk personal injury and equipment damage. Others will choose not to use the facility at all.

- **The Town should develop a maintenance request program** to allow the Town to respond to requests for small-scale and low-cost maintenance activities, such as sweeping, repairing surface problems, and replacing unsafe gratings
- **The Town should require that cuts be back-filled in bike lanes** to the level of the roadway as an exaggerated hump will not get packed down by bicycle traffic as one would by vehicular traffic
- **When an existing sidewalk, pedestrian path or bicycle facility is closed for construction or maintenance reasons, an adequate detour route should be established.** Consider closing on-street parking or a lane of traffic as a temporary pedestrian or bicycle route or establish a temporary crosswalk to a walkway or bike lane on the other side of the street

Significant information is available from NCDOT DBPT safety and education website at http://www.ncdot.org/transit/bicycle/safety/safety_intro.html.

3.2 POLICIES

As discussed earlier, the Town of Leland is experiencing a large amount of growth in both the residential and retail sectors. The establishment of sound, reasonable development policies can be a mechanism for ensuring that adequate bicycle facilities are provided as the Town grows. However, it should be noted that the Town cannot rely solely on new developments to provide bicycle facilities. These policies must be accompanied by an investment by the Town in bicycle facilities and connections, as described in Section 3.3.

- **Accommodation for cyclists should be integrated into all new development and roadway planning, design, and construction projects.** To truly make Leland a Town where bicycling is a viable transportation choice, all developments and roadway projects should include accommodation for cyclists. The facilities required of these developments should be consistent with the goals of this plan and appropriate for the developments. For example, a small specialty retail development may only need to provide bicycle parking facilities, while a large commercial development should provide a larger amount of parking including end-of-trip facilities such as water fountains and lockers. Additionally, roadway projects should emphasize complete street design and accommodate all modes of travel and include the appropriate level of bicycle accommodations consistent with this plan.
- **The Town should adopt design standards for bicycle facilities in Chapter 22 of the Town’s code,** to ensure safety and consistency in facility design and lighting. Examples of these design standards are shown in Chapter 4.0.
- **The Town should develop a roadway design manual.** This manual should include provisions for bicycle-friends streets. This guideline will also state the

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Town's desire for the type of roadway (ie: paved shoulder, curb and gutter, etc) and will help in determining the appropriate type of bicycle treatment.

- **The Town should consider the unique scenic vistas available for viewing when developing new bike facilities.** Consider both the view of nature from the bicycle facilities and view of the facilities from the natural areas
- **Bicycle parking standards for new developments should be established, in the land development code. Example standards are as follows:**
 1. Public buildings - Provide bike rack spaces for at least five percent of all employees
 2. Parking garages, park-and-ride lots – Provide bike rack and bike locker spaces equivalent to at least five percent of the vehicle parking capacity.
 3. Greenway trail heads – Provide at least 15 bike rack spaces.
 4. Community Centers – Provide bike rack spaces equivalent to at least 15 percent of the required number of vehicular parking spaces.
 5. Parks – Provide bike rack spaces at a rate of 15 spaces per acre. Parks over five acres in size should be evaluated to determine if additional bicycle parking is needed.
 6. Schools – Provide one bike rack space for every 20 students.
 7. Businesses – Provide one bike rack space for every 50 employees.
- **The Town should implement a plan to provide end-of-trip facilities,** such as bicycle parking, showers, restrooms, and personal lockers at major activity centers. For new developments, these facilities can be required to be provided by the developers. In areas with existing developments, the Town could partner with local retailers and organizations to provide these facilities, such as an “Adopt a Bike Rack” program. Some communities utilize similar programs to team with local artists to provide public art that serves as functional bike racks.
- **The Town should require greenway or sidewalk connections between cul-de-sac termini and nearby roadways and developments.** The Town should require greenway or sidewalk connections between adjacent commercial/office and developments and between residential neighborhoods and nearby activity centers, such as shopping centers, schools, parks, employment centers, and other destinations. These connections should be made to allow users to move throughout the town without having to enter a vehicle, as well as to promote more recreational opportunities by opening larger areas of the town to non-motorized travel. This can be accomplished by changes to the land development code.
- **The Town should require developments located in the vicinity of a planned greenway to set aside land for the development of the greenway or a connection to the greenway.**
- **The Town should encourage mixed-use, pedestrian-oriented developments.** These developments allow residents to access retail, office, and residential spaces without the use of a motorized vehicle. The benefits of these developments are well documented and can be used to mitigate the impacts of new developments and improve personal and environmental health.

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- The Town should allow alleys for vehicular and service access in pedestrian-oriented residential developments. The frontage streets in these types of developments should be designed to be pedestrian and bicyclist-friendly. Features such as medians, street trees, traffic calming techniques and devices, sidewalks, and bicycle facilities should be incorporated into the frontage street designs. Other features, such as bicycle-friendly inlet grates and adequate lighting, should also be utilized.

3.3 FACILITIES

As discussed above the Town cannot rely solely on new developments to provide bicycle facilities. These policies must be accompanied by an investment by the Town in bicycle facilities and connections. Given the proximity of the Town of Leland with the Towns of Belville and Navassa and the rate at which the Town of Leland is expanding into Brunswick County, coordination with adjoining communities, the County, regional planning agencies, and NCDOT is of paramount importance to ensure that future bicycle facility plans are compatible.

Detailed cost estimates are provided in Appendix D and can be recalculated at a later date if desired, utilizing updated unit cost prices.

Loops

To provide safe, usable, and attractive bicycle facilities, the Town of Leland should strive to develop and promote the following routes inside and immediately adjacent to the Town. These routes are shown on **Figure 3.1**. Please note that detailed cost estimates are included in Appendix D.

1. Village Road Loop (3.4 miles)
 - a. Navassa Road
 - b. Village Road
 - c. Old Mill Road

This loop would provide access to the Town Hall and its recreation opportunities, the Senior Center, Leland Community Park, and commercial areas on Village Road. Access to the planned non-motorized boat access at Appleton Way and the off-road bicycle facilities in Navassa located along Old Mill Road north of Leland would be provided. Improvements needed on this Loop are primarily related to the provision of a four-foot wide paved shoulder on Navassa Road and Old Mill Road suitable for bicycle use, and the currently planned multi-use path on Village Road (TIP R-4063). One current issue is the non-bike-friendly bridge on Old Mill Road, but this is currently planned to be replaced as part of project B-4928. However, the newly constructed bridge on Navassa Road over Sturgeon Creek only provides a three-foot offset and insufficient railing height, which may necessitate the placement of Share the Road signs at this location, as cyclists may need to enter the travel lane at this location. The completion of this Loop will require coordination with Brunswick County and the Town of Navassa. Approximate in-town cost – \$1,300,000.00

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2. Old Leland Loop (3.61 miles)
 - a. Village Road
 - b. Wayne Street
 - c. Proposed New Connection between Wayne Street and Royal Street
 - d. Royal Street
 - e. Rampart Street
 - f. Old Fayetteville Road
 - g. Lossen Road
 - h. Town Hall Drive

This Loop would provide travel around the core area of Leland, commonly known as “Old Leland” and would provide access to the commercial areas around Village Road, the Town Hall campus, and North Brunswick High School. The completion of this loop depends heavily on the construction of a connector (shown of **Figure 3.5**) between Village Road and Old Fayetteville Road that must traverse Sturgeon Creek via a bridge which could potentially be a significant cost and permitting constraint, as well as the planned improvements to Village Road as part of R-4063. A four-foot wide paved shoulder suitable for bicycle use is needed along Old Fayetteville Road, coupled with the multi-use path on Village Road planned as part of R-4063. The remaining roadways carry small volumes of traffic and should accommodate cyclists with their cross section. Approximate cost for this loop is approximately \$1,900,000.00, which includes the construction of a wooden bridge to serve as the connector. This cost includes improvements along Village Road, which could be incorporated into the costs for the Village Road Loop.

3. Cedar Hill Loop (0.76 miles)
 - a. Cedar Hill Road
 - b. Mt. Misery Road
 - c. Old Mill Road

While this Loop lies almost exclusively outside of the Town boundaries, many cyclists have indicated that this is an excellent bicycle route. The Town should encourage Brunswick County, NCDOT, and the Town of Navassa to improve the facilities by providing 4’ paved shoulders on this loop and to incorporate this loop with the Village Road Loop and Old Lanvale Road. Special concerns for this loop include the need for rubberized flangeway fillers at the railroad crossings on Mt. Misery Road and Village Road (Village Road may require additional shoulders to allow cyclists to cross the railroad tracks at a 90 degree angle) and the presence of ditches in several locations which hinder the ability to provide adequate shoulders. TIP project R-4063 is located on this route. Approximate cost in-town for paved shoulders is approximately \$300,000.00.

4. Chappell Loop (5.34 miles)
 - a. Blackwell Road
 - b. NC 133 (River Road)
 - c. Chappell Loop Road
 - d. Various Neighborhood Roads

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This Loop connects central Leland with the Brunswick River Park and would compliment the park by providing a bicycle route near the park facilities and includes the provision of wide paved shoulders on NC 133. If possible, a connection should be made between North Olde Towne Wynd and Night Harbor Drive to create a larger Loop as shown on **Figure 3.6**. Coordination with Brunswick County and the Town of Belville will be needed as this loop lies almost exclusively in their jurisdictions. The approximate cost for this loop (which includes the connection between North Olde Towne Wynd and Night Harbor Drive) is \$2,000,000.00.

5. Green Hill Loop (1.91 miles)
 - a. Green Hill Road
 - b. Crabapple Road
 - c. Cherry Tree Road

This Loop will provide access to the Town Creek District Park. The Town of Leland should encourage the County and NCDOT to improve these roadways to accommodate paved shoulders where feasible. The approximate cost for this loop is \$700,000.00.

Grandiflora / Pine Harvest / Palm Ridge Roads

Many cyclists have indicated that these roadways are excellent cycling routes. These roadways are very important to non-motorized mobility in the area, as they allow for north-south travel through a significant portion of the Town on roadways that carry substantially less volume than Lanvale Road. While sensitivity should be given to placing signage in residential areas, these routes should be indicated in Town mapping.

The success of these roadways as viable bicycle routes depends largely on the ability to provide connections to other areas. If a connection can be provided between Grandiflora Drive and Timber Lane, as discussed on pg 3-12 and shown in **Figure 3.7**, access would be opened up to the neighborhoods along and north of Old Fayetteville Road. Additionally, providing non-motorized access across the US 17 superstreet will further increase access to the commercial and residential areas to the south of US 17. The costs of the route lay largely in the cost of modifying the US 17 superstreet intersections and provide the connection between Grandiflora Drive and Timber Lane, as due to the low speeds, low vehicle volume, and residential nature of these streets, no bicycle facilities are needed.

The Recommended Bicycle Loops are shown in **Figure 3.1**.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

Comprehensive Bicycle Plan

Town of Leland, NC

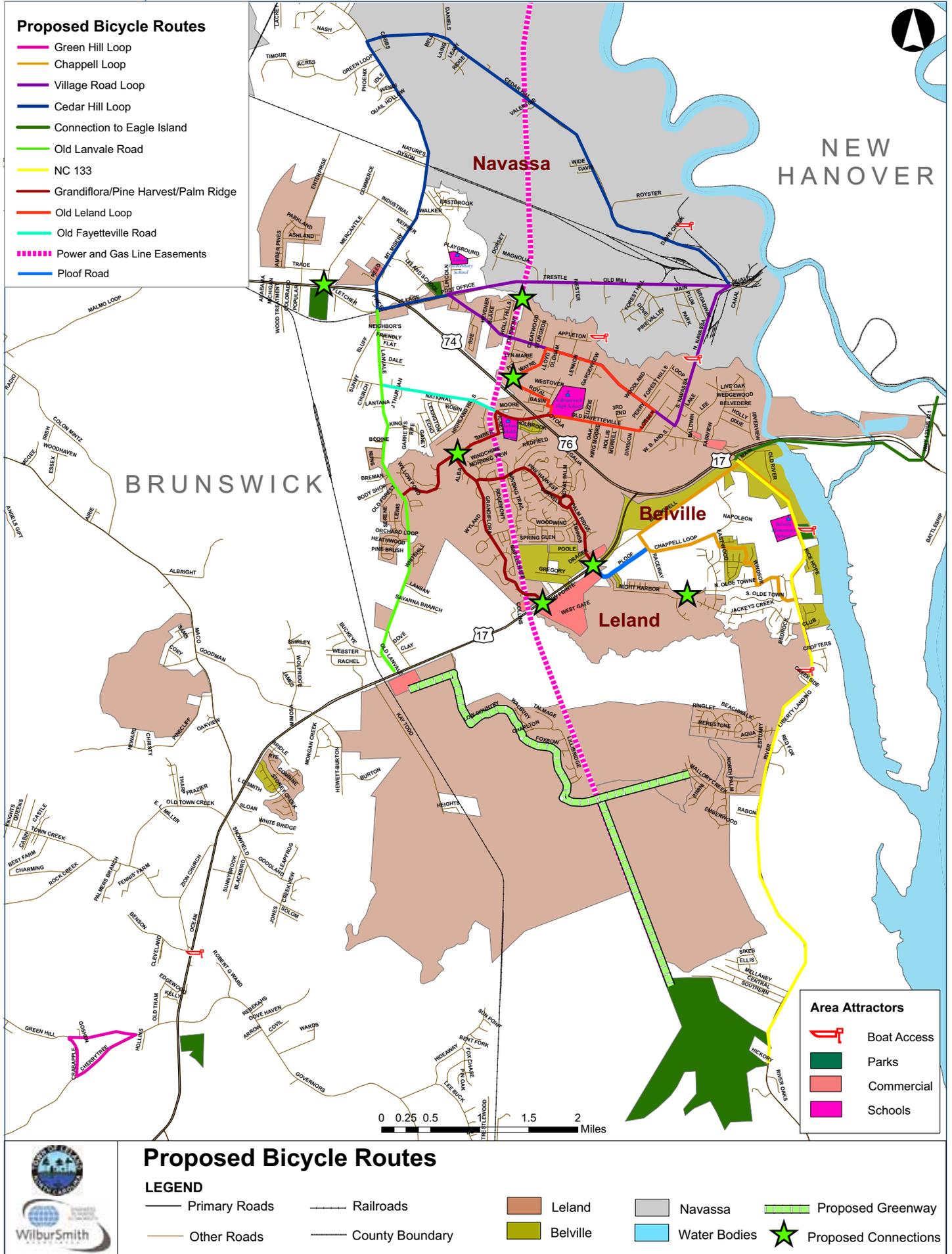


Figure 3.1



Connections

Discussions with the Steering Committee, public, and Town staff have identified several connections that will open large portions of the Town for both recreational and utilitarian cyclists.

US 17 Superstreet Connections

The Town should work with NCDOT to integrate crosswalks and median curb cut ramps into the existing superstreet (left-overs) on US 17, allowing pedestrians and cyclists operating as pedestrians to cross US 17. This will connect the commercial and residential developments on the east and west sides of US 17. Wayfinding and instructional signage should be included to instruct users how to safely perform a two-stage crossing at these intersections. Information regarding this crossing is included in Chapter 4. Any new left-overs installed on US 17 in Leland should be constructed to accommodate pedestrians and cyclists, particularly at Lanvale Road where the proposed Leland Greenway will intersect with US 17. Approximate cost: \$50,000.00 for crosswalks, pedestrian signals, and curb cuts in the median.

The US 17 Left-Over Connections recommendations are shown in **Figure 3.2**.

Holly Hills Drive / Sturgeon Drive

This multi-use path connection should run between the US Cellular tower on Holly Hills Drive, across the adjacent power line easement, and connect with a lift station at 9851 Sturgeon Drive. This pathway would connect two neighborhoods north of Village Road as shown in **Figure 3.3**. Approximate cost: \$15,000.00.

Fletcher Road / Northwest District Park

The Town should work with Brunswick County and local landowners to provide a connection between Fletcher Road and Northwest District Park. This multi-use path connection will require crossing a small ditch but will provide much needed local street access from the Town to Northwest District Park as shown in **Figure 3.4**. Fletcher road should also be maintained as it is currently very sandy. Approximate cost: \$10,000.00.

Wayne Street / Royal Street

One of the major issues in “Old Leland” is the lack of a connection between Village Road and Old Fayetteville Road between Town Hall Drive and Lanvale Road due to the wetlands associated with Sturgeon Creek. The Town should work to provide a multi-use path connection between Royal Street and Wayne Street as part or independent from the Old Leland Loop. This location provides the shortest crossing of Sturgeon Creek possible and will cause the least impacts to wetlands in the area. This connection will likely need to be elevated and will require an access easement, but will greatly increase mobility in the Town and will provide access to North Brunswick High School and Leland Middle School from the residential areas along Village Road as shown in **Figure 3.5**. Approximate cost: \$500,000.00.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Night Harbor Drive / Olde Towne Wynd

The Town should provide a multi-use path connection between Night Harbor Drive and Olde Towne Wynd. This connection will require navigating around the pool and clubhouse at the end of Night Harbor Drive, but will connect the residential developments along River Road to the commercial developments along US 17 as shown in **Figure 3.6**. This connection is also part of the Chappell Loop. Approximate cost: \$12,000.00.

Grandiflora Drive / Timber Lane

Grandiflora Drive, Pine Harvest Drive, and Palm Ridge Drive are excellent routes for cyclists as they carry relatively low traffic volumes and provide for long distances of north-south travel. However these roadways lack a connection to Old Fayetteville Road and require cyclists to use the much more heavily travelled Lanvale Road to access “Old Leland” A connection between Grandiflora Drive and Timber Lane would provide this access and, in conjunction with connections across the US 17 superstreet would open up much of Leland to nonmotorized travel. The Town should work with the management of the Magnolia Greens golf course to provide this connection as it would traverse closely to the maintenance area for the golf course. Additional fencing may be needed to secure the golf course’s facility and equipment, and an easement may also be required. This connection is shown in **Figure 3.7**. The cost for this connection should be minimal, as a current path exists in this area. The primary costs to the Town will be in providing additional fencing, lighting, and some paving. This should be less than \$10,000.00.

Ploof Road

Ploof Road currently provides a connection between US 17 and the proposed Chappell Loop. The current cross section is conducive to cyclists, particularly given the low traffic volumes. However, the Town should continue to ensure that this roadway is pedestrian friendly, including regular maintenance.

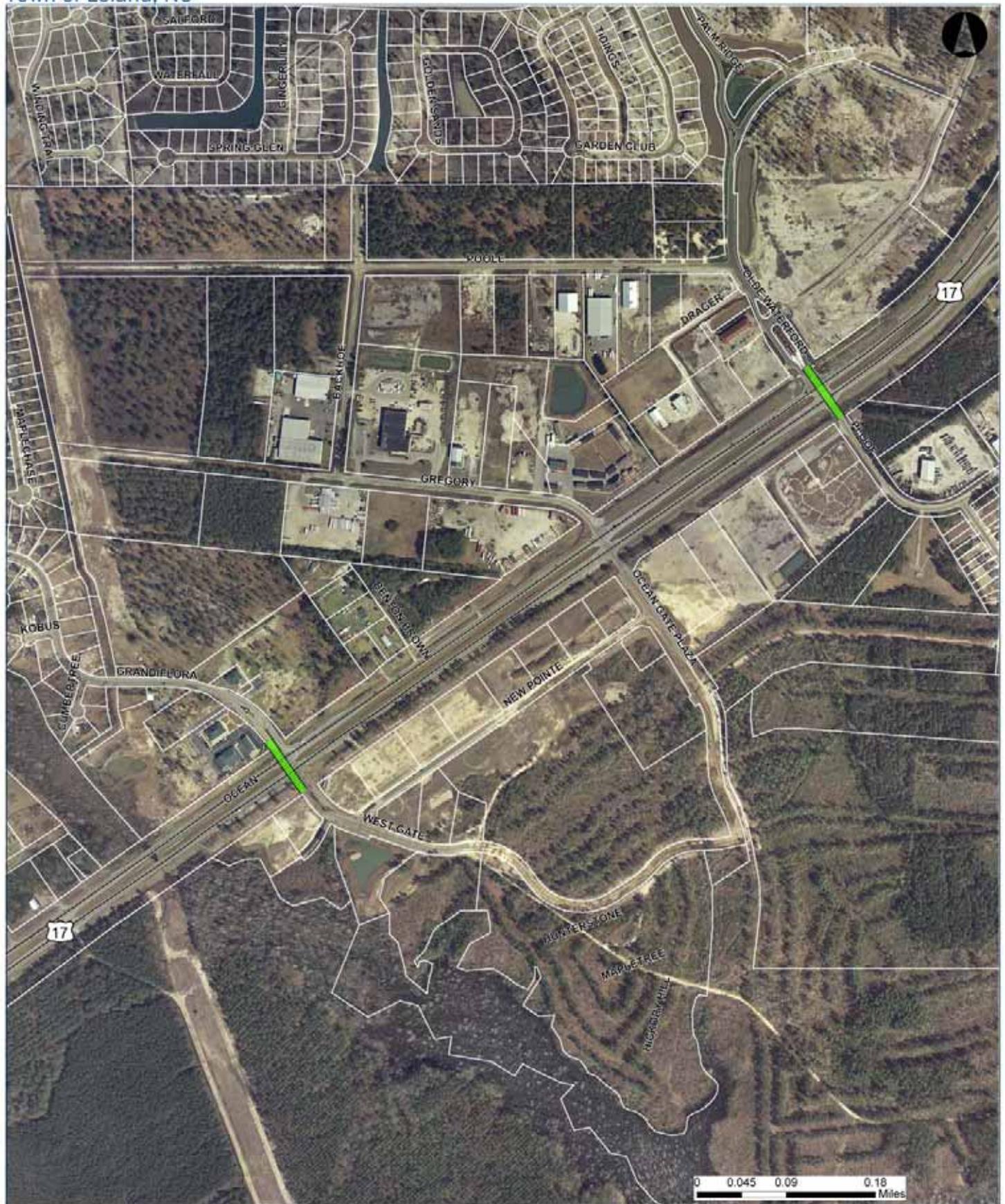
Parking

The lack of ample and secure bicycle parking facilities can be a large deterrent to cycling, particularly for utilitarian trips. Bicycle racks should be clearly visible and accessible, with ample room for pedestrians to maneuver around them. **Figure 3.8** indicates areas in and around Leland where it will be important to provide bicycle parking. These locations are based on the major activity centers and points of interest within the Town.

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

Comprehensive Bicycle Plan

Town of Leland, NC



US 17 Left-Over Connection

LEGEND

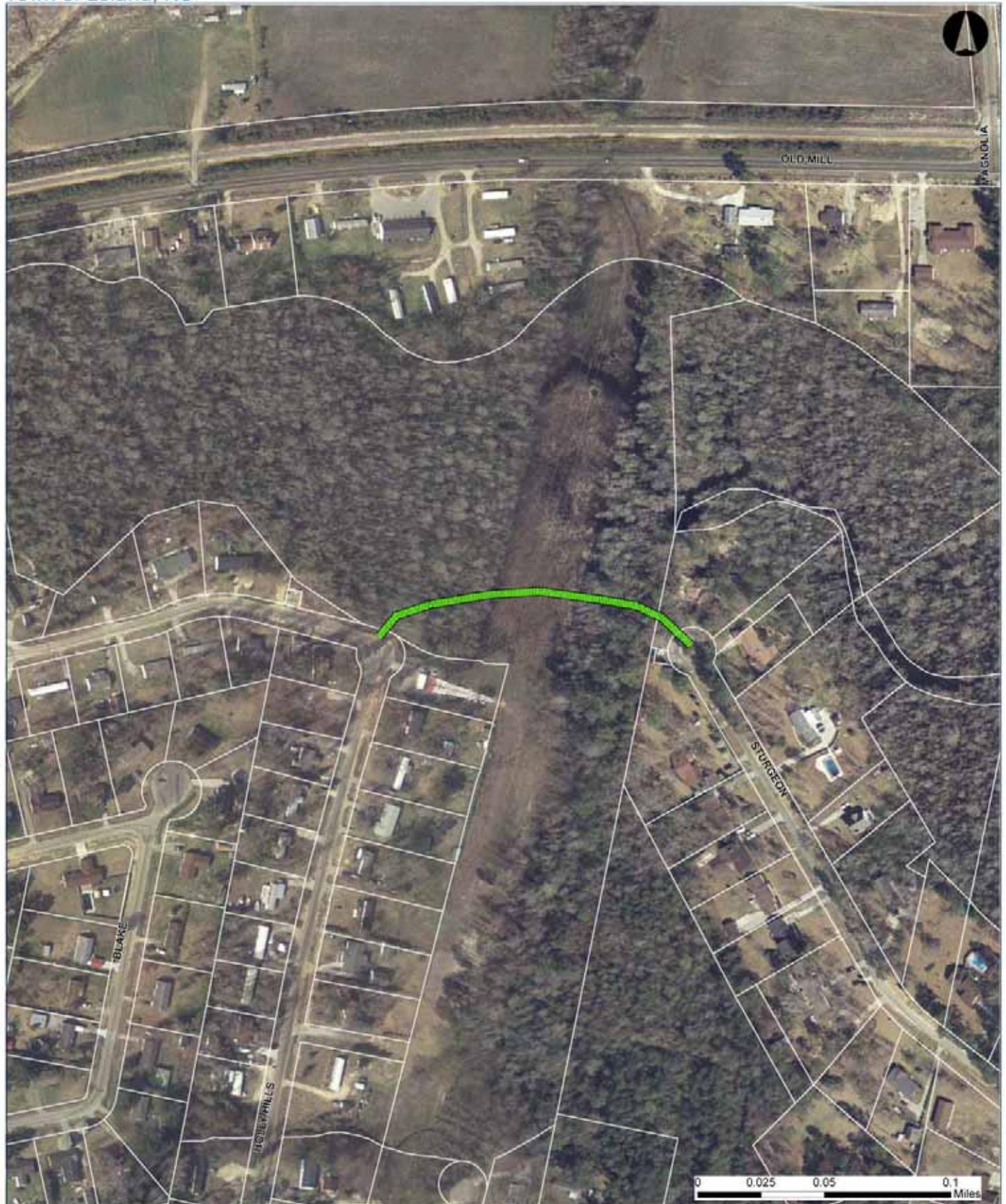
- Primary Roads
- Railroads
- Other Roads
- County Boundary
- Connection
- Parcels

Figure 3.2



Comprehensive Bicycle Plan

Town of Leland, NC



Holly Hills Drive / Sturgeon Drive Connection

LEGEND

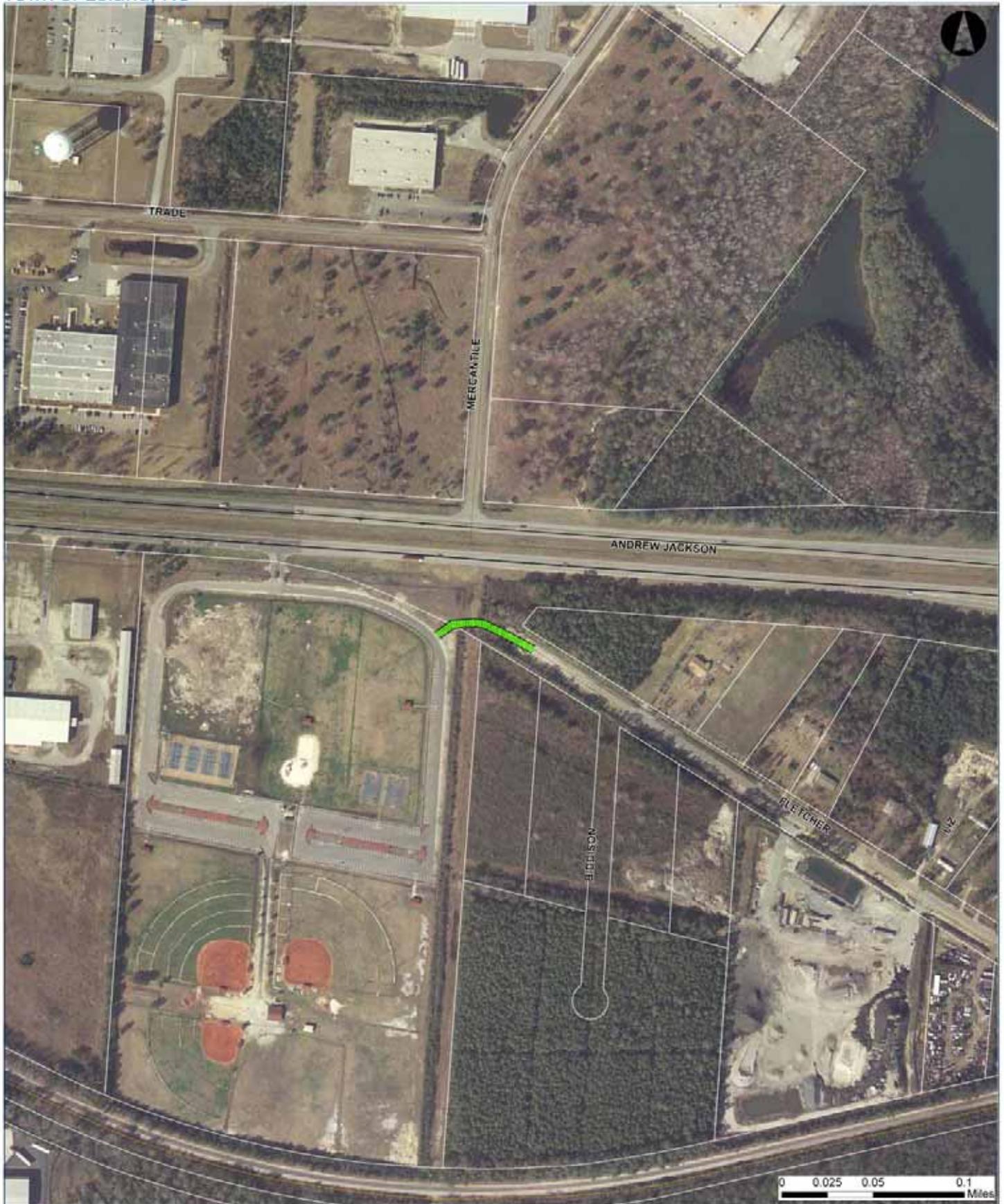
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|---------------|-----------------|------------|
| Primary Roads | Railroads | Connection |
| Other Roads | County Boundary | Parcels |



