CAPE FEAR REGIONAL BICYCLE PLAN

FINAL PLAN

2017

CAPE FEAR COUNCIL OF GOVERNMENTS

alta PLANNING + DESIGN

Prepared for the Cape Fear Council of Governments
Prepared by Alta Planning + Design

Acknowledgments

Thank you to the hundreds of local residents, community leaders, and government staff that participated in the development of this Plan through meetings, events, comment forms, and plan review. Special thanks to those who participated as project committee members and advisors, listed below.

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*MPO = metropolitan planning organization
RPO = rural planning organization
COG = council of governments

Prepared for the Cape Fear Council of Governments
Prepared by Alta Planning + Design
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2017

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INTENDED AUDIENCES

The intended audience for this document includes residents, elected officials, government planners, developers, and all people interested in active transportation, recreation, health, wellness, environmental stewardship, economic development, tourism, and overall quality of life throughout the Cape Fear Region of North Carolina.

ADDITIONAL INFORMATION

Please contact the Cape Fear Council of Governments for additional information on this Plan and the planning process: 1480 Harbour Dr, Wilmington, NC 28401 | 910-395-4553 | www.capefearcog.org

1 Introduction

"I live on the Cross-City Trail and it has been so wonderful to see how the path brings together families, friends, neighbors and citizens. Personally, we love it because it means we don't have to get in the car for dinner and a movie or a day at the beach. We slow down and meet the people around us in an entirely different way. Truly a step in the right direction, Wilmington! Really hope to see more connected paths being developed in the future. Thank you!"

- Public Comment, 2016

This regional plan focuses on connecting regional nodes, such as Wilmington, NC (Gary Shell Cross-City Trail shown above). Photo credit: City of Wilmington

PROJECT OVERVIEW

Cities, towns, and regions around the country are increasingly recognizing that bicycle-friendly communities offer multiple quality of life benefits to residents and visitors, in terms of public safety, health, economics, mobility, and the environment.

Why a Bicycle Plan & Why the Cape Fear Region?

The Cape Fear Region is blessed with a number of proposed regional bicyle routes and destinations. In the Currie area of Pender County alone, the East Coast Greenway, NC Bike Route 5, the new southern leg of the Mountains-to-Sea trail, and the West Pender Rail Trail/Atlantic Coastline Trail all converge in the area of the Moores Creek National Battlefield. Regional bicyclists are also looking forward to construction of the new Surf City bridge that will contain a multi-use path and bike lanes, finally giving cyclists legitimate access to NC beaches. As a tourist destination, the region has large seasonal populations that are often looking for recreational opportunities that regional bike routes could satisfy, while providing economic development opportunities to smaller inland communities. Residents and visitors alike are lucky to have many unique landscapes like Carolina Bays and Venus Flytrap habitat that would be attractive destinations for recreational cyclists, as would many of the inland parks, like Lake Waccamaw State Park, Lumber River State Park, Carolina Beach State Park. Finally, the region has some interesting rural cultural areas like Penderlea, Fort Fisher, Brunswick Town, Orton Plantation, and historic Burgaw, Southport, and Wilmington that would make ideal bike destinations. There are many low-volume rural roadways that might provide reasonable regional bike connections without significant investment.

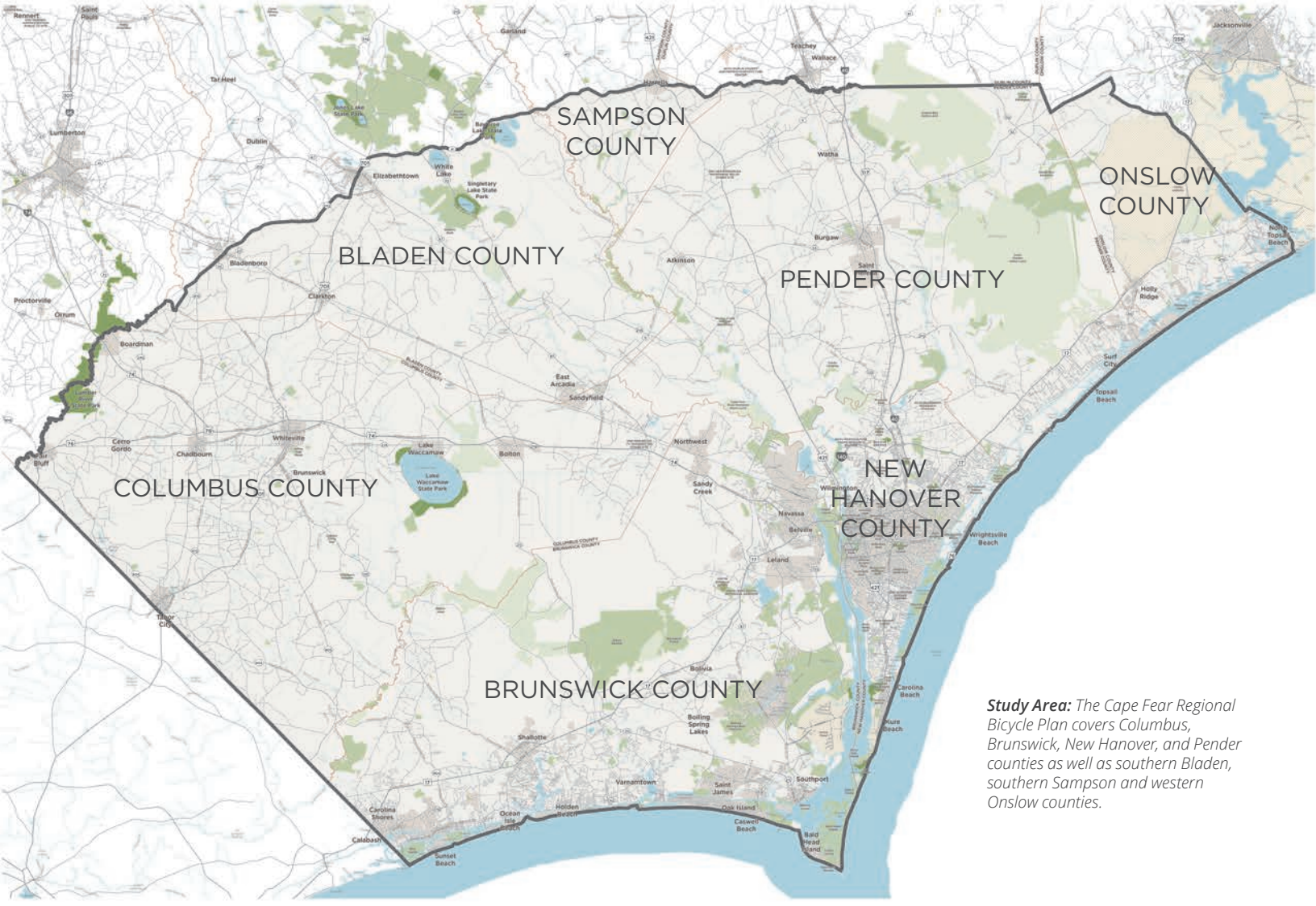
On a regional level, this plan will help to increase options for recreation-based tourism, affordable personal mobility and carbon-free transportation, while also creating more vibrant communities, tourism destinations, and healthy, active transportation choices for residents and visitors of the Cape Fear region.

In early 2016, the Cape Fear Council of Governments (Cape Fear COG), with funding from the North Carolina Department of Transportation (NCDOT), began the process for developing a regional bicycle plan for southeastern North Carolina. This Plan was developed in coordination with a whole host of regional planning organizations, counties, municipalities, and transportation agencies (see the study area and stakeholder graphics on the following pages). The purpose of this bicycle plan is to identify key bicycling routes and provide recommendations for new facilities, programs, and policies that will support safer bicycling throughout the region.

The development of this Plan included an open, participatory process, with residents providing input through public events, the project Steering Committee, social media, online input map, and online comment forms. The plan also incorporates recommendations from previously adopted local and regional plans that had their own public outreach and involvement processes as well.

STUDY AREA: THE CAPE FEAR REGION

The study area for this plan radiates from the coastal hub of Wilmington, NC, covering all of New Hanover, Brunswick, Columbus, and Pender counties, and parts of Bladen, Sampson, and Onslow counties (an area about the size of Connecticut). The character of the region ranges from urban and sub-urban Wilmington, to barrier island beach communities, to small rural towns and cross-roads communities, all surrounded by farms, forests, wetlands, lakes and waterways. The namesake of the region is the Cape Fear River, which roughly splits the region in two, running from the northwest to the south-east where it meets the Atlantic Ocean. All recommendations were developed using consistent data and inputs from across the region, and are aimed toward a single vision for the entire region, as laid out on the following page.



Study Area: *The Cape Fear Regional Bicycle Plan covers Columbus, Brunswick, New Hanover, and Pender counties as well as southern Bladen, southern Sampson and western Onslow counties.*

Plan Vision

While the Cape Fear COG and partner agencies must provide leadership and resources for this effort, overall success will also require continued, active participation and encouragement from residents and community organizations throughout the region. This plan represents a 30-year vision, with completion of recommendations to be achieved in stages. The plan's recommendations and implementation strategy will build on the Cape Fear Region's existing bicycling infrastructure and bicycling community efforts to achieve these goals, and ultimately to achieve the plan's vision:

"Bicycling is a safe and accessible form of transportation and recreation for residents and visitors in the Cape Fear Region. Key destinations are served by well-connected bikeways, increasing tourism and promoting economic development. Bicycling, as a means of recreation and transportation, enhances the health and well-being of people and communities throughout the region."

Plan Goals

Increase Transportation Choices

Improve connectivity of the bicycle network while increasing accessibility to transit and key destinations throughout the region.

Improve Safety for All Bicyclists

Improve the quality and safety of bicycling through new infrastructure, policies and programs, for all types of bicyclists.

Improve Health and Well-being of Communities

Improve health and wellness by increasing access to bikeways, thereby offering more opportunities for recreation, active transportation, and physical activity.

Create Value & Generate Economic Activity

Promote bicycle-related tourism and economic development, thereby increasing quality of life in the Cape Fear Region.

Background image: Singletary Lake in Bladen County

THE VALUE OF A BICYCLE-FRIENDLY REGION

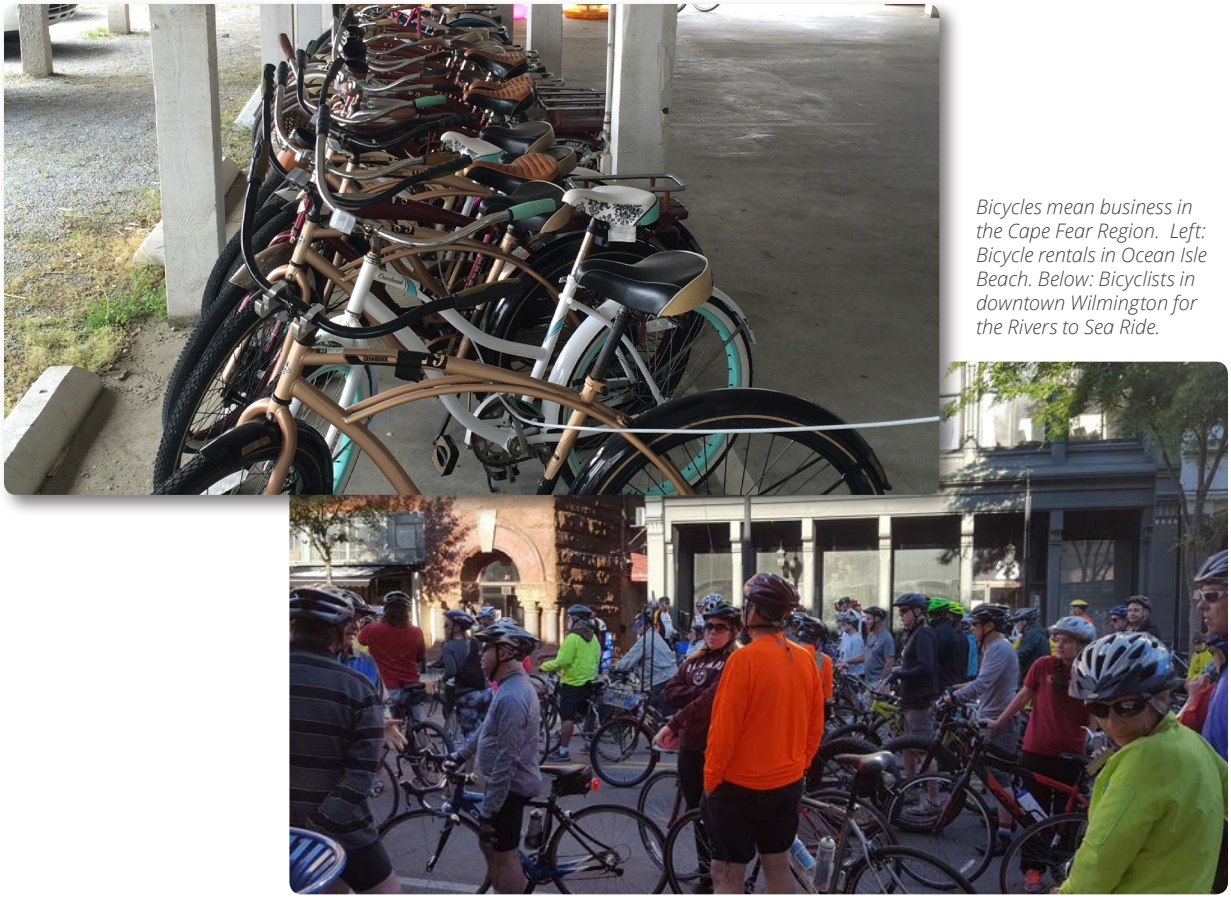
Communities across the U.S. and throughout the world are investing in bikeways as a key factor of overall livability. They do this because of their obligation to promote health, safety, and welfare, and also because of the growing awareness of the many benefits of a bicycle-friendly region.

CREATING VALUE AND GENERATING ECONOMIC ACTIVITY

The economic benefits of bicycling are generated in several ways. First, bicycle-friendly communities offer a higher quality of life, which benefits property owners, developers, and local government agencies that see increased property tax revenues. Second, bikeways and trails attract both businesses and tourists, spurring economic development that benefits all residents. Third, improved bicycling access near businesses has been shown to increase sales while reducing the need for expensive parking. Fourth, if planned in a way that also protects water quality through vegetated buffers along streams, trails and their associated greenway corridors can also reduce costs associated with water treatment and flood damages. Fifth, the health benefits of bicycling (discussed later in this chapter) reduce the costs of health care as a society. Finally, bikeway infrastructure is far less expensive to construct than roadways, representing only a fraction of a percentage of all roadway and highway project costs. For further information - https://www.ncdot.gov/bikeped/walkbikenc/pillars-of-plan/economy/.

Bicycle-friendly, Mixed-use Communities Are Valued by Homebuyers

Businesses, residents, and visitors consider quality of life factors like bikability and walkability when choosing locations to settle. According to a 2013 survey by the National Association of Realtors



Bicycles mean business in the Cape Fear Region. Left: Bicycle rentals in Ocean Isle Beach. Below: Bicyclists in downtown Wilmington for the Rivers to Sea Ride.

(NAR), the demand for the conventional suburban development patterns that predominated in the second half of the 20th century is shifting to more walkable, bikable, mixed-use communities—especially among the higher-educated work forces that businesses aim to attract and retain. **The NAR survey also showed that walkability and shorter commutes are key to community preference,** indicating that as the demand for automobile-dependent development decreases, communities should be built (and retrofitted) with bicycle and trail connectivity in mind.

Bikeways and Trails Offer Transportation Cost Savings

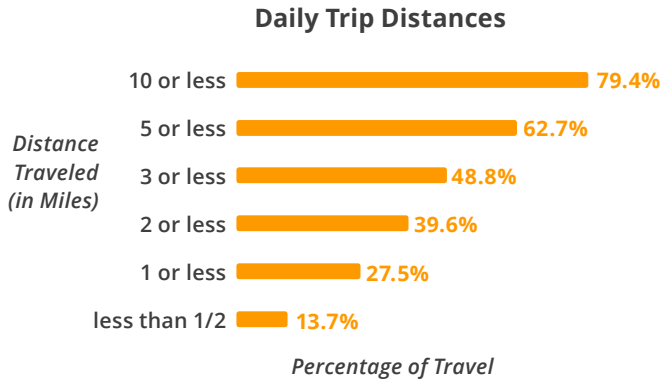
When looking at the returns on investment noted above, it is also important to put into perspective the massive differences in costs inherent in the transportation decisions we make, both as individuals and as a region. Consider the individual costs associated with various forms of transportation. The cost of operating a bicycle is far less than operating a car. A study cited by the Victoria Transport Policy Institute found that **households in automobile-dependent communities devote 50 percent more of their income to transportation (more than $8,500 annually) than households in communities with more accessible land use and more multi-modal transportation systems (less than $5,500 annually).** Bicycling is an affordable form of transportation, and with the relatively low cost and high return on investment for bikeways and trails, it is hard to argue against developing a regional system that creates value and generates economic activity.

On a broader scale, consider the regional costs of our transportation infrastructure investments. According to the Federal Highway Administration, the basic cost of a single mile of urban, four-lane highway is between $20 million and $80 million. For example, the Military Cutoff Rd Extension is estimated to cost $51,600,000, running roughly three miles from Market Street to the US 17 Wilmington Bypass, coming to about $17.2 million per mile. **By contrast, the Gary Shell Cross City Trail in Wilmington cost about $660,000 per mile (adjusted to 2016 dollars), which is only one twenty-fifth of the cost of the roadway project example.**

INCREASING TRANSPORTATION CHOICES

Surveys by the Federal Highway Administration show that Americans are willing to bicycle as far as five miles to a destination. A complete system of bikeways and trails in the Cape Fear Region, combined with other bicycle, pedestrian, and transit infrastructure, will transform the region in terms of access to jobs, access to recreational opportunities, and access to day-to-day trips that can be made for shorter distances. Choosing to bike or walk rather than drive, however, is often made difficult by the way our cities and towns have developed. Despite recent efforts to design roadway corridors for more than just cars, the fact is most roadways in the region were not constructed with bicycles in mind, leaving many residents with little

> *"I live in Bayshore, off of Market Street. I would like nothing more than to be able to bike with my kids to Wrightsville beach and to their school (Ogden Elementary) from where I live. If that were possible, then we could also get to Mayfaire as well, since we would be connected to the already-existing multi-use path on Military Cutoff"*
> - Public Comment, 2016



Most driving trips in the U.S. are for a distance of five miles or less. Chart from the Bicycle and Pedestrian Information Center, www.pedbikeinfo.org

choice but to drive, even for short trips. This is not unique to this region, as much of the urban and suburban growth in the U.S. of the past half-century has been automobile-dependent. In fact, **about 40% of all driving trips made in the U.S. are shorter than two miles,** indicating an opportunity to accommodate those trips by providing the right environment for people to make them by bicycle.

IMPROVING HEALTH THROUGH ACTIVE LIVING

The physical design of communities can provide permanent, sustainable environments that support physical activity. For example, when people are able to live near and get to destinations such as work, shopping, and entertainment without using automobiles, opportunities for physical activity through active transport are increased. The Centers for Disease Control (CDC) determined that **by creating and improving places in our communities to be physically active, there could be a 25 percent increase in the percentage of people who are physically active at least three times a week.** The CDC also reviewed 12 studies on the effectiveness of community scale urban design and land-use policies and practices in supporting physical activity and found an overall median effect size of 161% for some aspects of physical activity, such as increases in the number of walkers or bicyclists. This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits. **For example, 44.5% of those surveyed for the 2013 Bladen County Health Strategic Plan said that weight problems are a health concern in their community. At the same time, 96 percent of respondents to this Plan's public comment form said they would "bike more often if more bicycle lanes, trails, and safe roadway crossings were provided for bicyclists."**

Some related findings from the field of health include:

- "An estimated 10.8 percent of all deaths in the United States is attributable to physical inactivity." (Lee, et al.)
- "Every $1 spent building biking trails and walking paths can save about $3 in medical expenses. Through *GO NC!*, BlueCross BlueShield North Carolina hopes to improve health and reduce obesity-related medical costs in North Carolina." (Brad Wilson, BCBSNC president and CEO)
- "Every $1 investment in trails for physical activity led to $2.94 in direct medical benefit. The sensitivity analyses indicated the ratios ranged from 1.65 to 13.40. Therefore, building trails is cost beneficial from a public health perspective." (Cost-Benefit Analysis of Physical Activity
- Using Bike/Pedestrian Trails)

Bicycle lanes in Sunset Beach (left) and Surf City (below).

- "From current evidence, we find that urban river parkways can improve physical, mental, and community health, and that they are particularly important in offering opportunity for 'green exercise'—physical activity in the presence of nature." UCLA's Center for Occupational and Environmental Health

For further information - https://www.ncdot.gov/bikeped/walkbikenc/pillars-of-plan/health/.

Greenway Trails Provide Opportunities for Solace in Nature

Some bikeways, such as greenway trails, can positively affect psychological health through exposure to nature. Contact with nature has been linked to a greater ability to cope with life stressors, improve work productivity, reduce job-related frustration, increase self-esteem, reduce levels of attention deficit disorder in children, improve cognitive ability, reduce aggressive behavior, and provide greater life satisfaction (Frumkin) (Louv).

ENVIRONMENTAL BENEFITS OF BICYCLING AND GREENWAYS

There are many environmental benefits from bicycling, and from the protection of greenway corridors in particular, that help to protect the essential functions performed by natural ecosystems. Some of these benefits include carbon sequestration, airborne particulate capture, oxygen generation, urban heat-island temperature moderation, and surface water filtration & infiltration. As an educational tool, greenway trails can serve as a hands-on environmental classroom for people of all ages to experience natural landscapes, conduct river clean-ups, and further environmental awareness. Some of the largest benefits, however, are those directly related to water quality, wildlife, and reduced fuel consumption, as described below.

Environmental Benefits of Bicycling

Bicycling is one of the two major non-fuel- consuming, non-polluting forms of transportation (walking being the other). According to a national walking and bicycling study by the U.S Department of Transportation (Publication No. FHWA-PD-93-015), the greatest environmental benefits of bicycling and walking are that they conserve roadway and residential space; avert the need to build, service, and dispose of autos; and spare users of public space the noise, speed, and intimidation that often characterize motor vehicle use, particularly in urban areas. By far the greatest environmental benefit of bicycling and walking, according to the study, is that they bypass need for fossil fuel, and the environmental issues associated with the use of fossil fuel. Thus, to the extent that bicycling and walking displace trips that otherwise would have involved use of motor vehicles, they enable society to reduce consumption of fossil fuels and the associated pollution and other environmental damage.

National Security Concerns with Oil Dependence

Related to the benefits noted above: According to a Rand Corporation research brief (RB-9448), policies that reduce domestic consumption of oil should serve to reduce the national security risks the United States faces from importing oil. This topic relates less to this Plan specifically, but more to the national trends of growth in bicycling and walking as a mode of transportation.

Water Quality Benefits

Natural open spaces around greenway trails help to protect water quality by creating a natural buffer zone around streams, rivers, and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff. Rivers become polluted when rainwater picks up motor oils, fertilizers, litter, pesticides and other pollutants and then "runs off" into streams and creeks, which empty into rivers, lakes, estuaries and the ocean. Every time a site is developed with parking lots, roads and buildings, the amount of water that soaks into the ground is reduced, and the amount running off increases. Protected open spaces, such as those along greenway trails, usually contain natural grasses and other vegetation that serve as filters, removing pollutants before they are deposited into our water bodies.

Biodiversity & Wildlife Benefits

Greenways can protect and link fragmented habitats and provide opportunities for protecting plant and animal species. Biodiverse systems provide a wide range of ecosystem services, and have a greater ability to withstand natural and/or human caused disturbance. Many of the benefits of greenways depend upon biodiverse systems and the resulting ecosystem services they provide, such as: pollution breakdown and absorption, water resource protection, and erosion and flood control.

Greenways Protect People and Property from Flood Damage

The protection of greenway corridors associated with trail corridor dedication and development can have the added affect of also protecting natural floodplains along rivers and streams. According to the Federal Emergency Management Agency (FEMA), the implementation of floodplain ordinances is estimated to prevent $1.1 billion in flood damages annually. By restoring developed floodplains to their natural state and protecting them as greenway trail corridors, many riverside communities are preventing potential flood damages and related costs.

ENHANCING CULTURE AND SENSE OF COMMUNITY

Bikeways and trails can support connections to local heritage by promoting bicycle tourism to historic places and increasing business for the many historic downtowns and historic sites throughout the region. Trails can also provide access to historic sites such as battlegrounds, bridges, buildings, and mills that otherwise would be difficult to access or interpret.

Cities and regions have their own unique history, their own features and destinations, and their own landscapes. For example, historic attractions in Wilmington alone include a National Register Historic District that covers more than 230 blocks, plus historic museums, tours, and sites covering the Revolutionary War, the Civil War and WWII. These, combined with all the historic attractions of the many smaller towns throughout the region, make for unique bicycling touring opportunities, if connected with bikeways and supported by the necessary programming, such as tour maps and information about lodging, camp sites, and destinations.

Similarly, the historic importance of the region's rail corridors and the string of small communities that developed along the old rail lines could play a role in the outcomes of this Plan. There is potential for use of those corridors as bicycle facilities and there is opportunity to revitalize some of those communities by attracting tourists to experience their small town charm, showcasing their culture and history through bicycle-tourism.

Finally, bikeways and trails provide opportunities for people to interact with one another outside of work and their immediate neighborhood. Positive interaction (such as through exercising, strolling, or even just saying 'hello') among people from a wider community helps to build trust and awareness of others, which strengthens the overall sense of community.

Top left: Historic Downtown Whiteville

Above: Historic Train Depot at Chadbourn

Left: Historic Elwell Ferry, which provides a key link for regional bicycling as one of only a few crossings of the Cape Fear River that is safe for bicyclists.

THE PLANNING PROCESS

The planning process began in March 2016 and concluded in March of 2017. The development of this plan included a public process, featuring a kick-off meeting charrette, a steering committee, and ongoing public involvement through a project website, an interactive on-line map, a user comment form, two phases of outreach at events and meetings, county presentations, regional transportation planning organization presentations, and a final presentation to the regional transportation planning organization's Transportation Advisory Committee. These and other steps in the process are outlined in the approximate timeline below:

The Steering Committee and project advisors included representatives from the following agencies and organizations:

- Cape Fear RPO
- Mid-Carolina RPO
- Wilmington Urban Area MPO
- Grand Strand Transportation Study MPO
- Down East RPO
- Jacksonville Urban MPO
- NCDOT Division 3
- NCDOT Division 6
- NCDOT Division of Bicycle & Pedestrian Transportation
- Counties
- Municipalities
- Local, Regional, and Statewide Bicycling- and Trail-Related Organizations and Individuals

Key Steps in the Process:

MARCH-MAY 2016 - Data Collection: GIS analysis, Steering Committee kick-off charrette; launch project website and public comment form; begin outreach events

APRIL-JUNE 2016- Begin development of preliminary draft network; regional transportation planning organization TCC Meetings; 2nd Steering Committee Meeting; and continue outreach events

JULY-SEPT 2016 - Field tour and NCDOT division-level meetings to assess preliminary draft network; 3rd Steering Committee Meeting; and development of the Draft Plan

SEPT-OCT 2016 Release of the draft plan for review; 4th Steering Committee meeting; and development of priority project cut-sheets

OCT-DEC 2016 - Draft Plan Review Period; 2nd series of public outreach meetings/ events; draft plan presentations

JAN-MAR 2017 - Final Plan: Revisions based on input received, Final Steering Committee Meeting; and Final Plan presentations.

Plan Adoption/Approval Process & Implementation

TYPES OF BICYCLISTS

This Plan was developed with the understanding that there are different types of bicyclists, with differing needs. Bicyclists can be categorized into four distinct groups based on comfort level and riding skills. Bicyclists' skill levels greatly influence expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people. In the US population, people are generally categorized into one of four cyclist types. The characteristics, attitudes, and infrastructure preferences of each type are described below.

HIGHLY EXPERIENCED (~1% OF POPULATION)

Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared use paths.

ENTHUSED AND CONFIDENT (~ 5-10% OF POPULATION)

This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or multi-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

INTERESTED BUT CONCERNED (~ 60% OF POPULATION)

This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.