Figure 3.3

Comprehensive Bicycle Plan

Town of Leland, NC



Fletcher Road / Northwest District Park Connection

LEGEND

- | | | |
|---------------|-----------------|------------|
| Primary Roads | Railroads | Connection |
| Other Roads | County Boundary | Parcels |



Figure 3.4

Comprehensive Bicycle Plan

Town of Leland, NC



Wayne Street / Royal Street Connection

LEGEND

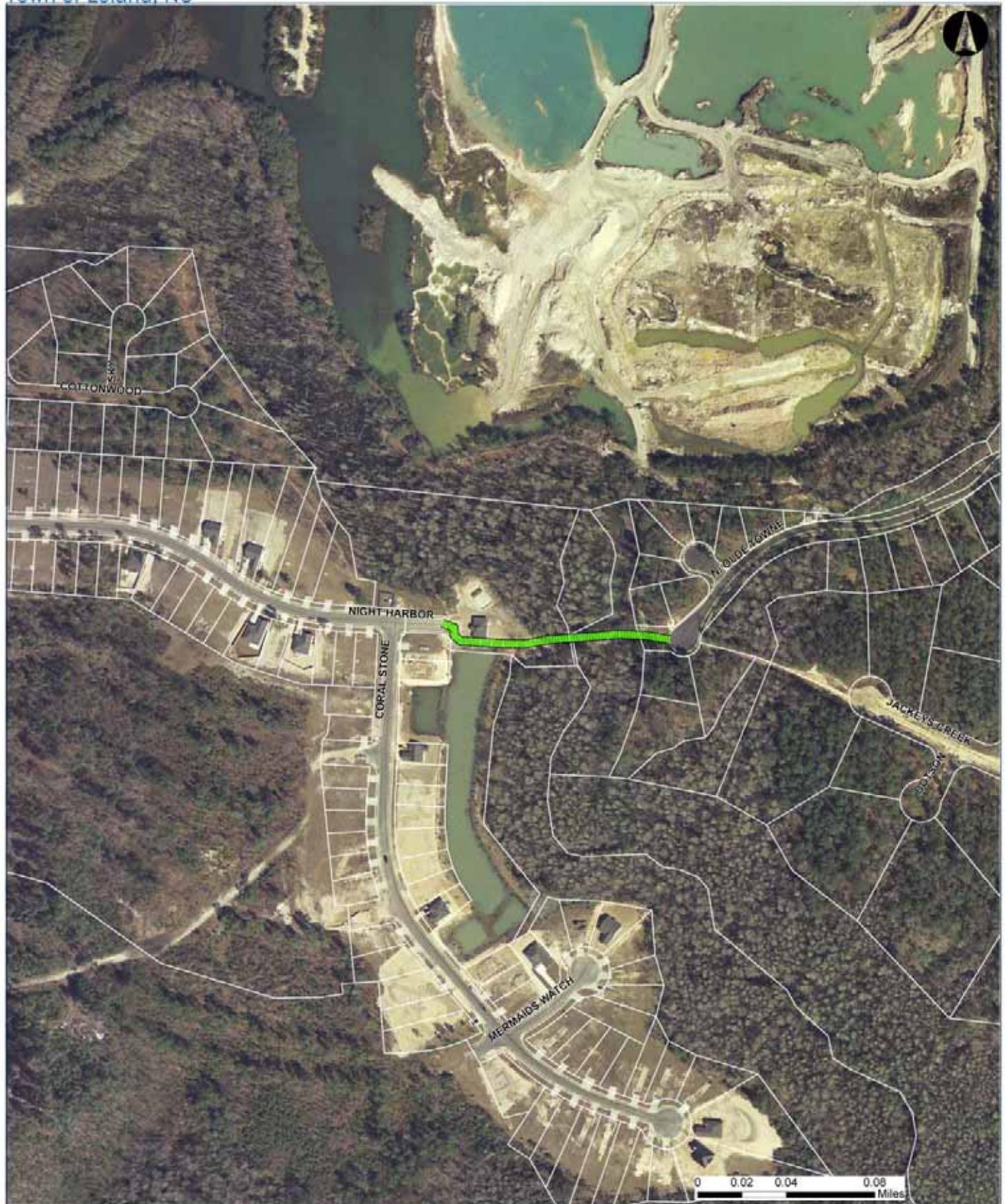
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|---------------|-----------------|------------|
| Primary Roads | Railroads | Connection |
| Other Roads | County Boundary | Parcels |



Figure 3.5

Comprehensive Bicycle Plan

Town of Leland, NC



Night Harbor Drive / Olde Towne Wynd Connection

LEGEND

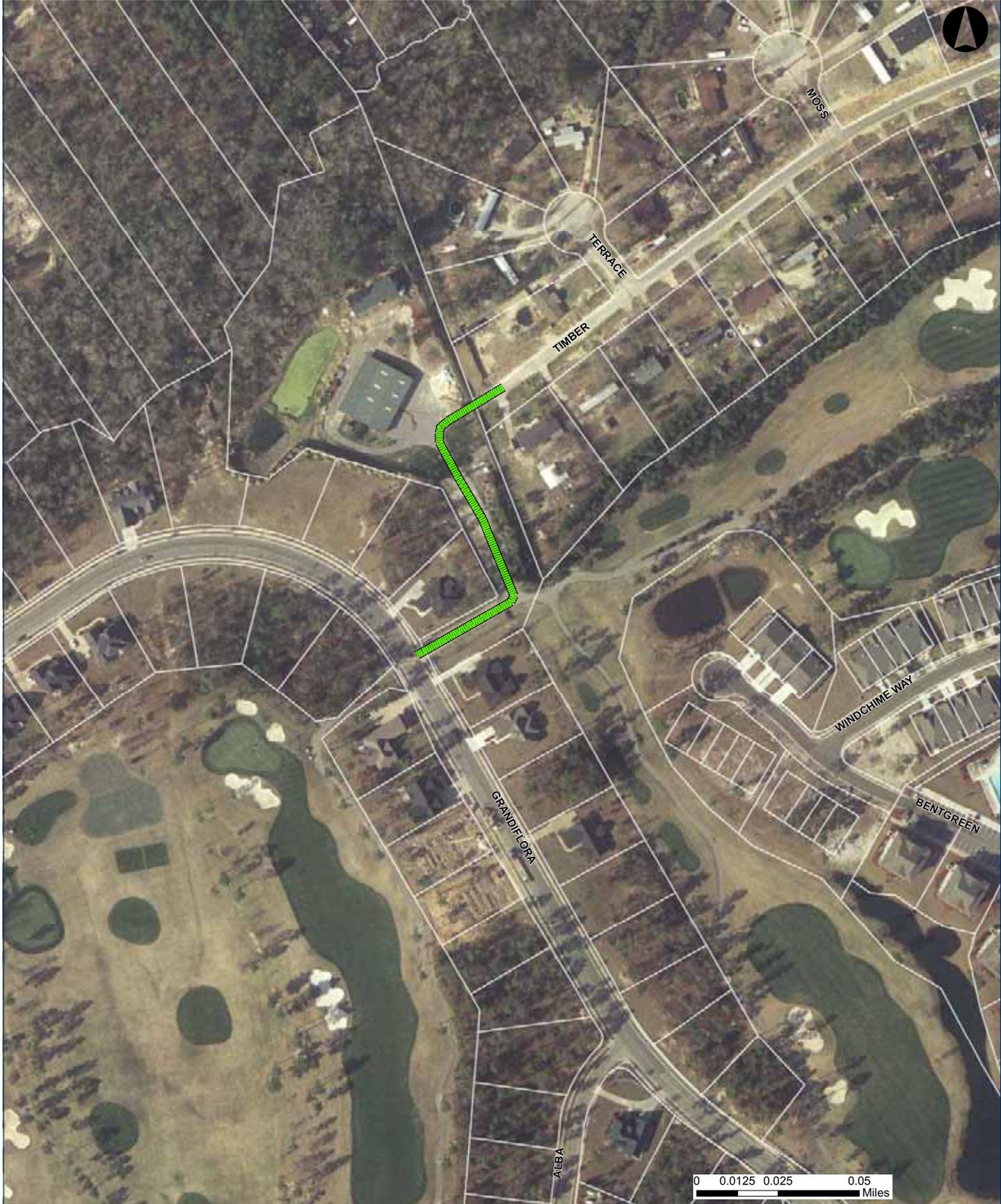
- | | | |
|---------------|-----------------|------------|
| Primary Roads | Railroads | Connection |
| Other Roads | County Boundary | Parcels |



Figure 3.6

Comprehensive Bicycle Plan

Town of Leland, NC



Timber Drive/Grandiflora Drive Connection

LEGEND

- Primary Roads
- Other Roads
- Railroads
- County Boundary
- Connection
- Parcels



Figure 3.7

Comprehensive Bicycle Plan

Town of Leland, NC

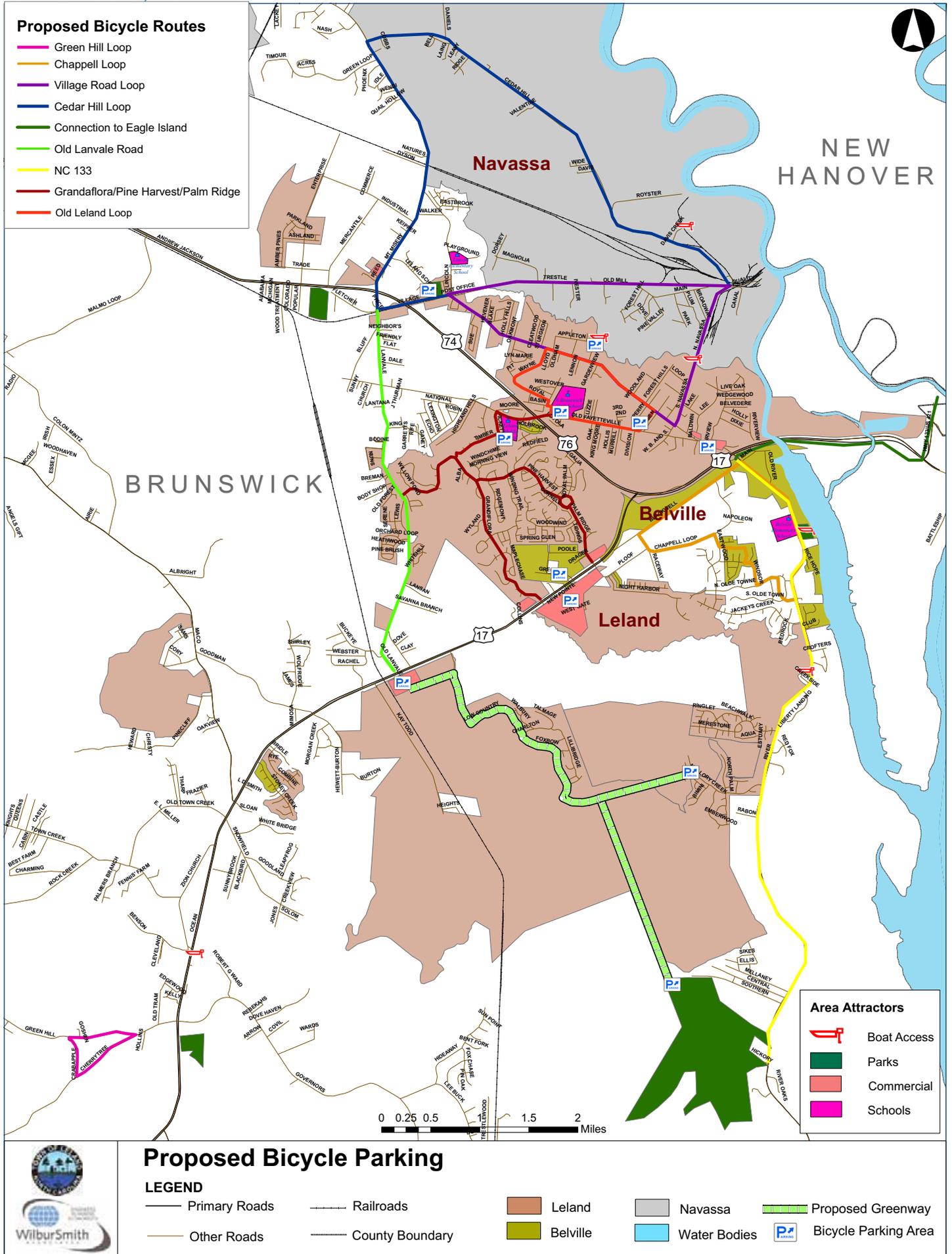


Figure 3.8



3.4 MAJOR FOCUS AREAS

NC 133 (River Road)

The Town should place a primary focus on the NC 133 corridor. This corridor provides a scenic route along the Cape Fear River, connects the Town with other areas in Brunswick County including Boiling Springs Lakes and Southport, and provides access to the Brunswick River Park and the future Brunswick County Nature Park south of Leland. A significant amount of improvement would be required to provide wide paved shoulders and to bring River Road to an acceptable facility for bicyclists of all skill levels due to the large ditches immediately adjacent to the roadway with many culverts. One potential area for immediate improvement, however, is the small section of narrow shoulder just north of Belville Elementary. Elimination of this barrier would open the area from US 17 south to Belville Elementary. South of this area, however, the roadway and shoulders are very narrow.

US 17

While US 17 is a vital transportation component within the Town of Leland, it is also somewhat of a barrier to bicycle transportation within the Town. The US 17 super-street connections mentioned above will help serve north-south travel within the Town, but a focus must also be placed on east-west travel in this area. With numerous future residential and commercial development projects, as well as the Wilmington Bypass and the Cape Fear Skyway, planned for the area, it is vital the these future projects accommodate cyclists that wish to travel in an east-west direction through the area, primarily through the provision of service roads and multi-use paths that do not require cyclists to utilize US 17.

Old Fayetteville Road

While Old Fayetteville Road from Lanvale Road to Pickett Road does not lie within the Town of Leland, this section of roadway can provide a valuable connection between the north-south routes along Lanvale Road and Timber Lane / Grandiflora Drive. The Town should work with NCDOT and the County to provide wide paved shoulders on this section of Old Fayetteville Road.

Lanvale Road

The Town should work with Brunswick County and NCDOT to improve Lanvale Road from US 17 to Village Road through the provision of wide paved shoulders and a bicycle safe railroad crossing at Village Road. This roadway will provide access to the various subdivisions east and west of Lanvale Road and will connect to the Village Road Loop and Cedar Hill Loop. This roadway also serves as an access point to the Magnolia Greens and Waterford Greens subdivisions via Grandiflora Drive. In the absence of a connection between Grandiflora Drive and Timber Lane, this will be the only access point between these subdivisions and Old Fayetteville and Village Road, and will be a vital link in connecting Old Leland to the Westgate area. The lack of available right of way and the presence of drainage ditches along either side of Lanvale Road will hinder the provision of paved shoulders. Approximate in-town cost: \$620,000.00.

Power and Gas Line Easements

The Town should work with local property owners and local utility companies to provide greenways along the edges of power line easements. Several large easements run through the community and could provide significant connectivity in the north-south

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directions. The major existing power and gas lines easement that transits the area is shown on **Figure 3.9**.

Connection to Eagle Island

To support the long range plans for the conservation of Eagle Island (which may include a nature center and hiking and paddle trails), the Town should plan for an off-road multi-use path on the north and/or south side of US 17 to connect central Leland with Eagle Island, possibly as part of NCDOT project R-3601. The costs for this improvement will be heavily dependent on whether a multi-use path can be included on the existing US-17 bridge or if a new pedestrian bridge will have to be constructed. This will also help serve as a vital non-vehicular connection to Wilmington, which was indicated by the steering committee as a needed link.

Ongoing NCDOT TIP Projects

There are several NCDOT Transportation Improvement Program projects in and near the Town of Leland. R-4002 involves widening of Village Road between US 17 and Old Fayetteville Road and includes wide outside lanes. This project is planned for construction in 2009. R-4063 involves the widening of Village Road from South Navassa Road to Lanvale Road and falls on the Cedar Hill Loop and the Village Road Loop. Project planning and design is currently ongoing for this project. Right-of-way acquisition is planned for 2012 with construction occurring between 2013 and 2015. Town staff and residents should work closely with NCDOT to ensure that on or off-road bicycle facilities are included in these projects, particularly in R-4063 and, to the extent practicable, on R-4002.

R-3601 includes the replacement of the decks on the US 17/74/76 bridge over the Alligator River and the construction on an additional northbound and southbound lane. This project is vital to the connection to Eagle Island. During the planning process for Eagle Island, if bicycles are planned to utilize US 17/74/76, bicycle facilities should be included on the new bridge decks.

R-2633A, the Wilmington Bypass is currently planned to terminate at US 17. Based on input from DBPT, the initial design plans do not appear to indicate the crossing treatments recommended for the US 17 left-overs and the crossing islands do not appear to be of sufficient width to accommodate cyclists. The final designs for this facility should accommodate cyclists on both the superstreet connections as well as through the provision of 4 ft. paved shoulders on any new services roads. This will be an important location for bicycle travel as the proposed Leland Greenway will terminate in this area and residents that live on the north and south side of US 17 will likely desire non-motorized access to the commercial development that are expected to develop along this portion of US 17. These concerns also hold true for U-4738, the Cape Fear Skyway, as it is the extension of R-2633A.

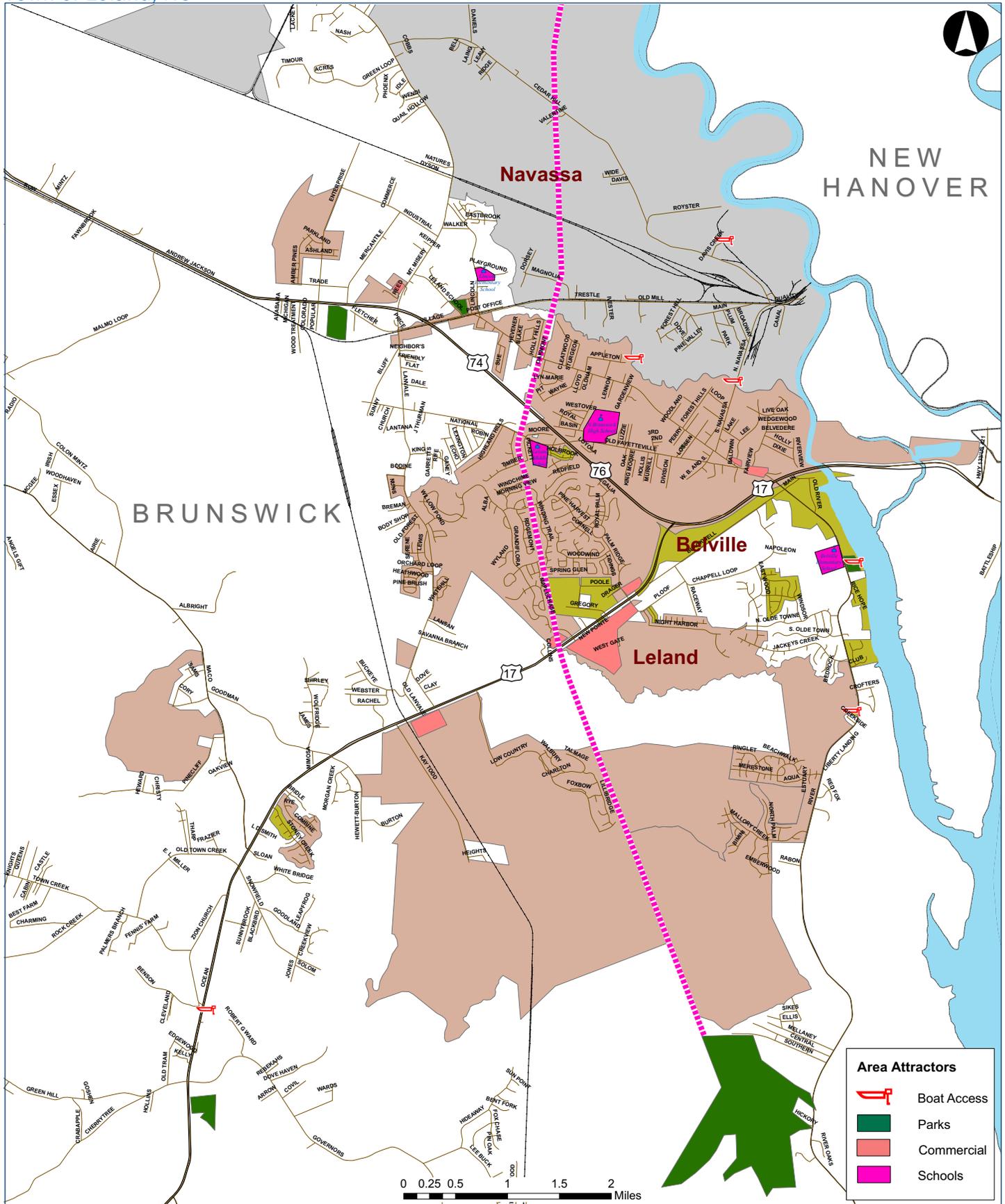
One bridge project is planned for the area, B-4928 the replacement of the Old Mill Road bridge over Mill Creek, which is on the Village Road Loop. Town staff should work closely with the County, the Town of Navassa, and NCDOT to promote the inclusion of a wide shoulder or wide outside lanes on the Old Mill Road Bridge.

Finally, the intersection of US 74/76 and Old Fayetteville Road is planned to be converted to a grade separated interchange as part of project U-3337. The planning and

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Comprehensive Bicycle Plan

Town of Leland, NC



Power and Gas Line Easement

LEGEND

Primary Roads	Railroads	Leland	Navassa
Other Roads	County Boundary	Belville	Water Bodies
			Power and Gas Line Easement

Figure 3.9



design is in progress for this project, with right-of-way acquisition planned for 2012. The construction for this project is currently unfunded. Special attention should be paid to the provision of bicycle facilities on this project including bicycle safe railing, as it lies directly between the Leland Middle School and North Brunswick High School and provides the only connection across US 74/76 in the area.

Leland Greenway



Leland should continue to pursue the proposed greenway between the Brunswick County Nature Park and the Town of Leland, which is expected to be funded by developers, the Town, the County, and other agencies. This Greenway should be planned as a “Class A” Greenway using the standards of the East Coast Greenway with a minimum 12 foot wide firm surface, year-round accessibility, safe, well-marked street crossings, and a smooth, firm surface. Particular focus should be provided to the terminus at US 17 in the vicinity of Lanvale Road. The Town should coordinate with NCDOT to ensure that the design of R-2633A accommodates the greenway and should coordinate with local developers to ensure that their developments connect to the greenway in an appropriate manner, with a particular focus on the Westgate and Brunswick Forest Developments. This Greenway should be developed in conjunction with members of the East Coast Greenway Alliance for inclusion into the East Coast Greenway System. This system, planned to be the nation’s first long distance urban trail system, is envisioned as a 3,000 mile traffic-free path long linking Calais, Maine with Key West, Florida. The proposed greenway connects existing and planned trails, waterfront esplanades, park paths, abandoned rail corridors, canal towpaths, and highway corridors. As of 2007, 21% of this greenway is complete, with work rapidly progressing at the remaining sections between Florida and Maine. The typical cost for a greenway is around \$700,000.00 per mile.

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Off Road Trails

The Parks, Recreation, and Open Space Plan includes recommendations for off-road trails. While these trails are planned to be unpaved, several may be appropriate for off-road cyclists. Please refer to Figures 3.1-3.4 of the plan for more information regarding these proposed trails.

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Chapter 4

FACILITY STANDARDS AND GUIDELINES



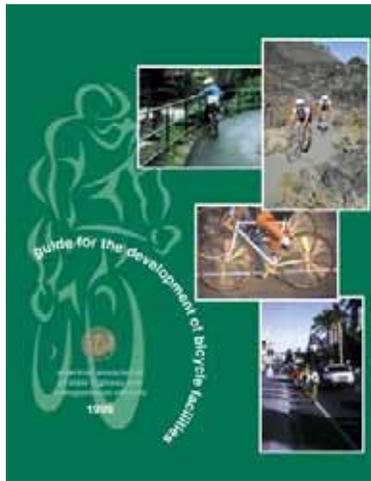
WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation

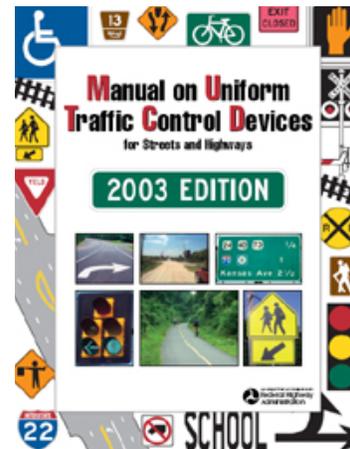


Chapter 4 - Bicycle Facility Standards and Guidelines



To aid in the construction of the facility recommendations proposed in Chapter 3, this chapter presents various bicycle facility design guidelines that are appropriate for the proposed facilities. The following recommended bicycle guidelines are in accordance with the 1999 American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, as well as the Federal Highway Administration (FHWA) *Manual of Uniform Traffic Control Devices* (MUTCD) and the Institute of Transportation Engineers (ITE) *Traffic Control Devices Handbook*.

The following bicycle facilities are addressed: wide outside lanes, wide paved shoulders, bike lanes, edge lines, shared-use paths, bike routes, and sharrows. When feasible, it is always prudent to develop guidelines that exceed the minimum standards for shared-use paths or bike lane widths, signage, lighting, and traffic signal detectors. Typical examples of these situations are in locations of projected heavy bicycle activities, such as water front areas, or recreationally oriented areas that are commonly found in Leland. Additional information on bicycle project types can be found at: http://www.ncdot.org/transit/bicycle/projects/project_types/bp_t_intro.html.



4.1 WIDE OUTSIDE LANES

A Wide Outside Lane refers to the travel lane that is located adjacent to the edge of curb and gutter on a roadway with multiple lanes. These lanes are most common on 4-lane roadways (but are occasionally utilized on 2-lane roadways) and are generally wider than the travel lanes located on the inside adjacent to the centerline or center median. These lanes should be designed so they are not used for dedicated right turn only lanes. There are two cost effective methods to develop wide outside lanes.

1. Non Construction Approach: When existing multi-lane roadways are being resurfaced, differential striping may be used to narrow the inside lane to allow for additional room for widening the outside lane which provides extra space where cyclists and motorists can more safely operate in the same lane.
2. Construction Approach: When roadway improvement projects are constructed, widened outside lanes can provide additional width on the outside to accommodate cyclists on the overall roadway project.

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The Wide Outside Lane bicycle facility is an effective way to accommodate both motorist and cyclist alike operating in the same travel lane. The following benefits occur when a wide outside lane is provided:

- 🚲 Motorists do not have to change lanes to pass a cyclist.
- 🚲 Improved sight distance for both motorist and cyclist.
- 🚲 Provides additional space for vehicles to turn onto the roadway.
- 🚲 Improves the capacity of the roadway.
- 🚲 Both motorists and cyclists have more space to maneuver.

This type of facility is most often considered for use in urban, suburban and, not as often, rural conditions on roadways where there exists curb and gutter.