NO WAY, NOW HOW (~ 30% OF POPULATION)

Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

Source: Four Types of Cyclists. (2009). Roger Geller, City of Portland Bureau of Transportation. Supported by data collected nationally since 2005.

2 Existing Conditions

"I do not live in the Cape Fear area today but plan to retire there. It would be a wonderful benefit if there was a planned bicycle trail system that could take you to the scenic areas in the Cape Fear region. I live in Colorado today where we are blessed with hundreds of miles of beautiful bike trails all along the front range between Denver and Ft. Collins." - Public Comment, 2016

"I would love to leave the car behind and use my bike more. When we lived in WI, the cities had more trails and lanes to allow you to get to places. I feel very squeezed on the roads here....These connections will make it easier to use our bike as a preferred mode. Thank you" - Public Comment, 2016

Bike shop in Ocean Isle Beach

OVERVIEW

This chapter summarizes the existing conditions for bicycling in the Cape Fear region, through a regional snapshot, existing conditions maps, public comments, stakeholder feedback, and a summary of support for bicycling in local and regional existing plans.

While the Cape Fear study area touches all or parts of seven counties, spanning over 3,600 square miles with a population over 450,000, a relatively small amount of bicycle facilities currently exist. The rural and scenic nature of the region does include miles of scenic, low-traffic volume roadways relatively comfortable for bicycling, but these are disconnected to community centers and regional destinations. The key to a successful bicycle network is connectivity; as more bicycle facilities are connected to one another, the benefits of any particular segment are greatly enhanced, with impacts to transportation, recreation, health, and economy. With miles of stunning beaches, rural scenery, and a major river running through the heart of the region, combined with the rich history of over 40 municipalities that dot a growing region, numerous opportunities exist to strengthen connectivity.

Bicyclists at Lake Waccamaw State Park

EXISTING CONDITIONS MAPS

The existing conditions maps on the following pages provide insight into the demographic, safety, and existing bicycling setting of the Cape Fear region, for purposes of a bigger-picture understanding of regional need and opportunities.

Maps 2.1-2.5 Existing & Previously Proposed Facilities

The study area for this project, the Cape Fear region, is 3,681 square miles with just over 450,000 in population covering all of New Hanover, Brunswick, Columbus, and Pender counties and parts of Bladen, Sampson, and Onslow counties. These maps show existing facilities as well as previously proposed facilities from local and regional planning efforts to date. The maps reveal more extensive existing and planned facilities some areas (throughout New Hanover County, Oak Island, Surf City, Leland, Whiteville, and Elizabethtown), and very little planning in other more rural areas, which is to be expected. The East Coast Greenway and State Bike Routes are exceptions to this observation, as they are spread throughout the region.

Map 2.6 Demographics/Equity Analysis

When evaluating the need for bicycle infrastructure, it is important to understand the distribution of population and resources. Bicycling can serve multiple purposes including access to transportation choice for those without vehicles and opportunities for healthy living for those who may trend toward inactive lifestyles. This analysis reveals areas of higher general need (and lower equity) in most of Bladen County's portion of the study area; the north half of Columbus County (and near Tabor City); the northeast and northwest parts of Pender County; areas near downtown Wilmington and Leland; and along parts of US 17 in Brunswick County.

Maps 2.7-2.11 Opportunities & Challenges

These maps feature opportunities and challenges identified by the steering committee and general public across the Cape Fear region. Opportunities exist to connect the region's community centers, regional parks, Cape Fear River access points, and ocean-front destinations and build upon previous local planning and development efforts. Challenges include bicycle connectivity across the Cape Fear River, railroad corridors, and major roadway corridors such as I-40, US 17, US 421, NC 211, and others.

Map 2.12 Live, Work, Play, and Learn Analysis

Connecting population centers, where people live, work, play, and learn, is essential for consideration in the development of a successful bicycle network. It will also be important to connect the bicycle network to key regional destinations to promote tourism. Examples include Historic Downtown Wilmington, state parks (like Lake Waccamaw State Park), the beach communities in Brunswick, Pender, and New Hanover counties, and the many small towns throughout the region, such as Whiteviille, Elizabethtown, and Burgaw, to name just a few.

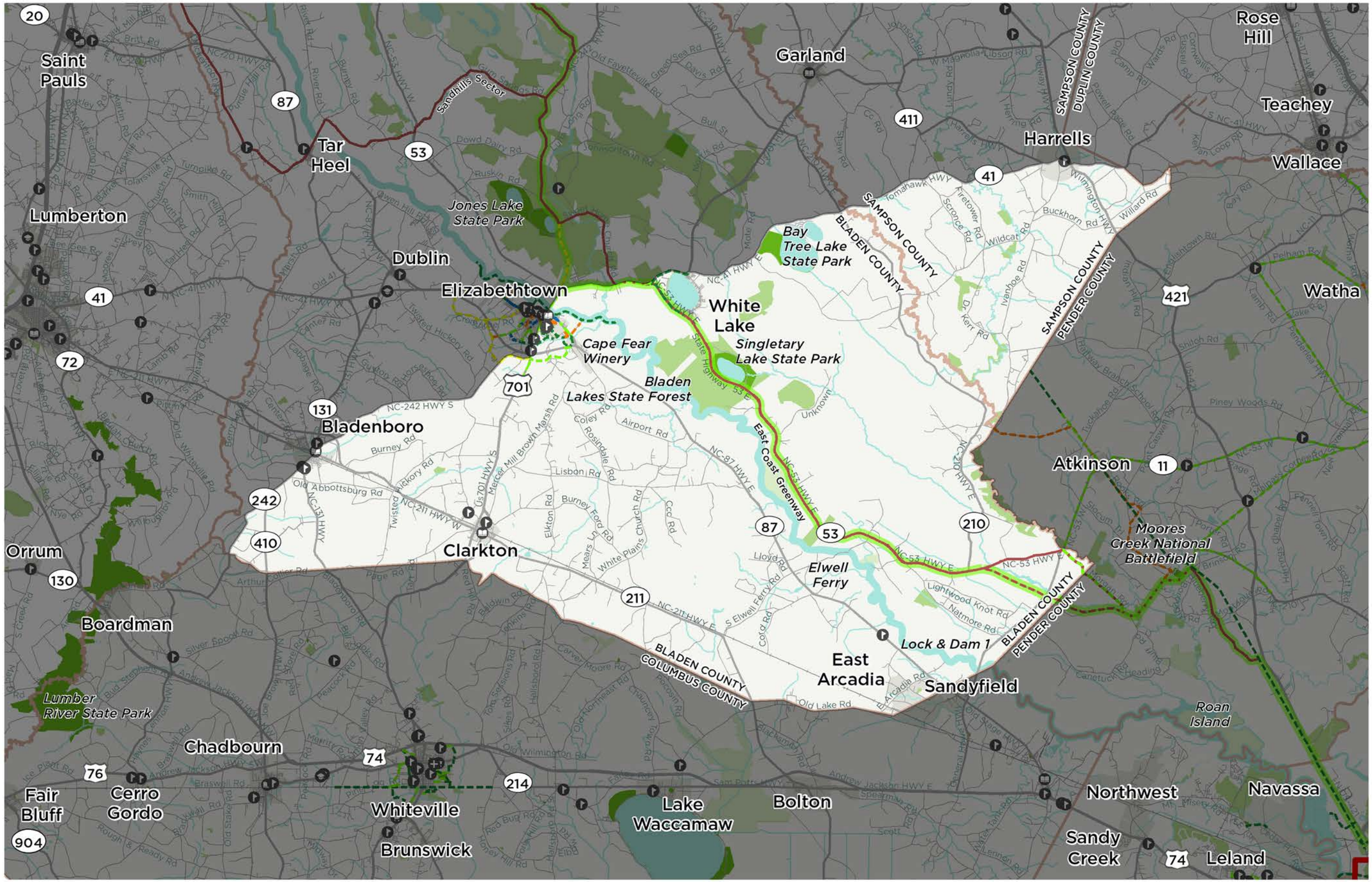
Maps 2.13-2.17 Bicycle Crash Analysis

This series of maps and charts examine the most recently available crash data in the Cape Fear region from 2007-2012. The bicycle crash data covers information related to what, when, why, where, and who. Generally speaking, clusters of crashes are found along heavily trafficked corridors through urban centers and roadways leading to beach access points along the coastline. Higher frequencies of crashes are found during the warmer months of the year, and during the day; higher frequencies occur with the evening rush hour.

Maps 2.18-2.19 Public Outreach & Input

Map 2.18 displays routes available online through the Cape Fear Cyclists and Brunswick County Pedalers respective websites. Map 2.19 features routes and points entered through the online input map throughout the course of the planning process, with a corresponding table showing specific comments from members of the general public. An overarching theme to the mapping input was a desire to connect to local destinations, and a desire for the use of lower-volume roadways for bike routes.

MAP 2.1 - EXISTING CONDITIONS: BLADEN + SAMPSON COUNTY



BIKEWAY NETWORK

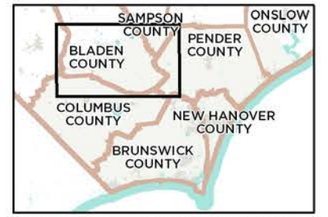
EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



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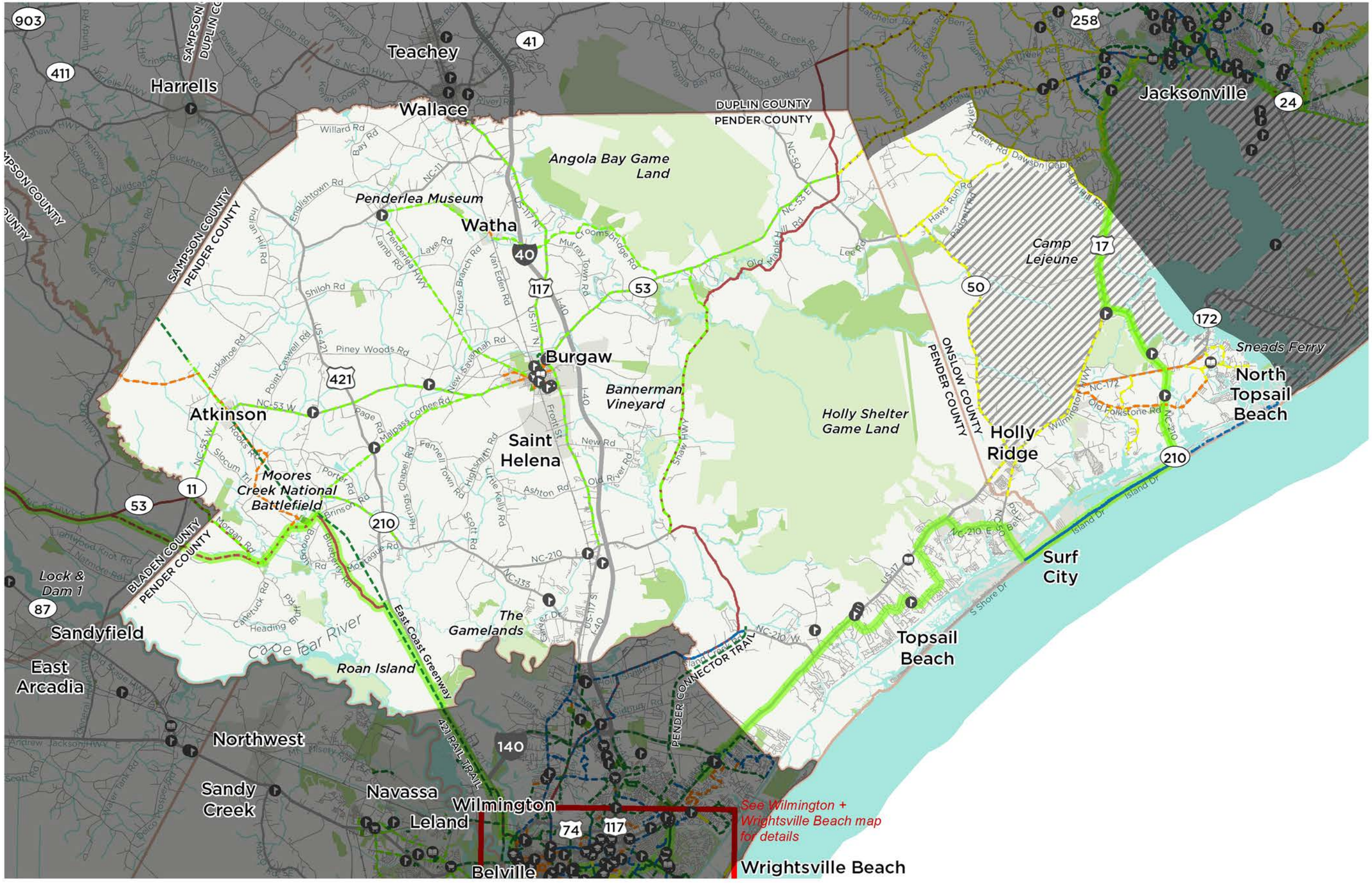
- 2009 Topsail Area CTP
- 2008 Olden Holden Bike Tour Map
- 2008 Brunswick County CTP
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

MILES 0 3 6

MAP 2.2 - EXISTING CONDITIONS: PENDER + ONSLOW COUNTY



BIKEWAY NETWORK

EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
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- Recreation or Historic Area
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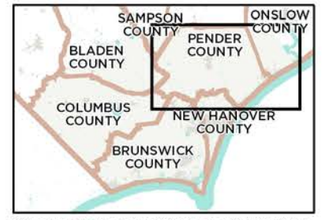

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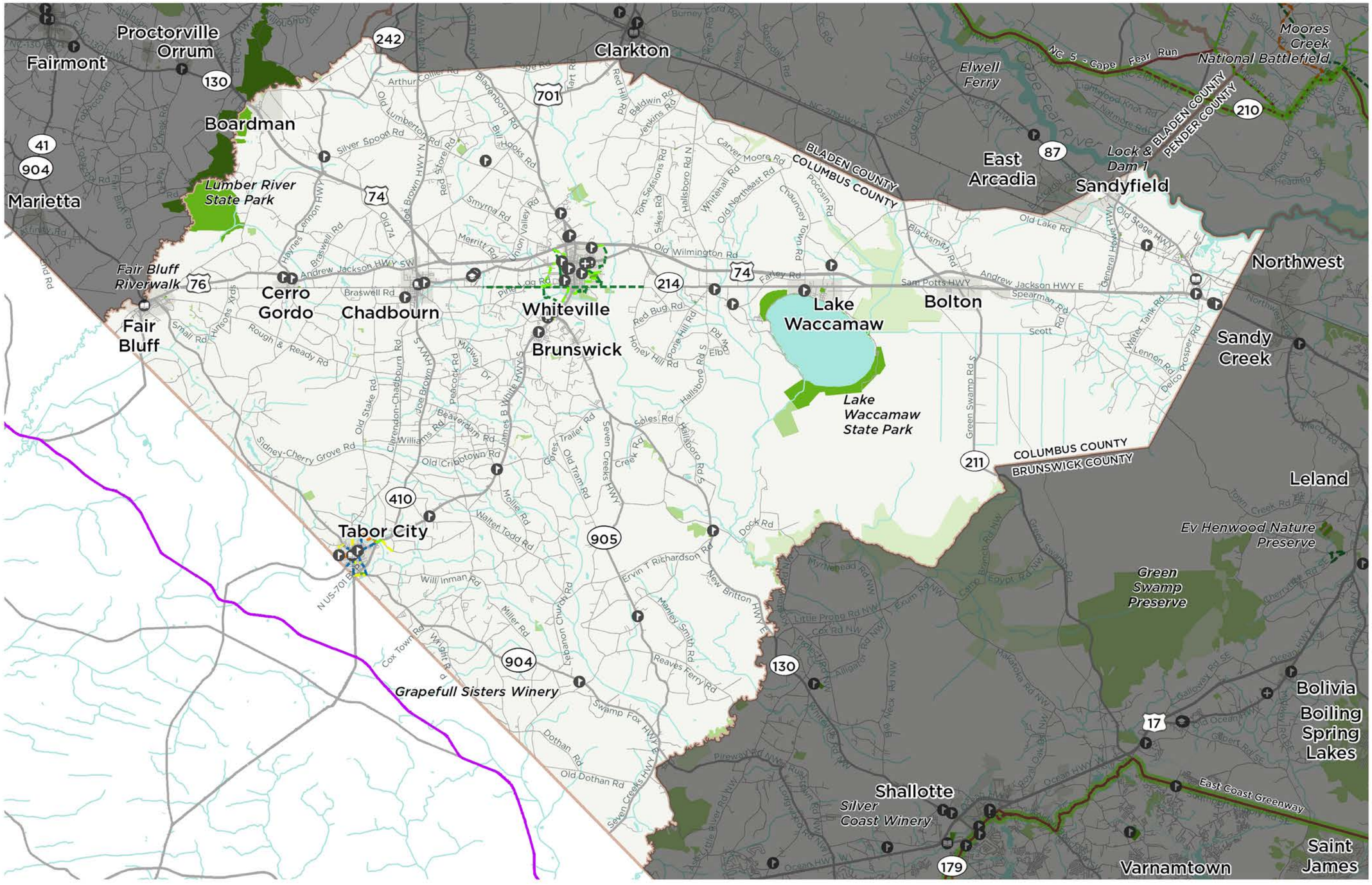
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

0 3 6 MILES

MAP 2.3 - EXISTING CONDITIONS: COLUMBUS COUNTY



BIKEWAY NETWORK

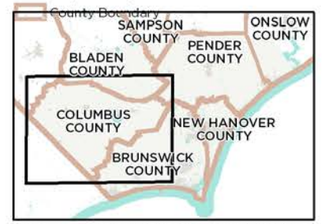
EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- South Carolina State Bike Routes
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



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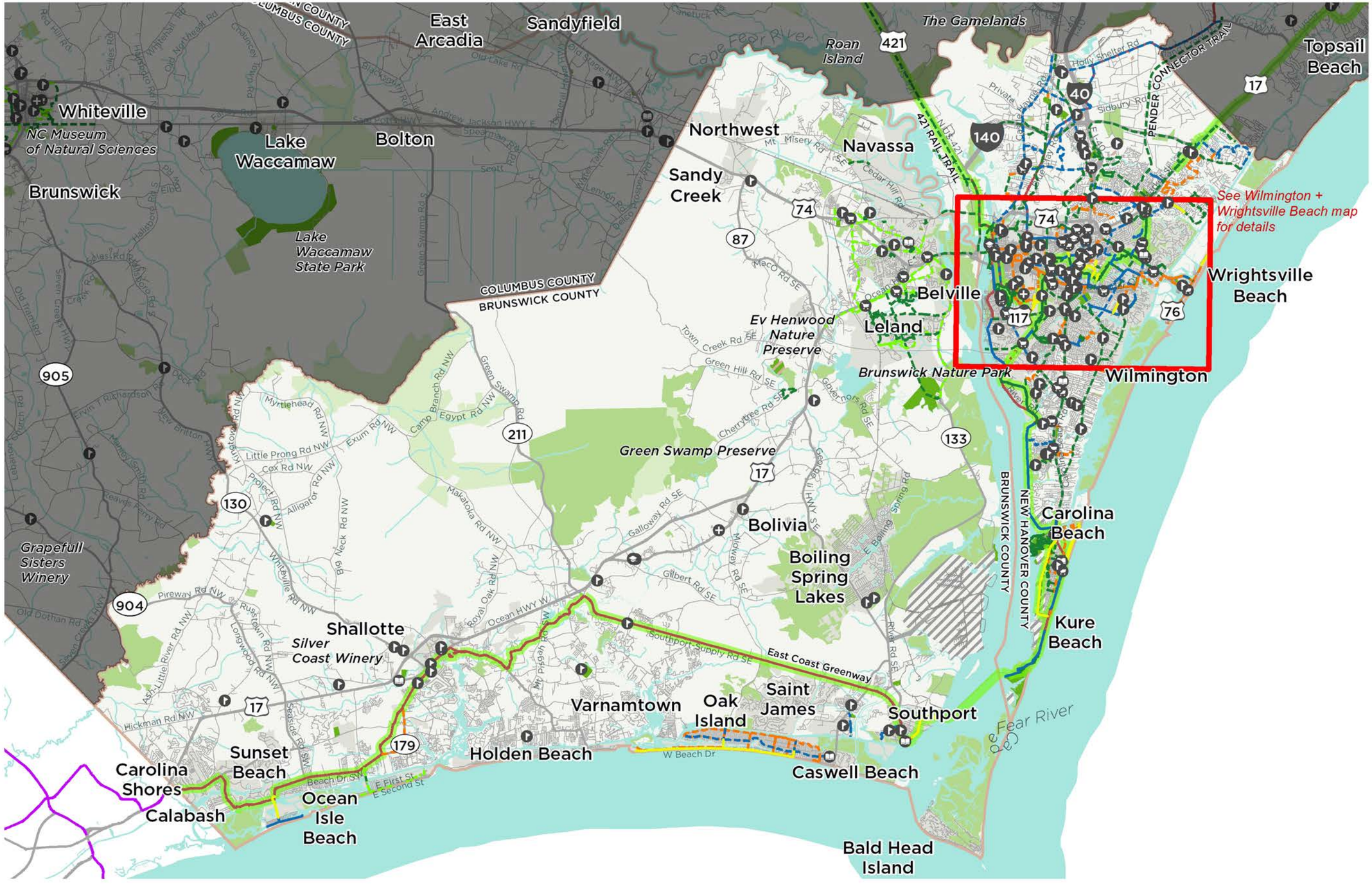
- 2008 Brunswick County CTP
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

0 3 6 MILES

MAP 2.4 - EXISTING CONDITIONS: BRUNSWICK + NEW HANOVER COUNTY



BIKEWAY NETWORK

EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- South Carolina State Bike Routes
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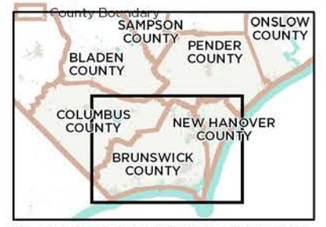

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- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

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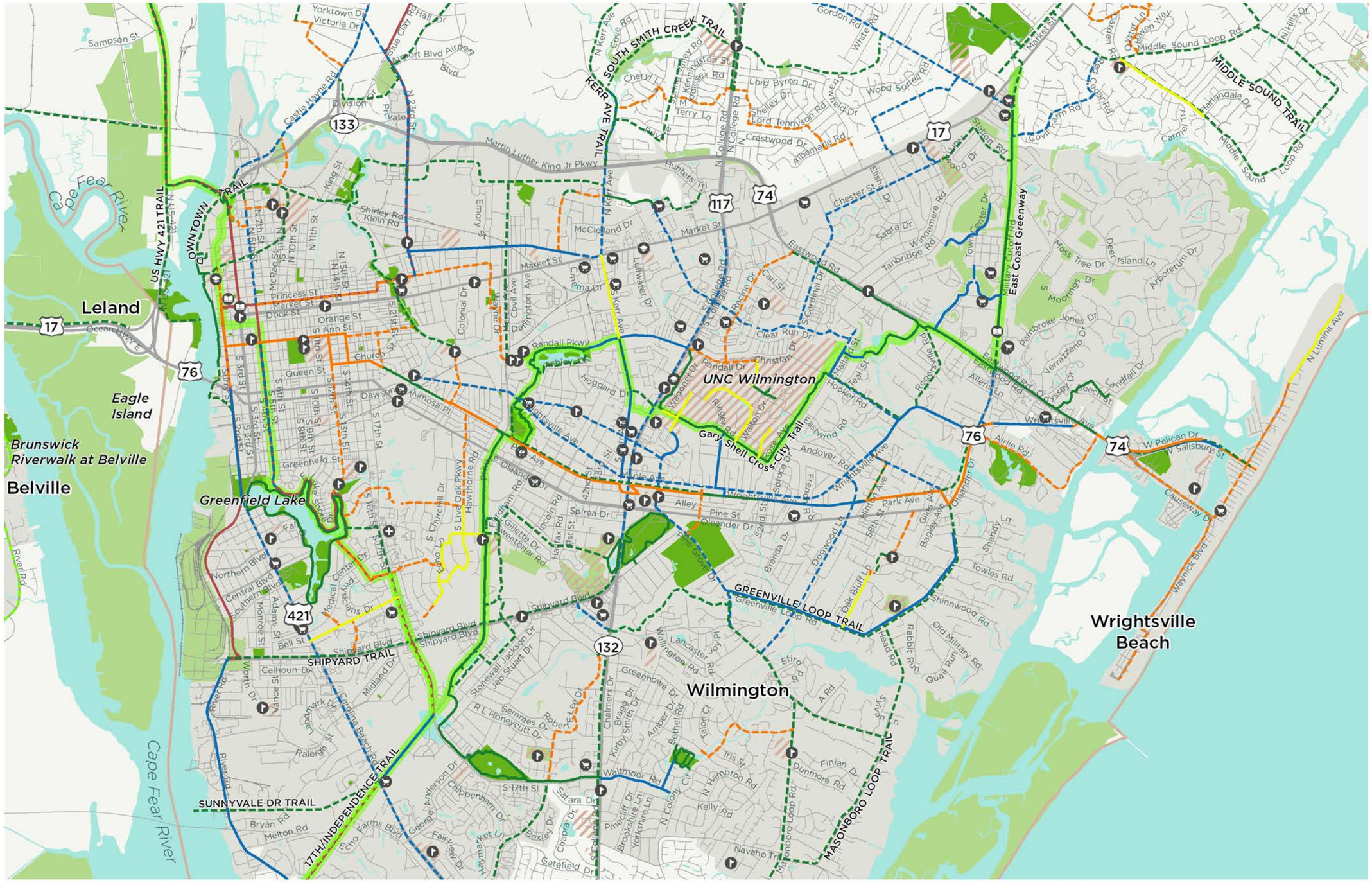
0 3 6 MILES

MAP 2.5 - EXISTING CONDITIONS: WILMINGTON + WRIGHTSVILLE BEACH



BIKEWAY NETWORK

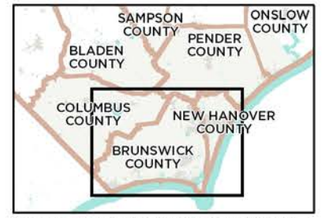
EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



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- 2009 Topsail Area CTP
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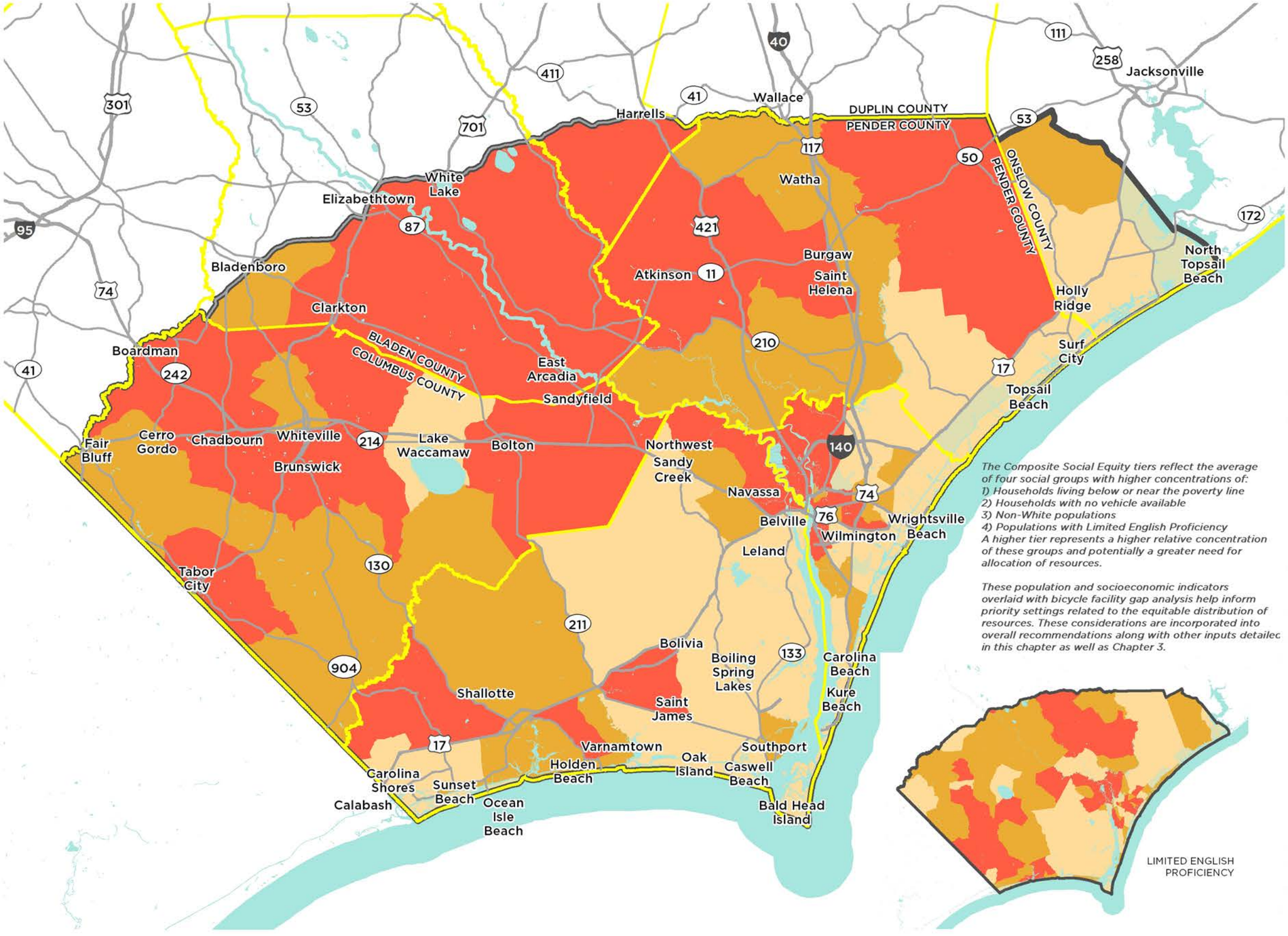
- 2008 Brunswick County CTP
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

0 0.5 1 MILES

MAP 2.6 - EQUITY ANALYSIS



EQUITY ANALYSIS

EQUITY TIER
Composite Map
Highest
Lowest

BOUNDARIES
Water Body
Project Study Area
County Boundary
Municipal Boundary

Data was provided by U.S. Census Bureau, NCDOT, and NC One Map.
Map produced September, 2016.

0 5 10 MILES

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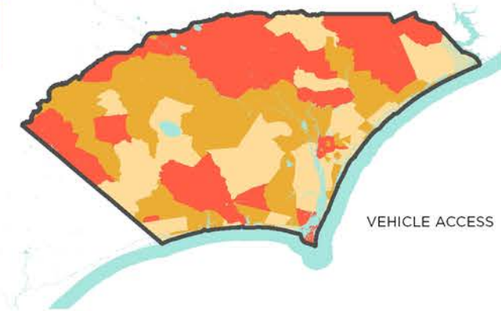
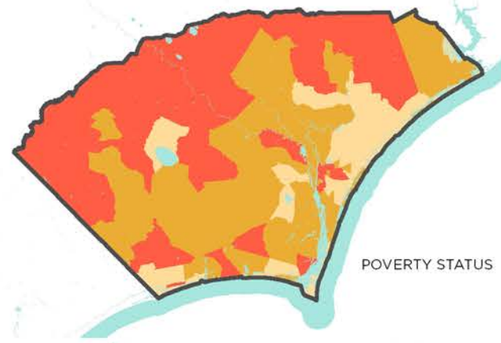
The Composite Social Equity tiers reflect the average of four social groups with higher concentrations of:
1) Households living below or near the poverty line
2) Households with no vehicle available
3) Non-White populations
4) Populations with Limited English Proficiency
A higher tier represents a higher relative concentration of these groups and potentially a greater need for allocation of resources.

These population and socioeconomic indicators overlaid with bicycle facility gap analysis help inform priority settings related to the equitable distribution of resources. These considerations are incorporated into overall recommendations along with other inputs detailec in this chapter as well as Chapter 3.

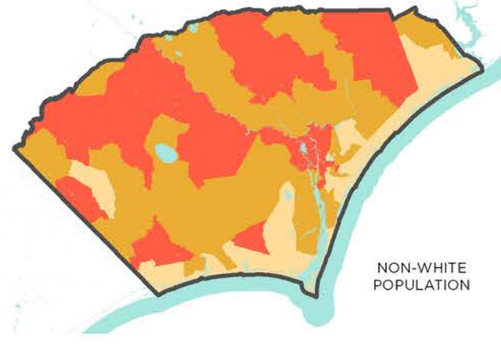


VEHICLE ACCESS



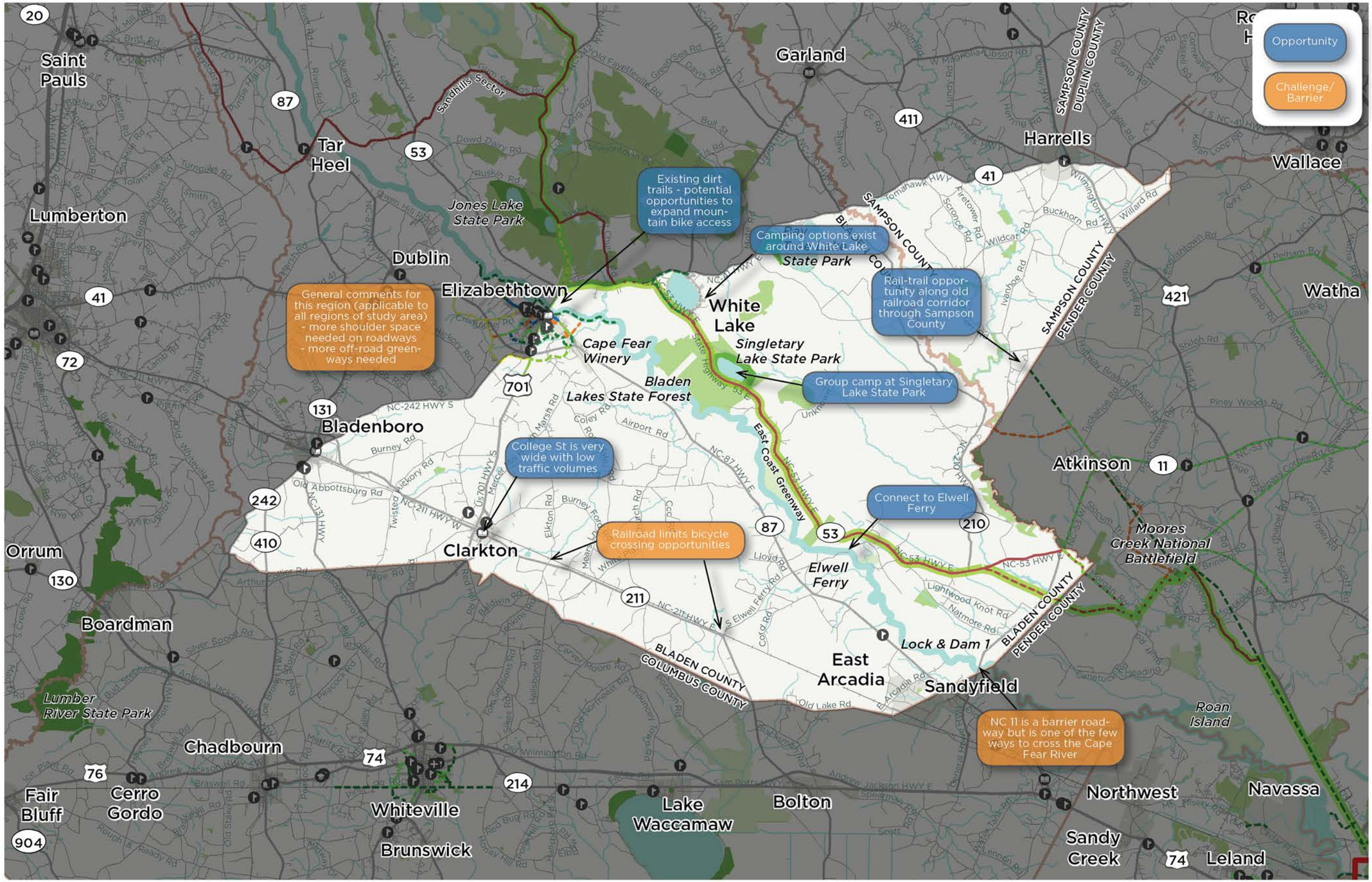
POVERTY STATUS

LIMITED ENGLISH PROFICIENCY



NON-WHITE POPULATION

MAP 2.7 - OPPORTUNITIES & CHALLENGES: BLADEN + SAMPSON COUNTY



BIKEWAY NETWORK

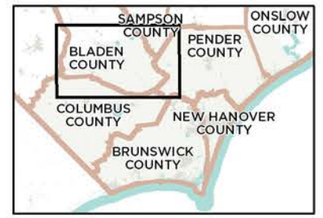
EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



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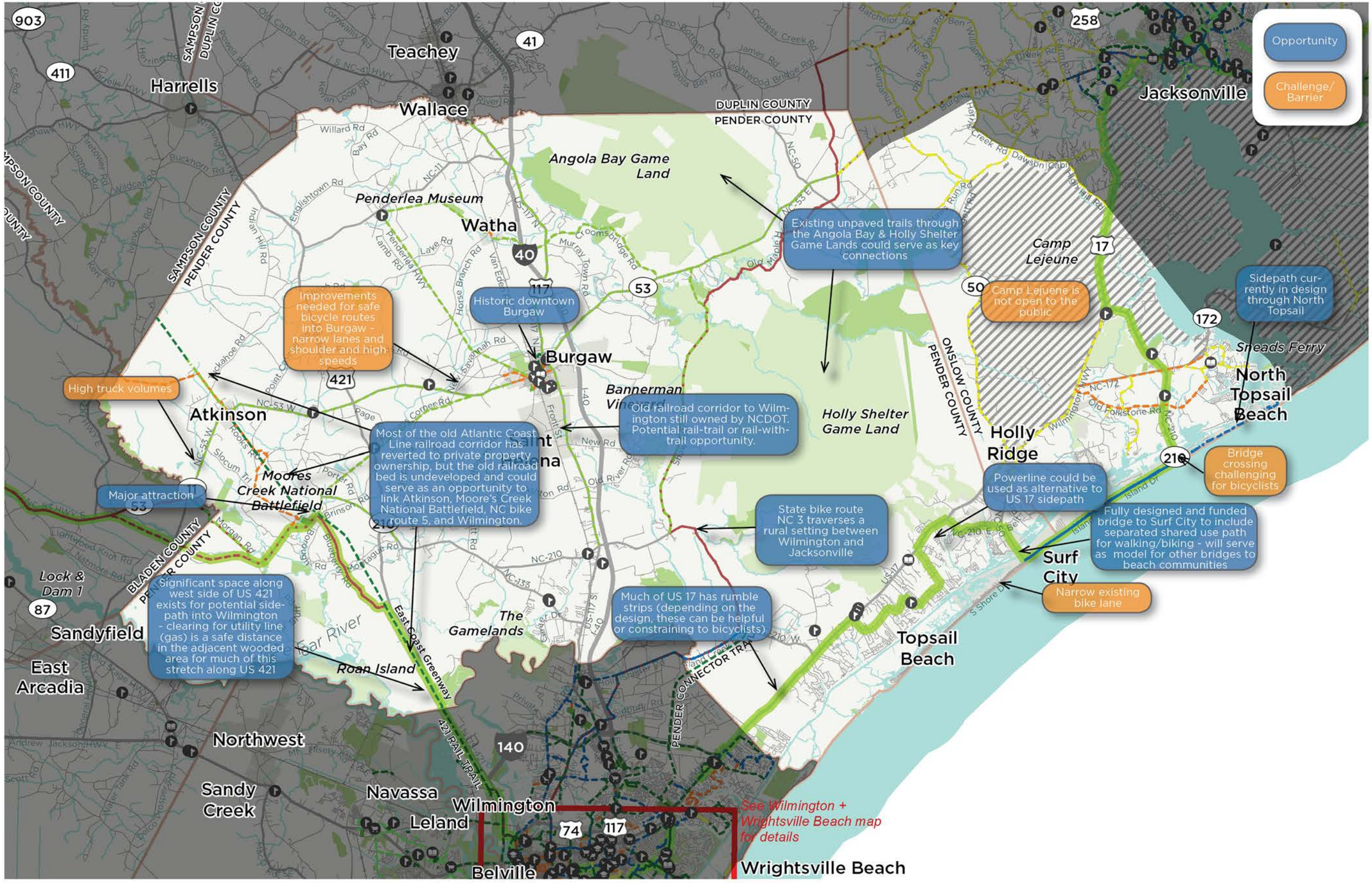
- 2009 Leland Bicycle Plan
- 2009 Topsail Area CTP
- 2008 Olden Holden Bike Tour Map
- 2008 Brunswick County CTP
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

0 3 6 MILES

MAP 2.8 - OPPORTUNITIES & CHALLENGES: PENDER + ONSLOW COUNTY



BIKEWAY NETWORK

EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
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- Updated State Bike Route (unsigned)
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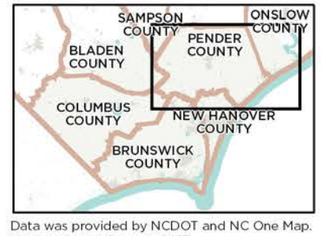

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- 2009 Leland Bicycle Plan
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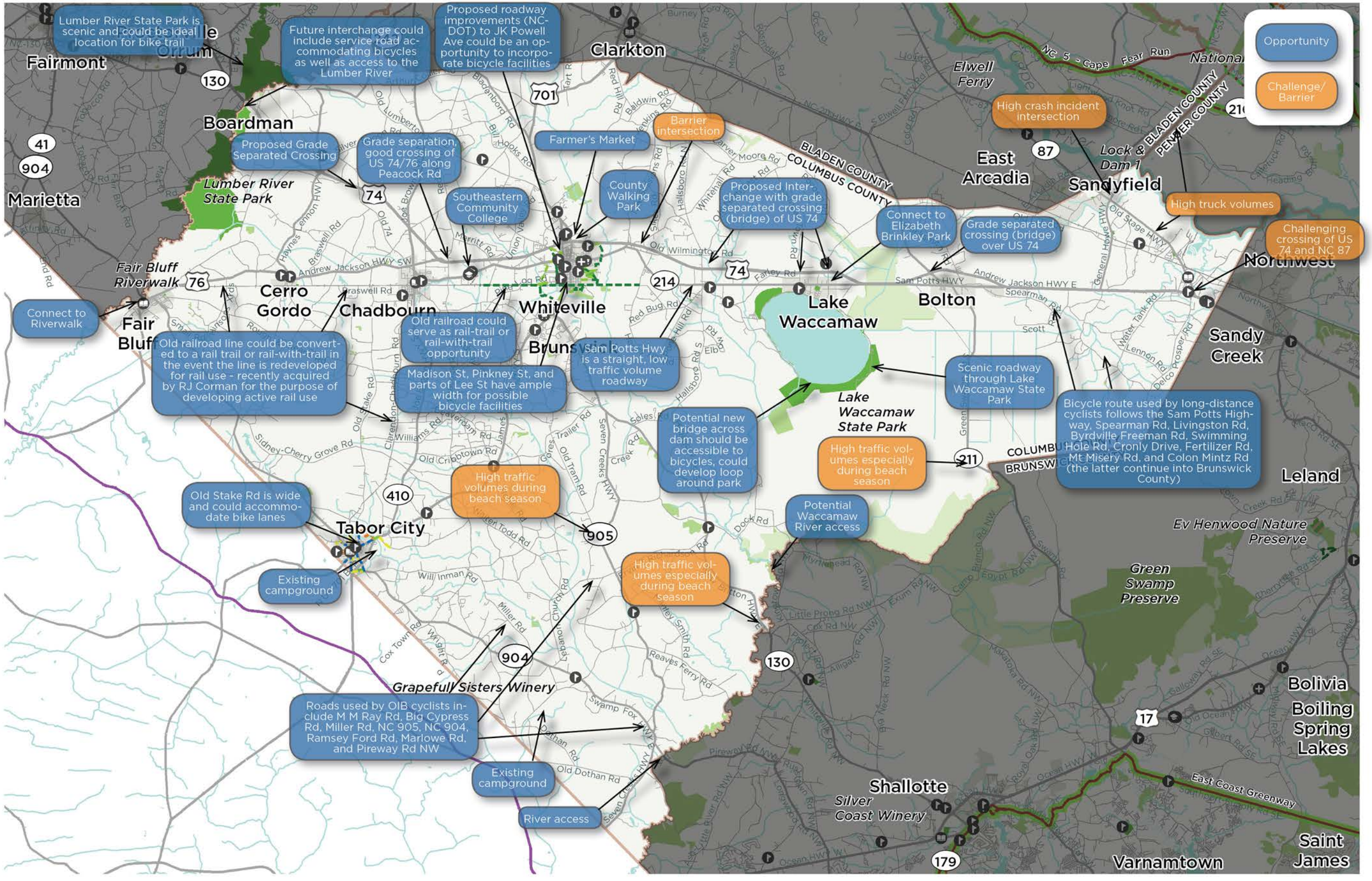
- 2008 Brunswick County CTP
- 2006 Oak Island Bicycle Plan
- 2035 GSATS LRTP

0 3 6 MILES

MAP 2.9 - OPPORTUNITIES & CHALLENGES: COLUMBUS COUNTY



BIKEWAY NETWORK

EXISTING PROPOSED*

- Shared Use Path
- Unimproved Trail
- Sidepath
- Bike Lane
- Paved Shoulder
- Shared Lane Markings/Bike Route

Opportunity

Challenge/ Barrier

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
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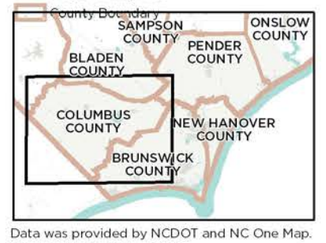

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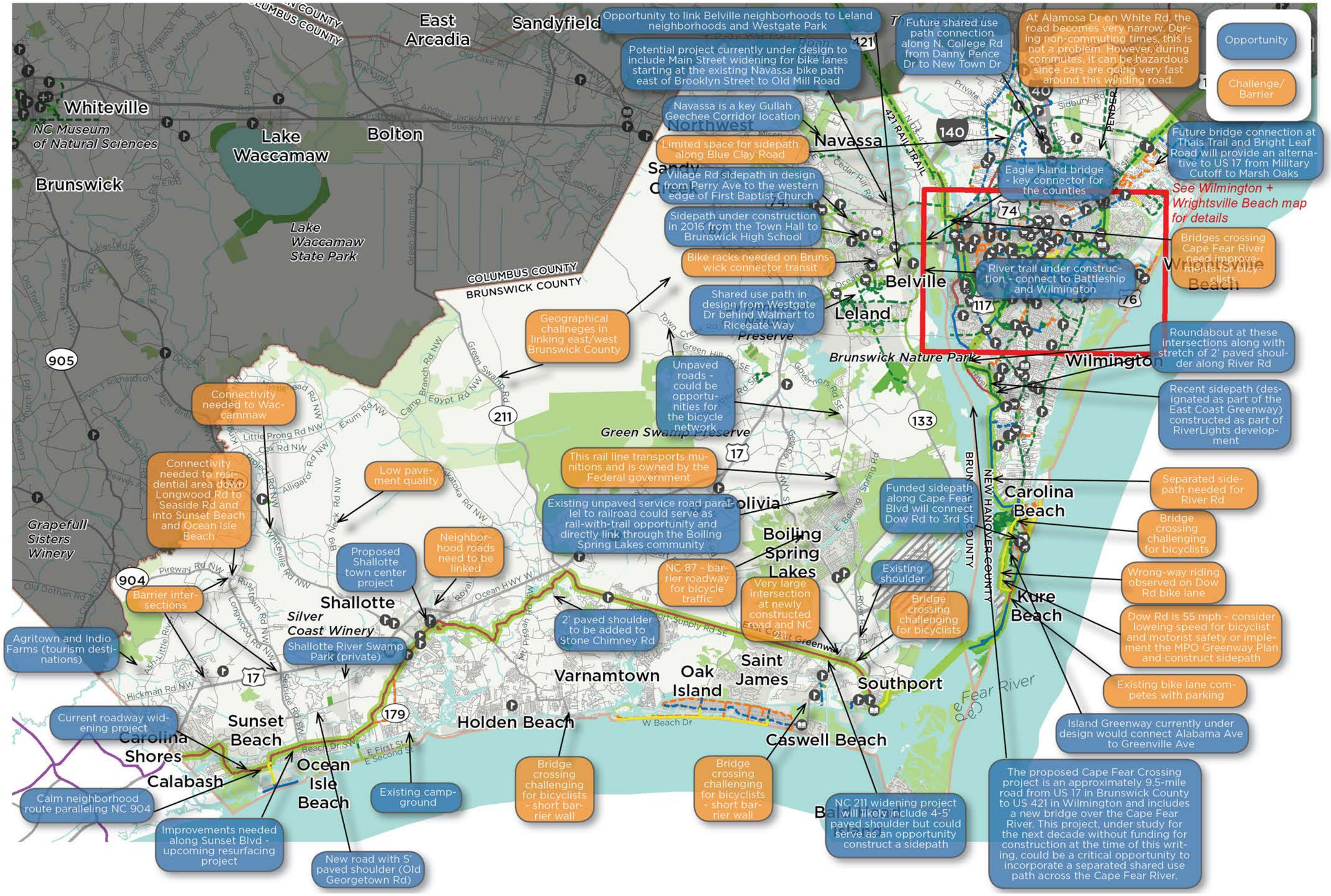
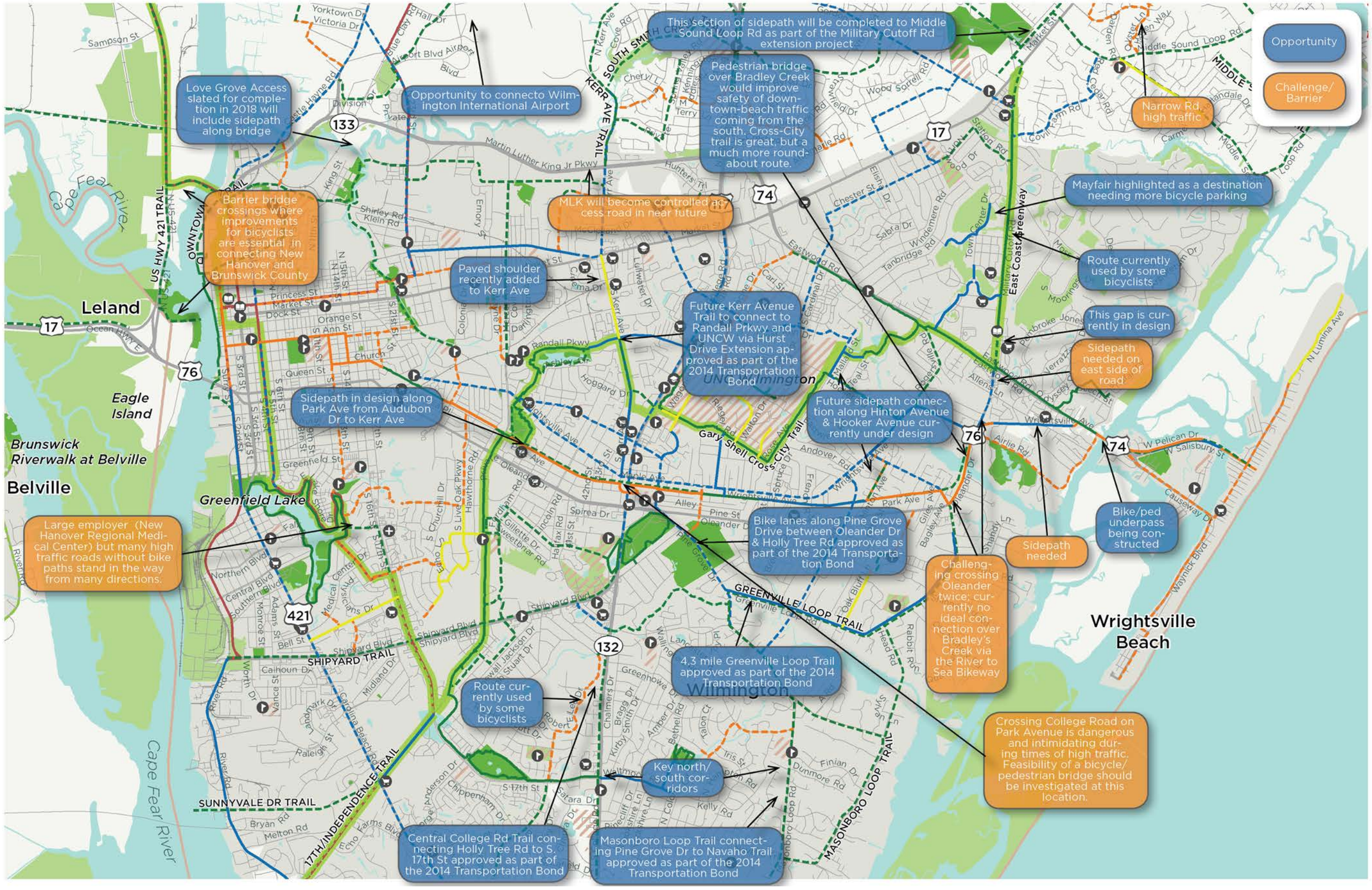
- 2035 GSATS LRTP

0 3 6 MILES

MAP 2.10 - OPPORTUNITIES & CHALLENGES: BRUNSWICK + NEW HANOVER COUNTY



MAP 2.11 - OPPORTUNITIES & CHALLENGES: WILMINGTON + WRIGHTSVILLE BEACH



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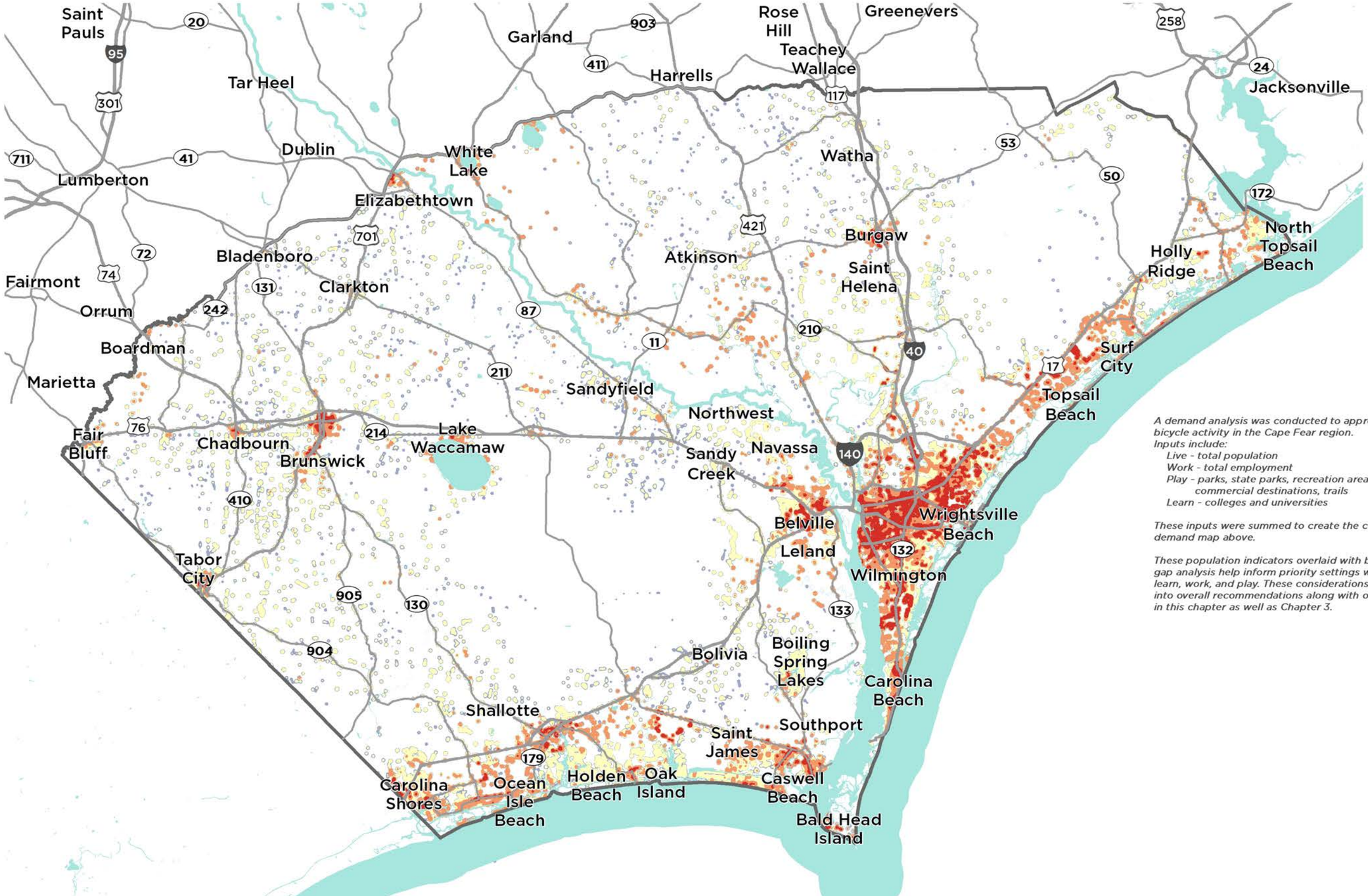
MAP 2.12 - LIVE, WORK, PLAY, & LEARN ANALYSIS



A demand analysis was conducted to approximate bicycle activity in the Cape Fear region.
Inputs include:
- *Live - total population*
- *Work - total employment*
- *Play - parks, state parks, recreation areas, local and commercial destinations, trails*
- *Learn - colleges and universities*

These inputs were summed to create the composite demand map above.