The following are recommended design standards and planning concerns regarding Wide Outside Lanes:*

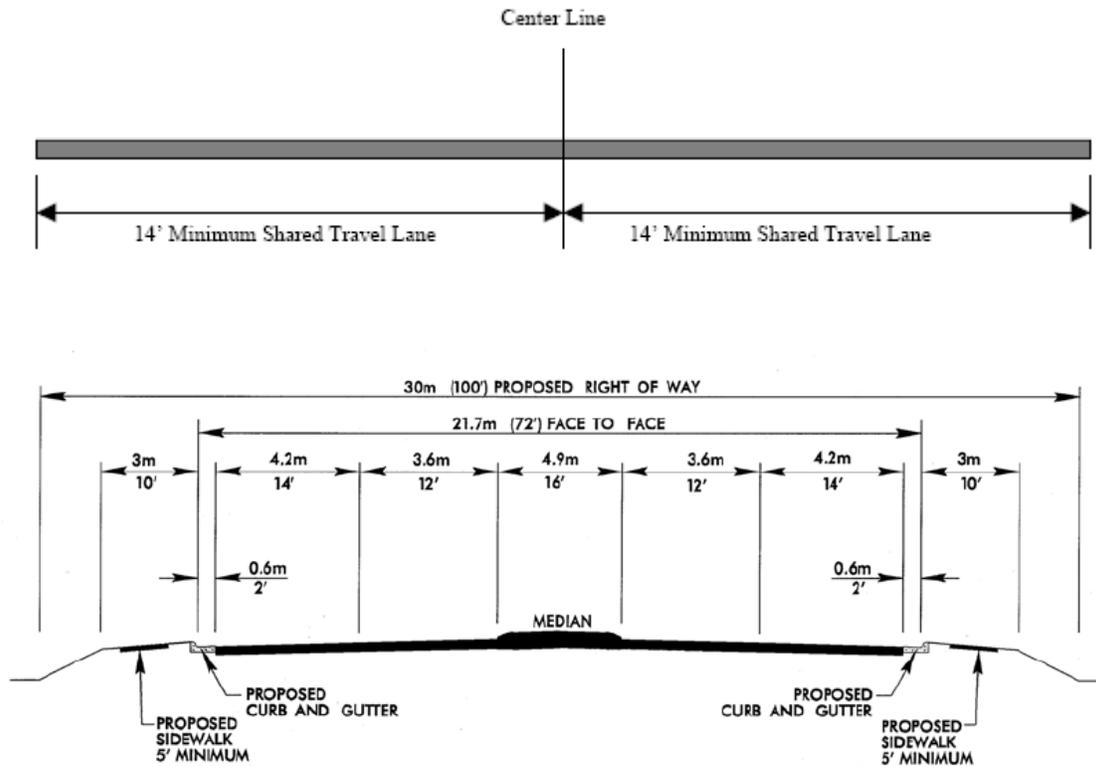
- 🚲 Motor vehicle traffic should not be more than 60 percent of the route's capacity (Level of Service [LOS] C) in the base and design year. This criterion may not always be met. However, since cyclists may still use the facility, wide outside lanes improve safety.
- 🚲 Truck traffic should not exceed 5 percent of the total motor vehicle traffic stream in the base and design year.
- 🚲 The AASHTO standard lane width to accommodate both motorists and cyclists should be 14 feet. See **Figure 4.1**.
- 🚲 If an existing multi-lane roadway with standard 12-foot lanes cannot be widened to accommodate 14-foot wide outside lanes, then the inside lanes can be narrowed to 11 feet, thus providing extra width for 13-foot wide outside lanes.

*Source: AASHTO Guide for the Development of Bicycle Facilities

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Figure 4.1
Wide Outside Lane



Currently there are no roadways providing curbs and gutters within the Town that would be appropriate for the re-stripping of wide outside lanes. However, wide outside lanes should be considered for the major roadways within new subdivisions proposed within the Town.

4.2 WIDE PAVED SHOULDER

A Wide Paved Shoulder is considered part of the roadway that is located next to the travel lane and is on the same level as the existing roadway surface. The most efficient way to develop a wide paved shoulder is to include these facilities during the construction of new alignments and when upgrading the existing roadway in locations where there are significant levels of potential



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bicycle travel. This improvement includes the construction of additional roadway surface width to a minimum of four foot of width that is added to an existing roadway in an effort to provide safe accommodations for cyclists.

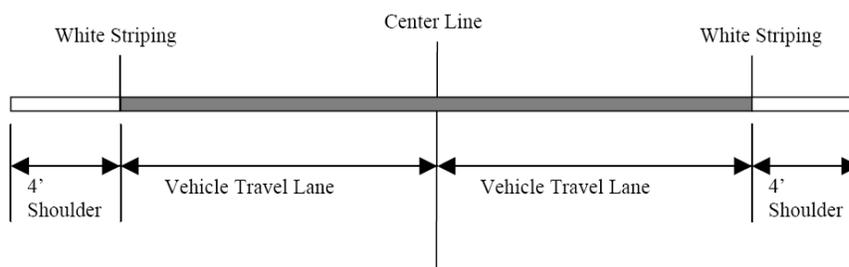
Wide paved shoulders are best utilized on roadways without curb and gutter and where bicycle travel is common. Many roads located in Leland are suitable for this improvement, such as roadways located in rural areas. These roadways, without curb and gutter, should have minimal commercial driveways and intersections to provide the cyclist with a wide, smoothly paved shoulder with limited conflict locations.

Following are recommended design standards and planning concerns regarding Wide Paved Shoulders:* See **Figure 4.2**.

- The paved shoulder should be of adequate width, smoothly paved, and have adequate strength and stability to support vehicle loads without rutting.
- The minimum width for a paved shoulder to accommodate bicycles is 4 feet. Recommendations for the actual paved shoulder width may vary according to the width of the adjacent roadway, traffic volume, posted speed limit, and the presence of heavy truck traffic along the roadway.
- The slope of the roadway should continue across the shoulder to maintain adequate drainage.
- Wide paved shoulders not only benefit cyclists, but improve safety for drivers and reduce maintenance costs.
- Rumble strips and other devices used to alert sleepy motorists should be avoided, because they pose a safety hazard to cyclists. If rumble strips are necessary, additional shoulder width should be provided for the cyclists.
- Wide paved shoulders may require relocation of drainage ditches that run parallel to the roadway.
- If speeds are higher than 40 mph and if the percentage of truck traffic is high, shoulder widths should be greater than 4 feet wide.

*Source: AASHTO Guide for the Development of Bicycle Facilities

Figure 4.2
Wide Paved Shoulder



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4.3 BIKE LANES

Bicycle lanes can be constructed as part of new construction or a widening project, by narrowing existing travel and turn lanes, by removing or modifying on-street parking, and by removing vehicular lanes.



All bike lanes should conform to the design guidelines of AASHTO, which is displayed in **Figure 4.3**. Bike lanes should be six feet in width measured from the edge of the gutter pan to the bike lane stripe, including bike lanes located on lower-speed roadways that are uncurbed, or in some cases between through traffic lanes and right-turn only lanes. Four-foot bike lanes also may be utilized for paved shoulder locations where right-of-way is restricted or there are topographical constraints. Generally, bike lane widths of five to six feet are desirable in areas of projected high bicycle traffic. Bike lanes should be striped, signed, and marked in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*. Intersections with bike lanes should follow the MUTCD and the Institute of Transportation Engineer's *Traffic Control Handbook* with striped bike lanes placed to the left side of right-turn only lanes. **Figure 4.4** shows this detail and other details for bike lane approaches to intersections.

The dimensions shown in **Figure 4.4** are those recommended by AASHTO. However, NCDOT recommends slightly more minimum widths:

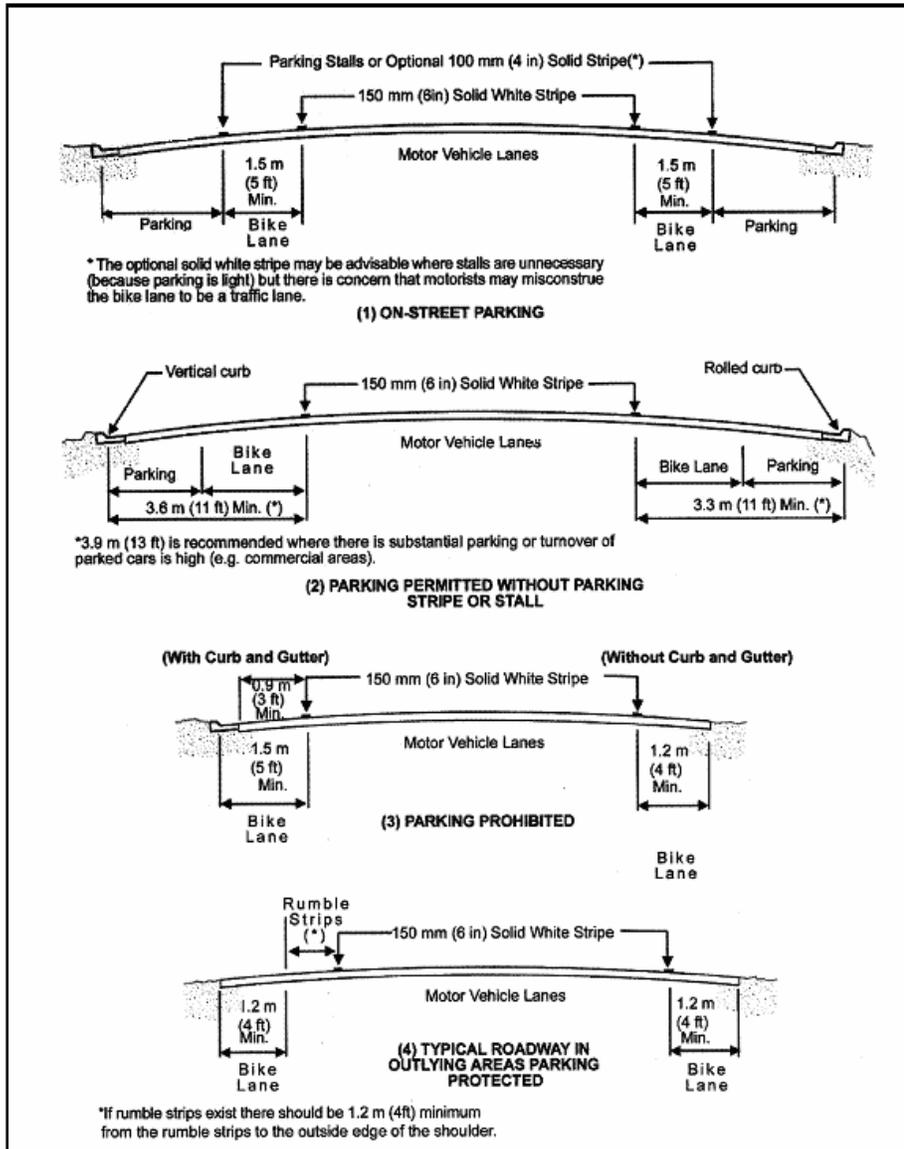
- Where marked parking and bike lanes – 8 to 10 ft. for parking and 5 ft. bike lane (parking lane shall be designed to include the door zone, as the door shall not open up into the bike lane.)
- Where combined parking and bike use – 12 ft. min. (13 ft. recommended).
- Where parking prohibited – 4 ft. bike lane (6 ft. from curb).

Traffic signal detectors that sense bicycles should be considered for signalized intersections. A stencil of a bicycle can identify the location for cyclists to stop in order to be detected. The stencil is typically only needed with loop detection systems. Curbside push buttons should not be considered a replacement for effective signal detection, as they encourage cyclists to stop in a location that places them too far to the right at the stop line and at a disadvantage to right-turning traffic. Curbside push buttons may be appropriate in certain situations, such as when there is an island separating right turning traffic from through traffic and when other detection methods are not effective. As stated in Section 9D of the MUTCD, the needs of cyclists shall be considered when setting signal timing on bikeways.

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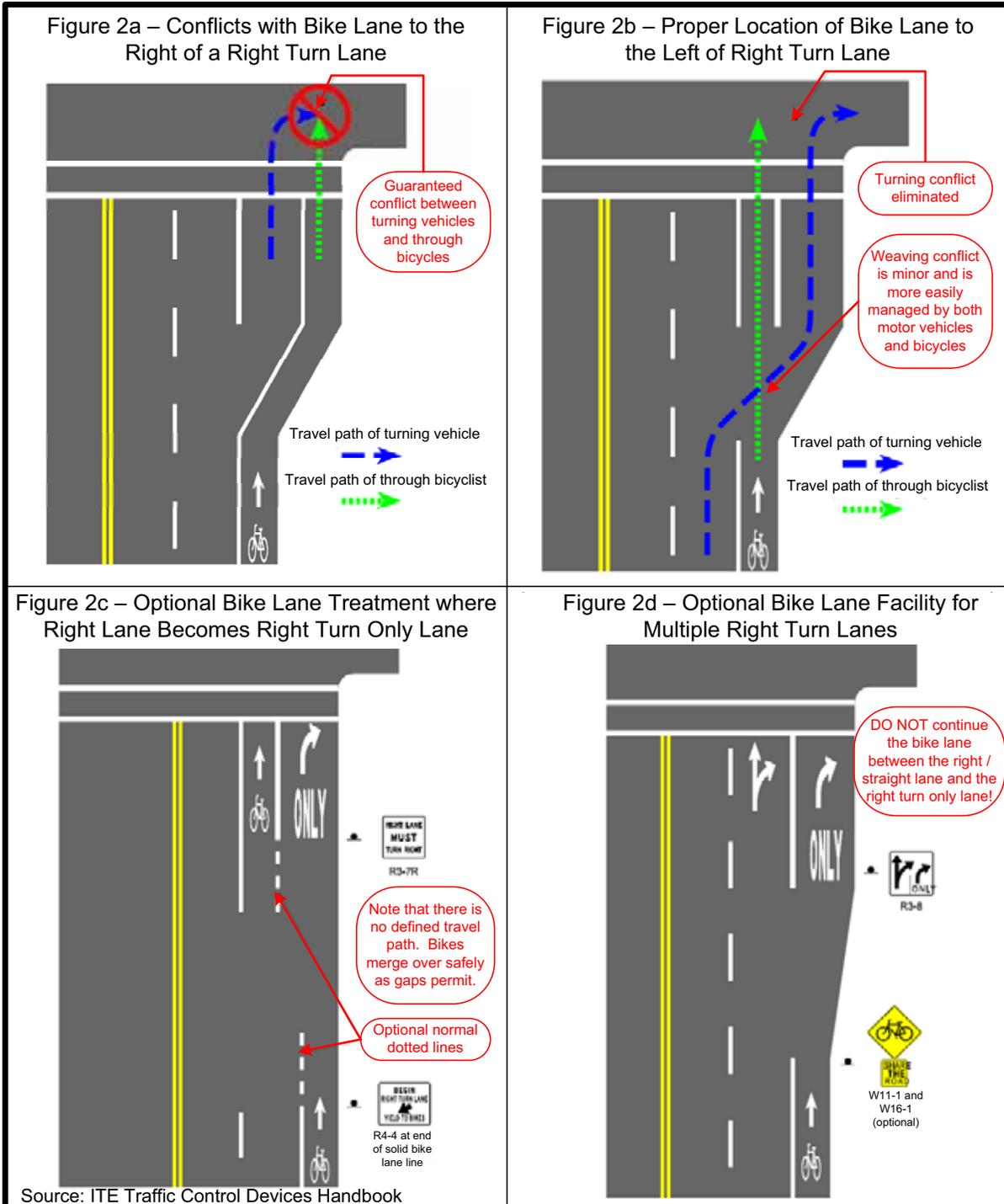
Figure 4.3
Typical Bike Lane Cross Section
Source: AASHTO Guide for the Development of Bicycle Facilities



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Figure 4.4
Bike Lane Striping Details at Intersections



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Bike lanes should be continuous where practical; the sudden termination of a bike lane or awkward transition from a bike lane to another facility should be avoided. Where right-of-way or other constraints preclude continuous bike lanes, the bike lane segments can be connected with local bike routes until such time as a continuous bike lane can be provided. However, in most cases, cyclists should be permitted to continue along the roadway and not be required to use an alternate route. Signage conforming to the MUTCD should be provided to designate the facility changes along the bicycle route.

The recommended criteria for implementation of Bike Lanes should include the following:

-  Located primarily on roads with 35 mph and 45 mph speed limits
-  Planned in the area of potential origins and destinations
-  Intersections are minimal, with limited cross traffic
-  Few driveway cuts
-  Limited turning movements
-  Commitment to keep bicycle lanes free of debris

Sign R3-17, as contained within Part 9 of the MUTCD, should be considered where bike lanes are designated, but may be optional where sign clutter is a concern. All signing and striping of bike lanes must conform to the most recent MUTCD, as approved by NCDOT. **Figures 4.5** and **4.6** illustrates the typical signs and pavement markings for bicycle facilities.

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Figure 4.5



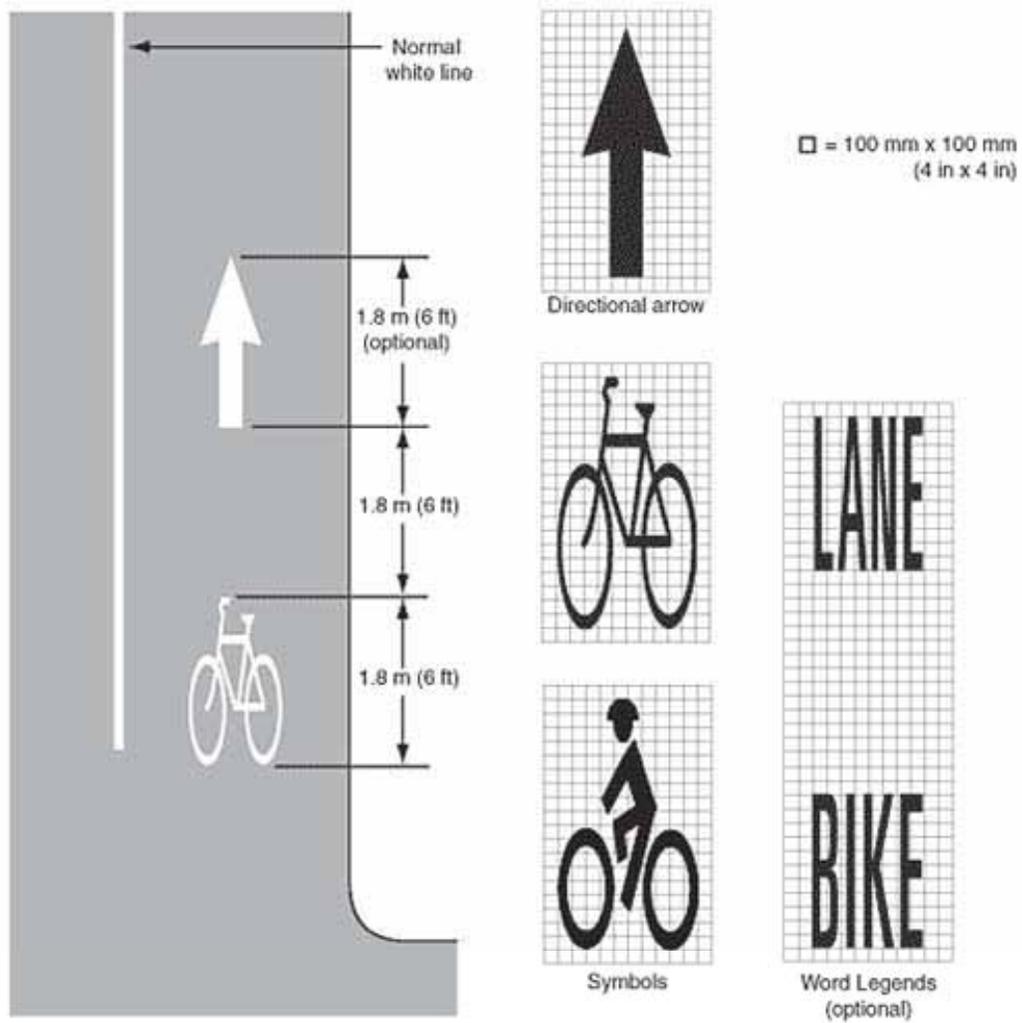
Regulatory Signs for Bicycle Facilities

Source: MUTCD, Figure 9B-2, Regulatory Signs for Bicycle Facilities

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Figure 4.6
Bike Lane Markings



Source: MUTCD, Figure 9C-6, Example of Optional Word and Symbol Pavement Markings for Bicycle Lanes

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4.4 SHARED-USE PATH (GREENWAY)

The following guidelines, in accordance with the AASHTO *Guide for the Development of Bicycle Facilities* and Part 9 of the MUTCD, should be considered in the construction and designation of shared-use paths. Sidewalk paths and shared-use paths located immediately adjacent to the roadway are discouraged by AASHTO. This is due to several factors including the potential for high numbers of intersecting roadways, conflicts at intersections particularly with cyclists traveling in the opposite direction of the adjacent roadway travel lane, potential insufficient sight distances due to walls and other obstructions, and possible conflicts within the right-of-way, such as utility poles.



Shared-use path facility design considerations are discussed below.

Shared-use path crossings of roadways and driveways must be carefully considered during the design process.

- Crossings should be a safe enough distance from neighboring intersections to not interfere (or be interfered) with traffic flow
- A roadway with flat topography is desirable to increase motorist visibility of the path crossing
- Warning devices for crossings multi-use paths can include signage (including trail stop signs), changes in pavement texture, flashing beacons, raised crossings, striping, etc
- A refuge is needed where crossing distance is excessive and in conditions exhibiting high volumes/speeds and where the primary user group crossing the roadway requires additional time, such as school children and the elderly
- A refuge may be needed where there is excessive roadway width and in conditions exhibiting high volumes/speeds and where the primary user group crossing the roadway requires additional time, such as school children and the elderly
- The crossing should occur as close to perpendicular (90 degrees) to the roadway as possible
- If possible, it may be desirable to bring the path crossing up to a nearby signalized crossing in situations with high speeds/ADT and design and/or physical constraints
- Signalized crossings may be necessary on trails with significant usage when intersecting with demanding roadways, but MUTCD warrants must be met for the installation of a signalized crossing

Shared-use paths should have a separation of five feet and preferably more from the traveled way or a suitable barrier should be provided between the pathway and roadway.

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The pathway should be a minimum ten feet wide and should include a minimum two feet of shoulder on each side and preferably four feet on each side (see **Figure 4.7**). Shared-use paths should have a minimum vertical clearance of eight feet. In areas of high usage, twelve feet of pavement or more is recommended, and in some cases an additional separate unpaved parallel path is optimal for pedestrian travel. Pavement widths of ten feet or more also better accommodate maintenance vehicles and reduces damage to the pavement edge from these vehicles.

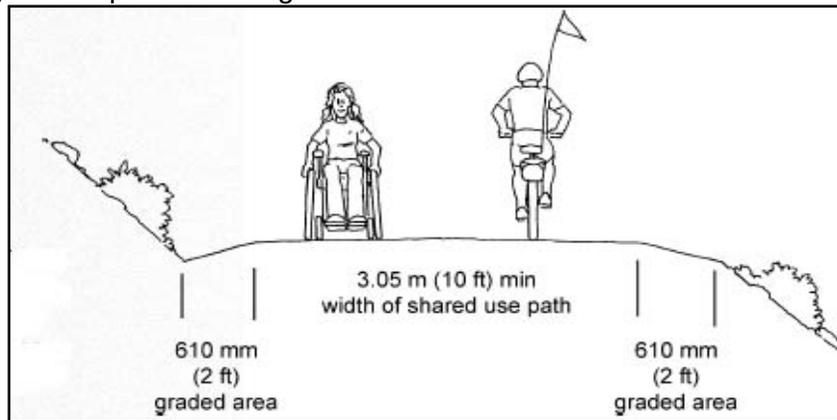


Figure 4.7
Typical Shared-use Path Standard Cross Section

Source: FHWA

Landscaping for shared-use paths should generally be low water use native vegetation. Selected plant species should generally be native plants. Selecting species that require minimal maintenance, including falling litter and debris is an important consideration. Shade landscaping should be considered as a valuable enhancement for bicycle and pedestrian use, and should be considered as a continuous design element along the pathway or at nodes within reasonable spacing along the pathway. This is especially appropriate considering the high temperatures that occur throughout the summer months in Leland. Tree trunks are recommended to be located between three and five feet from the shared-use path edge so that the tree provides the path with shade, but not so close as to cause future pavement damage from root intrusion (root guard may be needed). However, consideration should be taken so that the tree typically does not encroach into the vertical clearance of the path.

Pedestrian-scale lighting should be considered where bicycle users and others will likely use the shared-use path in the evenings or early mornings. This is an important safety and security consideration in Leland considering most users may frequently use the path during early or late hours in order to avoid the heat.

Barriers such as posts or bollards to prevent unauthorized motor vehicle use of shared-use paths may be used as appropriate. Ideally, fewer restrictions at entry points are preferred; however, if barriers are used, the barriers should be clearly marked as per MUTCD standards and should be Americans with Disability Act (ADA) accessible.

Shared-use path construction should take into consideration maintenance and emergency vehicles particularly for shared-use path surface material, width, shoulders, and vertical clearance requirements.

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Unpaved or impervious surface shoulders two to four feet in width should be provided where feasible for pedestrians and runners. The shoulders provide a softer running and walking surface, increase capacity of the path, and provide a clear zone for cyclists and in-line skaters who may unexpectedly leave the path. Cyclists and pedestrians may be directed to the right side of the pathway with signing and/or stenciling, and signs may be provided illustrating the rules of the path.

Where paths are heavily used, consideration may be made to install emergency phone service.

Grades that meet ADA provisions are important to accommodate users with disabilities. ADA requires that the grade of shared-use paths not exceed 8.33 percent.

Where shared-use path design occurs in environmentally sensitive areas such as coastal areas, design exceptions may be pursued to minimize environmental impacts; however, the minimum AASHTO design guidelines should be followed, or if not feasible (e.g., if only a six-foot width can be achieved), the path should not be designated for bicycle use.

Intersections of shared-use paths with roadways should be clearly signed to channel users to cross at safe and clearly delineated locations and to warn motorists of the intersection.

Shared-use paths should not be considered a substitute for on-road bicycle facilities. Paved shoulders or bicycle lanes should be considered along roadways that have adjacent shared-use paths. As stated within AASHTO, many cyclists will use the roadway instead of the shared-use path because they have found the roadway to be safer, more convenient, or better maintained. AASHTO lists several additional operational and safety reasons why paved shoulders or bike lanes should be implemented on the roadway if adjacent shared-use paths are built.

A twelve foot wide multi-use path should be considered for all the proposed connections within the Town and the proposed Leland Greenway.

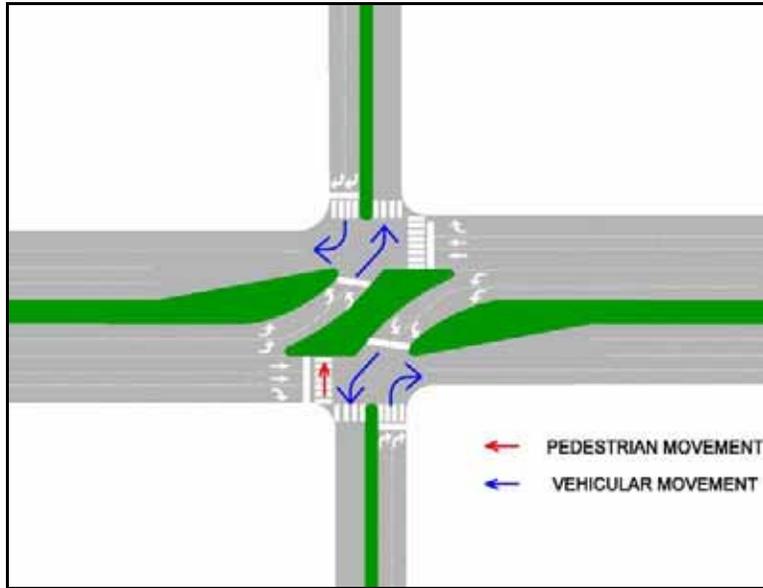
4.5 BICYCLE CROSSINGS ALONG “SUPERSTREET” CORRIDORS

While experienced cyclists travel through the superstreet in the same manner as a motor vehicle, crossing the major street at a superstreet can be difficult for novice or inexperienced riders. For these cyclists, navigating the superstreet as a pedestrian is safer and more comfortable. **Figures 4.8** through **4.10** show how this three phase crossing can occur. It is important to note that when crossing in this manner, the pedestrians are fully protected from the vehicles. Also, this method of crossing for pedestrians does not diminish the capacity of the minor movement right turns, as they do not have to yield to pedestrians.

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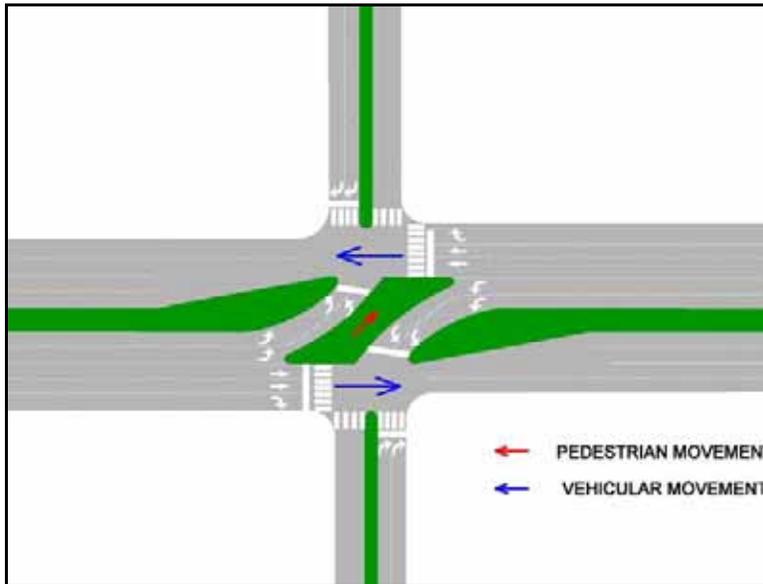


Figure 4.8
Phase 1 of Pedestrian/Cyclist Crossing at a Superstreet



In Phase 1 of the crossing the pedestrian (or cyclist acting as a pedestrian) crosses the major street as the vehicles are turning left into and right out of the minor street.

Figure 4.9
Phase 2 of Pedestrian/Cyclist Crossing at a Superstreet

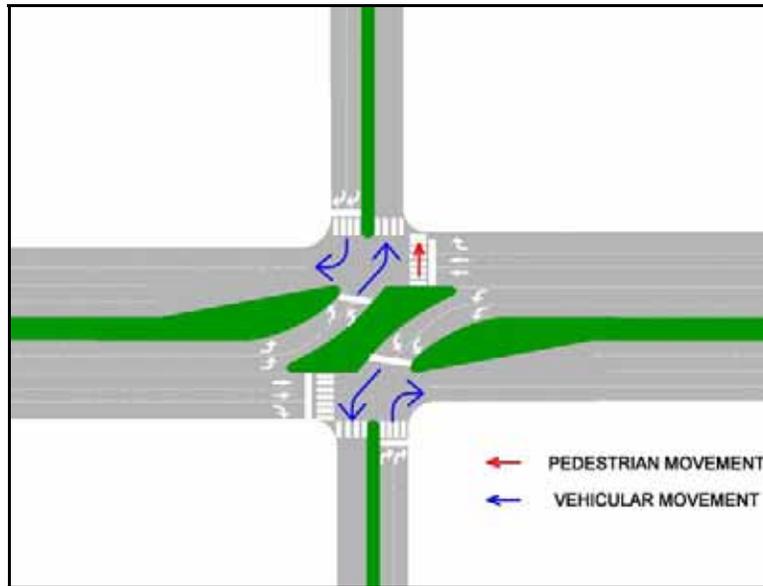


In Phase 2, as the major street movements have a green light, the pedestrian travels along the 'z' shaped island in preparation for crossing the major movement.

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Figure 4.10
Phase 3 of Pedestrian/Cyclist Crossing at a Superstreet



In Phase 3, much as in Phase 1, as vehicles are turning into and out of the minor street, pedestrians can cross the major movement.

The provision of these crossings should be considered as a retrofit to the current superstreet design on US 17 and should be considered on all new superstreets constructed along US 17. On all new locations the crossing island needs to be of sufficient width to accommodate bicyclists and pedestrians with proper paved surface and buffering. Where possible, the distance from the intersection to the next available turn around location should be kept to a minimum to accommodate cyclists that utilize the superstreet in the same fashion as a motor vehicle. The initial design plans for R-2633A do not appear to indicate the presence of these crossing treatments.

4.6 BIKE ROUTE

Bike routes have been typically designated as signed routes along street corridors, usually on local streets and sometimes on collectors. With proper route signing as per the MUTCD (which NCDOT is federally mandated to use), reasonably direct connectivity, and good street maintenance bike routes can be effective in guiding cyclists to local and regional destinations. Bike routes also can be good incubators for beginning cyclists to develop their skills. Bike routes can become more useful when coupled with such techniques as:



- Special route name, directional, and distance signing (**Figure 4.11**);

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- “Share the Road” signs along roadways where additional guidance is needed for motorists to share the road with bicycles, including locations where the bikeway narrows to substandard conditions; (**Figure 4.12**)
http://ncdot.org/transit/bicycle/safety/programs_initiatives/share.html
- Warning signs for cyclists when substandard conditions exist
- Wide outside lanes on collector roadways (14 feet in width);
- Routine pavement maintenance schedules;
- Traffic signals timed for cyclists and signalized crossings specifically for cyclists and/or pedestrians, where high use warrants increased safety and accessibility across major roadways; and
- Traffic calming and development of “bicycle boulevards” (roadways that are optimized for bicycle traffic), for example, including provision of speed humps, traffic circles, curb extensions, entrances to neighborhoods limited only to cyclists, and pedestrians, etc.



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Figure 4.11
Bicycle Facility Guide Signs

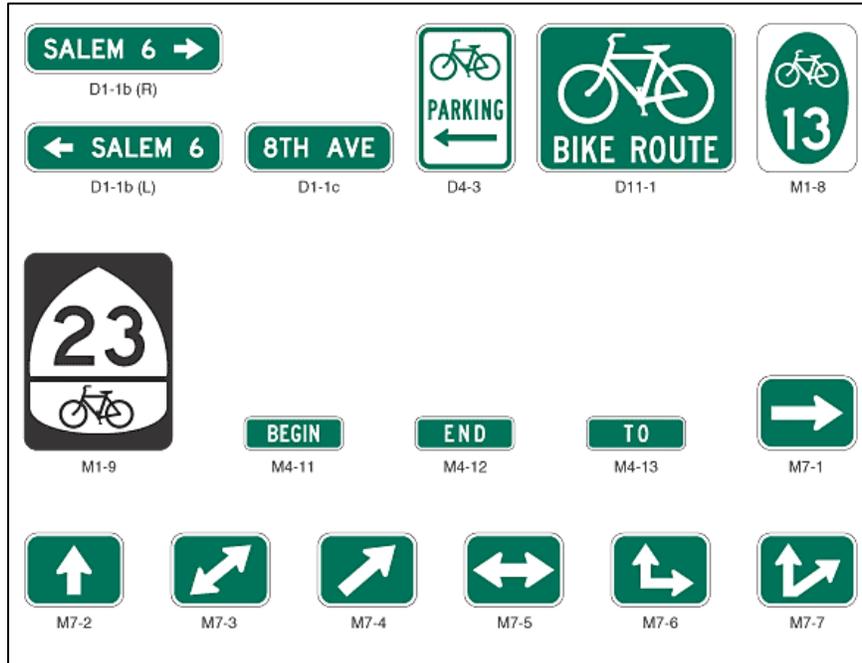
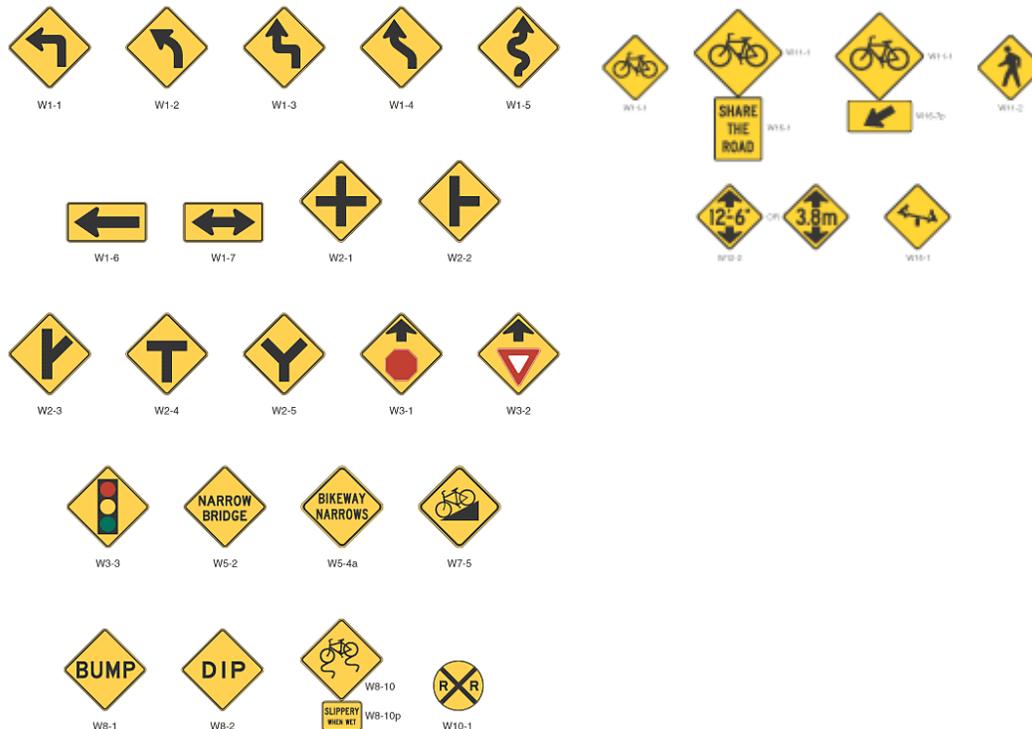


Figure 4.12
Warning Signs for Bicycle Facilities



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4.7 RIDING ON SIDEWALKS

The use of sidewalks as bicycle facilities should not be encouraged especially as a bike route. Although bicycle and motor vehicle speeds are generally lower at sidewalk intersections with roadways, potential conflicts can still result in severe injuries. It is inappropriate to sign these facilities as bikeways. Significant safety issues arise when those riding on the sidewalk, especially contrary to the flow of traffic, encounter driveways and side streets where motorists do not expect to see them. Cyclists should not be encouraged to ride on facilities that are not designed to accommodate bicycle travel. The following excerpt is from the 1999 AASHTO Design Guidelines on the use of sidewalks for bicycle facilities⁽¹⁾.

Undesirability of Sidewalks as Shared-Use Paths

Utilizing or providing a sidewalk as a shared-use path is unsatisfactory for a variety of reasons. Sidewalks are typically designed for pedestrian speeds and maneuverability and are not safe for higher speed bicycle use. Conflicts are common between pedestrians traveling at low speeds (exiting stores, parked cars, etc.) and cyclists, as are conflicts with fixed objects (e.g., parking meters, utility poles, sign posts, bus benches, trees, fire hydrants, mail boxes, etc.). Walkers, joggers, skateboarders, and roller skaters can, and often do, change their speed and direction almost instantaneously, leaving cyclists insufficient reaction time to avoid collisions.

Similarly, pedestrians often have difficulty predicting the direction an oncoming cyclist will take. At intersections, motorists are often not looking for cyclists (who are traveling at higher speeds than pedestrians) entering the crosswalk area, particularly when motorists are making a turn. Sight distance is often impaired by buildings, walls, property fences, and shrubs along sidewalks especially at driveways. In addition, cyclists and pedestrians often prefer to ride or walk side-by side when traveling in pairs. Sidewalks are typically too narrow to enable this to occur without serious conflicts between users.

It is especially inappropriate to sign a sidewalk as a shared-use path or designated bike route if to do so would prohibit cyclists from using an alternate facility that might better serve their needs. It is important to recognize that the development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel. Wide sidewalks might encourage higher speed bicycle use and can increase potential for conflicts with motor vehicles at intersections, as well as with pedestrians and fixed objects.

4.8 DRAINAGE GRATES

Replacing or modifying dangerous drain grates is one of the most basic improvements a community can make for cyclists. Fortunately, doing so is a relatively simple procedure. First, it's important to realize that a drainage grate, as part of a road's drainage system, is an important roadway feature. It allows storm water runoff that has flowed from the roadway into the gutter to be taken away via a subsurface system of pipes or to enter the groundwater through a sump.

¹ Source 1999: AASHTO Guide for the Development of Bicycle Facilities

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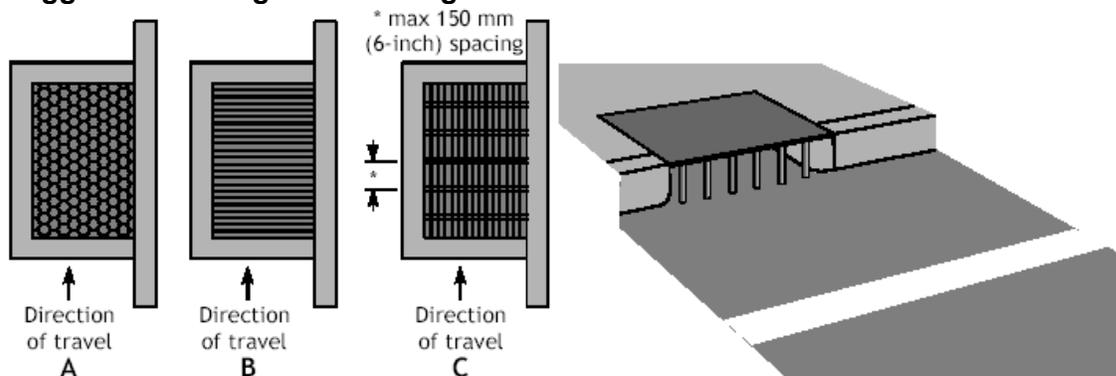
For this reason, any changes made to a grate must take hydraulics into account. A "bicycle safe" grate must let water pass without allowing routine types and amounts of debris to clog the inlets--and without trapping bicycle wheels. And that, by the way, is the primary danger for cyclists. Many traditional parallel-bar drain grates have slots wide enough to swallow some bicycle's wheels. A bicycle drops in, perhaps up to the fork, the wheel stops, and the rider catapults over the handlebars.



There are many designs of drainage grates that are also "bicycle-safe." Steel grates designed in a honeycomb pattern (A) work well and are the standard for the State of California (see **Figure 4.13**). Iron grates with a herringbone pattern of holes also are good and are standard for the State of North Carolina. Curb-face inlets take the water into a hole in the curb and have no slots on the road surface. Curb-face inlets offer an excellent solution, removing the grate entirely, however they can cause handling problems for bikes if the roadway slopes excessively toward the inlet.

Alternatives to replacing dangerous grates include placing covers over the top and painting warning markings on the roadway to direct cyclists away. The first option tends to be a temporary fix. Steel straps welded over the top of a grate (C) can, over time, come loose. And sending a welder out into the field is a very expensive way to handle such problems.

Figure 4.13
Suggested Drainage Grate Designs



Source: *Oregon Bicycle and Pedestrian Plan*, Oregon Department of Transportation, 1995.

4.9 BIKEWAY SIGNING

NCDOT is federally mandated to use only sign designs provided in the MUTCD. Therefore, all bikeway signing shall conform to signing standards identified in the MUTCD. This document provides specific information on the type and location of signing

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for bikeway systems. Stencils and pavement markings as indicated in the MUTCD also can be included on bicycle facilities to help cyclists and motorists more easily identify travel lanes and bike facilities and routes.

4.10 SHARROWS

The National Committee on Uniform Traffic Control Devices (NCUTCD) has recommended to the Federal Highway Administration (FHWA) that this shared lane marking symbol be included in the next edition of the MUTCD. This marking indicates the legal and appropriate bicyclist line of travel and cues motorists to pass with sufficient clearance. This marking can be used in locations where the travel lane is too narrow for a motor vehicle and a bicycle to travel side by side within the traffic lane and where parallel parking is present to assist bicyclists with positioning. Additional information can be found at:

http://townhall.townofchapelhill.org/agendas/2007/02/12/5g/5g-1_sharrow_details.pdf.



4.11 BICYCLE PARKING GUIDELINES

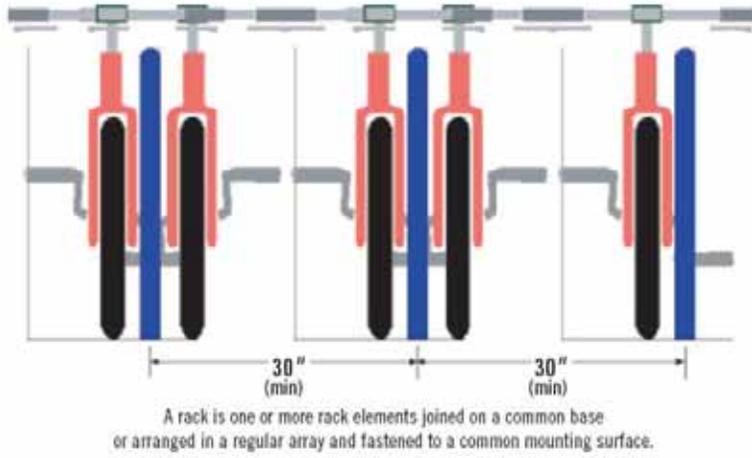
As the number of bicyclists begin to increase in and around the Town, not only will their safety be of paramount importance, but so will be the accessibility to bicycle racks. In order to provide bicyclists some means to protect their investment, some steps should be taken to provide ample and effective bicycle parking. Chapter 3 under the Policies section details the suggested number of bike racks needed at each particular facility.

The Association of Pedestrian and Bicycle Professionals suggests the most effect bike parking design is the “inverted U” rack design. This design is not only sturdy and resistant to potential thieves, but provides adequate support for the bicycle. See **Figure 4.14** for suggested spacing of multiple racks.

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Figure 4.14
Suggested Bike Rack Spacing



Source: Association of Pedestrian and Bicycle Professionals

Figure 4.15
Inverted U and Loop Bike Rack



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4.12 ACCESS MANAGEMENT

The Transportation Research Board's Access Management Committee defines access management as follows:

Access management is the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed.

The spacing and frequency of driveways and the provisions for access between adjacent parcels has a significant impact on cyclists and pedestrians. Implementing agencies should consider having an Access Management Plan that regulates the spacing of driveways and requires new developments to include direct access for pedestrians and cyclists from the adjacent roadway and to adjacent parcels.

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Chapter 5
IMPLEMENTATION



WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation



Chapter 5 – Implementation

After adoption of this plan, the Town must work toward implementing the projects outlined in this plan. To aid in the selection of which projects to pursue, this chapter presents a prioritization of projects based on a variety of metrics and a discussion of potential funding sources.

It is vitally important to ensure that an individual or group of individuals clearly be placed in charge of the implementation of this plan. This responsibility should fall primarily on the Planning Department and the newly formed Department of Parks, Recreation, and Environmental Programs. However, participation by members of the Bicycle Plan Steering Committee, listed in the Acknowledgments, as well as the Parks and Recreation Board is also vital. This department and the steering committee should establish continual contact with NCDOT Division 3, Wilmington MPO (particularly the WMPO's Bike/Ped Committee), Brunswick County, Towns of Belville and Navassa, North Brunswick Chamber of Commerce, and developers in the area to ensure that the recommendations in this plan are implemented.

5.1 PRIORITIZATION OF PROJECTS

The recommendations found in this plan represent a wide variety of projects, from very short connections that can open up large portions of Town, to large bicycle routes that while large in length, may only serve the recreational user. With the focus on making bicycling a viable, convenient, and safe transportation choice throughout the Town, a matrix of characteristics was developed (included in Appendix E) to rank the proposed facility recommendations in order to categorize these facilities into short term (less than 5 years), medium term (5 to 10 years) and long term (greater than 10 years) recommendations. The criteria included in this analysis were:

- Total length
- Portion within Town limits
- Length within Town limits
- Total cost (from information from bicyclinginfo.org and WSA sources)
- Cost within Town limits (included in Chapter 3 and Appendix E)
- Elimination of barriers or constraints
- Improvement in problematic routes
- Accessibility to activity centers
- Connections of gaps in system
- Enhancement of quality of life
- Lack of environmental constraints
- Positive impact on children
- Public support (Based on input from the public)

Short Term Priorities

The short term priorities were primarily focused on two objectives 1) Improving bicycle access and safety in “Old Leland” and 2) making connections between existing facilities to open up larger portions of the Town to bicycle travel within neighborhoods and local roads. The projects that fell into this group are:

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- **Village Road Loop** – This project should be placed in the short term priorities due to its large impact on bicycling within “Old Leland” and the access that it provides to basic goods and services. The initial focus should be on improving Village Road in concert with the existing NCDOT TIP projects. There is widespread public support for improvements along Village Road.
- **Old Leland Loop** – For many of the same reasons as the Village Road Loop, the Old Leland Loop should be placed in the short term priorities. The focus in this loop should be placed on improving Old Fayetteville Road, as it provides access to North Brunswick High School and Leland Middle School, as well as to the commercial areas along Village Road.
- **Fletcher Road / Northwest District Park Connection** – The completion of this project will provide a vital non-motor vehicle access to the Northwest District Park. Completing this connection will only require negotiations with one landowner and will be relatively inexpensive due to the short length and lack of serious environmental concerns. This project, in conjunction with improvements to Village Road and Old Fayetteville Road, will greatly ease access from “Old Leland” to District Park.
- **US 17 Superstreet Connections** – It is currently very difficult, if not impossible for the average cyclist to cross US 17 from the residential areas north of US 17 to the commercial areas south of US 17. Providing pedestrian connections across the superstreet will have minimal (if any) impact on vehicular traffic flow, while providing non-vehicular access to large portions of the Town. This improvement will also be relatively inexpensive to implement.
- **Leland Greenway** – While this project may not be completed until after the 5-year time horizon, it should still be considered a short term project. Such a greenway will provide large recreational benefits to the citizens of the Town and if included into the East Coast Greenway could be a tourist attraction. This facility will also provide a connection from the residential areas north of US 17 and Brunswick Forest to the County’s Town Creek Nature Park. This connection is very important to bypass congestion along NC 133, as NC 133 will be very difficult to improve for cyclists due to narrow roadway width paralleled by numerous ditches and culverts. The greenway will also help connect the neighborhoods of Mallory Creek, Westport, and Westgate. This greenway could also connect with future Lanvale Road improvements to provide greater north-south connectivity through the area.
- **Wayne Street / Royal Street Connection** – The provision of this connection will open a vital link between Village Road and Old Fayetteville Road. While this connection may be difficult to make given the private ownership of land in the area and the wetlands in the area, it is very important for increased mobility in the area.
- **Night Harbor Drive / Old Towne Wynd Connection** – The main barrier with this connection will be creating a path around the existing pool and pool house at the end of Night Harbor Drive. However this connection will provide access from the residential areas along NC 133 to commercial areas along US 17.
- **Grandiflora / Palm Ridge Drive** – While this project scored low on the evaluation matrix, this is a wide neighborhood street within the Town that is

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currently well suited to accommodate bicyclists. The Town should pursue making the connection between Grandiflora Drive and Timber Lane to provide access from “Old Leland.” At this point this facility should be signed as a bicycle route.

Ploof Road

The short term priorities are shown on **Figure 5.1**

Medium Term Priorities

The medium term priority projects were those that fell within the Town boundaries, but that were more difficult to construct and provided less benefit to residents of the Town. The projects that fell into this group are:

-  **Holly Hills Drive / Sturgeon Drive Connection** – This connection will make travel easier in the residential areas north of Village Road, and will also ease bicycle traffic along Village Road.
-  **Eagle Island Connection** – As the plans for Eagle Island progress, the Town should continue to consider non-vehicular access to the island. This connection will be vital when recreational activities are developed on the Island.
-  **NC 133** – Many members of the public expressed a desire to have better bicycle facilities along NC 133. While it is recognized that this is an important connection to areas south of the Town, it will be very difficult to improve this facility to a level where bicycle traffic is easily accommodated, particularly given the high traffic volumes along this facility and space limitations due to numerous ditches and culverts. The completion of the Leland Greenway and other connections within the Town will allow bicyclists to bypass the higher volume sections of NC 133.
-  **Lanvale Road** – Lanvale Road is an important roadway in the western portion of the Town. The Town should plan for the provision of bicycle facilities along this roadway as the area continues to develop and as Brunswick Forest nears completion. The Leland Greenway is planned to connect in this area, so bicycle facilities should be timed for construction after the completion of the greenway.
-  **Old Fayetteville Road** – Old Fayetteville Road provides a valuable connection between the north-south routes along Lanvale Road and Timber Lane / Grandiflora Drive. The Town should work with NCDOT and the County to provide wide paved shoulders on this section of road.

The medium term priorities are shown on **Figure 5.2**

Long Term Priorities

The remainder of the projects fall into the Long term priorities. The projects lie almost solely outside of the Town limits and serve primarily medium to advanced recreational cyclists. The desire to have bicycle facilities on these routes should be considered as the area develops. The projects that fall into this group are:

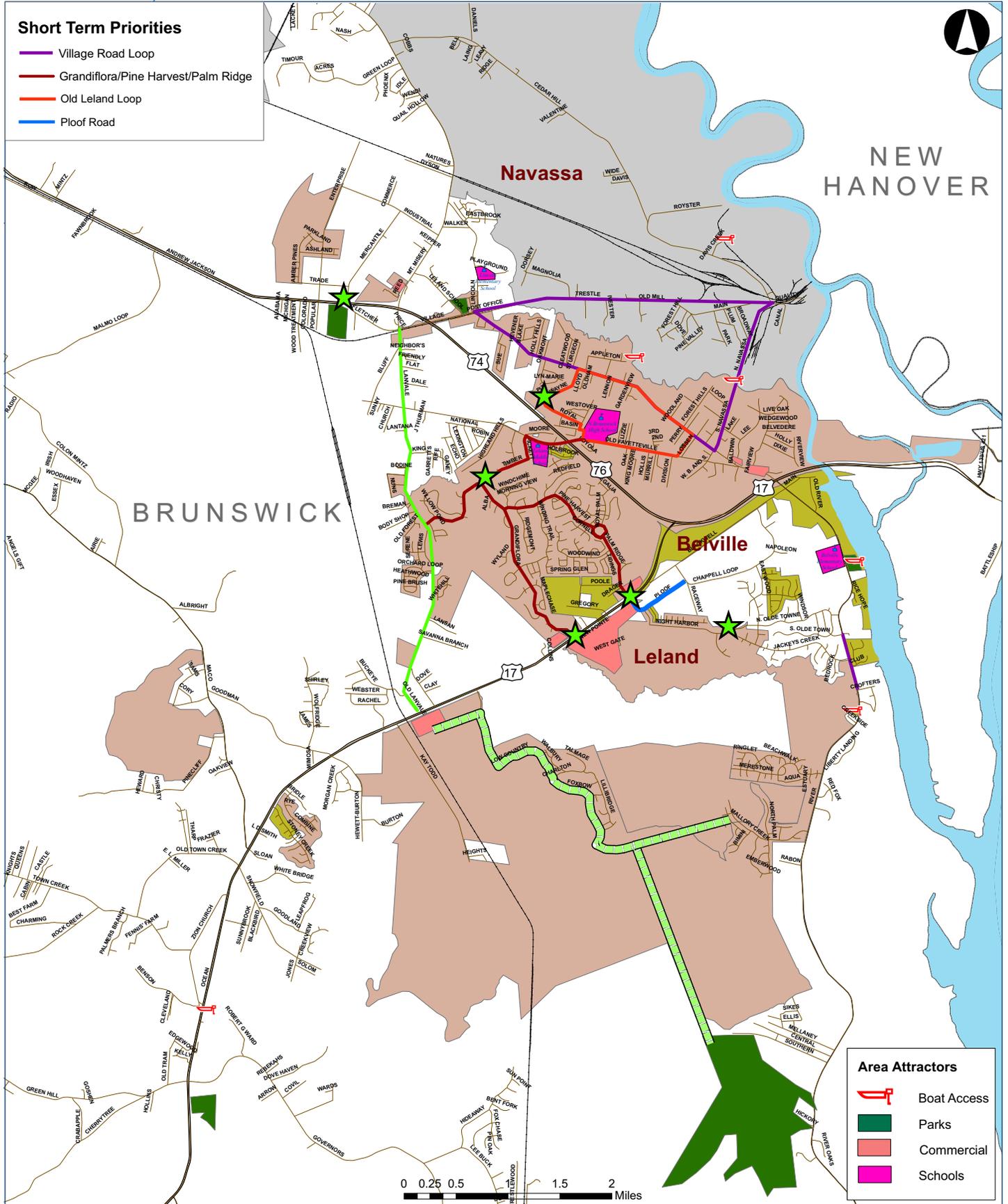
-  **Chappell Loop**
-  **Cedar Hill Loop**
-  **Green Hill Loop**

The long term priorities are shown on **Figure 5.3**

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Comprehensive Bicycle Plan

Town of Leland, NC



- Short Term Priorities**
- Village Road Loop
 - Grandiflora/Pine Harvest/Palm Ridge
 - Old Leland Loop
 - Ploof Road