These population indicators overlaid with bicycle facility gap analysis help inform priority settings where people live, learn, work, and play. These considerations are incorporated into overall recommendations along with other inputs detailed in this chapter as well as Chapter 3.

SAFETY ANALYSIS

This section reviews data (2007-2012) for crashes involving bicyclists in the Cape Fear study area.

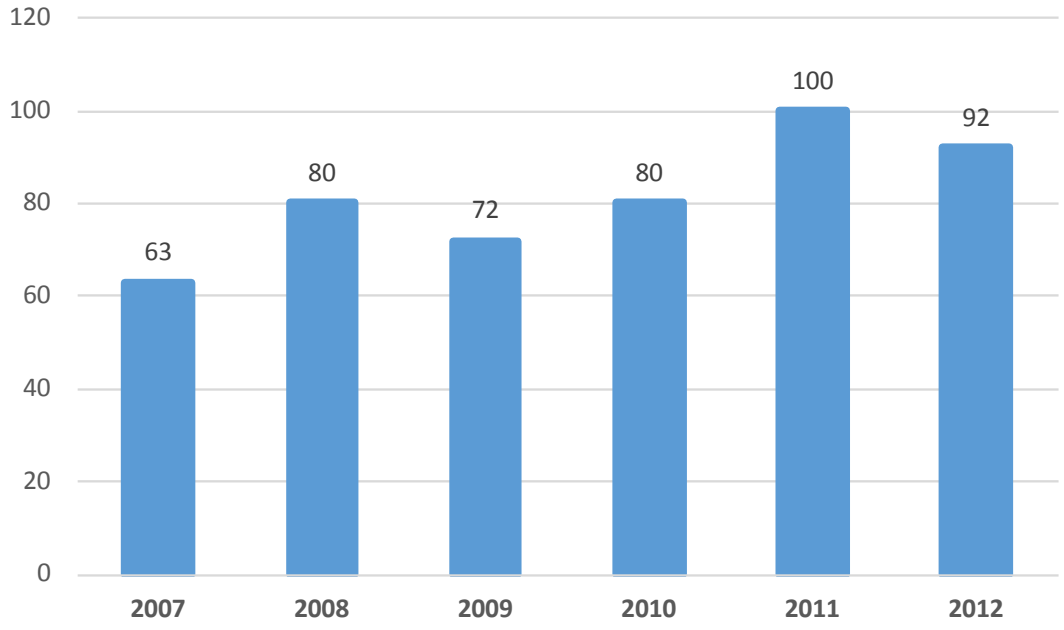
What: Number & Severity of Crashes

The chart and table below shows the 487 reported bicycle crashes from 2007-2012 that have resulted in 254 or more injuries and 8 fatalities. Bicycle crashes appear to be trending upwards, perhaps reflecting the fact that bicycling is becoming more common. Additional data on the number of bicycle trips that took place each year would be needed to understand if the crash rate (i.e., crashes per bicycle trip) is going up or down.

Table 2.1 - Number & Severity of Bicycle Crashes (2007-2012)

SEVERITY	TOTAL
Fatal Injury	8
Disabling Injury	26
Evident Injury	220
Possible Injury	186
No Injury	42
Unknown	5
Grand Total	**487**

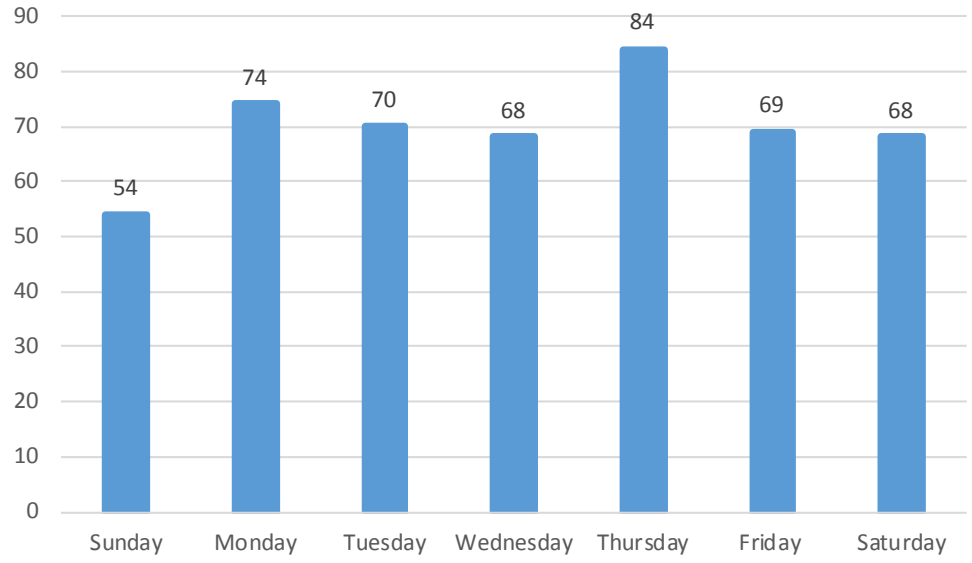
Chart 2.1 - Number of Bicycle Crashes by Year (2007-2012)



When: Day of Week

Bicycle crashes happen throughout the week, likely indicating that people bike for both recreational and utilitarian purposes. Collision activity appears to be lower on Sundays.

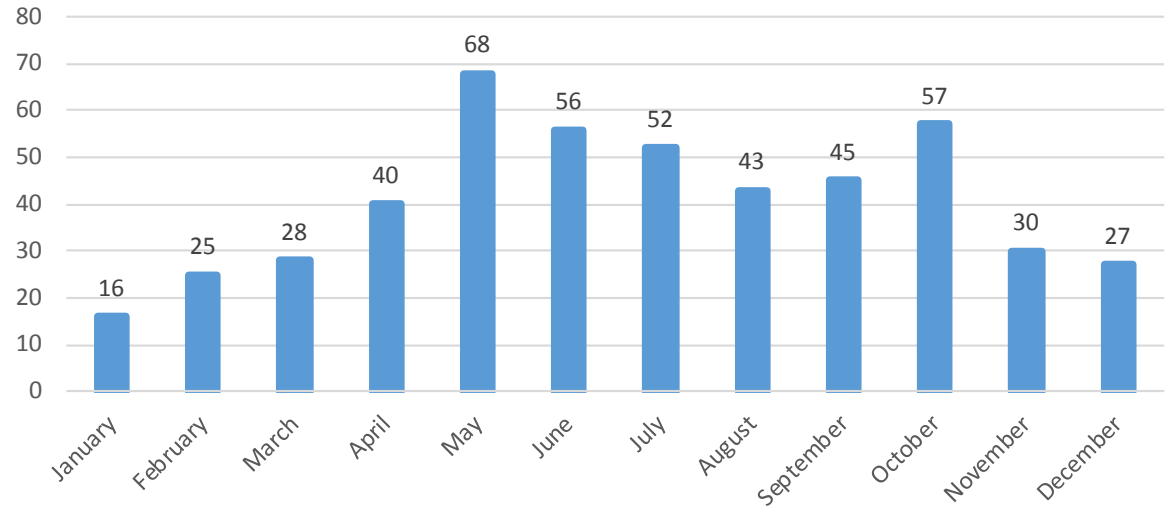
Chart 2.2 - Number of Bicycle Crashes (Day of Week)



When: Month of Year

Similar to the distribution across the week, bicycle crashes occur throughout the year, though the levels are somewhat higher in warmer months when activity is likely higher due to pleasant weather, longer daylight hours, and increased tourist activity. Nonetheless, bicycling appears to be a year-round activity in the Cape Fear Region.

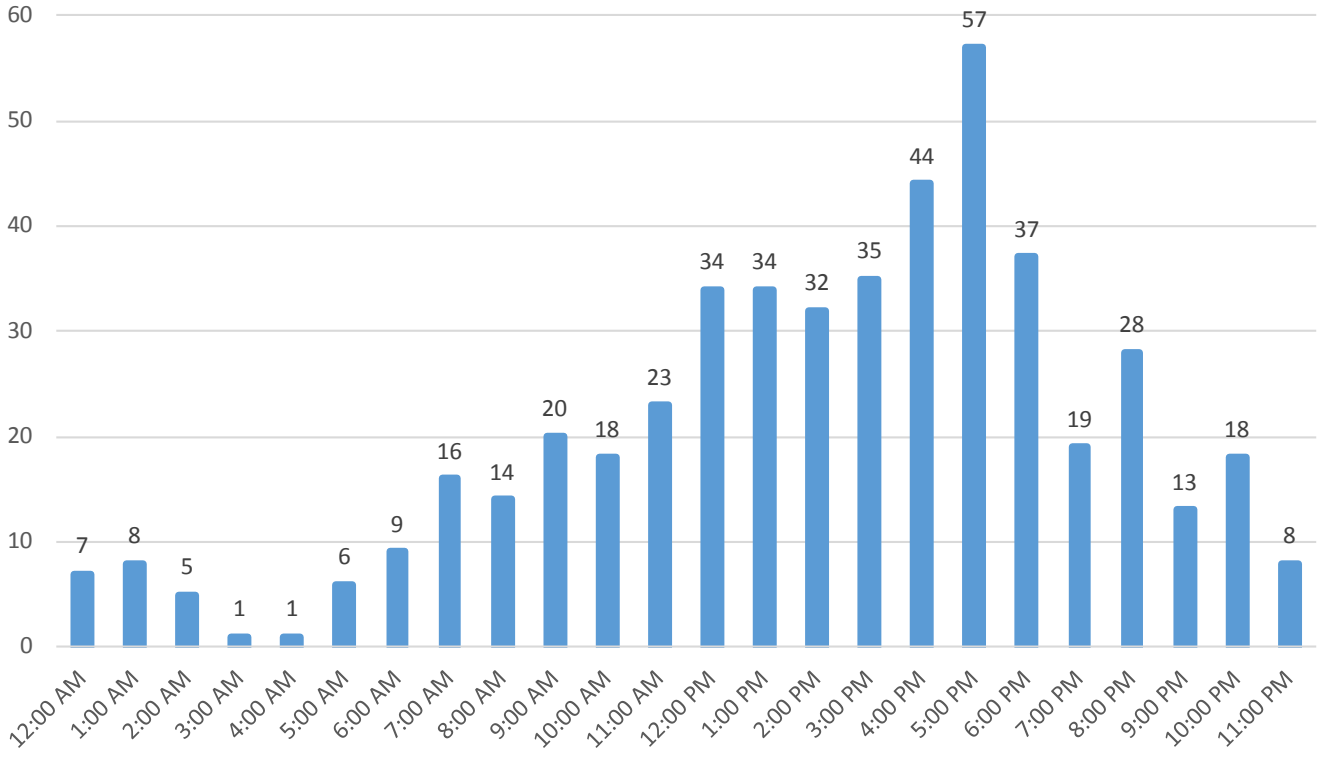
Chart 2.3 - Number of Bicycle Crashes (Month of Year)



When: Time of Day

The crash data shows a peak at 5:00 PM which could be related to rush hour traffic and peak activity time after the work day.

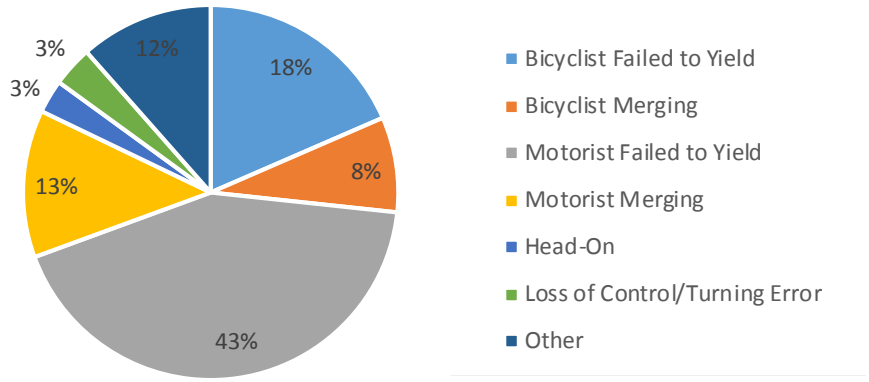
Chart 2.4 - Number of Bicycle Crashes (Time of Day)



Why: Contributing Factors

Both bicyclist and motorist failure to yield were key aspects of collisions, with motorists' failure to yield as the most often cited contributing factor.

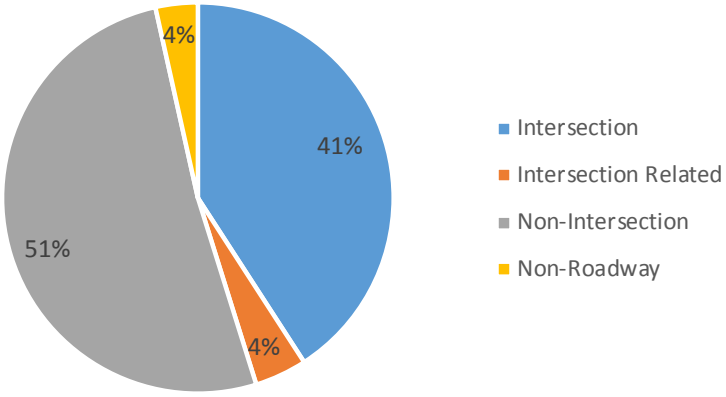
Chart 2.5 - Contributing Factors of Bicycle Crashes



Where: Location on Roadway

As illustrated in Chart 2.6, bicycle crashes occurred slightly more frequently at non-intersections compared to intersections.

Chart 2.6 - Location of Bicyclist Crash



Where: Roadway Ownership & Speed

As indicated in Chart 2.7, a majority of bicycle crashes occurred on local streets.

Chart 2.7 - Crashes by Roadway Ownership

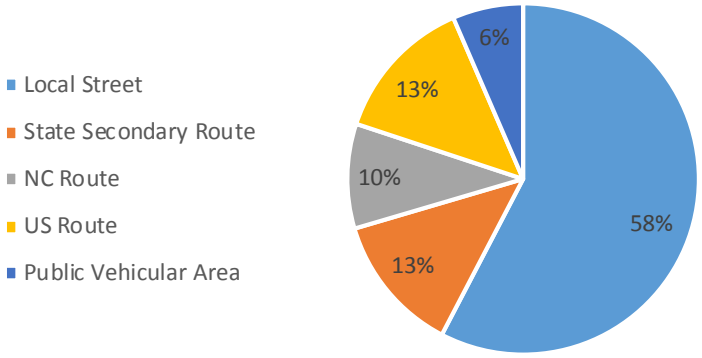
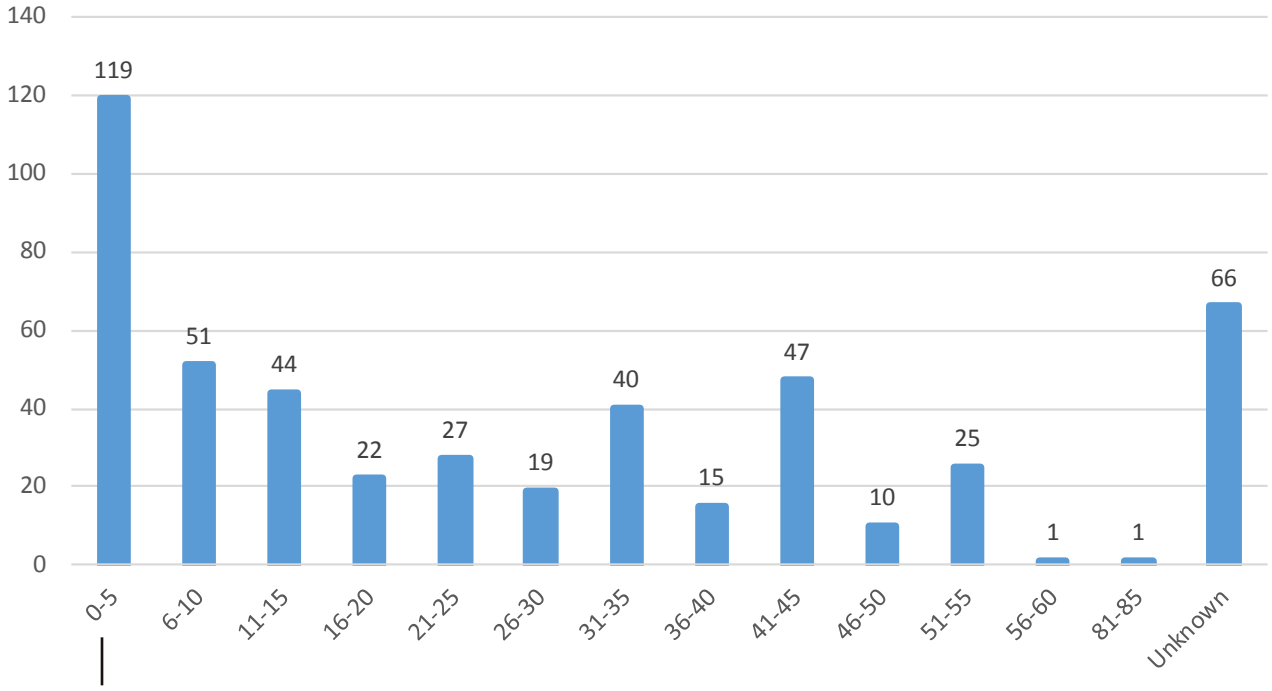


Chart 2.8 - Crashes by Roadway Speed Limit



Data includes crashes that occurred at driveways, hence the 0-5mph range being recorded

Where: Crashes by City

Table 2.2 identifies the number of crashes that have occurred in individual cities/towns (incorporated) along with individual counties (unincorporated) in the Cape Fear region. As expected, bicycle crashes are more common in larger cities, especially Wilmington, where there are likely more people bicycling. It is important to note that cities with higher numbers of crashes are not necessarily less safe than those with fewer crashes. Indeed, cities that have invested in bicycling improvements may have higher activity levels and thus are more likely to have crashes. To assess relative safety, it would be necessary to have data on the amount of bicycle activity so the number of crashes could be compared (or normalized) to the amount of activity.

Chart 2.9 - Crashes located in Incorporated vs. Unincorporated Areas

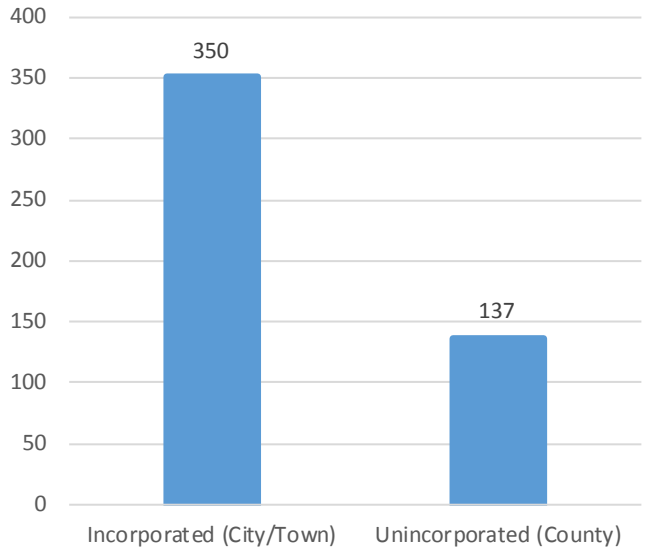


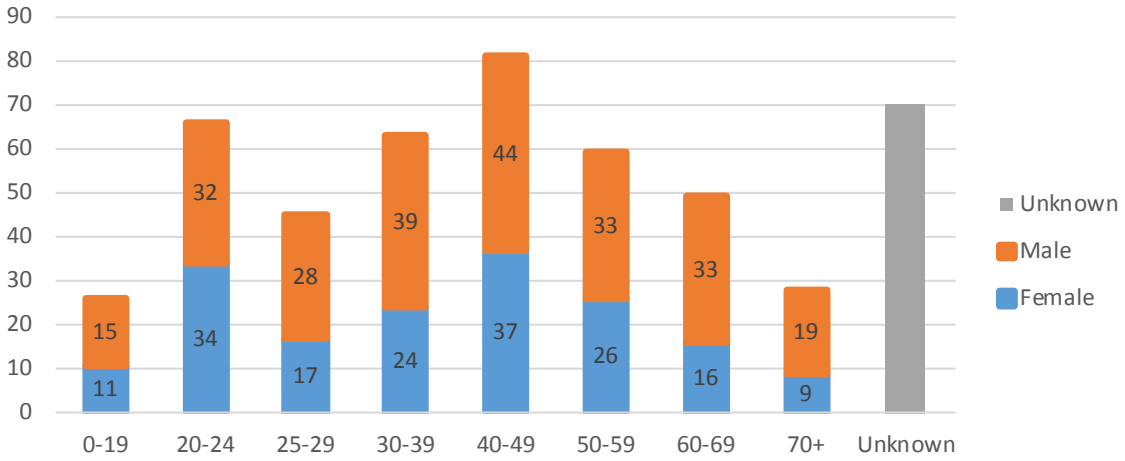
Table 2.2 - Crashes by Jurisdiction

INCORPORATED (CITY/TOWN)	TOTAL
Burgaw	1
Carolina Beach	11
Hampstead	1
Leland	3
Navassa	1
Oak Island	13
Ocean Isle Beach	1
Shallotte	1
Southport	1
Sunset Beach	6
Surf City	1
Tabor City	2
Whiteville	9
Wilmington	269
Wrightsville Beach	26
Total	**350**
UNINCORPORATED (COUNTY)	**TOTAL**
Bladen County	1
Brunswick County	35
Columbus County	13
New Hanover County	67
Onslow County	5
Pender County	16
Total	**137**

Who: Drivers

As indicated in Chart 2.10, adults of all age groups in the driving population are involved in crashes. Adults aged 40-49 recorded the most collisions with bicyclists. Males are slightly over-represented as drivers (58% of all crashes).

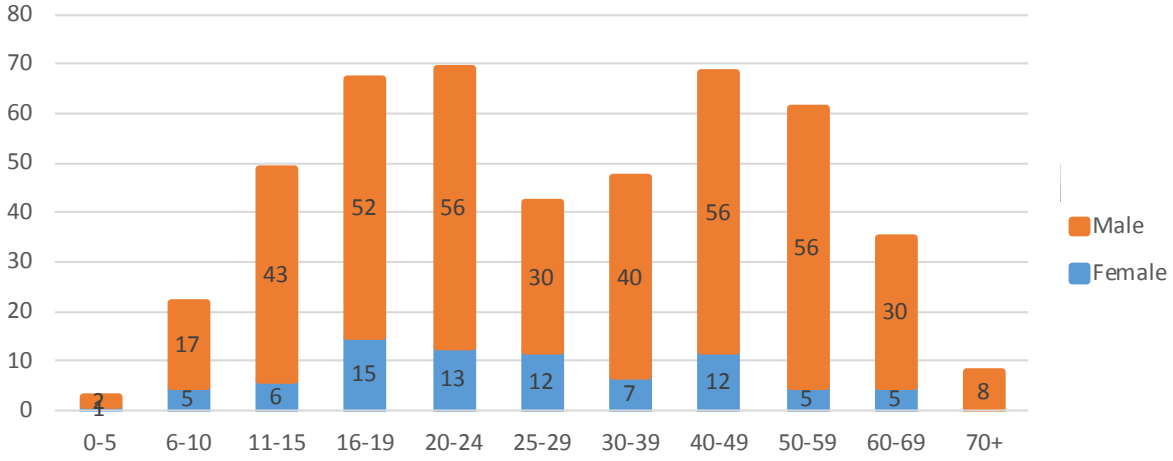
Chart 2.10 - Age & Gender of Drivers Involved in Bicycle Crashes



Who: Bicyclists

As indicated in Chart 2.11, males are much more likely to be involved in bicyclist crashes (83% of all crashes). This is likely indicative of males being over-represented in the total population of people bicycling.

Chart 2.11 - Age & Gender of Bicyclists Involved in Crashes



Bicycle Crash Maps

A series of maps on the following pages illustrate the location and severity of reported bicycle crashes in the study area.

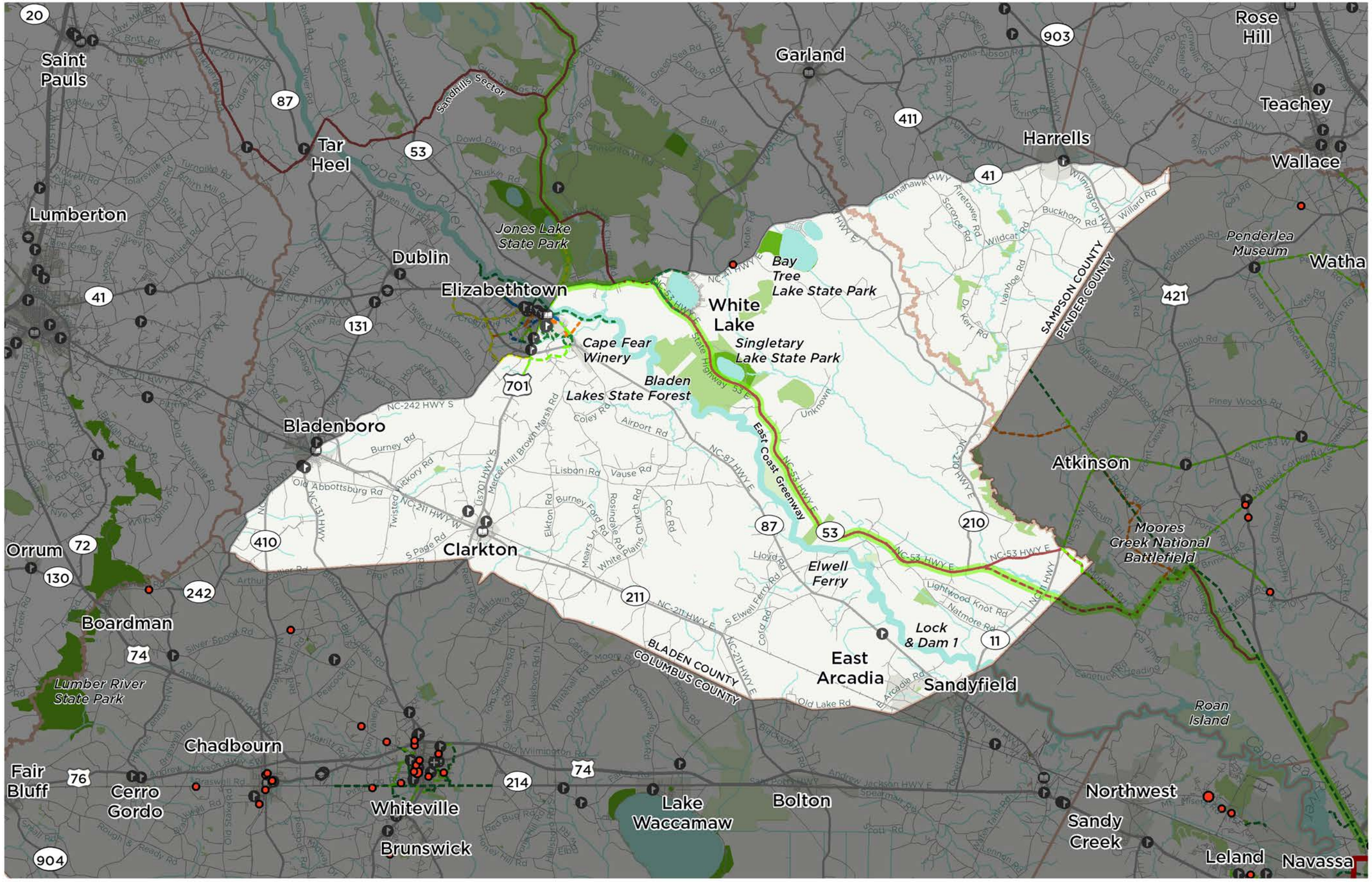
These maps illustrate several themes:

- **Wilmington** - A very large cluster of bicycle crashes are found in the urban area of Wilmington. Many crashes are found along higher traffic corridors where bicyclists are likely attempting to access businesses, schools (especially UNC-Wilmington), beach access points, and residential areas. These higher crash corridors in Wilmington include:
    - Market Street
    - College Road
    - US 421
    - Eastwood Road/Causeway Drive
    - Military Cutoff Road
    - Oleander Drive
    - Randall Parkway
    - Kerr Avenue

Similarly, crashes are found clustered near the downtown areas of smaller towns in the region such as Whiteville and Chadbourn.