- Area Attractors**
- Boat Access
 - Parks
 - Commercial
 - Schools



Proposed Short Term Priorities

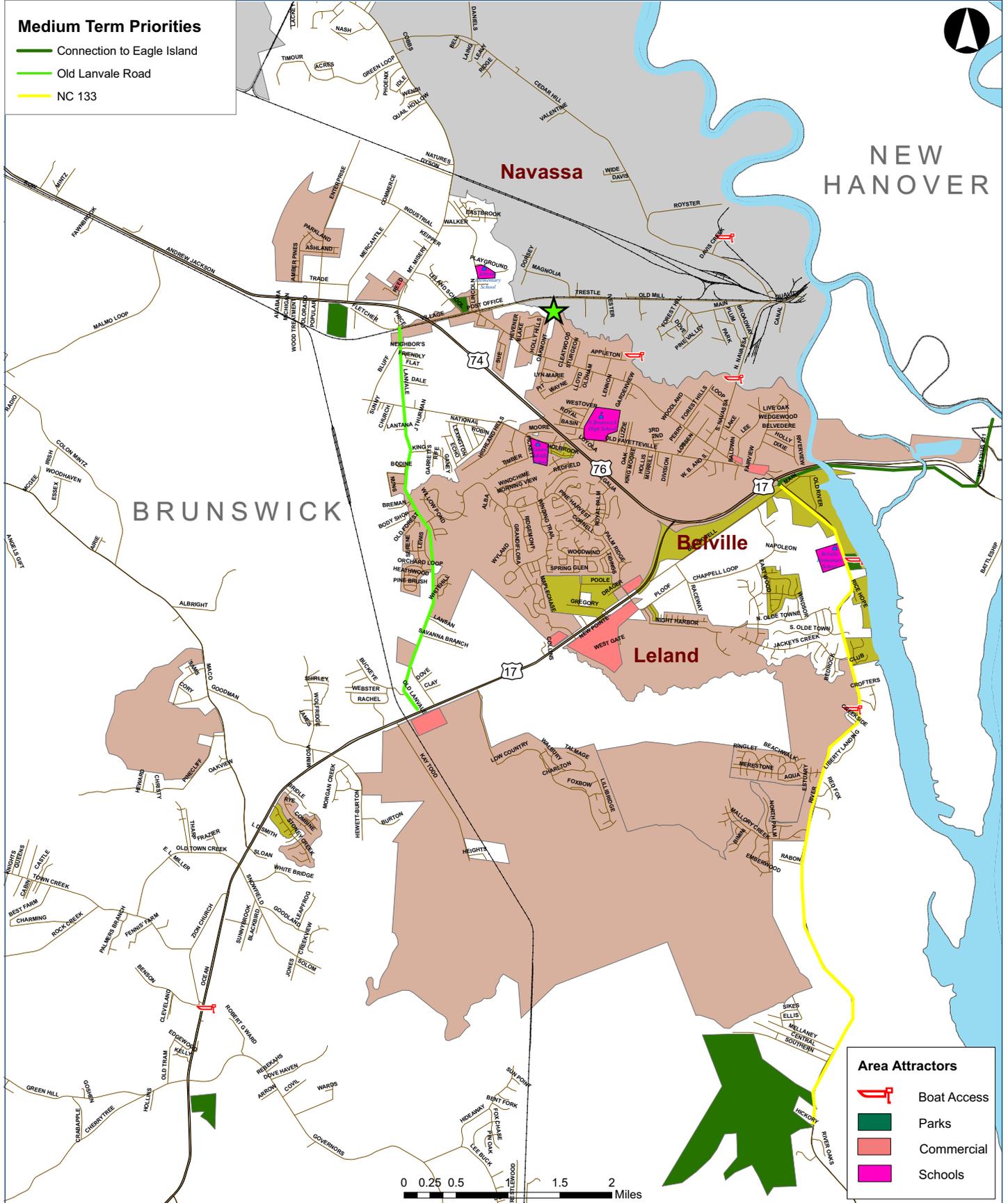
LEGEND

— Primary Roads	— Railroads	 Leland	 Navassa	 Proposed Greenway
— Other Roads	— County Boundary	 Belville	 Water Bodies	★ Proposed Connections

Figure 5.1

Comprehensive Bicycle Plan

Town of Leland, NC



Proposed Medium Term Priorities

LEGEND

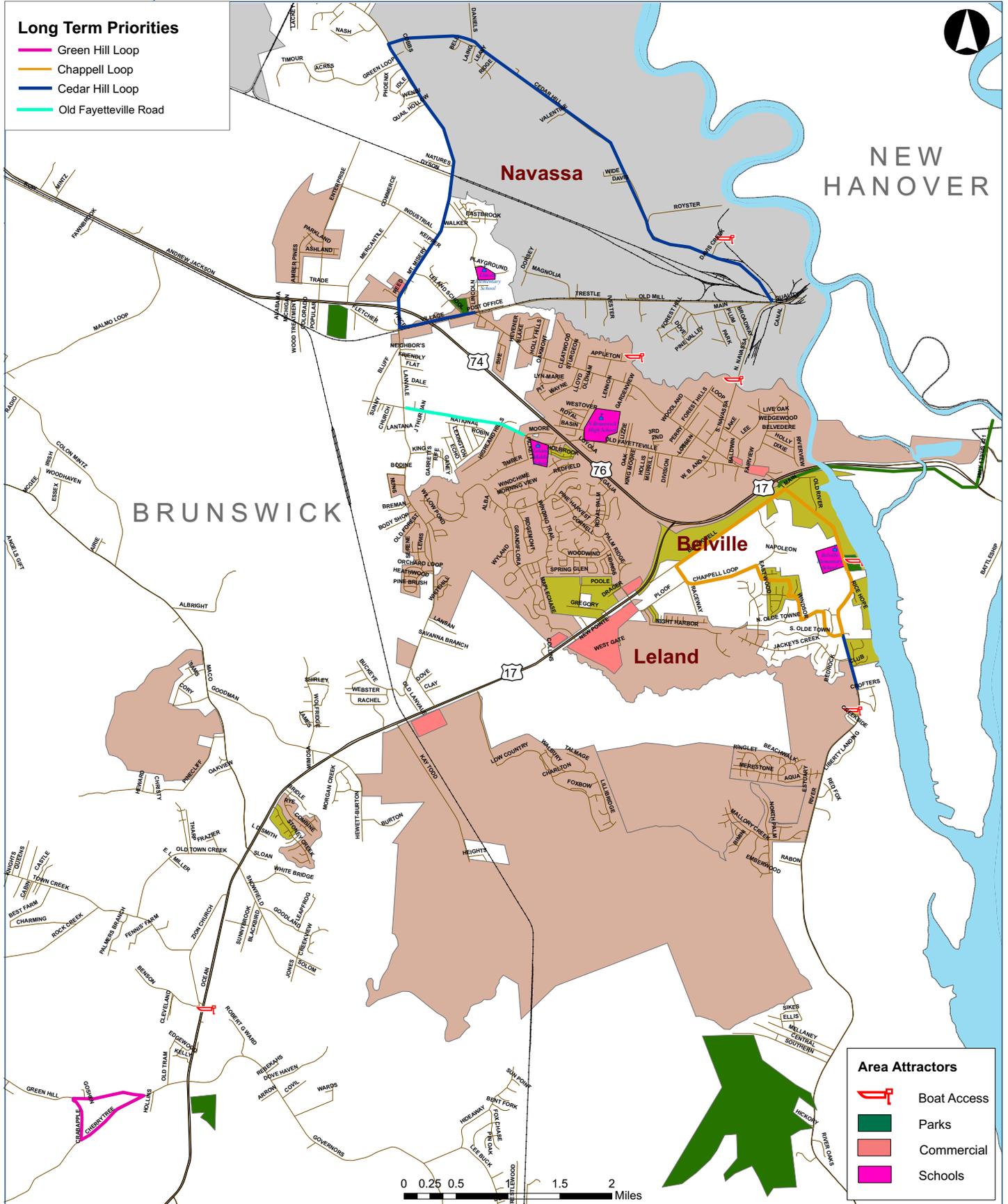
- Primary Roads
- Other Roads
- Railroads
- County Boundary
- Leland
- Belville
- Navassa
- Water Bodies
- Proposed Connections



Figure 5.2

Comprehensive Bicycle Plan

Town of Leland, NC



Long Term Priorities

- Green Hill Loop
- Chappell Loop
- Cedar Hill Loop
- Old Fayetteville Road

Area Attractors

- Boat Access
- Parks
- Commercial
- Schools

Proposed Long Term Priorities

LEGEND

- | | | | |
|---------------|-----------------|----------|--------------|
| Primary Roads | Railroads | Leland | Navassa |
| Other Roads | County Boundary | Belville | Water Bodies |



Figure 5.3



5.2 IMPLEMENTATION OF PROGRAMS AND POLICIES

The implementation of the various programs and policies recommended as part of this study is also a vital part of establishing bicycling as a viable, convenient, and safe transportation choice in Leland. Fortunately the majority of the program and policy recommendations in this report are low-cost endeavors. The implementation of these recommendations begins at the staff level by pursuing funding for the recommendations in this plan, coordinating with NCDOT and developers for the inclusion of bicycle facilities in their planned projects, by proposing changes to the Town's land development code, and by coordinating with the other agencies and groups to promote cycling and to educate the general public on safety and the benefits of cycling.

Given the low cost of the program and policy recommendations, they could all be considered short-term recommendations. However based on discussions with Town staff and the steering committee, the recommendations can be prioritized.

The first priority should be updating the Town's land development code and to coordinate with NCDOT regarding on-going projects. The rate at which the Town and surrounding areas is developing requires that the land development code be updated quickly, at the risk of losing the opportunity to have developers construct bicycle friendly developments. Additionally, as discussed in Chapter 2, there are several NCDOT projects currently in the planning and design phase in and around the Town. Town staff should continue to work with the MPO and NCDOT to ensure that cyclists are considered in these projects. The Town should also ensure that the recommendations included in this plan are reflected in the Comprehensive Plan, currently being prepared for the Town.

The second priority should be given to providing education to the public and promoting bicycle safety. To accomplish this objective, the Town should coordinate heavily with various cyclist groups in the area including the Cape Fear Cyclists as well as with the NCDOT DBPT and various groups that organize national activities such as Bike to Work Day. The Town should also devote a portion of its website to include bicycle safety information. This website should continue to be updated to provide routing information as the recommendations in this plan are implemented.

Finally, the Town should focus on developing a maintenance plan, increased enforcement for motorists and cyclists, and applying for grant money to implement the recommendations in this plan.

5.3 FUNDING SOURCES

Local, state, federal, and private funding is available to support the planning, construction, right of way acquisition and maintenance of bicycle and pedestrian facilities. Available funding sources are related to a variety of purposes including transportation, water quality, hazard mitigation, recreation, air quality, wildlife protection, community health, and economic development. This section identifies a list of some of the bicycle and pedestrian facility funding opportunities available through federal, state, nonprofit and corporate sources. An important key to obtaining funding is for local

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governments to have adopted plans for greenway, bicycle, and pedestrian or trail systems in place prior to making an application for funding.

Funding Allocated by State Agencies

Funding Opportunities through NCDOT:

-  Bicycle and Pedestrian Independent Projects Funded through the Transportation Improvement Program (TIP) - In North Carolina, the Department of Transportation, Division of Bicycle and Pedestrian Transportation (DBPT) manages the Transportation Improvement Program (TIP) selection process for bicycle and pedestrian projects.

Projects programmed into the TIP are independent projects – those which are not related to a scheduled highway project. Incidental projects – those related to a scheduled highway project – are handled through other funding sources described in this section.

A total of \$5.3 million dollars of TIP funding is available for funding various bicycle and pedestrian independent projects, including the construction of multi-use trails, the striping of bicycle lanes, and the construction of paved shoulders, among other facilities. Prospective applicants are encouraged to contact the DBPT regarding funding assistance for bicycle and pedestrian projects. For a detailed description of the TIP project selection process, visit: http://www.ncdot.org/transit/bicycle/funding/funding_TIP.html.

Incidental Projects – Bicycle and pedestrian accommodations such as bike lanes, widened paved shoulders, sidewalks and bicycle-safe bridge design are frequently included as incidental features of highway projects. In addition, bicycle-safe drainage grates are a standard feature of all highway construction. Most bicycle and pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of National Highway System funds and State Highway Trust Funds.

Governor's Highway Safety Program (GHSP) – The mission of the GHSP is to promote highway safety awareness and reduce the number of traffic crashes in the state of North Carolina through the planning and execution of safety programs. GHSP funding is provided through an annual program, upon approval of specific project requests. Amounts of GHSP funds vary from year to year, according to the specific amounts requested. Communities may apply for a GHSP grant to be used as seed money to start a program to enhance highway safety. Once a grant is awarded, funding is provided on a reimbursement basis. Evidence of reductions in crashes, injuries, and fatalities is required. For information on applying for GHSP funding, visit: www.ncdot.org/programs/ghsp/.

-  Safe Routes to School Program, managed by NCDOT, DBPT - The NCDOT Safe Routes to School Program (SRTS) is a federally funded program that was initiated by the passing of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A

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Legacy for Users (SAFETEA-LU) in 2005, which establishes a national SRTS program to distribute funding and institutional support to implement SRTS programs in states and communities across the country. SRTS programs facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools. The Division of Bicycle and Pedestrian Transportation at NCDOT is charged with disseminating SRTS funding.

The state of North Carolina has been allocated \$15 million in Safe Routes to School funding for fiscal years 2005 through 2009 for infrastructure or non-infrastructure projects. All proposed projects must relate to increasing walking or biking to and from an elementary or middle school. An example of a non-infrastructure project is an education or encouragement program to improve rates of walking and biking to school. An example of an infrastructure project is construction of sidewalks around a school. Infrastructure improvements under this program must be made within 2 miles of an elementary or middle school. The state requires the completion of a competitive application to apply for funding. For more information, visit www.ncdot.org/programs/safeRoutes/ or contact Leza Mundt at DBPT/NCDOT, (919) 807-0774.

 Transportation Enhancement Call for Projects, EU, NCDOT

The Enhancement Unit administers a portion of the enhancement funding set-aside through the Call for Projects process. In North Carolina the Enhancement Program is a federally funded cost reimbursement program with a focus upon improving the transportation experience in and through local North Carolina communities either culturally, aesthetically, or environmentally. The program seeks to encourage diverse modes of travel, increase benefits to communities and to encourage citizen involvement. This is accomplished through the following twelve qualifying activities:

1. Bicycle and Pedestrian Facilities
2. Bicycle and Pedestrian Safety
3. Acquisition of Scenic Easements, Scenic or Historic Sites
4. Scenic or Historic Highway Programs (including tourist or welcome centers)
5. Landscaping and other Scenic Beautification
6. Historic Preservation
7. Rehabilitation of Historic Transportation Facilities
8. Preservation of Abandoned Rail Corridors
9. Control of Outdoor Advertising
10. Archaeological Planning and Research
11. Environmental Mitigation
12. Transportation Museums

 Funds are allocated based on an equity formula approved by the Board of Transportation. The formula is applied at the county level and aggregated to the regional level. Available fund amount varies. In previous calls, the funds available ranged from \$10 million to \$22 million.

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The call process takes place on even numbered years or as specified by the Secretary of Transportation. The next call is anticipated to take place in 2009. For more information, visit: www.ncdot.org/financial/fiscal/Enhancement/.

Paved shoulders can be provided through the Division 3 resurfacing program. Contact:
Highway Division 3
124 Division Drive
Wilmington, NC 28401
(910) 251-5724

Funding Opportunities from Other State Agencies:

 Funding Available Through North Carolina Metropolitan Planning Organizations (MPOs)- MPOs in North Carolina which are located in air quality nonattainment or maintenance areas have the authority to program Congestion Mitigation Air Quality (CMAQ) funds. CMAQ funding is intended for projects that reduce transportation related emissions. Some NC MPOs have chosen to use the CMAQ funding for bicycle and pedestrian projects. Local governments in air quality nonattainment or maintenance area should contact their MPO for information on CMAQ funding opportunities for bicycle and pedestrian facilities.

 The North Carolina Conservation Tax Credit (managed by NCDENR) - This program, managed by the North Carolina Department of Environment and Natural Resources, provides an incentive (in the form of an income tax credit) for landowners that donate interests in real property for conservation purposes. Property donations can be fee simple or in the form of conservation easements or bargain sale. The goal of this program is to manage stormwater, protect water supply watersheds, retain working farms and forests, and set-aside greenways for ecological communities, public trails, and wildlife corridors. For more information, visit: www.enr.state.nc.us/conservationtaxcredit/.

Land and Water Conservation Fund (LWCF) -The Land and Water Conservation Fund (LWCF) program is a reimbursable, 50/50 matching grants program to states for conservation and recreation purposes, and through the states to local governments to address "close to home" outdoor recreation needs. LWCF grants can be used by communities to build a trail within one park site, if the local government has fee-simple title to the park site. Grants for a maximum of \$250,000 in LWCF assistance are awarded yearly to county governments, incorporated municipalities, public authorities and federally recognized Indian tribes. The local match may be provided with in-kind services or cash. The program's funding comes primarily from offshore oil and gas drilling receipts, with an authorized expenditure of \$900 million each year. However, Congress generally appropriates only a small fraction of this amount. The allotted money for the year 2007 is \$632,846.

The Land and Water Conservation Fund (LWCF) has historically been a primary funding source of the US Department of the Interior for outdoor recreation development and land acquisition by local governments and state agencies. In North Carolina, the program is administered by the Department of Environment

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and Natural Resources. Since 1965, the LWCF program has built a permanent park legacy for present and future generations. In North Carolina alone, the LWCF program has provided more than \$63 million in matching grants to protect land and support more than 800 state and local park projects. More than 37,000 acres have been acquired with LWCF assistance to establish a park legacy in our state. For more information, visit: <http://ils.unc.edu/parkproject/lwcf/home1.html>.

 NC Adopt-A-Trail Grant Program - This program, operated by the Trails Section of the NC Division of State Parks, offers annual grants to local governments to build, renovate, maintain, sign and map and create brochures for pedestrian trails. Grants are generally capped at about \$5,000 per project and do not require a match. A total of \$108,000 in Adopt-A-Trail money is awarded annually to government agencies. Applications are due during the month of February. For more information, visit: <http://ils.unc.edu/parkproject/trails/grant.html>.

 Recreational Trails Program - The Recreational Trails Program (RTP) is a grant program funded by Congress with money from the federal gas taxes paid on fuel used by off-highway vehicles. This program's intent is to meet the trail and trail-related recreational needs identified by the Statewide Comprehensive Outdoor Recreation Plan. Grant applicants must be able contribute 20% of the project cost with cash or in-kind contributions. The program is managed by the State Trails Program, which is a section of the N.C. Division of Parks and Recreation.

The grant application and instruction handbook is available through the State Trails Program website at <http://ils.unc.edu/parkproject/trails/home.html>. Applications are due during the month of February. For more information, call (919) 715-8699.

North Carolina Parks and Recreation Trust Fund (PARTF) - The fund was established in 1994 by the North Carolina General Assembly and is administered by the Parks and Recreation Authority. Through this program, several million dollars each year are available to local governments to fund the acquisition, development and renovation of recreational areas. Applicable projects require a 50/50 match from the local government. Grants for a maximum of \$500,000 are awarded yearly to county governments or incorporated municipalities. The fund is fueled by money from the state's portion of the real estate deed transfer tax for property sold in North Carolina.

The trust fund is allocated three ways:

-  65 percent to the state parks through the N.C. Division of Parks and Recreation.
-  30 percent as dollar-for dollar matching grants to local governments for park and recreation purposes.
-  5 percent for the Coastal and Estuarine Water Access Program.

For information on how to apply, visit: www.partf.net/learn.html.

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- Powell Bill Program - Annually, State street-aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as provided by statute. This program is a state grant to municipalities for the purposes of maintaining, repairing, constructing, reconstructing or widening of local streets that are the responsibility of the municipalities or for planning, construction, and maintenance of bikeways or sidewalks along public streets and highways. Funding for this program is collected from fuel taxes. Amount of funds are based on population and mileage of town-maintained streets. For more information, visit www.ncdot.org/financial/fiscal/ExtAuditBranch/Powell_Bill/powellbill.html.
- Clean Water Management Trust Fund - This fund was established in 1996 and has become one of the largest sources of money in North Carolina for land and water protection. At the end of each fiscal year, 6.5 percent of the unreserved credit balance in North Carolina's General Fund, or a minimum of \$30 million, is placed in the CWMTF. The revenue of this fund is allocated as grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. CWMTF funds may be used to establish a network of riparian buffers and greenways for environmental, educational, and recreational benefits. The fund has provided funding for land acquisition of numerous greenway projects featuring trails, both paved and unpaved. For a history of awarded grants in North Carolina and more information about this fund and applications, visit www.cwmtf.net/.
- Natural Heritage Trust Fund - This trust fund, managed by the NC Natural Heritage Program, has contributed millions of dollars to support the conservation of North Carolina's most significant natural areas and cultural heritage sites. The NHTF is used to acquire and protect land that has significant habitat value. Some large wetland areas may also qualify, depending on their biological integrity and characteristics. Only certain state agencies are eligible to apply for this fund, including the Department of Environment and Natural Resources, the Wildlife Resources Commission, the Department of Cultural Resources and the Department of Agriculture and Consumer Services. As such, municipalities must work with State level partners to access this fund. Additional information is available from the NC Natural Heritage Program. For more information and grant application information, visit www.ncnhf.org/.
- North Carolina Conservation Tax Credit Program - North Carolina has a unique incentive program to assist land-owners to protect the environment and the quality of life. A credit is allowed against individual and corporate income taxes when real property is donated for conservation purposes. Interests in property that promote specific public benefits may be donated to a qualified recipient. Such conservation donations qualify for a substantial tax credit. For more information, visit: www.enr.state.nc.us/conservationtaxcredit/.
- Urban and Community Forestry Assistance Program - This program offers small grants that can be used to plant urban trees, establish a community arboretum, or other programs that promote tree canopy in urban areas. The program operates as a cooperative partnership between the NC Division of Forest Resources and the USDA Forest Service, Southern Region. To qualify for this program, a community must pledge to develop a street-tree inventory, a municipal tree ordinance, a tree

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commission, and an urban forestry-management plan. All of these can be funded through the program. For more information, contact the NC Division of Forest Resources. For more information and a grant application, contact the NC Division of Forest Resources and/or visit http://www.dfr.state.nc.us/urban/urban_grantprogram.htm.

- Ecosystem Enhancement Program - Developed in 2003 as a new mechanism to facilitate improved mitigation projects for NC highways, this program offers funding for restoration projects and for protection projects that serve to enhance water quality and wildlife habitat in NC. Information on the program is available by contacting the Natural Heritage Program in the NC Department of Environment and Natural Resources (NCDENR). For more information, visit www.nceep.net/pages/partners.html or call 919-715-0476.
- *Conservation Reserve Enhancement Program (CREP)* - This program is a joint effort of the North Carolina Division of Soil and Water Conservation, the NC Clean Water Management Trust Fund, the Ecosystem Enhancement Program (EEP), and the Farm Service Agency - United States Department of Agriculture (USDA) to address water quality problems of the Neuse, Tar-Pamlico and Chowan river basins as well as the Jordan Lake watershed area.
- CREP is a voluntary program that seeks to protect land along watercourses that is currently in agricultural production. The objectives of the program include: installing 100,000 acres of forested riparian buffers, grassed filter strips and wetlands; reducing the impacts of sediment and nutrients within the targeted area; and providing substantial ecological benefits for many wildlife species that are declining in part as a result of habitat loss. Program funding will combine the Federal Conservation Reserve Program (CRP) funding with State funding from the Clean Water Management Trust Fund, Agriculture Cost Share Program, and North Carolina Wetlands Restoration Program.
- The program is managed by the NC Division of Soil and Water Conservation. For more information, visit www.enr.state.nc.us/dswc/pages/crep.html.
- Agriculture Cost Share Program - Established in 1984, this program assists farmers with the cost of installing best management practices (BMPs) that benefit water quality. The program covers as much as 75 percent of the costs to implement BMPs. The NC Division of Soil and Water Conservation within the NC Department of Environment and Natural Resources administer this program through local Soil and Water Conservation Districts (SWCD). For more information, visit www.enr.state.nc.us/DSWC/pages/agcostshareprogram.html or call 919-733-2302.
- Water Resources Development Grant Program - The NC Division of Water Resources offers cost-sharing grants to local governments on projects related to water resources. Of the seven project application categories available, the category which relates to the establishment of greenways is "Land Acquisition and Facility Development for Water-Based Recreation Projects." Applicants may apply for funding for a greenway as long as the greenway is in close proximity to a water body.

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For more information, see: [www.ncwater.org/Financial Assistance](http://www.ncwater.org/Financial_Assistance) or call 919-733-4064.

- Small Cities Community Development Block Grants - State level funds are allocated through the NC Department of Commerce, Division of Community Assistance to be used to promote economic development and to serve low-income and moderate-income neighborhoods. Greenways that are part of a community's economic development plans may qualify for assistance under this program. Recreational areas that serve to improve the quality of life in lower income areas may also qualify. Approximately \$50 million is available statewide to fund a variety of projects. For more information, visit www.hud.gov/offices/cpd/communitydevelopment/programs/stateadmin/ or call 919-733-2853.
- North Carolina Health and Wellness Trust Fund - The NC Health and Wellness Trust Fund was created by the General Assembly as one of 3 entities to invest North Carolina's portion of the Tobacco Master Settlement Agreement. HWTF receives one-fourth of the state's tobacco settlement funds, which are paid in annual installments over a 25-year period.

Fit Together, a partnership of the NC Health and Wellness Trust Fund (HWTF) and Blue Cross and Blue Shield of North Carolina (BCBSNC) administers Fit Community, a designation and grant program that recognizes and rewards North Carolina communities' efforts to support physical activity and healthy eating initiatives, as well as tobacco-free school environments. Fit Community is one component of the jointly sponsored Fit Together initiative, a statewide prevention campaign designed to raise awareness about obesity and to equip individuals, families and communities with the tools they need to address this important issue.

All North Carolina municipalities and counties are eligible to apply for a Fit Community designation, which will be awarded to those that have excelled in supporting the following:

- Physical activity in the community, schools, and workplaces
- Healthy eating in the community, schools, and workplaces
- Tobacco use prevention efforts in schools

Designations will be valid for two years, and designated communities may have the opportunity to reapply for subsequent two-year extensions. The benefits of being a Fit Community include:

- Heightened statewide attention that can help bolster local community development and/or economic investment initiatives (highway signage and a plaque for the Mayor's or County Commission Chair's office will be provided)
- Reinvigoration of a community's sense of civic pride (each Fit Community will serve as a model for other communities that are trying to achieve similar goals)

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- Use of the Fit Community designation logo for promotional and communication purposes. The application for Fit Community designation is available on the Fit Together Web site: www.FitTogetherNC.org/FitCommunity.aspx.

Fit Community grants are designed to support innovative strategies that help a community meet its goal to becoming a Fit Community. Eight to nine, two-year grants of up to \$30,000 annually will be awarded to applicants that have a demonstrated need, proven capacity, and opportunity for positive change in addressing physical activity and/or healthy eating. For more information, visit: www.healthwellnc.com/.

The North Carolina Division of Forest Resources - Urban and Community Forestry Grant can provide funding for a variety of projects that will help toward planning and establishing street trees as well as trees for urban open space. See: http://www.dfr.state.nc.us/urban/urban_ideas.htm.

Funding Allocated by Federal Agencies

- *Wetlands Reserve Program*
This federal funding source is a voluntary program offering technical and financial assistance to landowners who want to restore and protect wetland areas for water quality and wildlife habitat. The US Department of Agriculture's Natural Resource Conservation Service (USDA-NRCS) administers the program and provides direct payments to private landowners who agree to place sensitive wetlands under permanent easements. This program can be used to fund the protection of open space and greenways within riparian corridors. For more information, visit <http://www.nrcs.usda.gov/PROGRAMS/wrp/>.
- *The Community Development Block Grant (HUD-CDBG)*
The U.S. Department of Housing and Urban Development (HUD) offers financial grants to communities for neighborhood revitalization, economic development, and improvements to community facilities and services, especially in low and moderate income areas. Several communities have used HUD funds to develop greenways, including the Boulding Branch Greenway in High Point, North Carolina. Grants from this program range from \$50,000 to \$200,000 and are either made to municipalities or non-profits. There is no formal application process. For more information, visit: www.hud.gov/offices/cpd/communitydevelopment/programs/.
- *USDA Rural Business Enterprise Grants*
Public and private nonprofit groups in communities with populations under 50,000 are eligible to apply for grant assistance to help their local small business environment. \$1 million is available for North Carolina on an annual basis and may be used for sidewalk and other community facilities. For more information from the local USDA Service Center, visit: <http://www.rurdev.usda.gov/rbs/busp/rbeg.htm>.
- *Rivers Trails and Conservation Assistance Program (RTCA)*
The Rivers, Trails, and Conservation Assistance Program, also known as the Rivers & Trails Program or RTCA, is the community assistance arm of the National Park

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Service. RTCA staff provide technical assistance to community groups and local, State, and federal government agencies so they can conserve rivers, preserve open space, and develop trails and greenways. The RTCA program implements the natural resource conservation and outdoor recreation mission of the National Park Service in communities across America.

Although the program does not provide funding for projects, it does provide valuable on-the-ground technical assistance, from strategic consultation and partnership development to serving as liaison with other government agencies. Communities must apply for assistance. For more information, visit: www.nps.gov/ncrc/programs/rtca/ or call Chris Abbett, Program Leader, at 404-562-3175 ext. 522.

Public Lands Highways Discretionary Fund

The Federal Highway Administration administers discretionary funding for projects that will reduce congestion and improve air quality. The FHWA issues a call for projects to disseminate this funding. The FHWA estimates that the PLHD funding for the 2007 call will be \$85 million. In the past, Congress has earmarked a portion of the total available funding for projects. For information on how to apply, visit: <http://www.fhwa.dot.gov/discretionary/>.

Local Funding Sources

 Municipalities often plan for the funding of bicycle and pedestrian facilities or improvements through development of Capital Improvement Programs (CIP). In Raleigh, for example, the greenways system has been developed over many years through a dedicated source of annual funding that has ranged from \$100,000 to \$500,000, administered through the Recreation and Parks Department. CIPs should include all types of capital improvements (water, sewer, buildings, streets, etc.) versus programs for single purposes. This allows municipal decision-makers to balance all capital needs. Typical capital funding mechanisms include the following: capital reserve fund, capital protection ordinances, municipal service district, tax increment financing, taxes, fees, and bonds. Each of these categories are described below.

Capital Reserve Fund

Municipalities have statutory authority to create capital reserve funds for any capital purpose, including bicycle facilities. The reserve fund must be created through ordinance or resolution that states the purpose of the fund, the duration of the fund, the approximate amount of the fund, and the source of revenue for the fund. Sources of revenue can include general fund allocations, fund balance allocations, grants and donations for the specified use.

Capital Project Ordinances

Municipalities can pass Capital Project Ordinances that are project specific. The ordinance identifies and makes appropriations for the project.



Municipal Service District

Municipalities have statutory authority to establish municipal service districts, to levy a property tax in the district additional to the citywide property tax, and to use the proceeds to provide services in the district. Downtown revitalization projects are one of the eligible uses of service districts.

Tax increment financing

Tax increment financing is a tool to use future gains in taxes to finance the current improvements that will create those gains. When a public project, such as the construction of a greenway, is carried out, there is an increase in the value of surrounding real estate. Oftentimes, new investment in the area follows such a project. This increase in value and investment creates more taxable property, which increases tax revenues. These increased revenues can be referred to as the “tax increment.” Tax Increment Financing dedicates that increased revenue to finance debt issued to pay for the project. TIF is designed to channel funding toward improvements in distressed or underdeveloped areas where development would not otherwise occur. TIF creates funding for public projects that may otherwise be unaffordable to localities. The large majority of states have enabling legislation for tax increment financing.

Installment Purchase Financing

As an alternative to debt financing of capital improvements, communities can execute installment/ lease purchase contracts for improvements. This type of financing is typically used for relatively small projects that the seller or a financial institution is willing to finance or when up-front funds are unavailable. In a lease purchase contract the community leases the property or improvement from the seller or financial institution. The lease is paid in installments that include principal, interest, and associated costs. Upon completion of the lease period, the community owns the property or improvement. While lease purchase contracts are similar to a bond, this arrangement allows the community to acquire the property or improvement without issuing debt. These instruments, however, are more costly than issuing debt.

Taxes

Many communities have raised money through self-imposed increases in taxes and bonds. For example, Pinellas County residents in Florida voted to adopt a one-cent sales tax increase, which provided an additional \$5 million for the development of the overwhelmingly popular Pinellas Trail. Sales taxes have also been used in Allegheny County, Pennsylvania, and in Boulder, Colorado to fund open space projects. A gas tax is another method used by some municipalities to fund public improvements. A number of taxes provide direct or indirect funding for the operations of local governments. Some of them are:

Sales Tax

In North Carolina, the state has authorized a sales tax at the state and county levels. Local governments that choose to exercise the local option sales tax (all counties currently do), use the tax revenues to provide funding for a wide variety of projects and activities. Any increase in the sales tax, even if applying to a single county, must gain approval of the state legislature. In 1998, Mecklenburg County was granted authority to institute a one-half cent sales tax increase for mass transit.

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-  **Property Tax**
Property taxes generally support a significant portion of a municipality's activities. However, the revenues from property taxes can also be used to pay debt service on general obligation bonds issued to finance greenway system acquisitions. Because of limits imposed on tax rates, use of property taxes to fund greenways could limit the municipality's ability to raise funds for other activities. Property taxes can provide a steady stream of financing while broadly distributing the tax burden. In other parts of the country, this mechanism has been popular with voters as long as the increase is restricted to parks and open space. Note, other public agencies compete vigorously for these funds, and taxpayers are generally concerned about high property tax rates.
-  **Excise Taxes**
Excise taxes are taxes on specific goods and services. These taxes require special legislation and the use of the funds generated through the tax are limited to specific uses. Examples include lodging, food, and beverage taxes that generate funds for promotion of tourism, and the gas tax that generates revenues for transportation related activities.
-  **Occupancy Tax**
The NC General Assembly may grant towns the authority to levy occupancy tax on hotel and motel rooms. The act granting the taxing authority limits the use of the proceeds, usually for tourism-promotion purposes.
-  **Fees**
Three fee options that have been used by local governments to assist in funding pedestrian and bicycle facilities are listed here:
-  **Stormwater Utility Fees**
Greenway sections may be purchased with stormwater fees, if the property in question is used to mitigate floodwater or filter pollutants. Stormwater charges are typically based on an estimate of the amount of impervious surface on a user's property. Impervious surfaces (such as rooftops and paved areas) increase both the amount and rate of stormwater runoff compared to natural conditions. Such surfaces cause runoff that directly or indirectly discharge into public storm drainage facilities and creates a need for stormwater management services. Thus, users with more impervious surface are charged more for stormwater service than users with less impervious surface. The rates, fees, and charges collected for stormwater management services may not exceed the costs incurred to provide these services. The costs that may be recovered through the stormwater rates, fees, and charges includes any costs necessary to assure that all aspects of stormwater quality and quantity are managed in accordance with federal and state laws, regulations, and rules.
-  **Streetscape Utility Fees**
Streetscape Utility Fees could help support streetscape maintenance of the area between the curb and the property line through a flat monthly fee per residential dwelling unit. Discounts would be available for senior and disabled citizens. Non-residential customers would be charged a per foot fee based on the length of frontage on streetscape improvements. This amount could be capped for non-

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residential customers with extremely large amounts of street frontage. The revenues raised from Streetscape Utility fees would be limited by ordinance to maintenance (or construction and maintenance) activities in support of the streetscape.

 **Impact Fees**

Developers can be required to provide greenway impact fees through local enabling legislation. Impact fees, which are also known as capital contributions, facilities fees, or system development charges, are typically collected from developers or property owners at the time of building permit issuance to pay for capital improvements that provide capacity to serve new growth. The intent of these fees is to avoid burdening existing customers with the costs of providing capacity to serve new growth (“growth pays its own way”). Greenway impact fees are designed to reflect the costs incurred to provide sufficient capacity in the system to meet the additional needs of a growing community. These charges are set in a fee schedule applied uniformly to all new development. Communities that institute impact fees must develop a sound financial model that enables policy makers to justify fee levels for different user groups, and to ensure that revenues generated meet (but do not exceed) the needs of development. Factors used to determine an appropriate impact fee amount can include: lot size, number of occupants, and types of subdivision improvements. If Holly Springs is interested in pursuing open space impact fees, it will require enabling legislation to authorize the collection of the fees.

 **Exactions**

Exactions are similar to impact fees in that they both provide facilities to growing communities. The difference is that through exactions it can be established that it is the responsibility of the developer to build the greenway or pedestrian facility that crosses through the property, or adjacent to the property being developed.

 **In-Lieu-Of Fees**

As an alternative to requiring developers to dedicate on-site greenway sections that would serve their development, some communities provide a choice of paying a front-end charge for off-site protection of pieces of the larger system. Payment is generally a condition of development approval and recovers the cost of the off-site land acquisition or the development’s proportionate share of the cost of a regional facility serving a larger area. Some communities prefer in-lieu-of fees. This alternative allows community staff to purchase land worthy of protection rather than accept marginal land that meets the quantitative requirements of a developer dedication but falls a bit short of qualitative interests.

 **Bonds and Loans**

Bonds have been a very popular way for communities across the country to finance their projects. A number of bond options are listed below. Contracting with a private consultant to assist with this program may be advisable. Since bonds rely on the support of the voting population, an education and awareness program should be implemented prior to any vote. Billings, Montana used the issuance of a bond in the amount of \$599,000 to provide the matching funds for several of their TEA-21 enhancement dollars. Austin, Texas has also used bond issues to fund a portion of their bicycle and trail system.

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Revenue Bonds

Revenue bonds are bonds that are secured by a pledge of the revenues from a certain local government activity. The entity issuing bonds, pledges to generate sufficient revenue annually to cover the program's operating costs, plus meet the annual debt service requirements (principal and interest payment). Revenue bonds are not constrained by the debt ceilings of general obligation bonds, but they are generally more expensive than general obligation bonds.



General Obligation Bonds

Cities, counties, and service districts generally are able to issue general obligation (G.O.) bonds that are secured by the full faith and credit of the entity. In this case, the local government issuing the bonds pledges to raise its property taxes, or use any other sources of revenue, to generate sufficient revenues to make the debt service payments on the bonds. A general obligation pledge is stronger than a revenue pledge, and thus may carry a lower interest rate than a revenue bond. Frequently, when local governments issue G.O. bonds for public enterprise improvements, the public enterprise will make the debt service payments on the G.O. bonds with revenues generated through the public entity's rates and charges. However, if those rate revenues are insufficient to make the debt payment, the local government is obligated to raise taxes or use other sources of revenue to make the payments. G.O. bonds distribute the costs of land acquisition and greenway development and make funds available for immediate purchases and projects. Voter approval is required.



Special Assessment Bonds

Special assessment bonds are secured by a lien on the property that benefits by the improvements funded with the special assessment bond proceeds. Debt service payments on these bonds are funded through annual assessments to the property owners in the assessment area.



State Revolving Fund (SRF) Loans

Initially funded with federal and state money, and continued by funds generated by repayment of earlier loans, State Revolving Funds (SRFs) provide low interest loans for local governments to fund water pollution control and water supply related projects including many watershed management activities. These loans typically require a revenue pledge, like a revenue bond, but carry a below market interest rate and limited term for debt repayment (20 years).

Other Local Options



Facility Maintenance Districts

Facility Maintenance Districts (FMDs) can be created to pay for the costs of on-going maintenance of public facilities and landscaping within the areas of the Town where improvements have been concentrated and where their benefits most directly benefit business and institutional property owners. An FMD is needed in order to assure a sustainable maintenance program. Fees may be based upon the length of lot frontage along streets where improvements have been installed, or upon other factors such as the size of the parcel. The program supported by the FMD should include regular maintenance of streetscape of off road trail improvements. The municipality can initiate public outreach efforts to merchants, the Chamber of

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Commerce, and property owners. In these meetings, Town staff will discuss the proposed apportionment and allocation methodology and will explore implementation strategies. The municipality can manage maintenance responsibilities either through its own staff or through private contractors.

Partnerships

Another method of funding pedestrian systems and greenways is to partner with public agencies and private companies and organizations. Partnerships engender a spirit of cooperation, civic pride and community participation. The key to the involvement of private partners is to make a compelling argument for their participation. Major employers and developers should be identified and provided with a “Benefits of Walking”-type handout for themselves and their employees. Very specific routes that make critical connections to place of business would be targeted for private partners’ monetary support following a successful master planning effort. Potential partners include major employers which are located along or accessible to pedestrian facilities such as multi-use paths or greenways. Name recognition for corporate partnerships would be accomplished through signage trail heads or interpretive signage along greenway systems. Utilities often make good partners and many trails now share corridors with them. Money raised from providing an easement to utilities can help defray the costs of maintenance. It is important to have a lawyer review the legal agreement and verify ownership of the subsurface, surface or air rights in order to enter into an agreement.

Local Trail Sponsors

A sponsorship program for trail amenities allows smaller donations to be received from both individuals and businesses. Cash donations could be placed into a trust fund to be accessed for certain construction or acquisition projects associated with the greenways and open space system. Some recognition of the donors is appropriate and can be accomplished through the placement of a plaque, the naming of a trail segment, and/or special recognition at an opening ceremony. Types of gifts other than cash could include donations of services, equipment, labor, or reduced costs for supplies.

Volunteer Work

It is expected that many citizens will be excited about the development of a greenway corridor. Individual volunteers from the community can be brought together with groups of volunteers from church groups, civic groups, scout troops and environmental groups to work on greenway development on special community work days. Volunteers can also be used for fund-raising, maintenance, and programming needs.

Private Foundations and Organizations

Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are a few examples of private funding opportunities available in North Carolina.

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Land for Tomorrow Campaign

Land for Tomorrow is a diverse partnership of businesses, conservationists, farmers, environmental groups, health professionals and community groups committed to securing support from the public and General Assembly for protecting land, water and historic places. The campaign is asking the North Carolina General Assembly to support issuance of a bond for \$200 million a year for five years to preserve and protect its special land and water resources. Land for Tomorrow will enable North Carolina to reach a goal of ensuring that working farms and forests; sanctuaries for wildlife; land bordering streams, parks and greenways; land that helps strengthen communities and promotes job growth; historic downtowns and neighborhoods; and more, will be there to enhance the quality of life for generations to come. For more information, visit <http://www.landfortomorrow.org/>.

The Trust for Public Land

Land conservation is central to the mission of the Trust for Public Land (TPL). Founded in 1972, the Trust for Public Land is the only national nonprofit working exclusively to protect land for human enjoyment and well being. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities. TPL's legal and real estate specialists work with landowners, government agencies, and community groups to:

-  Create urban parks, gardens, greenways, and riverways
-  Build livable communities by setting aside open space in the path of growth
-  Conserve land for watershed protection, scenic beauty, and close-to home recreation safeguard the character of communities by preserving historic landmarks and landscapes.

The following are TPL's Conservation Services:

-  Conservation Vision: TPL helps agencies and communities define conservation priorities, identify lands to be protected, and plan networks of conserved land that meet public need.
-  Conservation Finance: TPL helps agencies and communities identify and raise funds for conservation from federal, state, local, and philanthropic sources.
-  Conservation Transactions: TPL helps structure, negotiate, and complete land transactions that create parks, playgrounds, and protected natural areas.
-  Research & Education: TPL acquires and shares knowledge of conservation issues and techniques to improve the practice of conservation and promote its public benefits.

Since 1972, TPL has worked with willing landowners, community groups, and national, state, and local agencies to complete more than 3,000 land conservation projects in 46 states, protecting more than 2 million acres. Since 1994, TPL has helped states and communities craft and pass over 330 ballot measures, generating almost \$25 billion in new conservation-related funding. For more information, visit <http://www.tpl.org/>.

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Z. Smith Reynolds Foundation

This Winston-Salem based Foundation has been assisting the environmental projects of local governments and non-profits in North Carolina for many years. The foundation has two grant cycles per year and generally does not fund land acquisition. However, the foundation may be able to support municipalities in other areas of greenways development. More information is available at www.zsr.org.

North Carolina Community Foundation

The North Carolina Community Foundation, established in 1988, is a statewide foundation seeking gifts from individuals, corporations, and other foundations to build endowments and ensure financial security for nonprofit organizations and institutions throughout the state. Based in Raleigh, North Carolina, the foundation also manages a number of community affiliates throughout North Carolina that make grants in the areas of human services, education, health, arts, religion, civic affairs, and the conservation and preservation of historical, cultural, and environmental resources. In addition, the foundation manages various scholarship programs statewide. Web site: <http://nccommunityfoundation.org/>.

National Trails Fund

In 1998, the American Hiking Society created the National Trails Fund, the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. Each year, 73 million people enjoy foot trails, yet many of our favorite trails need major repairs due to a \$200 million in badly needed maintenance. National Trails Fund grants give local organizations the resources they need to secure access, volunteers, tools and materials to protect America's cherished public trails. For 2005, American Hiking distributed over \$40,000 in grants thanks to the generous support of Cascade Designs and L.L.Bean, the program's Charter Sponsors. To date, American Hiking has granted more than \$240,000 to 56 different trail projects across the U.S. for land acquisition, constituency building campaigns, and traditional trail work projects. Awards range from \$500 to \$10,000 per project.

What types of projects will American Hiking Society consider? Securing trail lands, including acquisition of trails and trail corridors, and the costs associated with acquiring conservation easements. Building and maintaining trails which will result in visible and substantial ease of access, improved hiker safety, and/ or avoidance of environmental damage. Constituency building surrounding specific trail projects - including volunteer recruitment and support. Web site: www.americanhiking.org/alliance/fund.html.

5.4 Conclusion

In summary, this presents a series of recommendations, facility standards and guidelines, and a plan for implementation that is a visionary, yet practical approach towards making Leland a better place to live and bike in the coming years. Many thanks to the Town staff, North Carolina Department of Transportation (NCDOT), Wilmington Area MPO, local bike clubs, and the citizens of Leland who participated in the planning process and who will work to make the recommendations in this plan a reality.

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APPENDICES



WilburSmith
ASSOCIATES

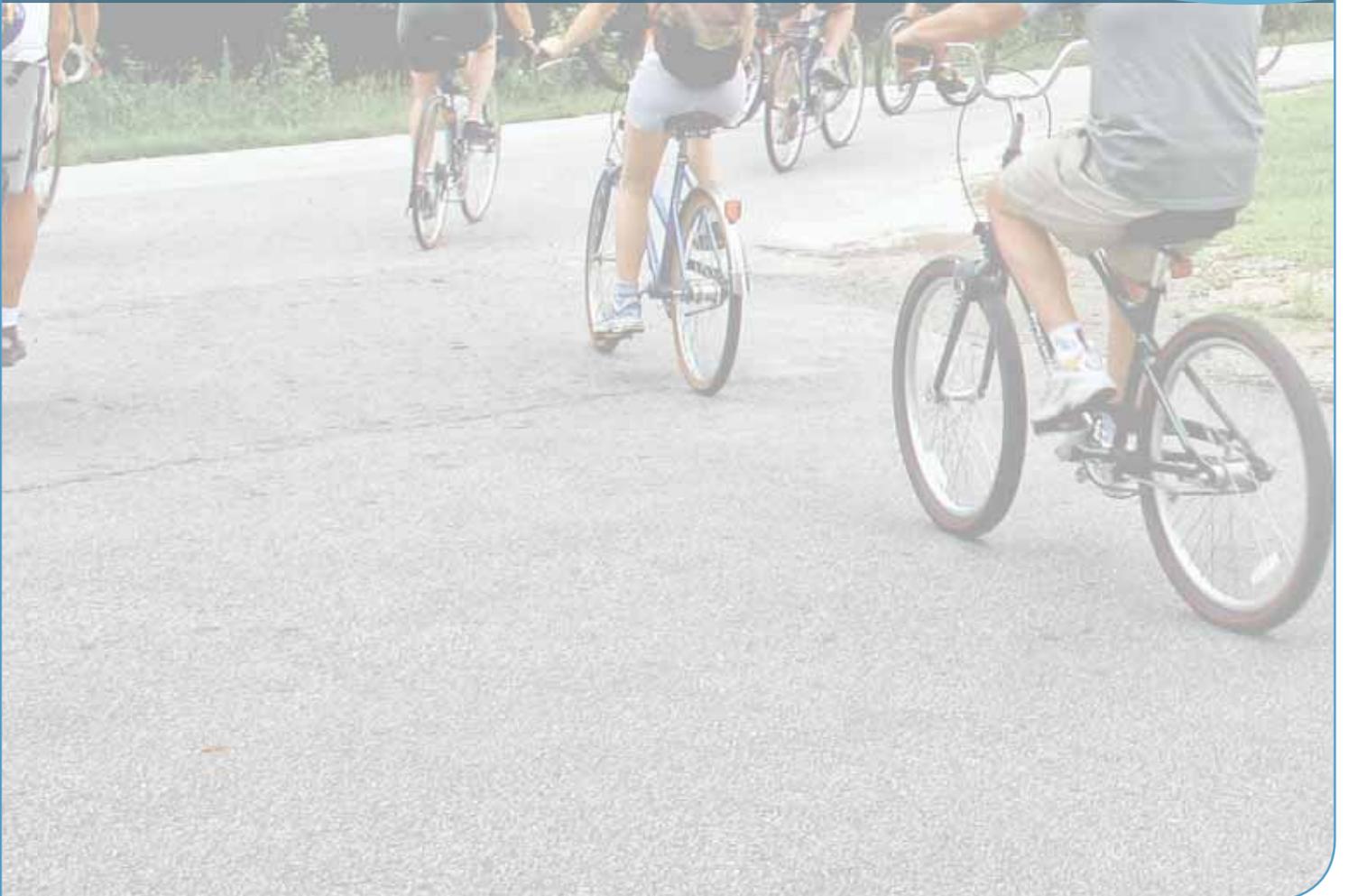


Division of
Bicycle &
Pedestrian
Transportation



Appendix A

**LELAND BICYCLE PLAN
MEETING MINUTES**





NCDOT Comprehensive Bicycle and Pedestrian Planning Grant Initiative
Town of Leland Comprehensive Bicycle Plan
Start-Up Meeting
January 19, 2007

AGENDA

1. Greetings (Town of Leland)
2. Introductions (WSA)
3. Scope of Work (WSA)
 - a. Data Collection
 - b. Public Involvement
 - i. Public Meetings
 - ii. One-Day Bicycling Event
 - c. Mapping
 - d. Deliverables
 - i. Implementation Plan
 - e. City Responsibilities
4. Schedule (WSA)
 - a. Project Timeline
 - b. Meeting Arrangements
5. City Staff Expectations
 - a. Project priorities
6. Next Steps (WSA)
7. Other Discussion

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LELAND BICYCLE PLAN START- UP MEETING MINUTES

INTRODUCTION

A start-up meeting for the subject project was held on January 19, 2007 at 11:00am at the Town Hall of Leland. The following persons attended this meeting:

Name	Agency
John Vine-Hodge	NCDOT Ped/Bike division
Landon Barker	Town of Leland
Steve Spruill	Town of Leland
Niel Brooks	Town of Leland
David Bender	Wilbur Smith Associates
William Letchworth	Wilbur Smith Associates
Matt Pickens	Wilbur Smith Associates

GENERAL ISSUES

- A meeting agenda was provided to each attendee at the meeting.
- David Bender opened the meeting with asking the Town of Leland if there were any changes to the scope, then progressed with reviewing the provided scope.
- Introductions were done for all that attended.
- Bender asked the Town of Leland if they had any needs or future plans that should be included in the report.
- Centerline Project
 - Steve mentions the GIS portion of the project and its need to split into 2 phases with a limit of 5000, the phases should include collection and mapping.
 - Steve also inquired about our use of a sub-meter device over a more accurate, sub-foot GIS device, Letchworth says he will look into further with discussing with Rajit.
- Letchworth asked for as much information to be sent to WSA for GIS work, including digital, paper, and policies.
- Bender talked about future meetings, project goals, 4 steering committee meetings and a 1 day bicycle event which will include the community and bike shops gathering together, surveys will be taken as well.
- Landon mentioned the use of a bike raffle to draw attendees, DARE program in June or July. Landon does PR work.
- Steve also offered his time to drive WSA around Leland to survey the area.
- John added that the Town needs to maintain good communications within the project team to prevent project lag in the event of any employee turnover.
- Steve says monthly WSA billing is ok. Also that the Ped/Bike and Open Space plans were chosen so that they could incorporate each other. He also adds that pavement stripping for bike lanes in subdivision and collectors are needed. He desires a map as final product, implementation policy, and construction feasibility.
- Landon mentions that we should utilize the field behind Town Hall to benefit the community, stresses connectivity, preservation, suggests to look at surrounding

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Brunswick Park/Recreation facilities and incorporate them into Leland's Plan. She also added that there is plenty of support for a Ped/Bike/ Open Space Plan in Leland.

- Town discussed local amenities including paddle trails, like water access on Appleton Way.
- Letchworth discusses fee-n-lieu with Town, some suggestions made by Town to change policies.
- Steve said he can provide utility plans, and that Municode.com details their local ordinances. He also adds that he has concern over highway crossings for Peds and Bikers, and mentions that Leland is mostly a retired community with some young population.
- Steve also added there are 3 projects in Leland that should be considered: the Village Road widening from US17/74/76 to S Navassa, the eventual continued Village Road widening further north (typical section not know), and the currently unfunded 74/76 interchange TIP.
- The meeting then concluded with its roll-over into the Ped/Bike steering committee meeting.

INFORMATION TO BE PROVIDED BY TOWN

- Utility plans
- Necessary GIS data (digital, paper, etc),

SCHEDULE

- Steering Committee Meeting within 6-8 weeks

The meeting adjourned at approximately 12:10pm.

This is our understanding of the discussions held during the subject Start-up Meeting. If errors and/or omissions are identified, please email dbender@wilbursmith.com.

cc: Project File

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



NCDOT Comprehensive Bicycle and Pedestrian Planning Grant Initiative
Town of Leland Comprehensive Bicycle Plan
Bicycle Plan Steering Committee Meeting
January 19, 2007

AGENDA

8. Greetings (Town of Leland)
9. Introductions (WSA)
10. Scope of Work (WSA)
 - a. Data Collection
 - b. Public Involvement
 - i. Public Meetings
 - ii. One-Day Bicycling Event
 - c. Mapping
 - d. Deliverables
 - i. Implementation Plan
 - e. City Responsibilities
11. Schedule (WSA)
 - a. Project Timeline
 - b. Meeting Arrangements
12. Goals and Objectives (BPSC)
 - a. (i.e. Safety, Access, Comprehensive, Environmental, Livable Communities, Education, Funding, Maintenance, Policy)
13. Existing Conditions Workshop (BPSC)
14. Next Steps (WSA)
15. Other Discussion

LELAND BICYCLE PLAN
1st STEERING COMMITTEE MEETING MINUTES

INTRODUCTION

A steering committee meeting for the subject project was held on January 19, 2007 at 12:00pm at the Town Hall of Leland. The following persons attended this meeting:

Name	Agency
Dave Staebler	Cape Fear Cyclists
Lynette Carlisle	Leland Park Rec



Samuel Richardson	Leland Park Rec
Kristie Dixon	Brunswick County Planning
Michael Lovell	NCDOT Dist
Jackson Provost	NCDOT Div
Joshuah Mello	WMPO
Bethel Paris	Cape Fear Cyclists
Jane Gilbert	Leland Park Rec
Jim Herstine	Town of Leland
John Vine-Hodge	NCDOT Ped/Bike division
Landon Barker	Town of Leland
Steve Spruill	Town of Leland
Niel Brooks	Town of Leland
David Bender	Wilbur Smith Associates
William Letchworth	Wilbur Smith Associates
Matt Pickens	Wilbur Smith Associates

GENERAL ISSUES

- A meeting agenda was provided to each attendee at the meeting.
- David Bender opened the meeting with introductions and discussed the project scope or work.
- Several goals were identified by the attendees which included:
 - Education of the Public and Bicyclist
 - Connection with Schools/ Destinations (Wilmington)/ East Coast Greenway
 - Safety (share the road)
 - Safe crossing of US74/76/17
 - Coordination with future NCDOT projects
 - Continuity between existing facilities
 - Maintain quality of Life/Scenic
 - Maintenance of shoulders/sidewalks
 - Multi-Use paths similar to Wrightsville Beach/Greenfield Lake
 - Developer standards, policies set for the construction of sidewalks (Brunswick Forest)
 - Implementation plan
 - Coordination with Belville
- Bender then gives a brief discussion of the implantation plan and its significance
- Attendees then set some priorities from the goals which included:
 - Safety
 - Education and Enrichment
 - Connectivity, Coordination, Continuity (policies)
 - Quality of Life (Scenic, Environmental, Health)
 - Maintenance, Implementation Plan
- Discussion then moved to the tables where further, more precise problems were addressed and possible solutions analyzed.

SCHEDULE

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



- Steering Committee Meeting within 6-8 weeks

The meeting adjourned at approximately 2:00pm.