- **Beach Access Corridors** - The Cape Fear region has many high traffic roads providing beach access that are difficult to bike along. These roads also serve as barriers inhibiting connectivity between adjacent areas and neighborhoods. Some of these areas include:
    - Lumina Avenue/Waynick Boulevard in Wrightsville Beach
    - Island Drive leading to North Topsail Beach
    - S. Lake Park Boulevard in Carolina Beach
    - E. Oak Island Drive through Oak Island
    - Sunset Boulevard and Seaside Road leading to Sunset Beach
- **Rural Bicycle Routes** - Bicycle crashes are found in small numbers on the rural roadways of the Cape Fear region, highlighting that bicycling is not limited to downtown centers and beach corridors. While some rural roadways such as Mt. Misery Road and Lanvale Road near Leland/Navassa do show multiple crashes, most rural crashes are unique to a location (although likely similar in circumstance).

MAP 2.13 - CRASH ANALYSIS: BLADEN + SAMPSON COUNTY



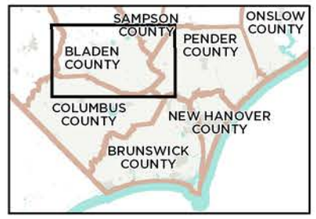
BICYCLE CRASHES

- 1
- 2 - 3
- 4 - 6
- 7 - 9
- 10 - 11

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



BIKEWAY NETWORK

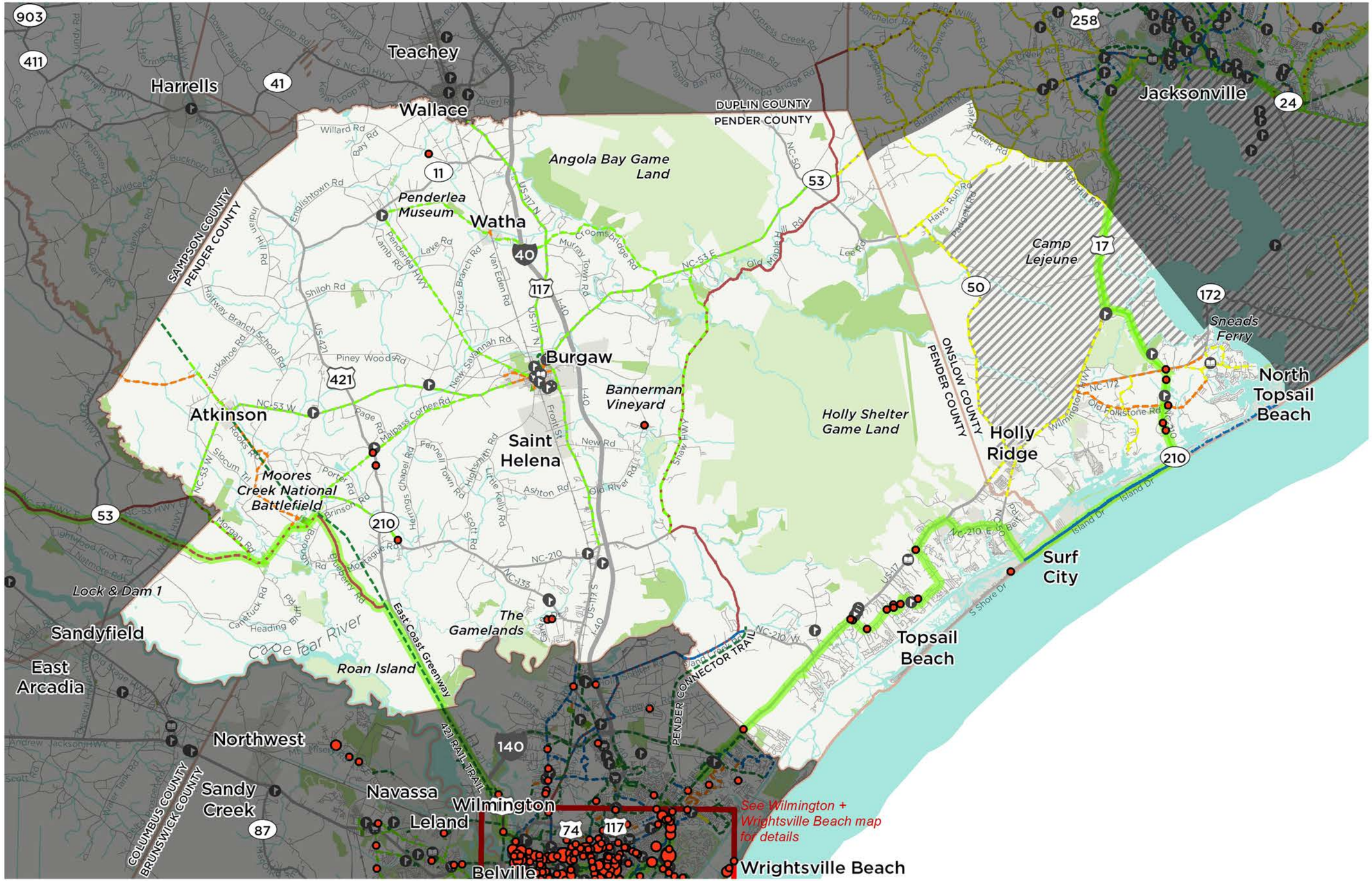
EXISTING	PROPOSED*
	Shared Use Path
	Unimproved Trail
	Sidepath
	Bike Lane
	Paved Shoulder
	Shared Lane Markings/Bike Route

alta PLANNING + DESIGN

N

0 2.5 5 MILES

MAP 2.14 - CRASH ANALYSIS: PENDER + ONSLOW COUNTY



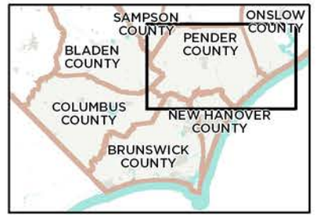
BICYCLE CRASHES

- 1
- 2 - 3
- 4 - 6
- 7 - 9
- 10 - 11

DESTINATIONS + BOUNDARIES

Regional Destinations
- College or University
- School
- Library
- Health Department
- Grocery Store

- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



BIKEWAY NETWORK

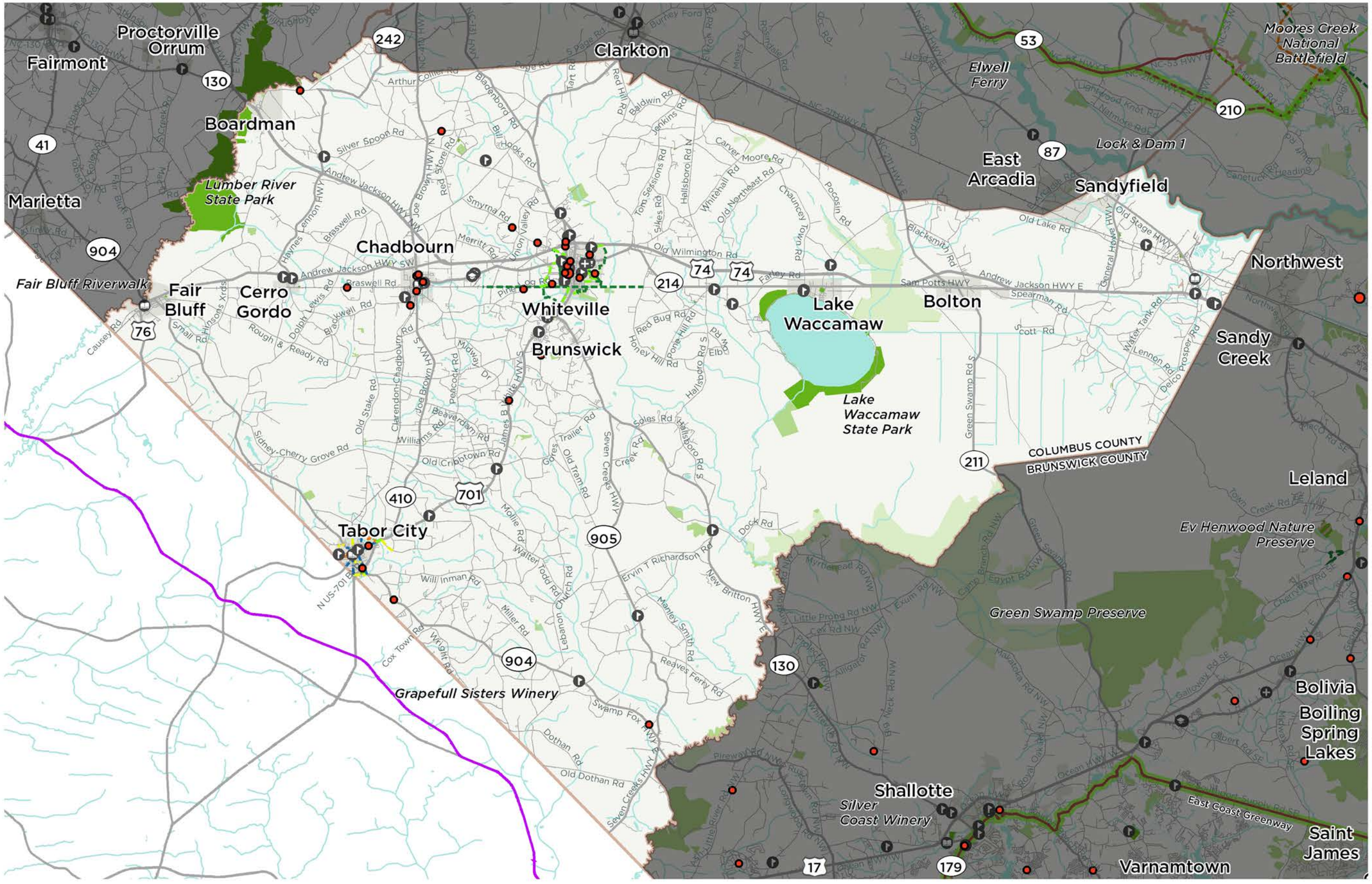
EXISTING	PROPOSED*
	Shared Use Path
	Unimproved Trail
	Sidepath
	Bike Lane
	Paved Shoulder
	Shared Lane Markings/Bike Route

alta PLANNING + DESIGN

N

0 2.5 5 MILES

MAP 2.15 - CRASH ANALYSIS: COLUMBUS COUNTY



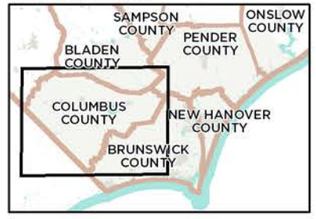
BICYCLE CRASHES

- 1
- 2 - 3
- 4 - 6
- 7 - 9
- 10 - 11

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- South Carolina State Bike Routes
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



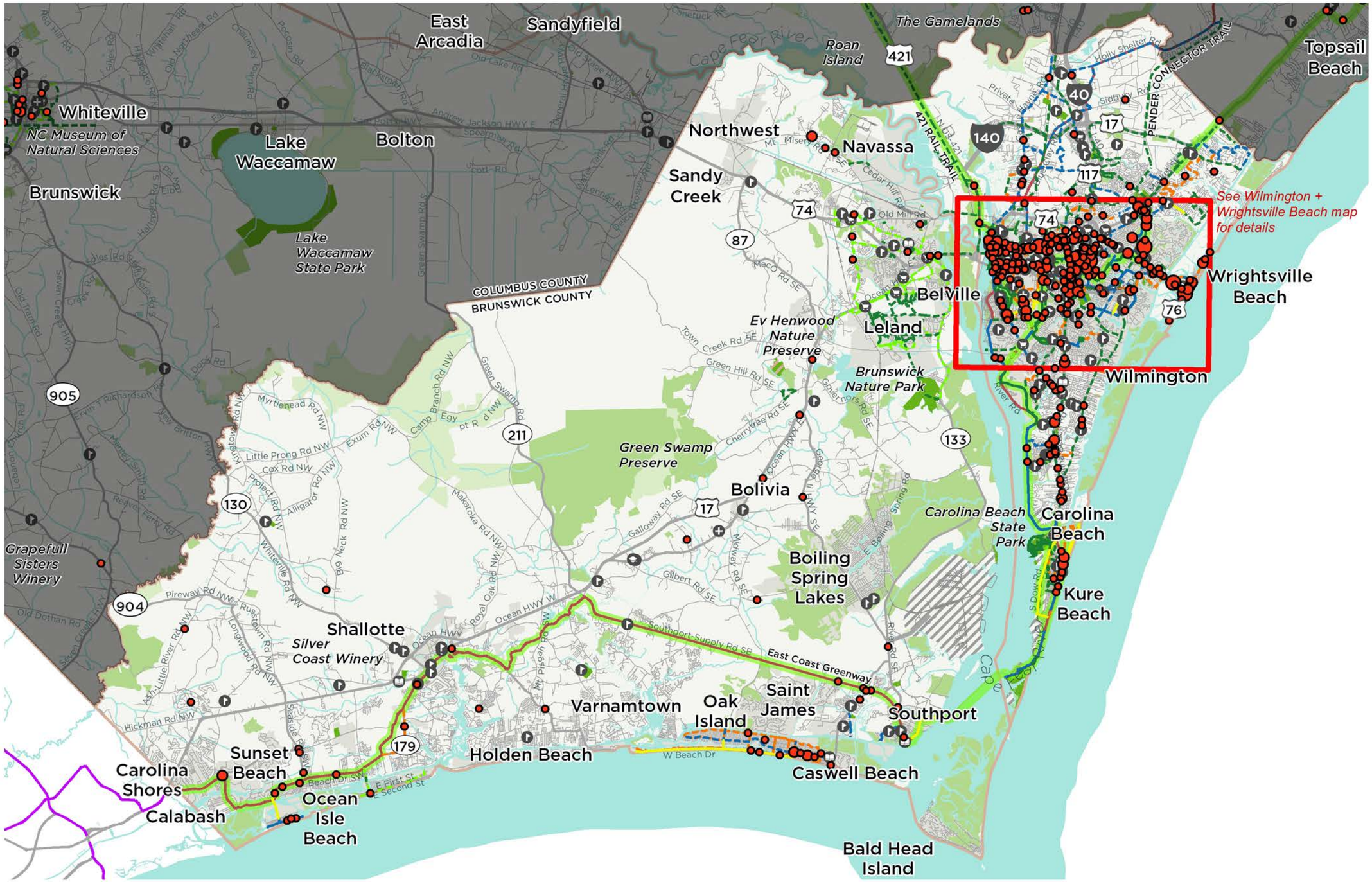
BIKEWAY NETWORK

EXISTING	PROPOSED*
	Shared Use Path
	Unimproved Trail
	Sidepath
	Bike Lane
	Paved Shoulder
	Shared Lane Markings/Bike Route

alta PLANNING + DESIGN

0 2.5 5 MILES

MAP 2.16 - CRASH ANALYSIS: BRUNSWICK + NEW HANOVER COUNTY



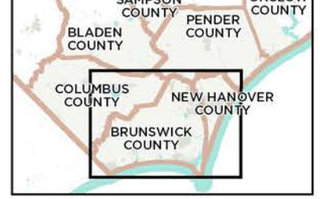
BICYCLE CRASHES

- 1
- 2 - 3
- 4 - 6
- 7 - 9
- 10 - 11

DESTINATIONS + BOUNDARIES

Regional Destinations
- College or University
- School
- Library
- Health Department
- Grocery Store

- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- South Carolina State Bike Routes
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



BIKEWAY NETWORK

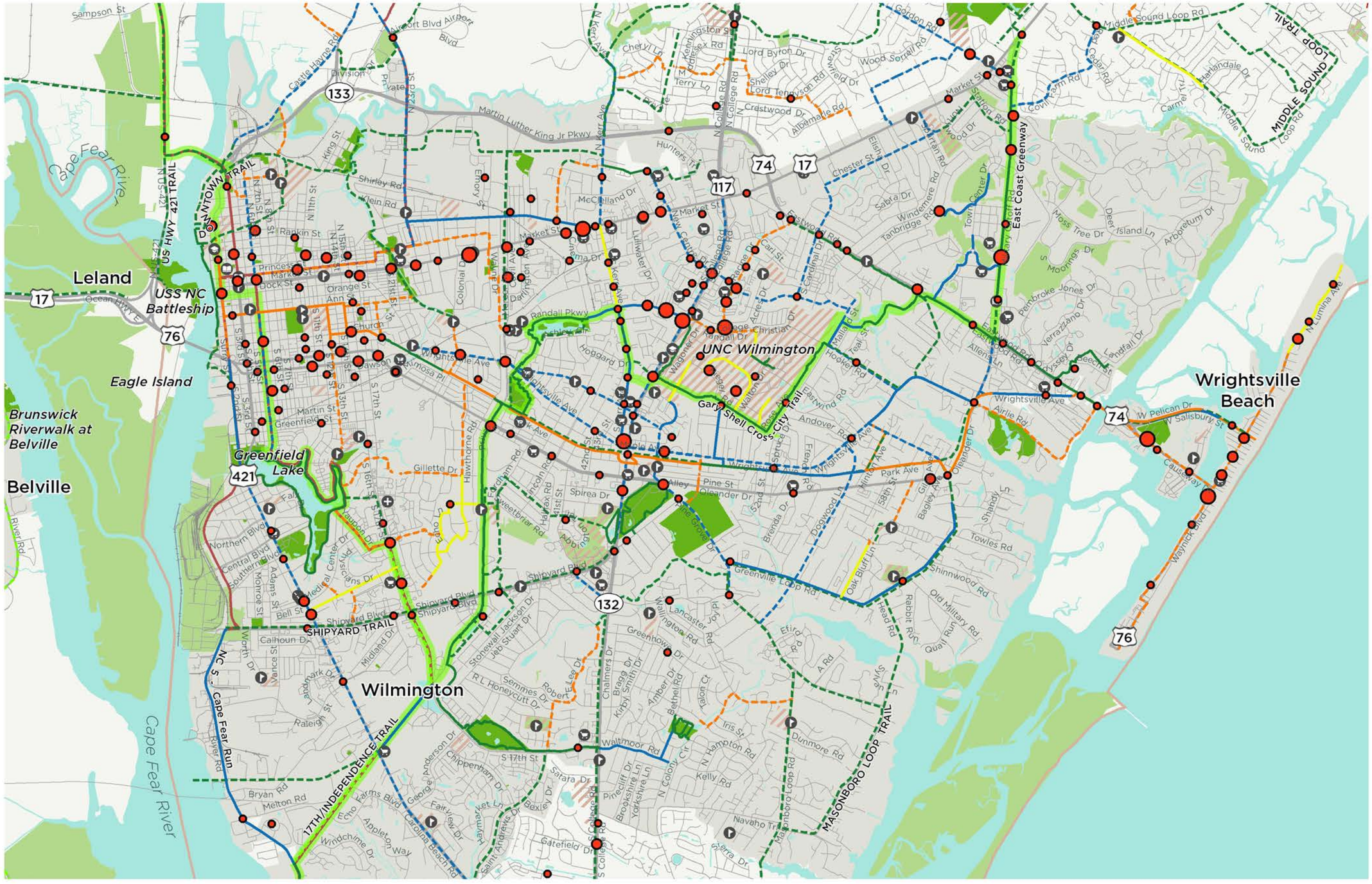
EXISTING	PROPOSED*
	Shared Use Path
	Unimproved Trail
	Sidepath
	Bike Lane
	Paved Shoulder
	Shared Lane Markings/Bike Route

alta PLANNING + DESIGN

N

0 2.5 5 MILES

MAP 2.17 - CRASH ANALYSIS: WILMINGTON + WRIGHTSVILLE BEACH



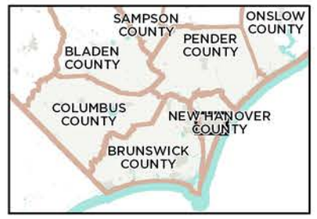
BICYCLE CRASHES

- 1
- 2 - 3
- 4 - 6
- 7 - 9
- 10 - 11

DESTINATIONS + BOUNDARIES

Regional Destinations

- College or University
- School
- Library
- Health Department
- Grocery Store
- Updated State Bike Route (unsigned)
- Existing State Bike Route
- East Coast Greenway
- Water Body
- School
- Recreation or Historic Area
- Conserved Land
- Game Land
- Military Land (Not Open to Public)
- Municipal Boundary
- Project Study Area
- County Boundary



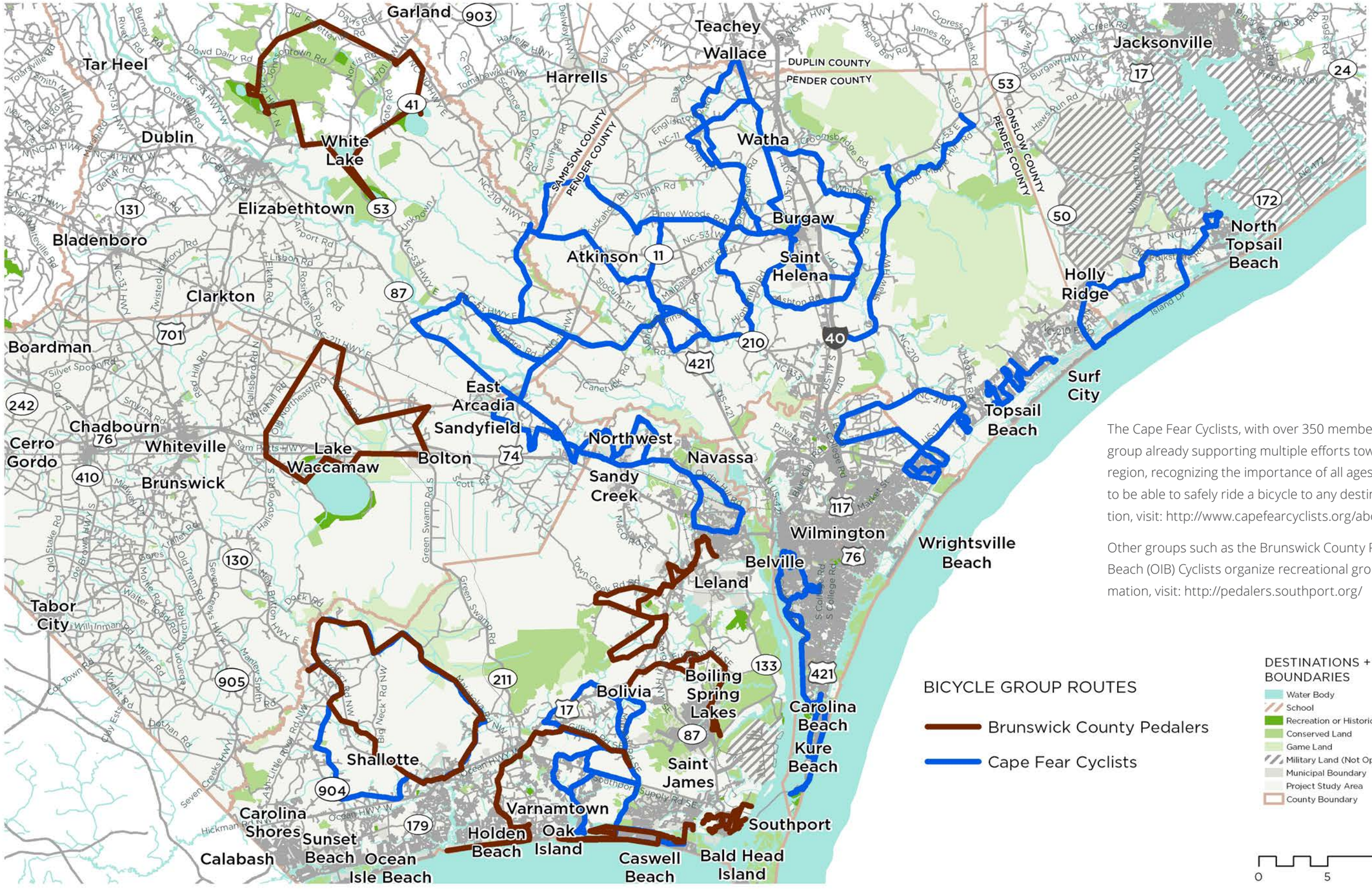
BIKEWAY NETWORK

EXISTING	PROPOSED*
	Shared Use
	Unimproved
	Sidepath
	Bike
	Paved
	Shared Lane Markings/Bike Route

alta PLANNING + DESIGN

0 0.5 1 MILES

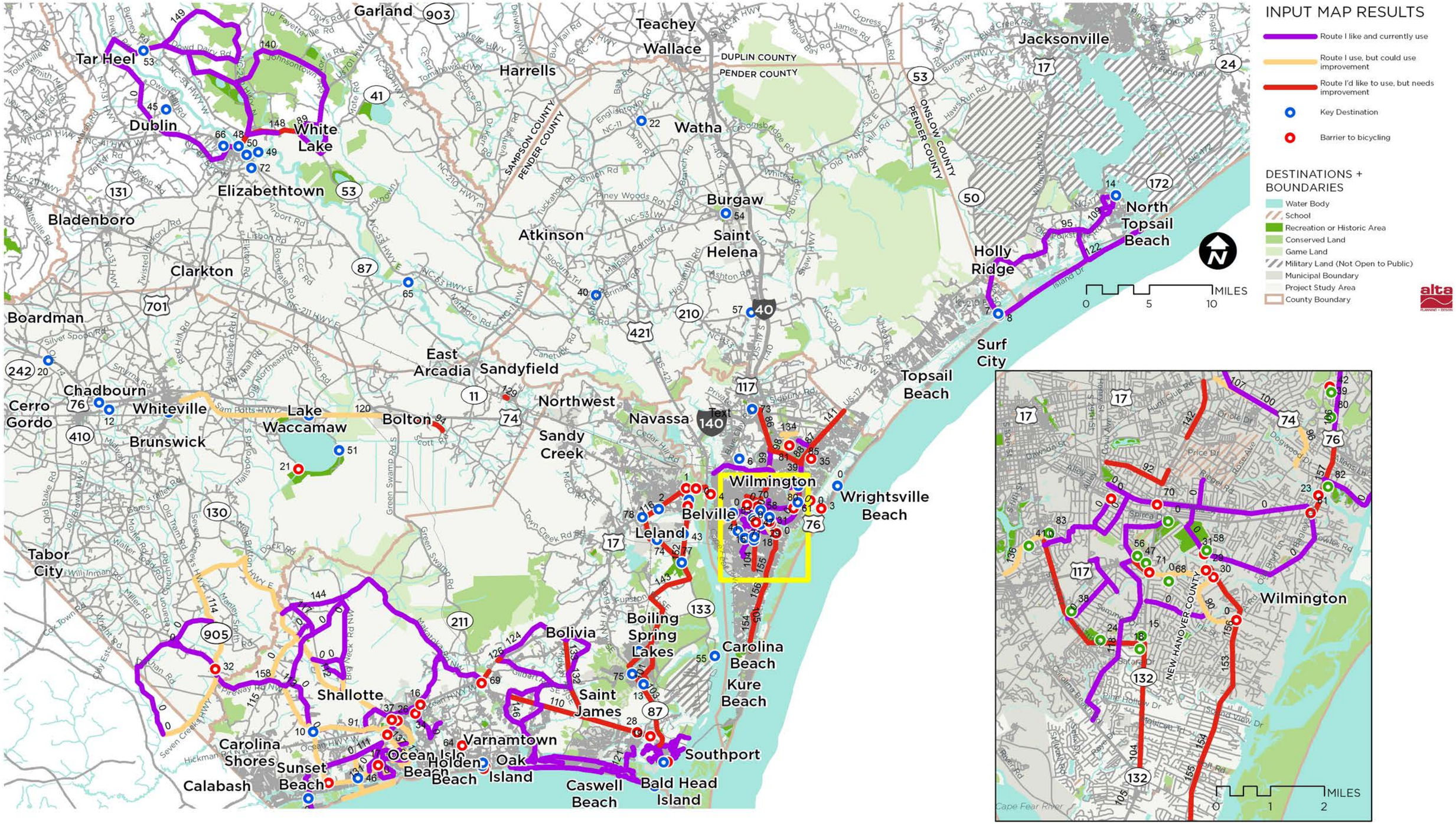
MAP 2.18 - BICYCLE GROUP ROUTES



The Cape Fear Cyclists, with over 350 members, are a bicycle advocacy group already supporting multiple efforts toward a bicycle friendly region, recognizing the importance of all ages and abilities of bicyclists to be able to safely ride a bicycle to any destination. For more information, visit: http://www.capefearcyclists.org/about-us/