This is our understanding of the discussions held during the subject Start-up Meeting. If errors and/or omissions are identified, please email dbender@wilbursmith.com.

cc: Project File

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



**Town of Leland
Comprehensive Bicycle Plan
3rd Bicycle Plan Steering Committee Meeting
September 24, 2007**

- 1) Greetings
- 2) Comprehensive Bicycle Plan Project Update
- 3) Survey Results
- 4) Discussion of Recommendations
- 5) Central Leland Facilities
- 6) Off-Road Trails
- 7) Public Meeting
 Tonight: 6:00 – 7:30
- 8) Next Steps

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



**LELAND BICYCLE PLAN
2nd STEERING COMMITTEE MEETING MINUTES**

INTRODUCTION

A steering committee meeting for the subject project was held on May 24, 2007 at 11:30pm at the Town Hall of Leland. The following persons attended this meeting:

Name	Agency
Chuck Bost	Leland PD
Steven Spruill	Town of Leland
Landon Barker	Town of Leland
Niel Brooks	Town of Leland
David Staebler	Cape Fear Bike Club
Brian Ennis	Town of Belville
Michael Kirkbride	Town of Carolina Beach
Jackson Provost	NCDOT
Samuel Richardson	Leland Planning and P&R Board
Anthony Prinz	WMPO
Sam Miller	Leland P&R
Kirstie Dixon	Brunswick Co. Planning
Jane Gilbert	Leland P&R Board
Robert Ernest	Leland PD
Bethel Paris	Cape Fear Cyclists

GENERAL ISSUES

- A meeting agenda, draft Vision, Goals and Objectives, and draft Public Survey was provided to each attendee at the meeting.
- David Bender opened the meeting with introductions and discussed the current status of the project, including an update on the Centerline Project.
- The BPSC discussed the Draft Vision, Goals and Objectives. Mr. Bender asked that any comments be sent to Landon Barker or Niel Brooks.
- The BPSC discussed the draft Public Survey, and commented that the Town needed to ensure that the survey went out to surrounding areas outside of Leland and was included in the newspaper and posted online.
- The BPSC discussed the upcoming “Leland Bikefest” to be held on Saturday, June 30 from 9:30am – 1pm. BPSC comments included
 - The event should be promoted via the newspaper, radio, churches, and TV bulletin board.
 - Possible locations discussed included: behind Town Hall, at the Walmart, at the local High School.
 - A radio broadcast from the event should be included if possible
 - Retail stores can be included

HANDS-ON WORKSHOP

The WSA Project Team conducted a hands-on Existing Conditions Workshop with the committee members. Maps and markers were provided to each committee member to

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mark up the maps with corrections, revisions, recommendations on the maps of existing facilities, origin/destinations, etc.

ACTION ITEMS

- Finalize Goals and Objectives and Vision
- Update data and GIS base maps to include centerline data from Atlas Graphics
- Analysis centerline data to begin roadway assessment for BPSC evaluation
- Submit final digital GIS data files from Centerline Project to town staff for review and comment.
- Develop final public survey instrument
- Coordinate with Town staff for Leland Bikefest (June 30th)

SCHEDULE

- “Leland Bikefest” to be held on Saturday, June 30 from 9:30am – 1pm.
- Steering Committee Meeting within 6-8 weeks

The meeting adjourned at approximately 12:30pm.

This is our understanding of the discussions held during the subject Bicycle Plan Steering Committee meeting. If errors and/or omissions are identified, please email dbender@wilbursmith.com.

cc: Project File

**Town of Leland
Comprehensive Bicycle Plan
Park, Recreation, and Open Space Master Plan**



Public Meeting
September 25, 2007 6:00 – 7:30

- 9) Greetings
- 10) Comprehensive Bicycle Plan Project Presentation
- 11) Public Comments
- 12) Parks, Recreation, and Open Space Master Plan Presentation
- 13) Public Comments
- 14) Open Forum at Maps

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**LELAND BICYCLE MASTER PLAN
3rd STEERING COMMITTEE MEETING MINUTES**

INTRODUCTION

A steering committee meeting for the subject project was held on September 25, 2007 at 2:00pm at the Town Hall of Leland. The following persons attended this meeting:

Name	Agency
Lynette Carlyle	Leland P&R Board
Landon Barker	Town of Leland
Niel Brooks	Town of Leland
John Vine-Hodge	NCDOT Ped/Bike division
Joshua Mello	City of Wilmington
Ben Hughes	NCDOT
Sam Miller	Leland P&R
Jim Herstine	Leland P&R Board
Dale Privette	Wilbur Smith Associates
William Letchworth	Wilbur Smith Associates
Rhonda Woody	

- A meeting agenda, draft Recommendations, Public Survey results were provided to each attendee at the meeting.
- Mr. Letchworth opened the meeting with introductions, discussed the current status of the project and briefly emphasized the original Vision, Goals, and Objectives
- The BMPSC discussed the public survey and results of the survey
 - There has been excellent response to the survey, many thanks to the Town and PROSSC
 - Notables: Need to plan for 2 age groups, lots of public support for public funding and development policies, most cycling is for exercise and leisure, bicycle and off-road facilities are highly desired
- The BMPSC discussed the Draft recommendations
 - Josh Mello says the MPO can update the MPO bicycle map showing Leland routes when established
 - The Bike Festival should be held during school year.
 - The bike on WAVE Transit buses should be promoted
 - The BMPSC wants more “Share the Road” signs.
 - There should more discussion about Safe Routes to School in the recommendations.. Administration wants a variety of recommended projects, not just sidewalks.
 - Leland should consider using funds for safety projects at the Middle School.
 - Brunswick County doing a Comprehensive Transportation Plan with bicycle and pedestrian elements
 - The Wilmington MPO working on a regional bike/ped plan including Leland.
 - WSA will put more work into design standards.
 - Paths/greenways/trails need to be lighted.

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- The Town needs to meet with NCDOT with regards to recommendations for new developments so that crossing major roads is more bike/ped friendly.
- Mr. Herstein thinks Bike/Ped coordination position should be separate from the Park & Rec position.
- Mr. Letchworth discussed the program for Tuesday evening's public meeting.
- Mr. Letchworth asked that any additional comments be sent to Landon Barker or Niel Brooks.

ACTION ITEMS

- Get public input from public meeting
- Present the BMPSC with Draft Recommendations, and gather comments from the committee
- Begin development of Draft Report for BMPSC review

SCHEDULE

- Draft recommendations in early November
- Draft Final Report in late November
- Final PROSSC and Public meeting in early January after BMPSC, Town, and NCDOT review

The meeting adjourned at approximately 3:30pm.

This is our understanding of the discussions held during the subject Bicycle Plan Steering Committee meeting. If errors and/or omissions are identified, please email wletchworth@wilbursmith.com.

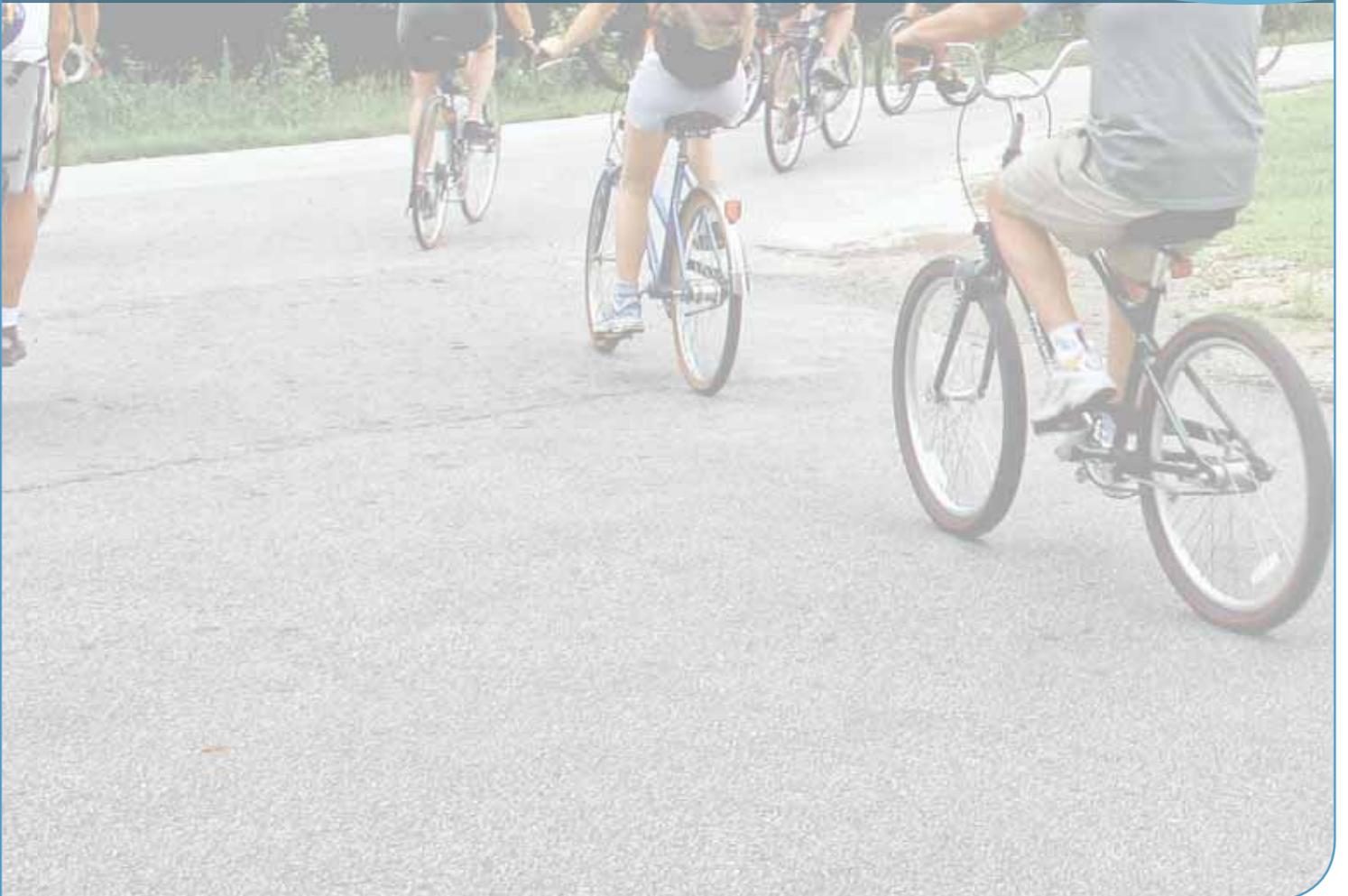
cc: Project File

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Appendix B

LELAND BICYCLE FEST





Town of Leland Parks and Recreation Presents

Bicycle Fest

Saturday, June 30, 2007

Leland Middle School
927 Old Fayetteville Rd

Free Raffle!

Bring your
Bike!



9:30am to
1pm

Free Drinks!

Activities

!!! Free Raffle for New Youth Bicycles!!!

(Provided by Coastal Bicycles of Shallotte and Wheel Fun Rentals of Carolina Beach)

Bike Inspections

Safety Education

Helmet Fittings

Bike Rodeo

Food Vendors

Radio Station Give Aways

7.3 mile Town Cruise through Leland*

*Starts at 11:00am

30 mile Cape Fear Cyclists' Tri-Town Ride*

*Starts at 8 a.m.

Call Town of Leland Parks and Recreation for more
information – 371-0148

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Leland Bicycle Fest- News Article, Star News Online, Sunday, July 1, 2007

Leland pedals its wares to cyclists

Town looks at ways to become bike friendly

By Ana Ribeiro

Staff Writer - ana.ribeiro@starnewsonline.com

Leland: It was a biker's dream: pedaling along Village Road without traffic, and around noon, no less.

It happened Saturday, the air turning from muggy to wet with faint raindrops, cars stopping as two Leland Police officers quickly got off their motorcycles and held out their palms emphatically.

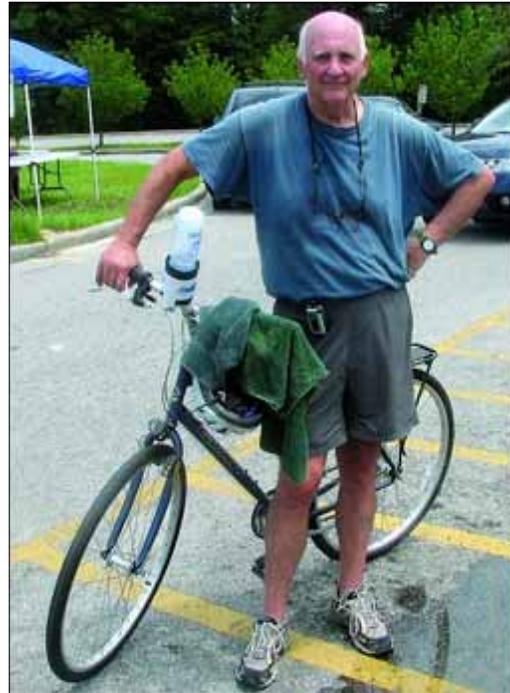
They seemed to be everywhere at the same time, hopping back on their motorcycles just as quickly, speeding up and slowing down to escort a group of 15 cyclists who made their way through a 7.5-mile stretch, mostly within Leland's town limits. The town itself had invited the bikers there.

Town Manager Bill Farris, riding his own bike in shorts and a T-shirt, wanted to know what they thought could be done to make frequent, town-wide cycling a more viable activity in rapidly growing Leland. Outside of Saturday's event, it would be impractical, to say the least, to have police halt traffic every time a bicycle were to come through.

To open some bike trails where there are practically none, the town and its consultants are coming up with a Bicycle Master Plan. It will take into account plans by the N.C. Department of Transportation to improve Village Road and install bike lanes there, Farris said, while mapping out bike routes the town could build and laying out guidelines to encourage developers to create some themselves in old and new communities.

The DOT has given the town about \$25,000 to design the plan, which will also cover signage, bike parking facilities and assorted safety enhancements, Farris said.

"My vision is that sometime in the future you'll be able to ride a bike anywhere in Leland safely," said Farris, who, at age 63, is a self-proclaimed bike enthusiast. "It's a way for us to connect our neighborhoods."



As part of Leland's first Bicycle Fest, Town Manager Bill Farris donned some comfortable clothing, hopped on his bicycle and joined a group of about 15 local residents and bike enthusiasts on a 7.5-mile ride around town with the purpose of getting feedback on the viability of town-wide bicycle routes Saturday, June 30, 2007. WILMINGTON STAR-NEWS -- Staff Photo By Ana Beatriz

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Other bike and multipurpose recreational paths are in the works for the region. Wilmington, notorious for its unfriendly traffic to bikers and pedestrians, is planning the first stretch of a series of trails that would lead from Halyburton Park to Wrightsville Beach. Planners with New Hanover County are discussing putting new bike lanes on Blue Clay Road, which links Cape Fear Community College's North Campus to Wilmington.

It could take years for these and Leland's trails to be completed. But Leland's Saturday event, its first Bicycle Fest, was a way for the town to kick off its plans.

Besides organizing the bike ride, staff gave away food, helmets and raffle prizes that included new bicycles. Standing by were the town's bike plan consultants, Raleigh-based Wilbur Smith and Associates, seeking input on what people would like for their town in terms of bike paths and also a general recreation plan.

"There are no shoulders anywhere," Bill Culpepper, 62 and a resident of Leland's Magnolia Greens, said after finishing the 45-minute group bike ride.

Helen Miller, 27, of Wilmington, said Leland offered her a change of scenery for cycling. But upon returning from the ride with Culpepper and others, she observed that potholes needed to be fixed and that streets should be extended at least a little bit so that drivers and bikers could share a more comfortable distance.

"Drivers don't know how to deal with cyclists on the road," said Joan Miller, who moved from the Chicago area to Leland's Mallory Creek last year.

Miller and her husband Ron, both in their late 50s, said they are used to a city where cycling is so popular that many railroad tracks have been turned into bicycle trails. The couple, who also participated in the bike ride, admire Leland's initiative in trying to come up with its own plan and to get the community interested in it, they said.

The turnout Saturday - about two dozen people - was a little disappointing to Farris; but he said he'll do this again next year.

"We have to start somewhere," he said.

Saturday's bike ride began at Leland Middle School on Old Fayetteville Road and continued along Village Road, passing through neighborhoods, crossing railroad tracks and going up and down elevations on the road before returning to the school. The few people who joined in represented, nonetheless, a diverse age group, with some people over 50, others in their 20s and even a baby. But they all had at least one thing in common.

They could ride much faster than I.

Ana Ribeiro: 343-2327

ana.ribeiro@starnewsonline.com

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Leland Bicycle Fest- News Article, Star News, Sunday, July 1, 2007

LOCAL & STATE



INS AND OUTS OF TIMBER
Log scaler has learned to identify many trees in her 38 years on the job. **3B**

STATE NEWS 2B
OBITUARIES 4B
WEATHER 10B

B STAR-NEWS | SUNDAY, JULY 1, 2007

Leland pedas its wares to cyclists

Town looks at ways to become bike friendly

By Ana Ribeiro
Staff Writer

Leland | It was a biker's dream: pedaling along Village Road without traffic, and around noon, no less. It happened Saturday, the air turn-

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BrunswickVoice
To see a video of a biker and his baby, visit www.BrunswickVoice.com.

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As part of Leland's first Bicycle Fest, Town Manager Bill Farris donned some comfortable clothing, hopped on his bike and joined a group of about 15 local residents on a 7.5-mile ride around town. STAFF PHOTO | ANA RIBEIRO

SES BIKE | 6B

STAR-NEWS | SUNDAY, JULY 1, 2007

BIKE

CONTINUED FROM 1B

encourage developers to create some themselves in old and new communities.

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Appendix C

BICYCLE SURVEY SUMMARY





TOWN OF LELAND *Public Survey*

Comprehensive Bicycle Plan and Parks, Recreation and Open Space Master Plan

Demographics

1. Do you live within the Town limits of Leland? Yes No
If no, where do you live? Please identify: _____
2. Indicate the total number of individuals in your family. Male _____ Female _____
3. Please list the number of individuals for each age group in your household. Age 0-5 _____ Age 6-12 _____
Age 13-18 _____ Age 19-29 _____ Age 30-39 _____ Age 40-54 _____ Age 55+ _____

Bicycle Survey

1. What is the primary reason you use your bicycle in Leland? (Please check all that apply)

<input type="checkbox"/> Personal Fitness/Exercise	<input type="checkbox"/> Cheaper
<input type="checkbox"/> Leisure/Recreation	<input type="checkbox"/> Less stressful than driving
<input type="checkbox"/> Work/Employment Related	<input type="checkbox"/> It's fun
<input type="checkbox"/> Environmental Benefits	<input type="checkbox"/> No other transportation available
<input type="checkbox"/> Reduce traffic	<input type="checkbox"/> Other _____
2. Check any of the following obstacle(s) that discourage you from bicycling in Leland: (Please check all that apply)

<input type="checkbox"/> Lack of bicycle facilities like bicycle lanes or paved trails	<input type="checkbox"/> No shower facilities available
<input type="checkbox"/> Roadways are too narrow or have no shoulders	<input type="checkbox"/> Limited places to lock/store a bike
<input type="checkbox"/> Roadways are poorly maintained or have hazards	<input type="checkbox"/> Not safe
<input type="checkbox"/> Traffic congestion on the roads and in the intersections	<input type="checkbox"/> Health or physical condition restricts biking
<input type="checkbox"/> Poor lighting along roadways	<input type="checkbox"/> Bicycle needs repair or maintenance
<input type="checkbox"/> Drivers are distracted while driving	<input type="checkbox"/> I do not enjoy bicycling
<input type="checkbox"/> It is easier to drive	<input type="checkbox"/> I do not own a bicycle
<input type="checkbox"/> Weather (too hot, cold, rainy, etc.)	<input type="checkbox"/> I do not know how to ride a bicycle
<input type="checkbox"/> I have too many items to carry	<input type="checkbox"/> Nothing discourages me from bicycling wherever I need to go
	<input type="checkbox"/> Other _____
3. Would you bicycle more in Leland if many of the obstacles you checked above were fixed?
Yes No Maybe I Don't Know
4. Do you think Leland has adequate bicycle facilities?
Yes No Maybe I Don't Know
5. Do you think Leland will benefit if bicycle facilities are improved?
Yes No Maybe I Don't Know
6. Would you support development policies that promote bicycling like connecting bike facilities together, require businesses to provide bike racks and bicycle safety programs for children?
Yes No Maybe I Don't Know
7. Would you support public funding for improving bicycle accommodations in Leland?
Yes No Maybe I Don't Know
8. Are you aware of the safety and helmet regulations in place for riding your bike on public streets?
Yes No Maybe I Don't Know
9. Are you aware of the rules governing the way you should ride a bike on public streets?
Yes No Maybe I Don't Know

page one

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



TOWN OF LELAND *Public Survey*
Comprehensive Bicycle Plan and Parks, Recreation and Open Space Master Plan

Parks, Recreation and Open Space Survey

- Which organized recreational programs do you or other members of your family participate?
(Please check all that apply)
 School Sport Leagues Youth Adult Private County Sponsored None
 Other _____
- What is the longest distance you are willing to travel for the following types of recreational activities?
(Please write the number of miles you would be willing to travel.)
 Playgrounds _____ Natural Areas _____ Picnic Areas _____ Camping _____ Court Games _____
 Sport Fields _____ Lakes/Ponds _____ Arts/Music _____ Theater _____ Open Space _____
 Water Access _____ Other _____
- How many members of your household are members of a private recreation association?
 YMCA _____ Civic Groups _____ Country Club _____ Other _____
- Do you or those living with you participate in outdoor recreation activities as much as you would like?
 Yes No Maybe I Don't Know
- With the town and county expanding its parks and facilities, which do you prefer? (Please check all that apply)
 Swimming Golf Bike Trails Equestrian Trails Sport Facilities Nature Trails
 Music Facility Picnic Areas Fishing Playground Horseshoes Croquet
 Frisbee Golf Indoor Programs Dog Park Gymnasiums Equestrian Show Ring
 Theater Facility Farmers Market Skate Park Other _____
- Would you be willing to consider a bond issue to pay for the continued development of existing parks and to acquire and protect open spaces in Leland?
 Yes No Maybe I Don't Know
- What types of programs would you like to have offered for seniors (55-over)? (Please check all that apply)
 Exercise Trips Arts and Crafts Day Care Bingo Cards Theater
 Music Farmers Market Other _____
- How do you prefer to find out about our recreation programs? (Please check all that apply)
 Newspaper Word of Mouth Banners/Signs Email Notices
 Bulletin Boards at Parks Flyers Sent From School Other: _____



page two

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland

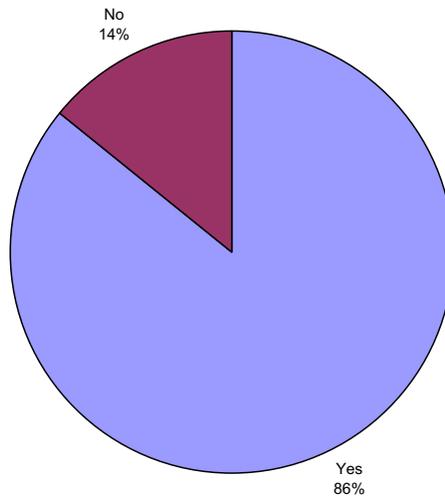


Leland Bicycle Plan Public Survey Summary

Total Responses: 391

Do you live within the Town of Leland	
Yes	324
No	54
If no, where do you live?	-

Do you live within the Town of Leland?

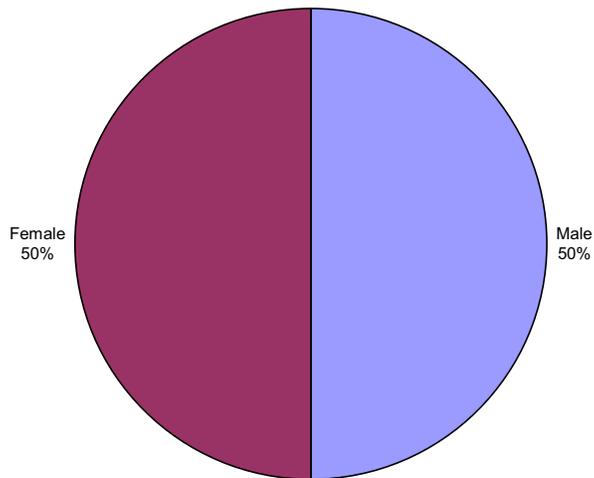


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Indicate the total number of individuals in your household	
Male	458
Female	458

Total number of individuals in your household

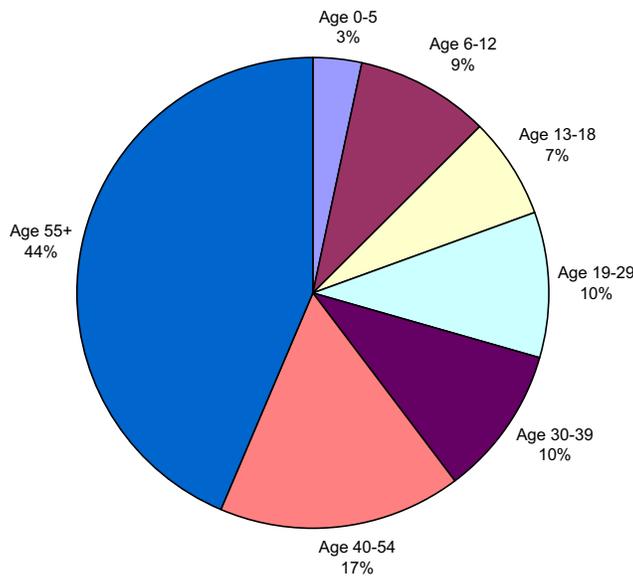


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Please list the number of individuals for each age group in your household.	
Age 0-5	31
Age 6-12	84
Age 13-18	62
Age 19-29	92
Age 30-39	94
Age 40-54	153
Age 55+	397

Number of individuals for each age group in household

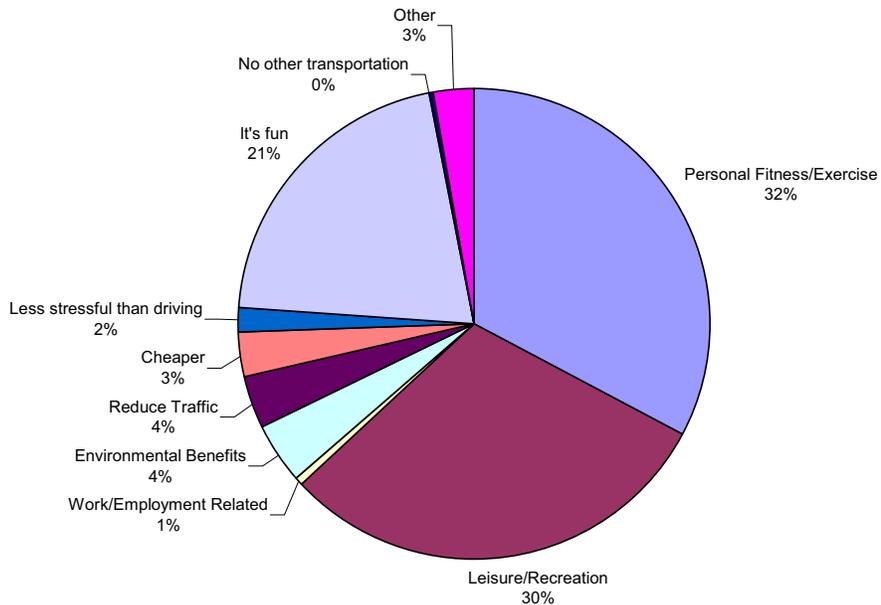


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



What is the primary reason you use your bicycle in Leland?	
Personal Fitness/Exercise	267
Leisure/Recreation	247
Work/Employment Related	5
Environmental Benefits	34
Reduce Traffic	29
Cheaper	24
Less stressful than driving	15
It's fun	170
No other transportation	1
Other	23

Primary reason for biking in Leland

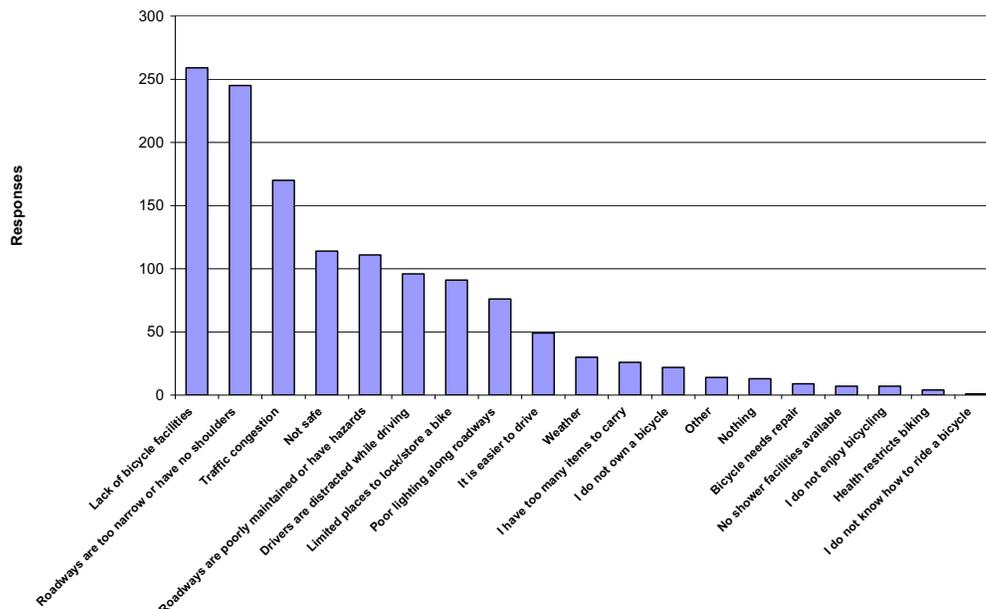


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Check any of the following obstacle(s) that discourage you from bicycling in Leland.	
Lack of bicycle facilities	259
Roadways are too narrow or have no shoulders	245
Traffic congestion	170
Not safe	114
Roadways are poorly maintained or have hazards	111
Drivers are distracted while driving	96
Limited places to lock/store a bike	91
Poor lighting along roadways	76
It is easier to drive	49
Weather	30
I have too many items to carry	26
I do not own a bicycle	22
Other	14
Nothing	13
Bicycle needs repair	9
No shower facilities available	7
I do not enjoy bicycling	7
Health restricts biking	4
I do not know how to ride a bicycle	1

Obstacles that discourage users from biking in Leland



Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



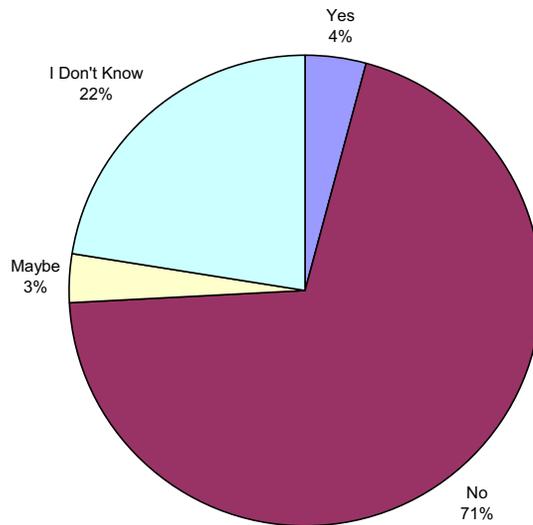
Where in Leland do you enjoy Bicycling?
Parks
M. Greens5
Lanvale Trace
Waterford 2
Greenfield
Subdivisions
Gateway Trail
Windsor Park

Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Do you think Leland has adequate bicycle facilities?	
Yes	16
No	268
Maybe	13
I Don't Know	86

Does Leland have adequate bicycle facilities?

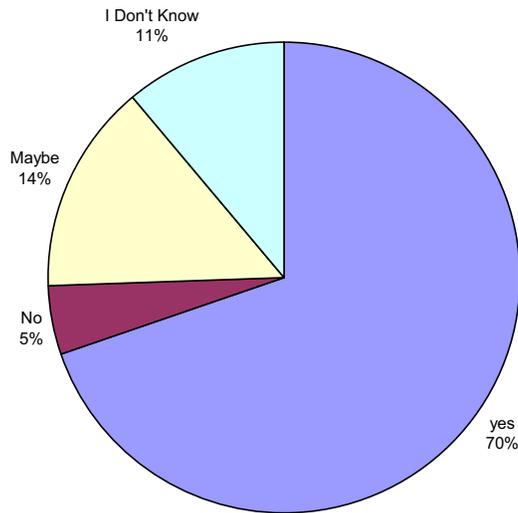


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Do you think Leland will benefit if bicycle facilities are improved?	
Yes	252
No	17
Maybe	52
I Don't Know	40

Will Leland benefit if bicycle facilities are improved?

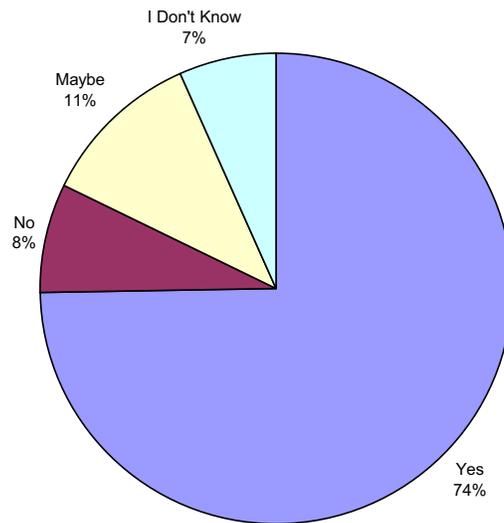


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Would you support development policies that promote bicycling like connecting bike facilities together, require businesses to provide bike racks and bicycle safety programs for children?	
Yes	276
No	28
Maybe	41
I Don't Know	25

Would you support for development of policies that promote bicycling?

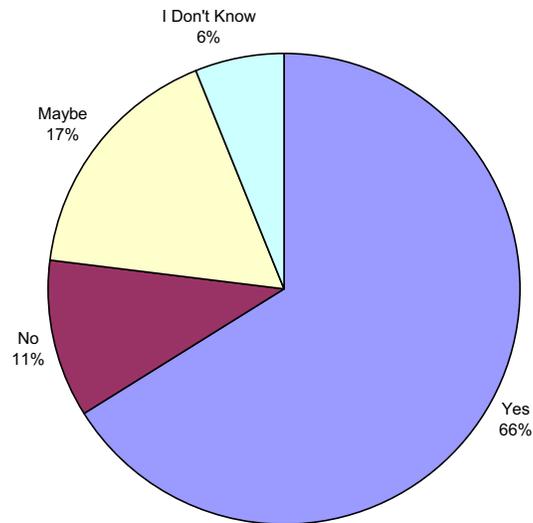


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Would you support public funding for improving bicycle accommodations in Leland?	
Yes	243
No	40
Maybe	62
I Don't Know	23

Would you support for public funding for improving bicycle accommodations?

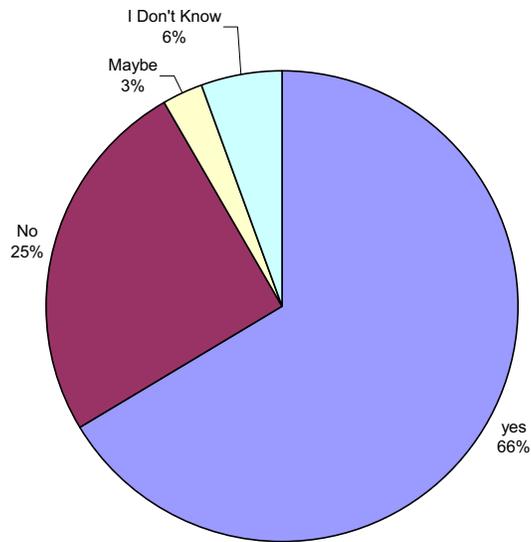


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Are you aware of the safety and helmet regulations in place for riding your bike on public streets?	
Yes	247
No	94
Maybe	10
I Don't Know	21

Are you aware of safety and helmet regulations?

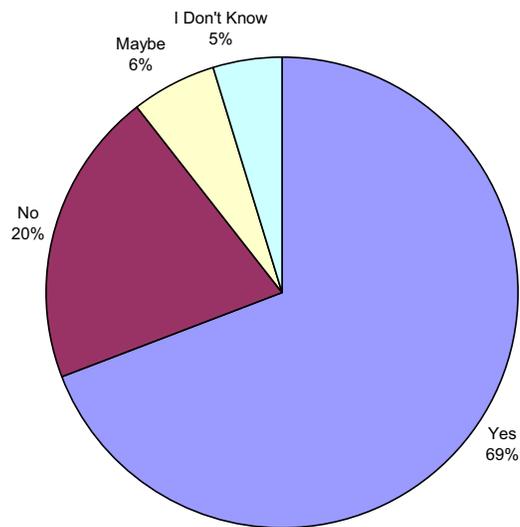


Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Are you aware of the rules governing the way you should ride a bike on public streets?	
Yes	256
No	75
Maybe	22
I Don't Know	17

Are you aware of rules governing the ways you ride a bike?



Vision: To establish bicycling as a viable, convenient and safe transportation choice throughout Leland



Appendix D

COST ESTIMATES



Green Hill Loop

Total Length of Loop - 1.91 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 If each side	\$1.50	\$15,000	\$28,650
	New Lane Markings ⁽¹⁾	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal				\$32,000	\$61,120
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$2,292
	Bike Lane Striping	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal - No Lane Restriping				\$18,200	\$34,762
	If Restriping of Lanes to Accommodate Bike Lane	If	5000 If each side	\$3.00	\$30,000	\$57,300
	Subtotal - With Lane Restriping				\$48,200	\$92,062
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$764
	Edge Line Striping	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal					\$33,234
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$636,660
Greenway	Excludes right-of-way - 10-foot wide path	If	5280	\$50.00	\$264,000	\$504,240
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$728,722
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$669,894

Town Creek Loop

Total Length of Loop - 3.02 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$6,040
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 if each side	\$1.50	\$15,000	\$45,300
	New Lane Markings ⁽¹⁾	lf	5000 if each side	\$1.50	\$15,000	\$45,300
	Signs	4/mile	8	\$250.00	\$2,000	\$6,040
	Subtotal				\$32,000	\$96,640
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$3,624
	Bike Lane Striping	lf	5000 if each side	\$1.50	\$15,000	\$45,300
	Signs	4/mile	8	\$250.00	\$2,000	\$6,040
	Subtotal - No Lane Restriping				\$18,200	\$54,964
	If Restriping of Lanes to Accommodate Bike Lane	lf	5000 if each side	\$3.00	\$30,000	\$90,600
	Subtotal - With Lane Restriping				\$48,200	\$145,564
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$1,208
	Edge Line Striping	lf	5000 if each side	\$1.50	\$15,000	\$45,300
	Signs	4/mile	8	\$250.00	\$2,000	\$6,040
	Subtotal					\$52,548
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$1,006,657
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$797,280
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$1,152,221
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,059,205

Goodman Loop

Total Length of Loop - 4.3 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$8,600
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 if each side	\$1.50	\$15,000	\$64,500
	New Lane Markings ⁽¹⁾	lf	5000 if each side	\$1.50	\$15,000	\$64,500
	Signs	4/mile	8	\$250.00	\$2,000	\$8,600
	Subtotal				\$32,000	\$137,600
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$5,160
	Bike Lane Striping	lf	5000 if each side	\$1.50	\$15,000	\$64,500
	Signs	4/mile	8	\$250.00	\$2,000	\$8,600
	Subtotal - No Lane Restriping				\$18,200	\$78,260
	If Restriping of Lanes to Accommodate Bike Lane	lf	5000 if each side	\$3.00	\$30,000	\$129,000
	Subtotal - With Lane Restriping				\$48,200	\$207,260
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$1,720
	Edge Line Striping	lf	5000 if each side	\$1.50	\$15,000	\$64,500
	Signs	4/mile	8	\$250.00	\$2,000	\$8,600
	Subtotal					\$74,820
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$1,433,319
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$1,135,200
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$1,640,579
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,508,139

Grandafiora/Pine Harvest/Palm Ridge

Total Length of Route - 4.78 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	Component \$9,560
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 if each side	\$1.50	\$15,000	\$71,700
	New Lane Markings ⁽¹⁾	lf	5000 if each side	\$1.50	\$15,000	\$71,700
	Signs	4/mile	8	\$250.00	\$2,000	\$9,560
	Subtotal				\$32,000	\$152,960
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$5,736
	Bike Lane Striping	lf	5000 if each side	\$1.50	\$15,000	\$71,700
	Signs	4/mile	8	\$250.00	\$2,000	\$9,560
	Subtotal - No Lane Restriping				\$18,200	\$86,996
If Restriping of Lanes to Accommodate Bike Lane		lf	5000 if each side	\$3.00	\$30,000	\$143,400
	Subtotal - With Lane Restriping				\$48,200	\$230,396
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$1,912
	Edge Line Striping	lf	5000 if each side	\$1.50	\$15,000	\$71,700
	Signs	4/mile	8	\$250.00	\$2,000	\$9,560
	Subtotal					\$83,172
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$1,593,317
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$1,261,920
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$1,823,713
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,676,489

Village Road Route						
Total Length of Route - 7.22 Miles						
Conceptual Bicycle Facility Cost						
Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000.00	\$14,440.00
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 If each side	\$1.50	\$15,000.00	\$108,300.00
	New Lane Markings ⁽¹⁾	if	5000 If each side	\$1.50	\$15,000.00	\$108,300.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$14,440.00
	Subtotal				\$32,000.00	\$231,040.00
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200.00	\$8,664.00
	Bike Lane Striping	4/mile	5000 If each side	\$1.50	\$15,000.00	\$108,300.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$14,440.00
	Subtotal - No Lane Restricting				\$18,200.00	\$131,404.00
	If Restricting of Lanes to Accommodate Bike Lane	if	5000 If each side	\$3.00	\$30,000.00	\$216,600.00
	Subtotal - With Lane Restricting				\$48,200.00	\$348,004.00
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400.00	\$2,888.00
	Edge Line Striping	if	5000 If each side	\$1.50	\$15,000.00	\$108,300.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$14,440.00
	Subtotal					\$175,628.00
Wide Paved Shoulder	Assume 4 feet per side (5000 If per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330.00	\$2,406,645.00
Greenway	Excludes right-of-way - 10-foot wide path	if	5280	\$50.00	\$264,000.00	\$1,906,080.00
Path Bridge	square foot (sf)			\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$2,754,647
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$2,832,271

Village Road Route within Leland Town Limits						
Total Length of Route - 3.4 Miles						
Conceptual Bicycle Facility Cost						
Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000.00	\$6,800.00
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 If each side	\$1.50	\$15,000.00	\$51,000.00
	New Lane Markings ⁽¹⁾	if	5000 If each side	\$1.50	\$15,000.00	\$51,000.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$6,800.00
	Subtotal				\$32,000.00	\$108,600.00
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200.00	\$4,080.00
	Bike Lane Striping	4/mile	5000 If each side	\$1.50	\$15,000.00	\$51,000.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$6,800.00
	Subtotal - No Lane Restricting				\$18,200.00	\$61,880.00
	If Restricting of Lanes to Accommodate Bike Lane	if	5000 If each side	\$3.00	\$30,000.00	\$102,000.00
	Subtotal - With Lane Restricting				\$48,200.00	\$163,880.00
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400.00	\$1,360.00
	Edge Line Striping	if	5000 If each side	\$1.50	\$15,000.00	\$51,000.00
	Signs	4/mile	8	\$250.00	\$2,000.00	\$6,800.00
	Subtotal					\$59,160.00
Wide Paved Shoulder	Assume 4 feet per side (5000 If per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330.00	\$1,933,922.00
Greenway	Excludes right-of-way - 10-foot wide path	if	5280	\$50.00	\$264,000.00	\$887,600.00
Path Bridge	square foot (sf)			\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$1,287,202
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,192,482

Cedar Hill Loop									
Total Length of Loop - 11.54 Miles									
Conceptual Bicycle Facility Cost									
Type of Facility	Component	Number	Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component			
Standard Route	Signs	4/mile	8	\$2,250.00	\$2,250.00	\$2,250.00			
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 If each side	\$1.50	\$15,000	\$173,100			
	New Lane Markings ⁽¹⁾	If	5000 If each side	\$1.50	\$15,000	\$173,100			
	Signs	4/mile	8	\$250.00	\$2,000	\$23,080			
	Subtotal				\$32,000	\$369,280			
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$13,848			
	Bike Lane Striping	If	5000 If each side	\$1.50	\$15,000	\$173,100			
	Signs	4/mile	8	\$250.00	\$2,000	\$23,080			
	Stripes - No Lane Restriping			\$16,200	\$16,200	\$172,028			
	If Restriction of Lanes to Accommodate Bike Lane	If	5000 If each side	\$3.00	\$30,000	\$348,200			
	Subtotal - With Lane Restriping				\$48,200	\$558,228			
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$4,616			
	Edge Line Striping	If	5000 If each side	\$1.50	\$15,000	\$173,100			
	Signs	4/mile	8	\$250.00	\$2,000	\$23,080			
	Subtotal					\$29,704			
Wide Paved Shoulder	Assume 4 feet per side (5000 If per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330	\$3,848,628			
Greenway	Excludes right-of-way - 10-foot wide path	If	5280	\$50.00	\$264,000	\$3,046,580			
Path Bridge	square foot (sf)			\$100.00					

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Markings and Wide Paved Shoulder	\$4,409,850
Total Cost With Edge Line Markings and Wide Paved Shoulder	\$4,447,450

Cedar Hill Loop within Leland Town Limits									
Total Length of Loop - 0.76 Miles									
Conceptual Bicycle Facility Cost									
Type of Facility	Component	Number	Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component			
Standard Route	Signs	4/mile	8	\$2,250.00	\$2,250.00	\$2,250.00			
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 If each side	\$1.50	\$15,000	\$11,400			
	New Lane Markings ⁽¹⁾	If	5000 If each side	\$1.50	\$15,000	\$11,400			
	Signs	4/mile	8	\$250.00	\$2,000	\$1,420			
	Subtotal				\$32,000	\$24,820			
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$812			
	Bike Lane Striping	If	5000 If each side	\$1.50	\$15,000	\$11,400			
	Signs	4/mile	8	\$250.00	\$2,000	\$1,420			
	Stripes - No Lane Restriping			\$16,200	\$16,200	\$11,832			
	If Restriction of Lanes to Accommodate Bike Lane	If	5000 If each side	\$3.00	\$30,000	\$22,800			
	Subtotal - With Lane Restriping				\$48,200	\$36,632			
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$304			
	Edge Line Striping	If	5000 If each side	\$1.50	\$15,000	\$11,400			
	Signs	4/mile	8	\$250.00	\$2,000	\$1,420			
	Subtotal					\$19,224			
Wide Paved Shoulder	Assume 4 feet per side (5000 If per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330	\$3,853,331			
Greenway	Excludes right-of-way - 10-foot wide path	If	5280	\$50.00	\$264,000	\$2,906,640			
Path Bridge	square foot (sf)			\$100.00					

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Markings and Wide Paved Shoulder	\$289,953
Total Cost With Edge Line Markings and Wide Paved Shoulder	\$293,553

Eagle Island Connection

Total Length of Connection - 2.7 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 If each side	\$1.50	\$15,000	\$28,650
	New Lane Markings ⁽¹⁾	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal				\$32,000	\$61,120
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$2,292
	Bike Lane Striping	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal - No Lane Restriping				\$18,200	\$34,762
	If Restriping of Lanes to Accommodate Bike Lane	If	5000 If each side	\$3.00	\$30,000	\$57,300
	Subtotal - With Lane Restriping				\$48,200	\$92,062
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$764
	Edge Line Striping	If	5000 If each side	\$1.50	\$15,000	\$28,650
	Signs	4/mile	8	\$250.00	\$2,000	\$3,820
	Subtotal					\$33,234
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$636,660
Greenway	Excludes right-of-way - 10-foot wide path	If	5280	\$50.00	\$264,000	\$504,240
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$728,722
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$669,894

Chappell Loop

Total Length of Loop - 5.34 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$10,680
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 if each side	\$1.50	\$15,000	\$80,100
	New Lane Markings ⁽¹⁾	lf	5000 if each side	\$1.50	\$15,000	\$80,100
	Signs	4/mile	8	\$250.00	\$2,000	\$10,680
	Subtotal				\$32,000	\$170,880
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$6,408
	Bike Lane Striping	lf	5000 if each side	\$1.50	\$15,000	\$80,100
	Signs	4/mile	8	\$250.00	\$2,000	\$10,680
	Subtotal - No Lane Restriping				\$18,200	\$97,188
	If Restriping of Lanes to Accommodate Bike Lane	lf	5000 if each side	\$3.00	\$30,000	\$160,200
	Subtotal - With Lane Restriping				\$48,200	\$257,388
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$2,136
	Edge Line Striping	lf	5000 if each side	\$1.50	\$15,000	\$80,100
	Signs	4/mile	8	\$250.00	\$2,000	\$10,680
	Subtotal					\$92,916
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$1,779,982
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$1,026,960
Path Bridge		square foot (sf)		\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$2,037,370
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,872,898

NC 133 Route

Total Length of Route - 7 Miles

Conceptual Bicycle Facility Cost

Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$14,000
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 If each side	\$1.50	\$15,000	\$105,000
	New Lane Markings ⁽¹⁾	lf	5000 If each side	\$1.50	\$15,000	\$105,000
	Signs	4/mile	8	\$250.00	\$2,000	\$14,000
	Subtotal				\$32,000	\$224,000
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$8,400
	Bike Lane Striping	lf	5000 If each side	\$1.50	\$15,000	\$105,000
	Signs	4/mile	8	\$250.00	\$2,000	\$14,000
	Subtotal - No Lane Restriping				\$18,200	\$127,400
	If Restriping of Lanes to Accommodate Bike Lane	lf	5000 If each side	\$3.00	\$30,000	\$210,000
	Subtotal - With Lane Restriping				\$48,200	\$337,400
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$2,800
	Edge Line Striping	lf	5000 If each side	\$1.50	\$15,000	\$105,000
	Signs	4/mile	8	\$250.00	\$2,000	\$14,000
	Subtotal					\$121,800
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$2,333,310
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$1,848,000
Path Bridge	square foot (sf)			\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$2,670,710
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$2,455,110

Old Lanvale Road Route						
Total Length of Route - 3.89 Miles						
Conceptual Bicycle Facility Cost						
Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,780
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 if each side	\$1.50	\$15,000.00	\$58,350
	New Lane Markings ⁽¹⁾	if	5000 if each side	\$1.50	\$15,000.00	\$58,350
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,780
	Subtotal				\$32,000.00	\$124,480
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200.00	\$4,668
	Bike Lane Striping	if	5000 if each side	\$1.50	\$15,000.00	\$58,350
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,780
	Subtotal - No Lane Resstriping				\$3,200.00	\$11,806
	if Restrictions of Lanes to Accommodate Bike Lane	if	5000 if each side	\$3.00	\$15,000.00	\$18,700
	Subtotal - With Lane Resstriping				\$48,200.00	\$187,498
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400.00	\$1,556
	Edge Line Striping	if	5000 if each side	\$1.50	\$15,000.00	\$58,350
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,780
	Subtotal				\$3,900.00	\$14,666
Wide Paved Shoulder	Assume 4 feet per side (5000 if per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330.00	\$1,288,654
Greenway	Excludes right-of-way - 10-foot wide path	if	5280	\$50.00	\$264,000.00	\$1,026,960
Path Bridge	square foot (sf)			\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Markings and Wide Paved Shoulder	\$ 1,484,199
Total Cost With Edge Line Markings and Wide Paved Shoulder	\$ 1,562,454

Old Lanvale Road Route within Leland Town Limits						
Total Length of Route - 1.63 Miles						
Conceptual Bicycle Facility Cost						
Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,260
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (ft)	5000 if each side	\$1.50	\$15,000.00	\$24,450
	New Lane Markings ⁽¹⁾	if	5000 if each side	\$1.50	\$15,000.00	\$24,450
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,260
	Subtotal				\$32,000.00	\$52,160
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200.00	\$1,956
	Bike Lane Striping	if	5000 if each side	\$1.50	\$15,000.00	\$24,450
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,260
	Subtotal - No Lane Resstriping				\$3,200.00	\$4,812
	if Restrictions of Lanes to Accommodate Bike Lane	if	5000 if each side	\$3.00	\$15,000.00	\$18,900
	Subtotal - With Lane Resstriping				\$48,200.00	\$71,516
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400.00	\$652
	Edge Line Striping	if	5000 if each side	\$1.50	\$15,000.00	\$24,450
	Signs	4/mile	8	\$250.00	\$2,000.00	\$7,260
	Subtotal				\$3,900.00	\$5,962
Wide Paved Shoulder	Assume 4 feet per side (5000 if per mile each side)	square yard (sq)	4444.4	\$75.00	\$333,330.00	\$645,328
Greenway	Excludes right-of-way - 10-foot wide path	if	5280	\$50.00	\$264,000.00	\$430,320
Path Bridge	square foot (sf)			\$100.00		

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Markings and Wide Paved Shoulder	\$ 621,894
Total Cost With Edge Line Markings and Wide Paved Shoulder	\$ 699,954

Old Leland Loop

Total Length of Route - 3.61 Miles						
Conceptual Bicycle Facility Cost						
Type of Facility	Component	Number	Number Per Mile (both sides of road)	Unit Cost	Cost Per Mile (both sides of road)	Cost Per Component
Signed Route	Signs	4/mile	8	\$250.00	\$2,000	\$7,220
Wide Outside Lane	Removal of Lane Markings ⁽¹⁾	linear feet (lf)	5000 if each side	\$1.50	\$15,000	\$54,150
	New Lane Markings ⁽¹⁾	lf	5000 if each side	\$1.50	\$15,000	\$54,150
	Signs	4/mile	8	\$250.00	\$2,000	\$7,220
	Subtotal				\$32,000	\$115,520
Bike Lane	Bike Lane Markings	4/mile	8	\$150.00	\$1,200	\$4,332
	Bike Lane Striping	lf	5000 if each side	\$1.50	\$15,000	\$54,150
	Signs	4/mile	8	\$250.00	\$2,000	\$7,220
	Subtotal - No Lane Restriping				\$18,200	\$65,702
	If Restriping of Lanes to Accommodate Bike Lane	lf	5000 if each side	\$3.00	\$30,000	\$108,300
	Subtotal - With Lane Restriping				\$48,200	\$174,002
Edge Line	Edge Line Markings	4/mile	8	\$50.00	\$400	\$1,444
	Edge Line Striping	lf	5000 if each side	\$1.50	\$15,000	\$54,150
	Signs	4/mile	8	\$250.00	\$2,000	\$7,220
	Subtotal					\$62,814
Wide Paved Shoulder	Assume 4 feet per side (5000 lf per mile each side)	square yard (sy)	4444.4	\$75.00	\$333,330	\$1,203,321
Greenway	Excludes right-of-way - 10-foot wide path	lf	5280	\$50.00	\$264,000	\$953,040
Path Bridge		square foot (sf)	5000	\$100.00		\$ 500,000

⁽¹⁾ per stripe to be removed (i.e., if only one lane stripe on each side - \$11,000; if 2 lane stripes on each side are to be removed - \$22,000)

Total Cost With Bike Lane Marking and Wide Paved Shoulder	\$1,877,323
Total Cost With Edge Line Marking and Wide Paved Shoulder	\$1,766,135



Appendix E

PROJECT PRIORITIZATION



Facility Name	Total Length (mi)	Portion Within Town	Length Within Town (mi)	Total Cost (thou)	Cost Within Town	Eliminates Barrier or Constraint (1-5)	Improves Problematic Routes (1-5)	Assessability to Activity Centers (1-5)	Connects Gaps in System (1-5)	Enhances Quality of Life for Residents (1-5)	Lack of Environmental Constraints (1-5)	Positive Impact on Children (1-5)	Public Support(1-5)	Sum of Metrics
Fletcher Road / Northwest District Park Connection	0.07	Y	0.07	10	10	5	5	5	5	3	5	5	5	38
US 17 Leftover Connections	n/a	Y	n/a	30	30	5	5	5	5	4	5	3	5	37
Leland Greenway	5.10	Y	4.80	500	500	5	5	3	5	5	4	5	5	37
Old Leland Loop	3.61	Y	3.61	1377	1377	3	5	5	4	4	5	4	5	35
Village Road	7.22	Y	3.4	2755	1300	3	5	5	4	4	5	3	5	34
Wayne Street / Royal Street Connection	0.14	Y	0.14	50	50	5	5	5	5	2	1	4	3	30
Night Harbor Drive / Olde Towne Wynd Connection	0.11	Y	0.11	25	25	4	2	4	4	2	4	4	3	27
Holly Hills Drive / Sturgeon Drive Connection	0.14	Y	0.14	25	25	4	2	2	4	2	4	4	3	25
Eagle Island Connection	2.70	Y	2.7	729	729	4	3	2	3	3	3	3	3	24
NC 133	7.00	Y	1.9	2671	724	3	5	2	2	3	3	1	5	24
Old Lanvale Road	3.89	Y	1.63	1484	622	2	4	3	1	2	5	1	4	22
Grand/Forn/Palm Ridge	4.78	Y	4.78	10	10	1	1	1	1	1	5	4	3	20
Chappell Loop	5.34	N	0	2037	0	1	3	2	1	1	5	1	3	17
Cedar Hill Loop	11.54	Y	0.76	4403	290	1	2	2	1	1	5	1	3	16
Green Hill Loop	1.91	N	0	729	0	1	2	1	1	1	5	1	3	15

Town Creek	3.02	N	0	1152	0	1	2	1	1	1	5	1	3	15
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Goodman Loop	4.30	N	0	1641	0	1	2	1	1	1	5	1	3	15
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WilburSmith
ASSOCIATES



Division of
Bicycle &
Pedestrian
Transportation