Other groups such as the Brunswick County Pedealers and Ocean Isle Beach (OIB) Cyclists organize recreational group rides. For more information, visit: http://pedalers.southport.org/

MAP 2.19 - INPUT MAP RESULTS



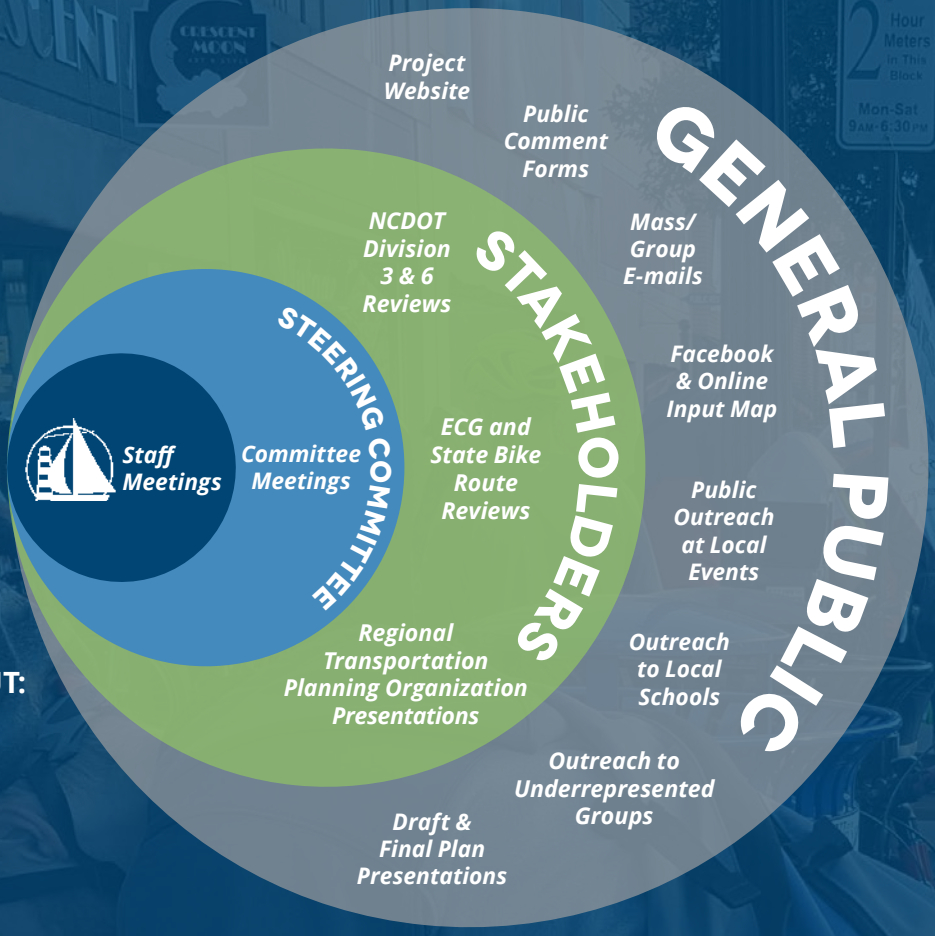
PUBLIC INPUT MAP COMMENTS

Each Map ID below is also shown in Map 2.19 to allow the reader to geographically locate each comment received through the online input map.

TYPE	COMMENT	MAP ID
Barrier to bicycling	would like to see a bike lane to Wilmington and or battleship	1
Key Destination	Wal-Mart Commercial Area	2
Barrier to bicycling	Very narrow point at which motorists are not always aware of cyclists right of way.	3
Barrier to bicycling	There is no safe way to cross between Leland and Wilmington	4
Barrier to bicycling	The only difficult part of getting to Wrightsville Beach is crossing the bridge. There is no bike lane over the bridge, so it can be difficult when there's a lot of traffic, as there normally is during the summer.	5
Key Destination	The Airport	6
Key Destination	Surf City Swing Bridge	7
Key Destination	Surf City Soundside Park	8
Key Destination	Sunset Beach Bridge: best hill climbing	9
Key Destination	Start/finish: OIB Cyclists	10
Key Destination	Spring Lake Park	11
Key Destination	Southeastern Community College	12
Key Destination	South Brunswick Middle and High School	13
Key Destination	Sneads Ferry Waterfront	14
Key Destination	Shopping center	15
Barrier to bicycling	Rumble strip forcing Bikes into 55mph heavy traffic to connect to tranquil routes of Greeenswamp.	16
Barrier to bicycling	rough, broken pavement	17
Key Destination	Restaurants	18
Barrier to bicycling	Requires Bikes to ""Take the Lane"" in bad traffic. Six or 4 lanes narrow to two here.	19
Key Destination	Programmed grade separation, good route to cross US 74.	20
Barrier to bicycling	Potential new bridge across dam should be accessible to bikes.	21
Key Destination	Penderlea museum	22
Barrier to bicycling	Pedestrian bridge over Bradley Creek would improve safety of downtown-beach traffic coming from the south. Cross-City trail is great, but a much more roundabout route.	23
Key Destination	Park	24
Key Destination	Oak Island Lighthouse	25
Barrier to bicycling	no shoulder, rough pavement	26
Barrier to bicycling	No shoulder at merging intersection	27
Barrier to bicycling	No safe shoulder for bicycles.	28
Barrier to bicycling	No bike lane. Multiple lanes of cars converting/turning	29
Barrier to bicycling	No bike lane, no signal, heavy traffic	30
Key Destination	NC Museum of Natural Sciences	31
Barrier to bicycling	No bike lane, multiple turning/converging lanes, heavy traffic	31
Barrier to bicycling	Narrow, uneven shoulder at merging intersection	32
Barrier to bicycling	Narrow uneven roadway.	33
Barrier to bicycling	narrow shoulder, high traffic	34
Barrier to bicycling	Narrow road.. high traffic	35
Barrier to bicycling	Narrow road and high traffic on 133	36
Barrier to bicycling	narrow bridge on high traffic road	37
Key Destination	Museum	38
Barrier to bicycling	More bike racks throughout Mayfaireâ€¦	39
Key Destination	Moores Creek National Battlefield, key destination	40
Key Destination	Medical offices	41
Key Destination	Mayfaire	42
Key Destination	mallory creek	43
Barrier to bicycling	Main intersection at Holden Beach is not conducive to bike traffic. Very busy and no place to cross. Bikes can go under the bridge instead, but not always obvious. Other beaches like Ocean Isle have nice roundabouts with sidewalks that are helpful for	44
Key Destination	Lu Mil Vineyard	45
Key Destination	Lowes Foods	46
Key Destination	Long Leaf Mall shopping center	47
Key Destination	Location of Tory Hole Park. Riverfront park in downtown Elizabethtown.	48
Key Destination	Location of Browns Landing at Lock and Dam #2 along the Cape Fear River. Picnic Shelter, fishing pier, boat launch area, and picnic tables will bbq grills.	49
Key Destination	Location of Browns Creek Bike Park and Nature Trail.	50
Key Destination	Lake Waccamaw State Park	51
Key Destination	Holden Beach (from Shallotte)	52
Key Destination	Historic Harmony Hall Plantation	53
Key Destination	Historic Downtown Burgaw	54
Key Destination	Historic Brunswick Park No Fee Donations are Welcomed	55
Key Destination	High School	56
Key Destination	Heidi Trask SORBA Trail	57
Key Destination	Grocery Store	58
Key Destination	Great restaurants would be nice to bike to from the beach.	59
Key Destination	Grade separation, good crossing of US 74/76.	60
Barrier to bicycling	Future dual-right turn lanes on Greenville Loop Road will create barrier to cycling.	61
Key Destination	Fun places to visit by bicycle.	62
Key Destination	Fair Bluff river walk	63
Barrier to bicycling	Extremely dangerous route from Shallotte to Holden Beach	64
Key Destination	Elwell Ferry, key river crossing, unique experience.	65
Key Destination	Elizabethtown Inn. Six well appointed rooms in downtown Elizabethtown. The home is listed on the National Registry of Historic Places.	66
Key Destination	Elizabeth Brinkley park	67
Key Destination	Elementary school	68
Barrier to bicycling	Dangerous section of Bike Route do to traffic and minimal shoulder.	69
Barrier to bicycling	Crossing College Road on Park Avenue is dangerous and intimidating during times of high traffic. Long range goal should be a pedestrian bridge connecting Two Wheeler Dealer and Winter Park Baptist Church along the Park Avenue corridor. This is a centra	70
Barrier to bicycling	College and Holly Tree?? Lots of bicycle traffic but it is the Wild West out there.	71
Key Destination	Cape Fear Vineyard and Winery. Overnight accommodations overlooking Greene's Lake and Conservation Park. Restaurant on sight as well as a winery, distillery, and banquet hall.	72
Key Destination	Cape Fear SORBA Mountain Biking Facility	73
Key Destination	Cape Fear National Golf Course	74
Key Destination	BSL Community Center	75
Key Destination	Brunswick Riverwalk at Belville	76
Key Destination	Brunswick Nature Park	77
Key Destination	Brunswick Forest Commercial Village	78
Barrier to bicycling	Bridge at Holden Beach does not allow bicycles to cross safely. There are many small businesses and restaurants we'd likely visit by bike if able to do so.	79
Key Destination	Bicycle Shop, Bike Cycles. Sales, repair and rental.	80
Barrier to bicycling	At this point on White Road, the road becomes very narrow. During non-commuting times, this is not a problem. However, during commutes, it can be hazardous since cars are going very fast around this winding road.	81
Key Destination	Airlie Park	82
Key Destination	6000 people work at NHRMC and there are daily parking concerns. Increases in the number of bikers would help significantly but many high traffic road without bike paths stand in the way from many directions.	83
Barrier to bicycling	300' of narrowing with a loss of Bike Lane in heavy Ferry Traffic	84
Route needs improvement	Would like to see a bike path connecting Middle Sound Loops to the Red Cedar/Covil Farms bike path.	85
Route needs improvement	Would be great to add offroad path for access to High-School and Community College.	86
Route needs improvement	With Portner's Neck growing so much (many new neighborhoods, shops, Walmart, Lowes, etc.), it would make sense to install a multi-use path (separate from traffic) to allow Ogden and Porter's Neck to be linked. But more importantly it would provide a dir	87
Route needs improvement	With Portner's Neck growing so much (many new neighborhoods, shops, Walmart, Lowes, etc.), it would make sense to install a multi-use path (separate from traffic) to allow Ogden and Porter's Neck to be linked. But more importantly it would provide a dir	88
Route I like and currently use	White Lake Loop	89
Route could use improvement	Very narrow, no shoulder, cars use this as a cut-through and speeds are too high >45 mph	90
Route could use improvement	Very narrow shoulders along Main St.	91
Route needs improvement	Very hazardous, no shoulder in places, heavy traffic. I often see children on bikes, old people with groceries walking in the weeds, young mothers with toddlers waiting at school bus stops...all with cars speeding within inches of them.	92
Route needs improvement	Use at your own risk, or recommend to someone you would like to see dead or injured	93
Route needs improvement	Unpaved roadway only alternative to US 74/76 in this area.	94
Route I like and currently use	Topsail ""inland"" loop - low traffic inland!	95
Route could use improvement	Too narrow, no shoulder and cars drive through too fast	96

TYPE	COMMENT	MAP ID
Route could use improvement	This small section of College Road could use improvement. Cars are moving very fast and there's no clearly defined bike lane, so you're forced to take one of the lanes if you're trying to cross MLK.	97
Route could use improvement	This road is one of the two main conduits from all the surrounding neighborhoods to Gordon. It would be nice if there was a clearly defined, and sufficiently wide bike lane on this road since there's a lot of traffic during commuting times that go fairl	98
Route I like and currently use	This part of College is easy to commute since there's a wide shoulder.	99
Route I like and currently use	This is a great ""open road"" when ridden early in the morning. Would be great if the side of road could be swept more often to allow full use of shoulder by cyclists.	100
Route needs improvement	There should be a safe way to and from South Brunswick High School and Middle School. Right now it is exceptionally dangerous!	101
Route needs improvement	There is no way to safely navigate this road except on the sidewalk	102
Route needs improvement	There is no safe route from Boiling Spring Lakes into Southport. High speed traffic with narrow lanes/no shoulder to ride on.	103
Route needs improvement	There is no safe route along college road and along much of 17th street. There is a path along Halyburton but the ""East Coast Greenway"" highlighted along 17th street on the north side of Independence is a route that isn't clear to me. I drive it ever	104
East Coast Greenway	There is currently no bicycle or pedestrian path from Monkey Junction heading south to Carolina Beach. A trail would be heavily utilized by both pedestrians and bicyclists. This is the gateway to Carolina Beach.	105
Route I like and currently use	The Military Cutoff trail is a great way to get to Mayfaire and Landfall shopping centers, as well as reach the beach. There should be more multi-use paths (separated from car traffic) like this one on other busy roads in Wilmington.	106
Route could use improvement	The Cross City Trail (separated multi-use path) on Eastwood Road ends at Cardinal Drive. It would make sense to extend it all the way to Market Street where it could intersect with another multi-use path that runs along Market Street.	107
Route I like and currently use	Southport Scenic Loop in quiet neighborhoods	108
Route I like and currently use	Sneads Ferry loop	109
Route needs improvement	Small shoulder with high speed traffic. Very dangerous place to ride!	110
Route could use improvement	Shallotte/OIB Loop 35 mi	111
Route could use improvement	Shallotte/Nakina/Pireway/OIB Loop Metric Century 62 mi	112
Route could use improvement	Shallotte/Nakina/Pireway/OIB Loop Metric Century 62 mi	113
Route could use improvement	Shallotte/Nakina/Pireway/OIB Loop Metric Century 62 mi	114
East Coast Greenway	Shallotte/Calabash/Ash Little River 50 mi loop	115
Route needs improvement	Route parallel to HWY 17 connecting commercial areas	116
Route could use improvement	Rough pavement	117
Route I like and currently use	Relatively safe (residential) commuting route from midtown to Silver Lake area.	118
Route needs improvement	Part of Leland loop	119
Route could use improvement	Only realistic alternative to US 74/76.	120
Route I like and currently use	Oak Island loop from the Cycle Dynamics Bike Shop	121
Route I like and currently use	North Topsail Beach Loop	122
Route needs improvement	no shoulder at busy merging intersection	123
Route I like and currently use	Needs US 17 bike Lane for connection to Old Ocean Highway	124
Route needs improvement	Needs safe shoulder or bike lane	125
Route needs improvement	Needs Safe Shoulder	126
Route needs improvement	Needs safe bike lane/shoulder without rumble strips	127
Route needs improvement	Needs safe bike lane/shoulder	128
Route needs improvement	Needed connection to avoid NC 87.	129
Route could use improvement	Narrow shoulder on high traffic highway	130
Route could use improvement	narrow shoulder	131
Route needs improvement	Narrow road with high speed traffic	132
Route needs improvement	Narrow road with high speed traffic	133
Route could use improvement	Murrayville Road really needs a well-defined, wide bike lane given the amount of traffic (especially during commuting times) and the speed of the traffic. There are a lot of neighborhoods that have quick access to Murrayville Road and it would be a grea	134
Route I like and currently use	Most of this road has a wide shoulder. It's a great way to link all of these neighborhoods into Market Street. If only Market Street had a multi-use path for biking and walking!	135
Route could use improvement	Lots of mixed traffic, buses, medical vehicles, and cut through traffic. Usually going way over the speed limit.	136
Route could use improvement	limited to no shoulde, some rough pavement	137
Route could use improvement	limited shoulder	138
Route needs improvement	Leland Bicycle Loop to tie in scenic routes, major neighborhoods, local restaurants and shopping, battleship.	139
Route I like and currently use	Johnsontown Road Loop	140
Route needs improvement	It would be very beneficial for a big group for this to be more bicycle friendly.	141
Route needs improvement	It would be great if there was a bike path (or better yet a multi-use trail) for College Road to link with Randall Parkway so it could tie into the Cross City Trail. This section of College Road is not safe for cyclists.	142
Route needs improvement	In all of the current mapping NOTHING goes through Boiling Spring Lakes...this needs to be addressed.	143
Route I like and currently use	Greenswamp rural ramble (Highway 17 section is dangerous, otherwise quiet rural riding).	144
Route could use improvement	Gordon Road has very little shoulder space for bikes. It's a conduit for many neighborhoods to reach Market St. and College Rd. I use it for my daily commute, but it would be great if it had a proper, wide bike lane. Speed limit is 45 mph, so it reall	145
Route I like and currently use	Good ride to Sunset Harbor, but needs a shoulder on US 17 from Old 17 to Galloway Rd	146
Route needs improvement	Extremely dangerous route. Small shoulder with vehicles traveling at high speeds.	147
Route needs improvement	Elizabethtown to White Lake	148
Route I like and currently use	Dowd Dairy Road Loop	149
Route could use improvement	cracked and broken pavement	150
Route needs improvement	Connect Boiling Spring Lakes to the Brunswick Nature Park.	151
Route needs improvement	Beautiful route with great destinations; I expect it would be a great tourist attraction, but it is extremely dangerous due narrow shoulders and high traffic on 133.	152
Route needs improvement	Alternative route from mid-town to Carolina Beach and points south. I see a lot of pedestrian traffic on this road, which is dangerous. Given the amount of residential property (families with children/dogs/etc) along this route, there should be a dedic	153
Route needs improvement	Alternative route from mid-town to Carolina Beach and points south. I see a lot of pedestrian traffic on this road, which is dangerous. Given the amount of residential property (families with children/dogs/etc) along this route, there should be a dedic	154
Route needs improvement	Alternative route from mid-town to Carolina Beach and points south. I see a lot of pedestrian traffic on this road, which is dangerous. Given the amount of residential property (families with children/dogs/etc) along this route, there should be a dedic	155
Route needs improvement	Alternative route from mid-town to Carolina Beach and points south. I see a lot of pedestrian traffic on this road, which is dangerous. Given the amount of residential property (families with children/dogs/etc) along this route, there should be a dedic	156
Route needs improvement	Add a multi-use path/greenway along Oleander Drive/Miltiary Cutoff. Add two-way separated bike lane on eastern side of Bradley Creek Bridge. Long-term: construct bike-ped bridge on the east side of existing bridge via cantilever or standalone facility.	157
Route I like and currently use	Access to Columbus Co routes	158
Route needs improvement	A major bike path just...ends, leaving you no option but to get in the middle of the traffic lane to avoid being run over.	159
Route needs improvement	210 West from Hampstead needs a wider shoulder	160

Public Process Overview



KEY TYPES OF MEETINGS & PUBLIC INPUT:

31	STEERING COMMITTEE MEMBERS, WITH 5 OFFICIAL MEETINGS
2,534	VISITORS TO THE PROJECT WEBSITE
5	OUTREACH SESSIONS AT LOCAL EVENTS
50+	LOCAL ORGANIZATIONS CONTACTED
450+	PUBLIC COMMENT FORMS
150+	WIKI-MAP COMMENTS
8	DRAFT PLAN PUBLIC OUTREACH OPPORTUNITIES
12+	FINAL PLAN PRESENTATIONS

Public Outreach at Community Events and Popular Locations

The first round of public outreach included tabling with project information at five different local events and festivals. Each table included two staff with project information cards, project surveys, project summary sheets, and a public input map where people were encouraged to provide site-specific comments. The second round of outreach used a similar format, and featured eight events and locations in total. This round included grocery stores and shopping centers in lower-income areas, where a variety of social and economic backgrounds could be invited to learn more about the plan and provide input.

The input received is summarized in the survey results on the following pages, and in the chapter two maps that show site-specific input from the public (the hard copy map comments from these events was transcribed onto the online public input map for record keeping).

"More of my friends want to ride but do not feel safe on the roads. We mostly ride in the local neighborhoods, leaving restaurants, shopping, or trips around town for the car unfortunately." - Public Comment, 2016

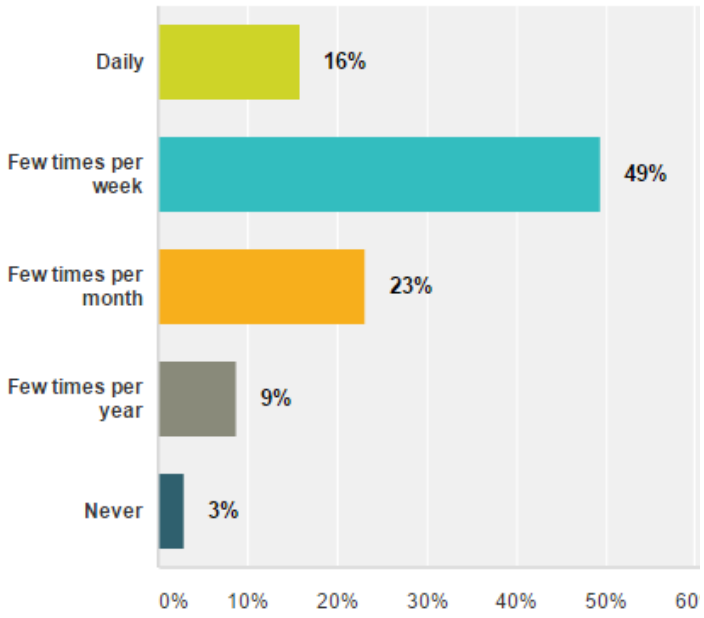
Images from the 2016 outreach sessions at local events.

PUBLIC COMMENTS ON EXISTING CONDITIONS

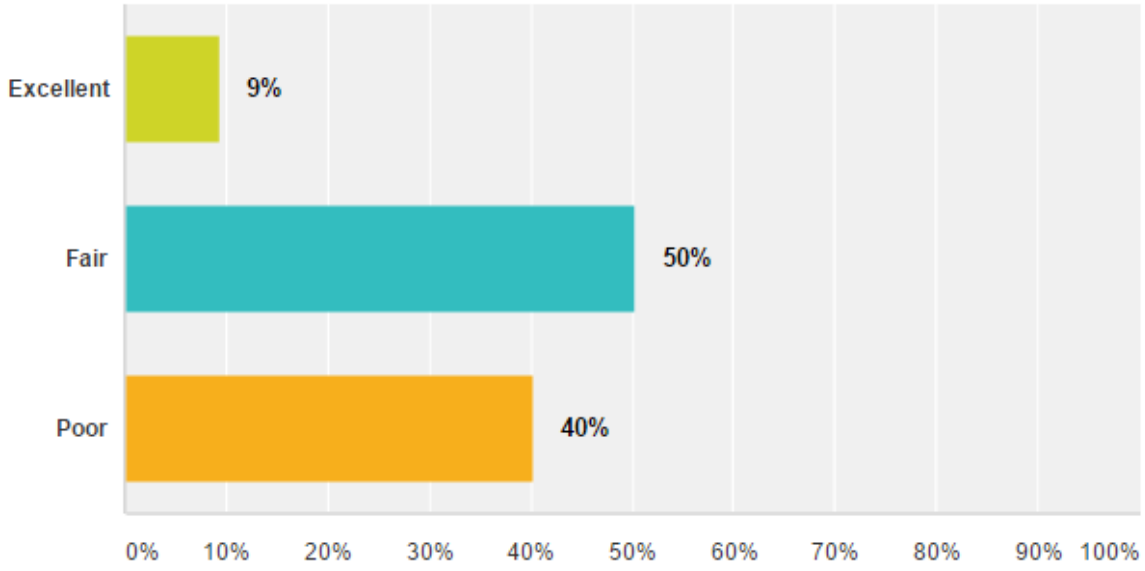
The public comment form was active between March 2016 and March 2017. It was available online through the project website and in hardcopy form at outreach events and meetings. People throughout the Cape Fear region were encouraged to complete these forms through the mass-email lists of project committee members and stakeholders, through social media (Facebook), and through municipal website announcements.

There were more than **450 respondents** to the public comment form. Although not statistically valid, the results that follow still reflect the voices of residents across the region who have an interest in the region's bicycle network. Summary responses are displayed below.

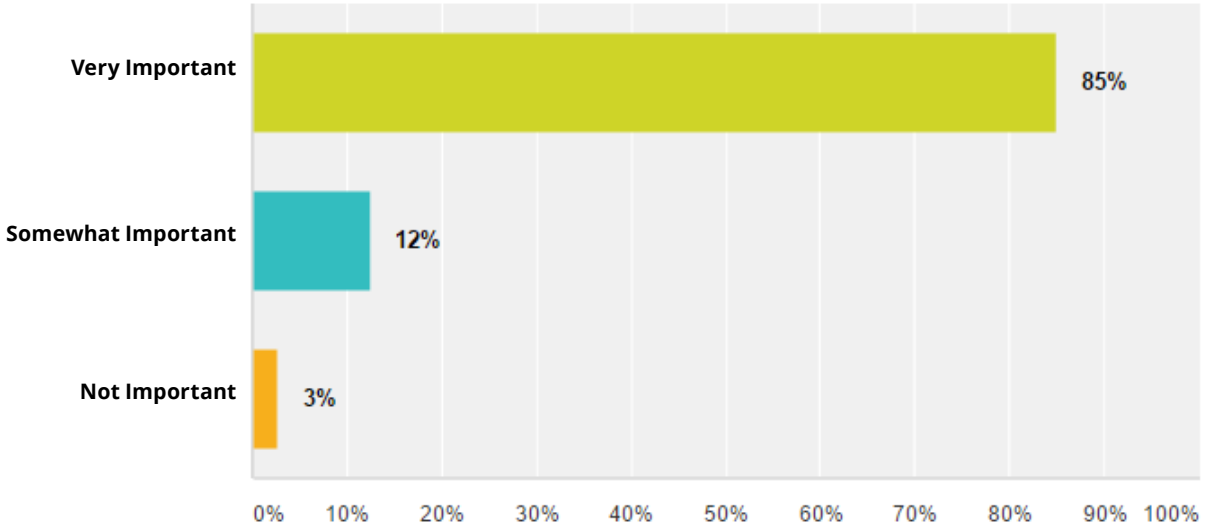
How often do you bike now?



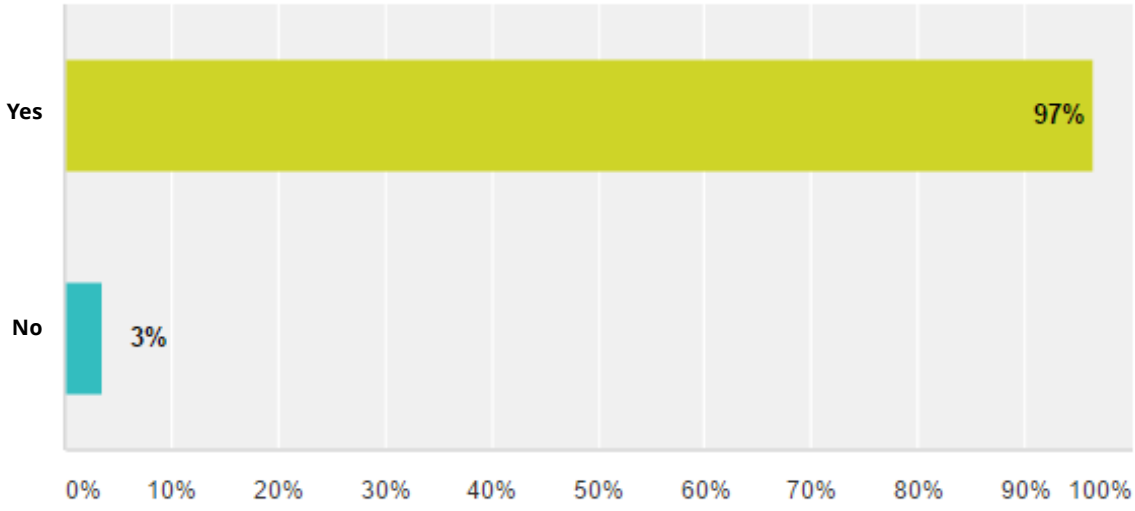
How do you rate present bicycling conditions in the Cape Fear region?



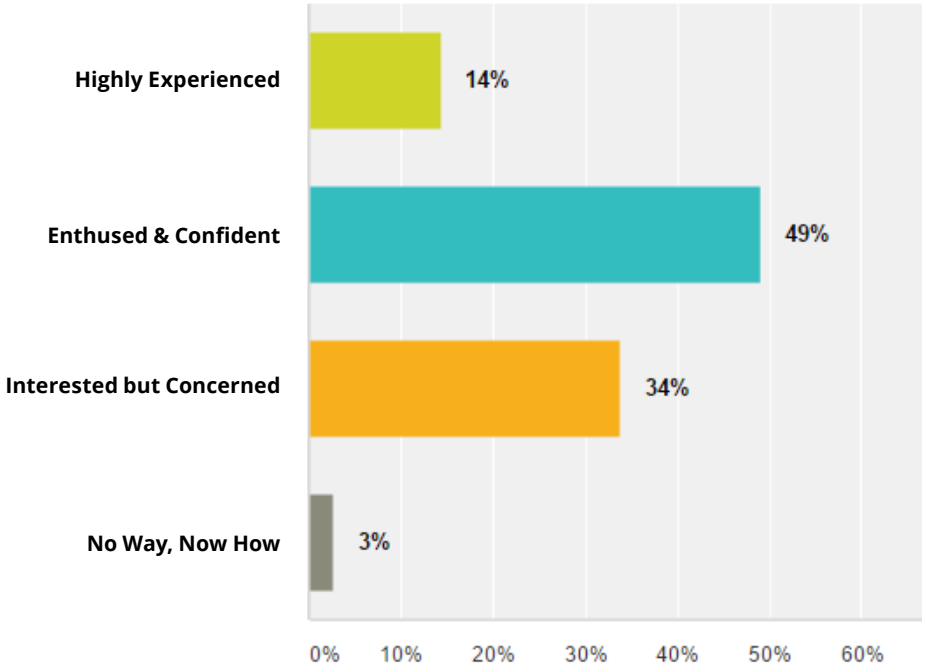
How important to you is improving bicycling conditions in the Cape Fear region?



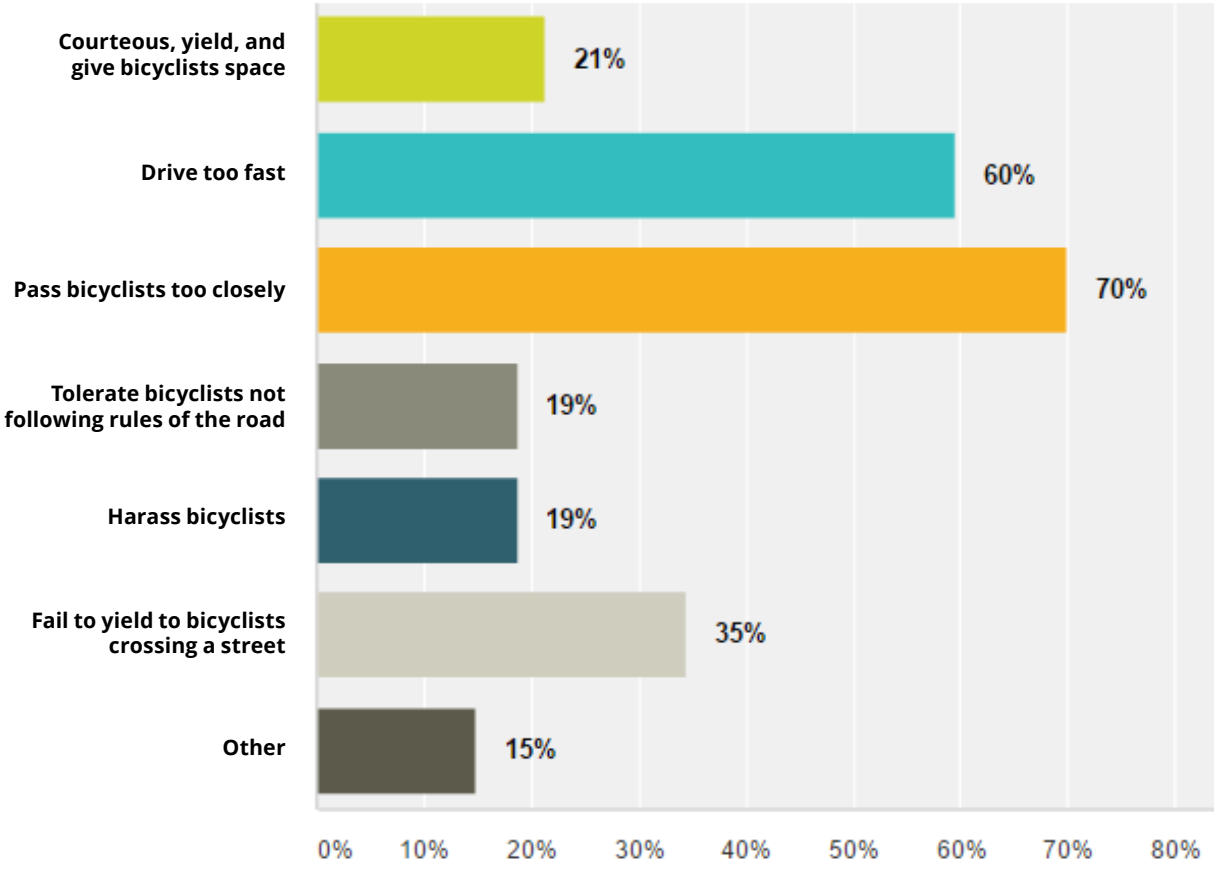
Would you bike more often if more bicycle lanes, trails, and safe roadway crossings were provided for bicyclists?



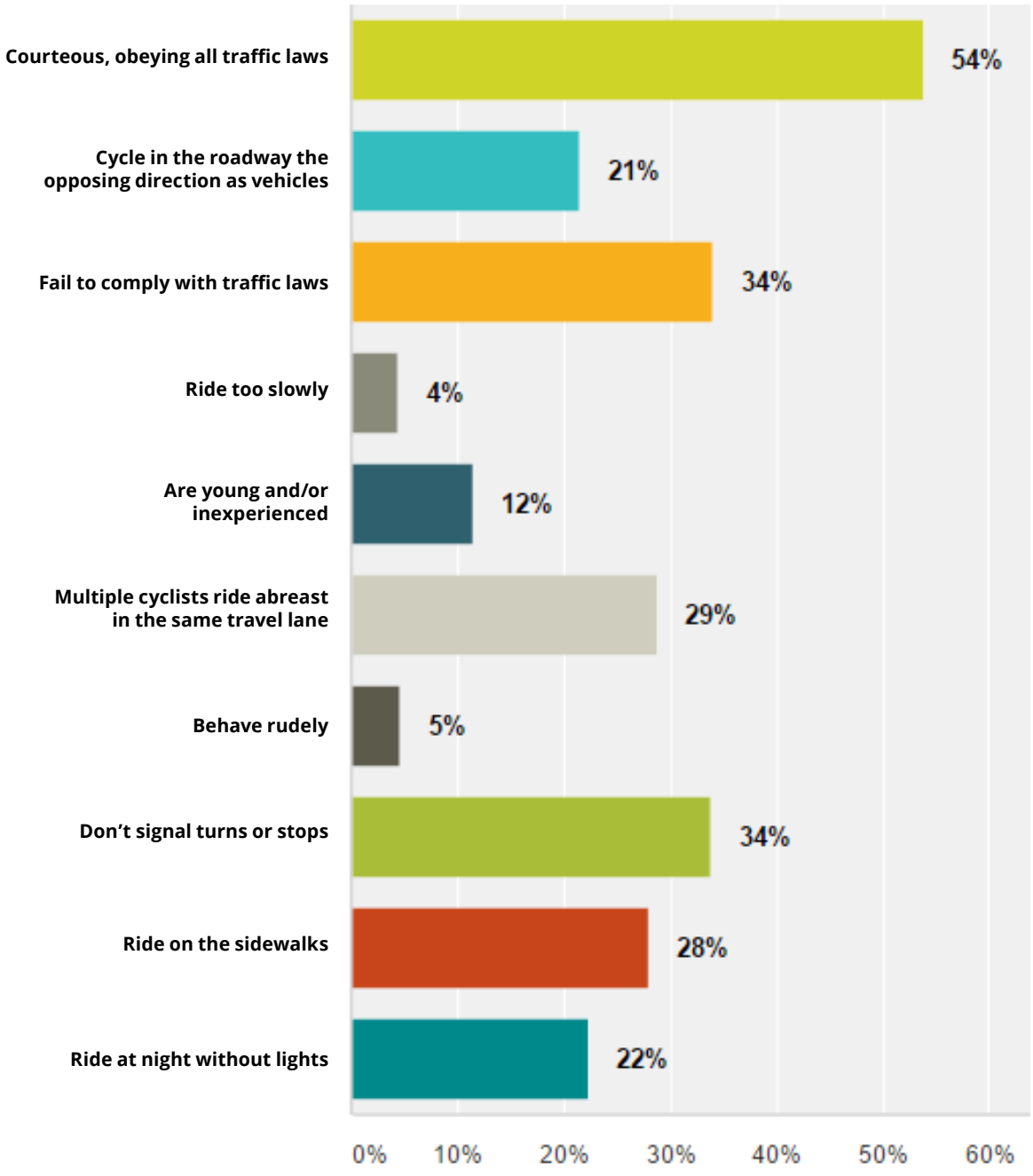
What type of bicyclist are you? *(see page 15 for definitions)*



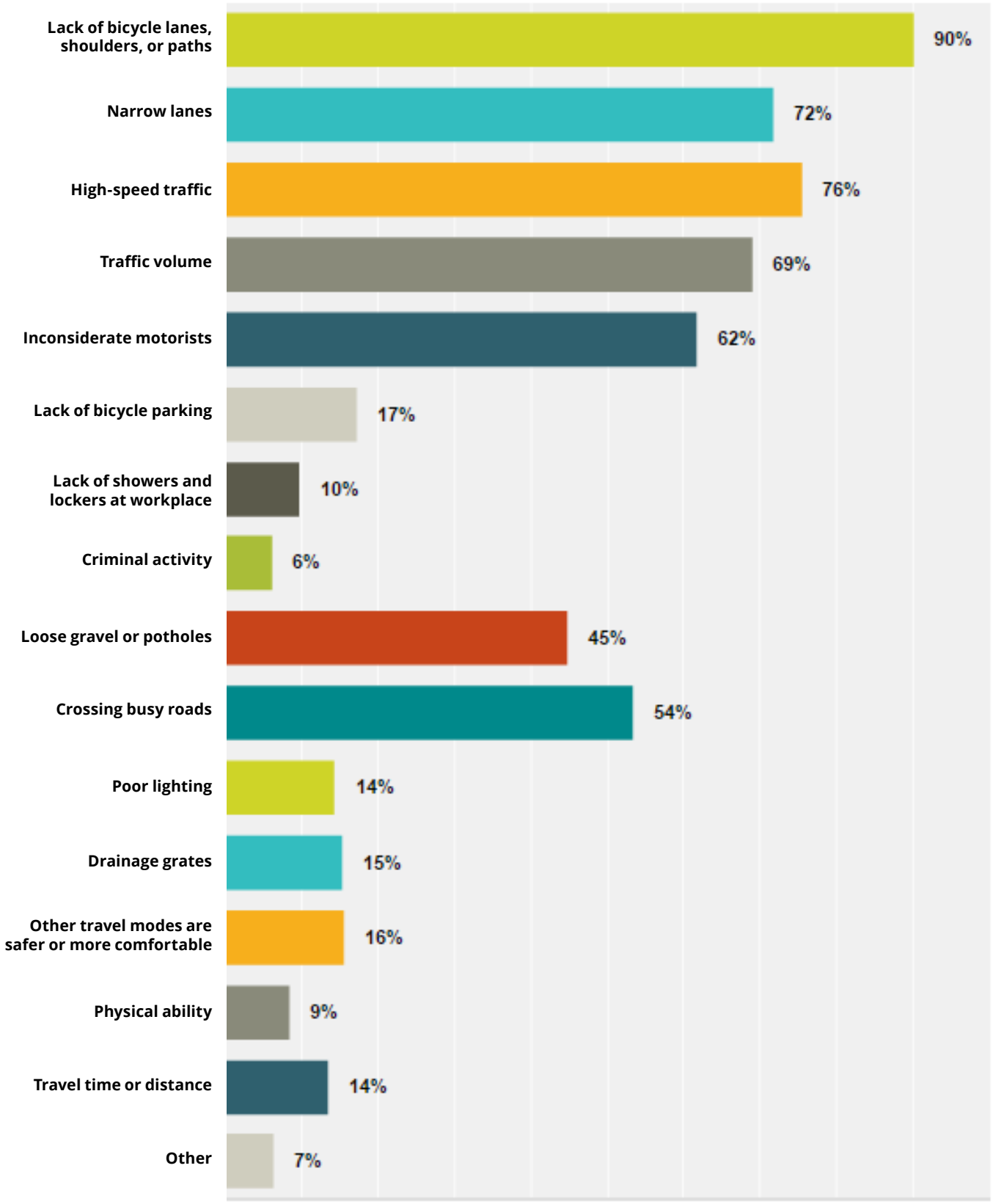
How do you feel drivers in your area typically behave around bicyclists?



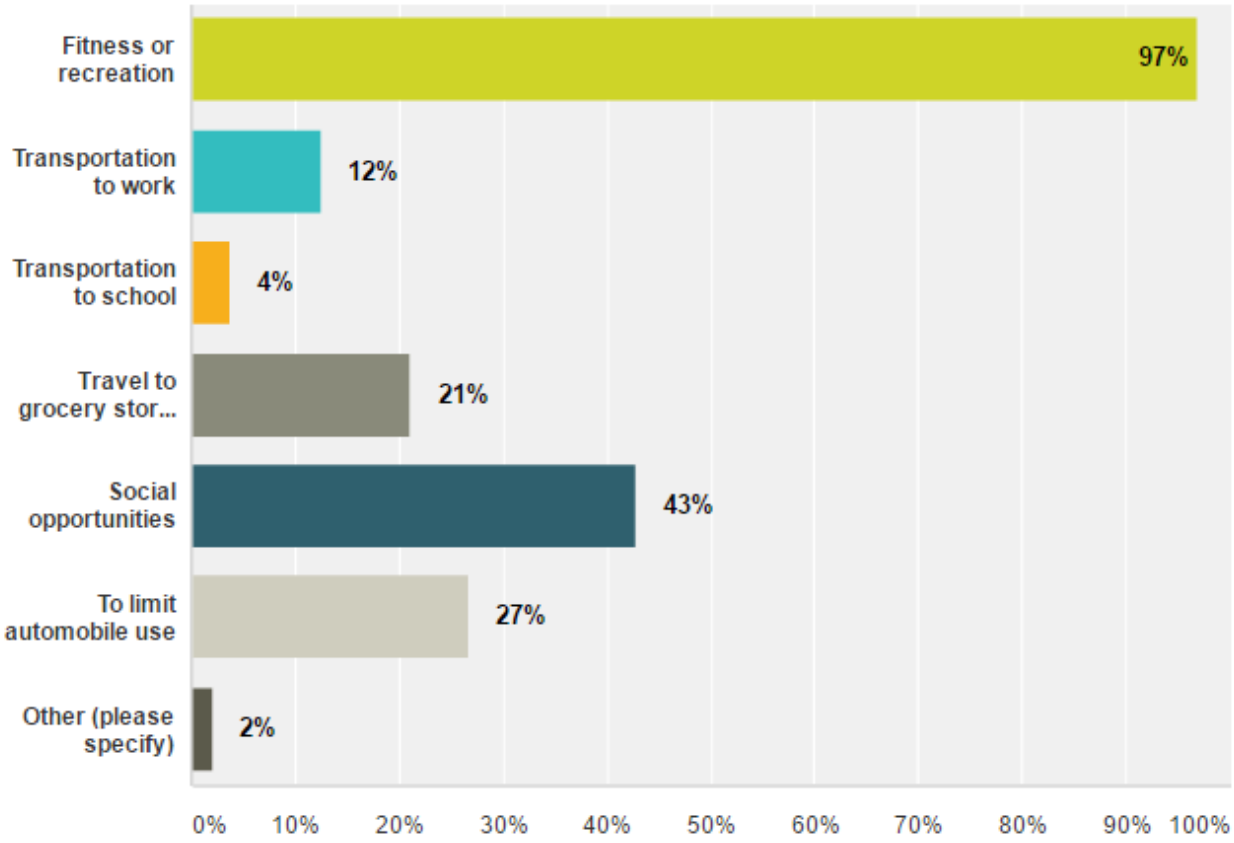
How do you feel bicyclists in your area typically behave?



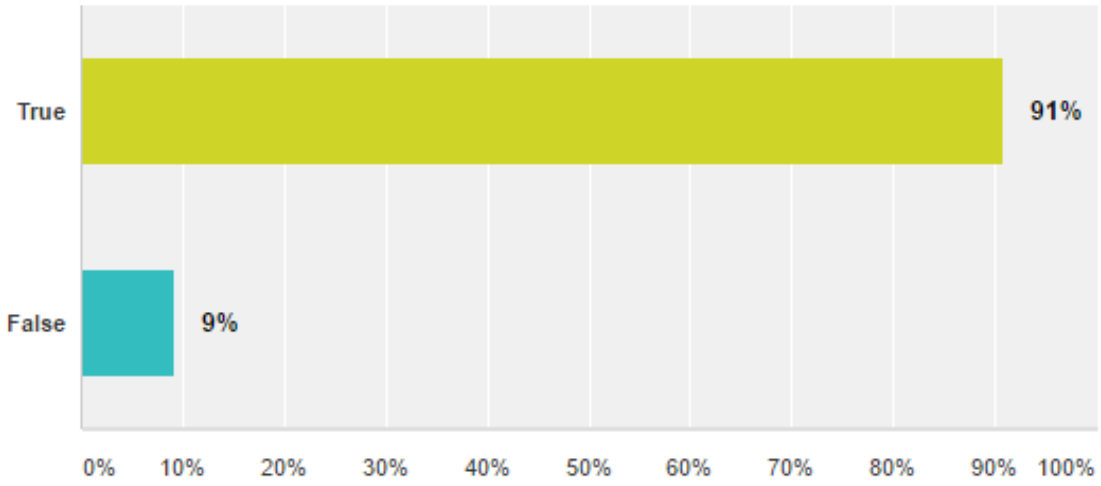
What factors discourage biking?



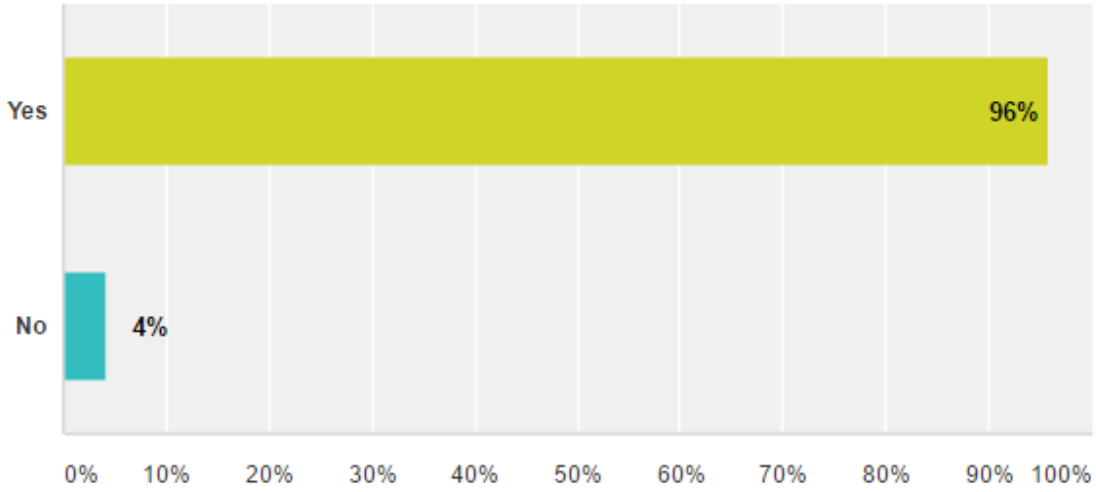
For what purposes do you bike most now?



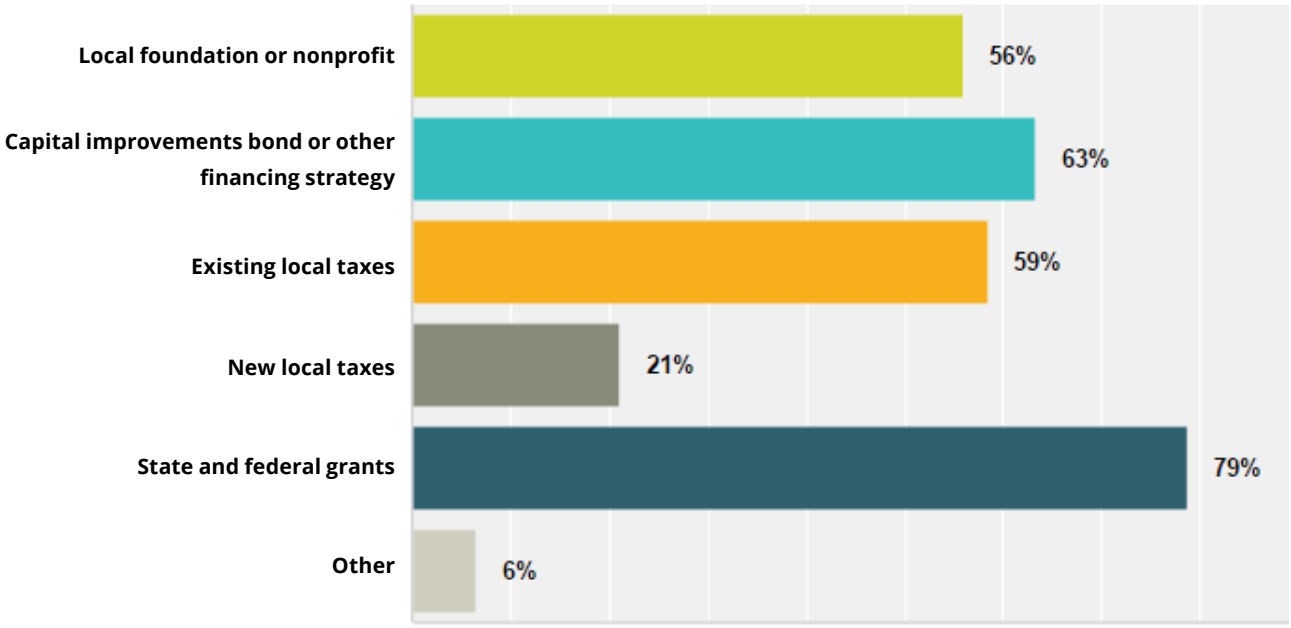
True or False. Counties and cities in the Cape Fear region should require developers to construct biking and walking facilities with development.



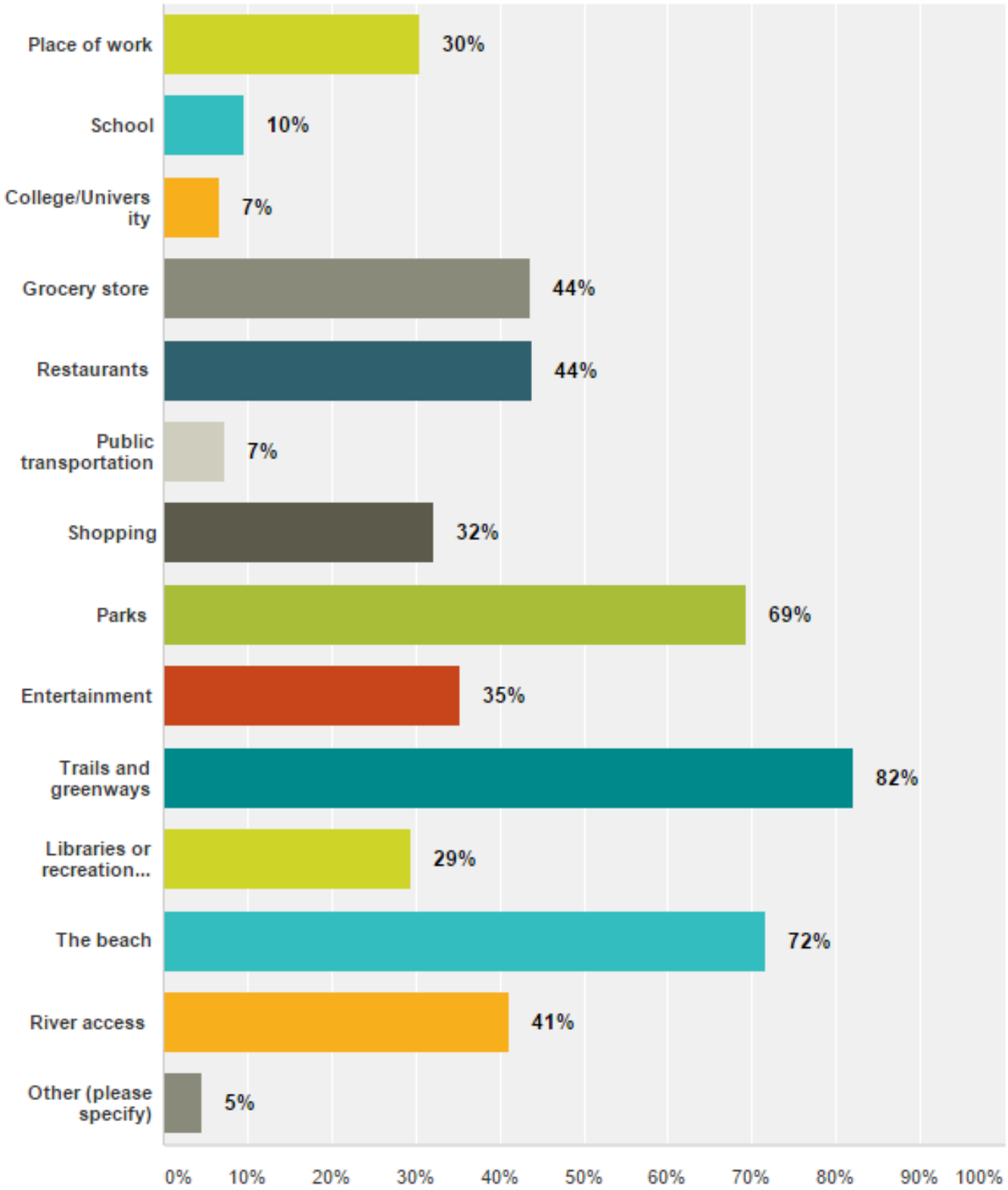
Should public funds be used to improve bicycling facilities?



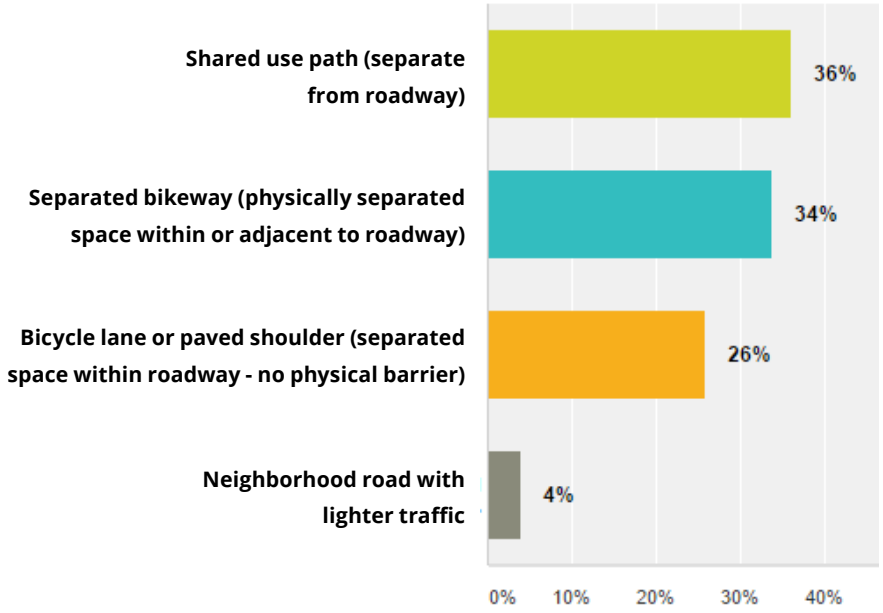
Which types of funds should be used for bicycle infrastructure improvements?



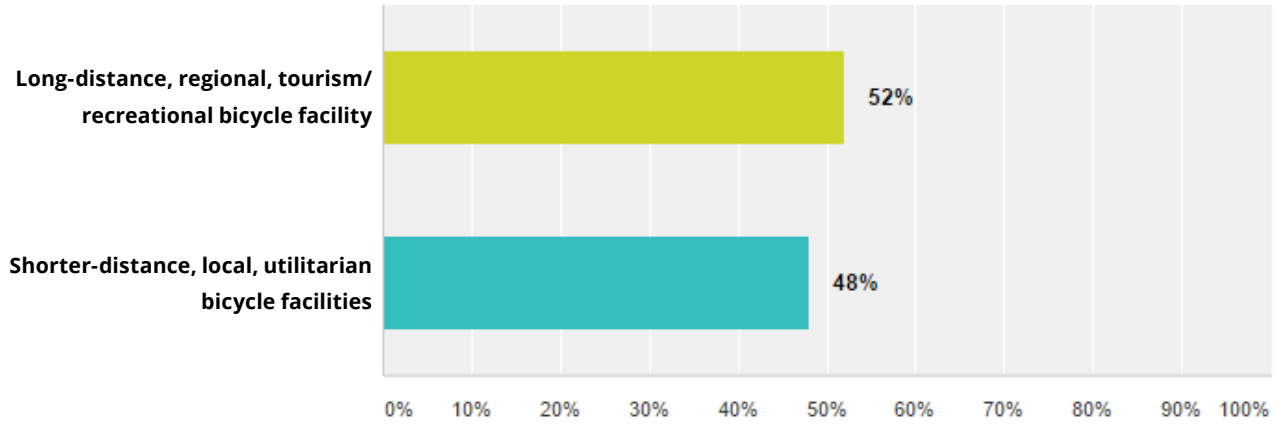
What bicycling destinations would you most like to reach?



What type of bicycle facility do you prefer?



Which one of the following types of bicycle facilities should be a priority in this Plan?



What do you think are the top roadway corridors most needing bicycle improvements? (the larger the word, the more often it was cited)

SUPPORT FOR BICYCLING IN EXISTING PLANS

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Brunswick County		
Brunswick County Comprehensive Transportation Plan (2010)	This long-range transportation plan covers transportation needs through 2035 and examines conditions for different modes of transportation, including highway, public transportation, rail, bicycle, and pedestrian. Recommendations were based on the 2006 Brunswick County Greenways/Blueways Master Plan, the 2006 Oak Island Bicycle Transportation Plan and the 1994 Southport Bicycle Map. Recommended on-road facilities include NC 133 from the airport to Southport, Midway Rd (State Route 1500) from Bolivia to Saint James, Stone Chimney Road (State Route 1115) in Holden Beach, and Old Georgetown Road in Ocean Isle Beach. Recommended off-road facilities include W. Oak Island Drive in Oak Island, Country Club Drive from Oak Island to Saint James, and Fish Factory Rd in Saint James.	https://connect.ncdot.gov/projects/planning/TPBCTP/Brunswick%20County/Bruinwick_Report_online.pdf
Brunswick County Greenways/Blueways Master Plan (2006)	Draft plan was approved in 2006 but was never adopted. It is currently being updated (in 2017).	http://www.focus-senc.org/wp-content/uploads/2013/06/BrunswickPlan.Greenway-Master-Map.06.13.pdf
Oak Island Bicycle Transportation Plan (2006)	Oak Island is a popular tourist attraction and a bicycle plan was developed to address bicycle safety concerns and improve/develop facilities. The proposed bicycle network would add nearly 45 miles of bicycle facilities and it is projected that the full network would be complete by 2020. Development of the network was based on a number of factors, including providing safe crossings over Oak Island Drive and bicycle access across the Intracoastal Waterway allowing safe bicycle entry into the island. Among the recommendations, shared-use paths are recommended for the path along NC Highway 133 and along the north side of the intracoastal waterway. Recommendations cover connections outside Oak Island and it is recommended that the Town of Oak Island coordinates with St. James, Caswell Beach, and Southport. Bike lanes proposed along Middleton Ave. and across the Second Bridge should continue as a signed bicycle route northward to NC Highway 211 which is the location of NC Bicycle Route 3.	https://connect.ncdot.gov/municipalities/PlanningGrants/Documents/Oak%20Island%20Bike%20Plan.pdf

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Leland Bike Plan (2008)	The Leland Bicycle Plan serves as a planning tool to assist in the development and expansion of bicycle facilities and programs. Bicycle recommendations are categorized as short term, medium term, and long term priorities. In terms of policy and program recommendations, the plan suggests that the town update its development ordinances, coordinate with NCDOT in regards to on-going projects, provide education programs to increase bicycle safety, and develop a maintenance plan. Short-term priorities were focused on improving bicycling access and safety in "Old Leland" and making connections between existing facilities. These projects are: 1) Village Loop Road, 2) Old Leland Loop, 3) Fletcher Road/ Northwest District Park Connection, 4) US 17 Superstreet Connections, 5) Leland Greenway, 6) Wayne Street/Royal Street Connection, 7) Night Harbour Drive, 8) Grandiflora/Palm Ridge Drive Connection, 9) Ploof Road. Details for these facilities can be found on pages 3-8 to 3-13. Projects that were prioritized the highest were projects in Old Leland and those that fell within the town limits.	http://www.wmpo.org/pdf/2008_lelandbikeplan-final.pdf
Ocean Isle Beach Bicycle and Pedestrian Plan (2014)	Although this is a pedestrian and bicycle plan, most of the recommendations were for multi-use paths which can accommodate both bicyclists and pedestrians. Based on public input, existing conditions, and available data, the following recommendations were included in the plan: 1) Ocean Isle West/West 2nd Street Multi-Use Path, 2) West 1st Street Multi-Use Path, 3) East 1st Street Multi-Use Path (Causeway to Leland), 4) East 1st Street Multi-Use Path (Leland to Winston-Salem), 5) West 2nd Street (Beaufort to Driftwood), 6) East 2nd Street (Causeway to Winston-Salem), 7) Causeway Drive (1st Street to Old Causeway Commercial Area), 8) West 4th Street (Driftwood to West 3rd Street), 9) Causeway Drive (Beach Dr to Culpepper), 10) Odell Williamson Bridge, 11) East 4th Street (Winston-Salem to Shallotte), 12) Shallotte Blvd (East 6th St to East 3rd St), 13) Driftwood, 14) Beaufort, 15) Old Causeway Drive	http://walkbikeoceanisle.weebly.com
Columbus County		
Columbus County CTP (2007)	Major recommendations in this long-range transportation plan focused on highway improvements and widening of narrow roads. There are no designated State bike routes or locally planned bike routes or greenways within the study area. A map of this element was not included in the plan.	https://connect.ncdot.gov/projects/planning/TPBCTP/Columbus%20County/Columbus_Co_Report.pdf

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Tabor City CTP (2015)	This long-range, multi-modal transportation plan covers Tabor City and adjacent areas in Columbus County, As part of this plan, bicycle recommendations were developed. The following were recommended for on-road bicycle improvements: 1) US 701 Business/NC 410, 2) US 701 Business (Hickman Rd), 3) NC 410 (Green Sea Road), 4) NC 904 (West 8th Street), 5) NC 904 (Fair Bluff Road), 6) NC 904 (North Main Street), 7) NC 904 (Pireway Road), 8) East 4th Street, 9) West 6th Street, 10) East 8th Street, 11) East Bell Street, 12) Canal Street, 13) Carolina Road, 14) Complex Street, 15) Lynwood Norris Road, 16) North Main Street, 17) New Warehouse Rd, 18) Old Stake Rd, 19) Richard Wright Rd, 20) School Street, 21) Stake Rd. This recommendations mainly provide connectivity within Tabor City.	https://connect.ncdot.gov/projects/planning/TPBCTP/Tabor%20City/TaborCity%20Report.pdf
Pender County		
Pender County CTP (2016)	The major recommendation from this plan that incorporates bicycle improvements involves widening US 117 and including a multi-use path on the east side of the facility. Several routes were recommended for multi-use paths. The location of facilities was planned so that it would coordinate with the East Coast Greenway. Recommendations are listed on 2-21 and 2-22.	https://connect.ncdot.gov/projects/planning/TPBCTP/Pender%20County/Pender%20County%20CTP%20Final%20Printed.pdf
Topsail Area CTP (2011)	The Towns of Surf City, North Topsail Beach, Topsail Beach and Holly Ridge are included in this long-range transportation plan. Topsail Drive (SR 1547)/ future NC 210 was designated as a major recommendation for improvement. The plan details that the counties and municipalities should improve existing Topsail Drive (SR 1547) to a two-lane major thoroughfare with bike lanes along the entire length. The project proposal for NC 210 from South Shore Drive to the end of state maintenance is to improve the existing corridor to a 2-lane major thoroughfare with bicycle lanes. Another recommended project is to reroute existing NC 210 on existing Shell Drive, Topsail Drive, and Roland Avenue (NC 50) in Surf City, connecting existing NC 210 from Shell Road to North New River Drive. The proposed project will have a 3-lane cross-section with bike lanes and sidewalks from North New River Drive to NC 50 and a 2-lane cross-section with bike lanes and sidewalks from NC 50 to existing NC 210. Bike lanes are recommended for the entire length of NC 210 between North New River Drive (NC 210) and New River Inlet Road (SR 1568). Bike lanes and a grass median are recommended for NC 210 between the west bridge end of North Topsail Beach and the planning area boundary north of NC 172. All bicycle recommendations are listed in CTP Inventory and Recommendations spreadsheet Appendix C	http://www.surfcity.govoffice.com/vertical/sites/%7BE3B58D98-8351-44DD-A832-B11828C397F0%7D/uploads/%7BE5617D08-6E97-4B23-8959-2481D228AB0A%7D.PDF

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Town of Burgaw Bicycle and Pedestrian Plan (2015)	This plan aims to outline community priorities in order for the town to appropriately direct investments in bicycle and pedestrian infrastructure and to coordinate that process with neighboring cities. High priority projects that were identified were to add shared lane markings on busy streets (Hwy 117 Bypass, S. Walker St., Hwy 53, E. Wilmington St., and Fremont St) and to establish bicycle boulevards. The streets recommended to become bicycle boulevards include Cowan St., Ashe St., McRae St., and Hayes St. A third high priority project is to increase the lane width and paved shoulder width of Penderlea Highway. All of the recommendations can be found on page 36-49.	http://www.townofburgaw.com/Data/Sites/1/media/departments/planning/bike-and-pedestrian-plan.pdf
New Hanover County		
Wrightsville Beach Community Transportation Plan (2013)	This plan aims to address the needs of different types of roadway users in Wrightsville Beach, including motorists, bicyclists, pedestrians, and emergency service providers. The existing bicycle network is limited. Regional connections include the River to Sea Bikeway and the Gary Shell Cross-City Trail. A key bicycle recommendation was to implement bicycle facilities on Causeway Drive. In addition, it was recommended that the bike lanes on Salisbury Street be widened. Other bicycle improvements include: constructing a bike lane through the parking lot at the Wildlife Public Boat Ramp, providing a connection under the Heide-Trask drawbridge for the Cross City Trail, constructing a bicycle lane on Salisbury Street east of Bank's Channel, and re-painting sharrows on Pelican Drive. On South Beach, it was recommended that Waynick Boulevard become a three-lane street with a multi-use path.	http://www.townofwrightsvillebeach.com/LinkClick.aspx?fileticket=ZeDAYAMLn-Vc%3D&tabid=102
New Hanover County Master Plan for Parks, Recreation, and Open Space (2006)	This plan is currently being updated and the final draft should be completed by June 2016	http://parks.nhcgov.com/master-plan-update/
Carolina Beach Bicycle/ Multi-Use Transportation Plan (2011)	With funds from a NCDOT planning grant, this plan sought to create a mechanism to establish Carolina Beach as a more bicycle-friendly community and to increase connectivity between destinations. A total of 48 projects were identified (listed on pg 5-12 and section 4-3 to 4-4). Clarendon Avenue was ranked as the highest priority project. Phase 2 Short-Term projects included the dual multi-use paths along Harper Avenue and Cape Fear Boulevard	http://www.carolinabeach.org/BicycleMulti_UseTransportationPlan.pdf

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Bicycle Facilities Study for the Blue Clay Corridor (2008)	The purpose of this Bicycle study is to develop design alternatives for bicycle facilities along the Blue Clay Road Corridor in unincorporated northern New Hanover County (also known as the Blue Clay Corridor). The Blue Clay Corridor is important because it is the most direct roadway between Wilmington and Cape Fear Community College - North Campus and it's part of the Ports of Call Route. As a result of this study, three alternatives were proposed. The first was a off-street paved multi-use trail for the length of the corridor. The second alternative is a mix of on street and off street bicycle facilities. The third alternative consists primarily of on street facilities that link together many destinations in the study area.	http://www.wmpo.org/PDF/2008-03_BlueClay_FinalCombined.pdf
Wilmington/New Hanover County Comprehensive Greenway Plan (2013)	This plan provides a framework for establishing a network of greenways in the City of Wilmington and New Hanover County. Priority projects are: 1) Downtown Trail (from Downtown Wilmington to parks and neighborhoods east of Downtown), 2) Park Avenue Trail, 3) Independence Blvd Trail, 4) 17th/Independence Trail, 5) Greenville Loop Trail, 6) Hugh McCrae Park Trail, 7) Kerr Ave Trail, 8) Central College Trail, 9) McCrary Park Trail, 10) Shipyard Trail, 11) South Smith Creek Trail, 12) Carolina Beach Rd Trail, 13) Market St Rail Trail, 14) South River Rd Trail, 15) North River Rd Trail, 16) Island Greenway, 17) Dow Rd Trail, 18) Wrightsville Beach Trail, 19) Harper Ave Trail, 20) Carolina Beach Waterfront Trail	
River to Sea Bikeway Master Plan (2013)	The goal of the River to Sea Bikeway (also known as WMPO Bike Route 1) is multi-fold. The goals include creating opportunities for basic transportation, recreational use and physical activity as well as connecting downtown Wilmington to Wrightsville Beach. The route of the bikeway goes from the foot of Market Street fronting the Cape Fear River in downtown Wilmington, follows the path of the Historic Car Line, enters Wrightsville Beach at the Heide-Trask draw bridge and ends at Johnnie Mercer's Pier at the Atlantic Ocean. The bikeway is collaboratively planned and managed by the City of Wilmington and the Town of Wrightsville Beach. Once it is completed, it will be an 11-mile on and off-road bicycle route. Portions of the River to Sea Bikeway overlap with the Gary Shell Cross-City Trail and East Coast Greenway.	http://www.rivertosea-bikeway.com/PDF/2013-12-19_RTSB_Master%20Plan_FINAL_reduced%20size.pdf
Town of Wrightsville Beach Bicycle Plan (2005)	Types of bicycle facilities included in the bike route network plan include multi-use trails, wide outside lanes, striped bike lanes, and signed bicycle routes. The plan identifies 12 opportunities for the enhancement of bicycle facilities on Wrightsville Beach (see map on page 8). Lumina Avenue is one of the main corridors for improvements.	http://www.wmpo.org/PDF/2005-01_WrightsvilleBicyclePlan.pdf

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Bladen County		
Bladen County CTP (2015)	Key bicycle recommendations from the Bladen County CTP shows the NC 5 Cape Fear Run bike route through Bladen County, a proposed multi-use path along the Cape Fear River corridor through Bladen County, a proposed multi-use path from Elizabethtown to White Lake, and incorporates the recommendations from the 2015 Elizabethtown Bicycle Plan.	https://connect.ncdot.gov/projects/planning/Pages/CTP-Details.aspx?study_id=Bladen+County
Elizabethtown	As part of the planning process, priority bicycle projects were identified. High priority projects that can be implemented at relatively low cost include: 1) King St/Peanut Rd Intersection, 2) Downtown Circulation, 3) MLK Drive, 4) Southwest Neighborhood Connectivity, 5) Torey Hole Park. Priority investments that have a high impact but are relatively expensive include: East Broad Street sidepath; Newkirk Street Extension sidepath; Browns Creek Trail; Browns Creek Trail Neighborhood Links; and Broad St, Peanut Road, and Newton Street streetscape. The complete network project list (table 3.2) can be found on pages 3-22 and 3-23.	http://elizabethtownbike-plan.weebly.com/document.html
Wilmington MPO		
Cape Fear Transportation 2040 Metropolitan Transportation Plan (2015)	Cape Fear Transportation 2040 serves as the transportation plan for the Wilmington Urban Area. In acknowledging the importance of bicycling and walking, the two factors that were continuously discussed were regional connectivity and overcoming existing barriers to bicycle and pedestrian activity (such as water features and high volumes of traffic). Within the WMPO boundaries, there are 27.8 miles of existing bike lanes, 24.4 miles of multi-use paths, and 1.5 miles of sharrow-marked roadways. A ranked list of bicycle and pedestrian projects can be found on pages 62-67.	http://www.transportation2040.org/PDFs/CFT2040_adoption-date_111815.pdf
Gary Shell Cross-City Trail Master Plan (2012)	Once completed, the Gary Shell Cross-City Trail will be a 15-mile, primarily off-road multi-use trail and will make up part of the East Coast Greenway. Development of the trail has been divided into phases and a prioritization process was put into place. The alignment of the trail is categorized by modern suburban development traversing primarily through commercial areas, interspersed with residential neighborhoods and municipal parks.	https://www.wilmingtonnc.gov/Portals/0/documents/Community%20Services/Parks,%20Recreation,%20and%20Downtown%20Services/Cross%20City%20Trail/2012-03-12_GSCCTMasterPlan_RevisedDraft.pdf
Pelican Drive/ Salisbury Street Bicycle Plan for the Town of Wrightsville Beach (2009)	The Town of Wrightsville Beach and the Wilmington MPO commissioned this study to explore options for extending bicycle connectivity along Salisbury Street from the Heide-Trask drawbridge to the existing bike lanes on the northern-most section of North Lumina Avenue. Two design options were proposed for the project corridor: an on-road option that relies primarily on bike lanes and sharrows to accommodate bicyclists along Salisbury Street or an on-road/off-road option that uses Pelican Drive and adjacent bike-ped bridge structures over Kenans Creek and Banks Channel to accommodate bicyclists with a separated facility.	http://www.rivertosea-bikeway.com/PDF/2009-09-10_WBBikePlan_FinalReport[ADOPTED].pdf

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Jacksonville Urban Area MPO (JUMPO)		
JUMPO Long Range Transportation Plan (2015)	The JUMPO LRTP establishes a vision for mobility for the City of Jacksonville and portions of Onslow County. In terms of existing facilities, the JUMPO study area has just over 100 miles of multi-use paths or trails as well as 74 miles of on-road bicycle facilities (page 2-20). Connections to major destinations was a major consideration when developing recommendations for bicycling and walking. Recommendations include both on-street and off-street facilities and a map of the recommended facilities can be found on page 4-6. To promote better connections between state bike routes and the East Coast Greenway, NCDOT plans to re-route NC Bike Route 3 to closely follow the East Coast greenway into downtown Jacksonville while providing additional wayfinding between the two trails at locations where they cross. Bicycle and pedestrian improvements were developed in coordination with the corridor and intersection recommendations.	http://files.www.jumpo-nc.org/plans-documents/JUMPO2040LRTP_Final_Report.pdf
JUMPO Comprehensive Transportation Plan (2012)	As part of this plan, bicycle lane improvements were identified in the following locations: 1) Piney Green Road from Marine Boulevard to Lejeune Boulevard and, 2) Burgaw Highway between Richlands Highway (US 258/NC 24) and Murrill Hill Road (SR 1113). Greenways and multi-use paths were proposed along the following corridors: 1) along the river from Georgetown Road to Old Bridge Street at Anne Street and from north of Marine Blvd west along the river to Bridget Lane, 2) extend existing Marine Blvd multi-use path from Marine Plaza to Empire Blvd, 3) multi-use path adjacent to Western Blvd on the east from Lejeune Blvd at Pine Valley Road to Henderson Drive, 4) multi-use path adjacent to Henderson Drive on the north, connecting to future facility at Western Blvd and continuing west to Doris Avenue, 5) multi-use path adjacent to Jacksonville Parkway and Henderson Drive Extension, 6) multi-use path adjacent to Lejeune Blvd on the south from Holcomb Blvd to Piney Green Road.	http://files.www.jumpo-nc.org/plans-documents/CTP_Revised_Full.pdf
Jacksonville Bicycle and Pedestrian Transportation Plan (2008)	Through the public input process, it was evident that there was a need and demand for more safe and accessible pedestrian and bicycle facilities. Approximately 175 miles of bicycle facilities are recommended in the ETJ. Locations of recommended bicycle facilities are shown in Map 3.4. Key corridors for bicycle improvements are: 1) US Hwy 17 Business, 2) US Hwy 17 non-controlled access portion, 3) US Hwy 258, 4) NC 24, 5) NC 53, 6) Gum Branch Road, 7) Bell Fork Road, 8) Henderson Drive, 9) Onslow Drive, 10) Western Boulevard, 11) Hargett Street, 12) Country Club Road, 13) Piney Green Road. Table 3-1 describes the corridor and type of bicycle improvement.	http://www.jumpo-nc.org/bicycle-and-pedestrian

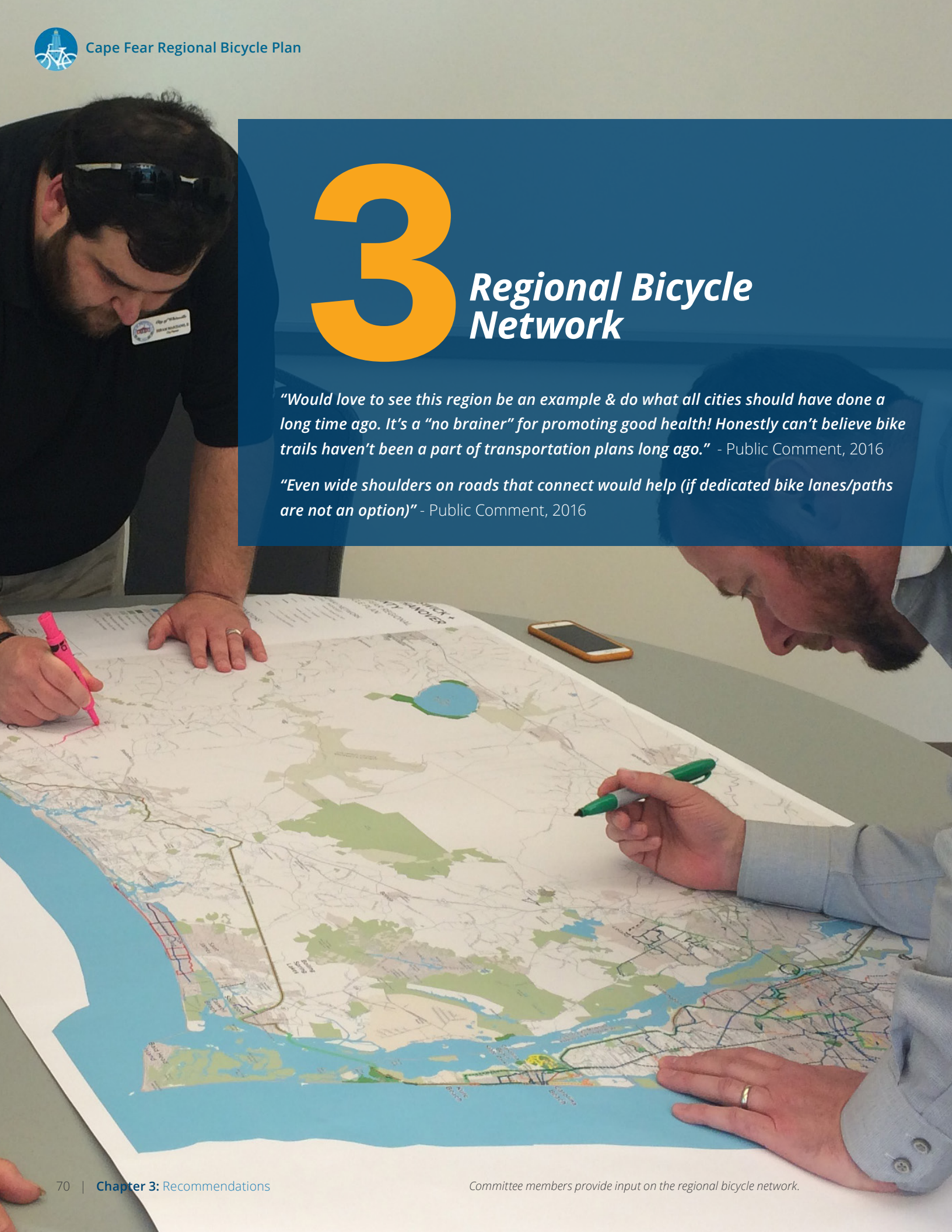
PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Regional Plans/Stakeholder Organizations & Agencies		
Mountains-to-Sea North Carolina State Trail Master Plan (2015)	The vision for the MST is an off-road hiking trail connecting Clingmans Dome on North Carolina's western border to Jockey's Ridge State Park on its eastern Outer Banks. In this master plan, the North Carolina Division of Parks and Recreation (DPR) is focused on connecting these trail limits. There are 18 planning segments and Carteret/Ocracoke Counties is one of these segments. This segment travels from Craven County through a small portion of the Croatan National Forest along the Neusiok Trail through Carteret County to the NCDOT Cedar Island Ferry Terminal. This segment is characterized as a long-term planning priority. While this master plan does not include a southern route through the Cape Fear region, the Friends of the Mountains to Sea Trail, an organization of volunteers and citizens who support the trail, have identified a route through the Cape Fear region that follows through White Lake, Moores Creek National Battlefield, Burgaw, and Topsail Island.	NC Parks MST Master Plan: http://www.ncmountain-stosea.org/wp-content/uploads/2014/09/MST-Master-Plan_webfinal.pdf Friends of the MST map can be accessed here: http://www.ncmst.org/the-trail/planned-route-of-the-mst/
MST Eastern Conceptual Plan (2004)	This conceptual plan proposes a route and alignment for a 246-mile, combined land and water trail that will make up the eastern portion of the trail. The purpose of the plan is to define actions for acquiring the land and/or public right-of-way and to offer recommendations for constructing and managing the trail. The 20-mile Neusiok Trail runs north to south from the Pine Cliff Recreation Area on the Neuse to the Newport River. This trail will connect to the MST and a portion may become part of the main MST corridor. The map on page 13 shows the proposed route of the eastern portion of the trail.	http://www.ncparks.gov/sites/default/files/ncparks/37/MST_East_Conceptual_Plan.pdf
East Coast Greenway	The East Coast Greenway (ECG) is a developing trail system, linking many of the major cities of the Eastern Seaboard between Canada and Key West. Over 30 percent of the route is already on traffic-free greenways, creating safe, accessible routes for people of all ages and abilities. Current goals for the ECG in North Carolina include: Signing the route with ECG trail markers to raise awareness and enhance the trail experience, designating trails, supporting connections between existing greenway trails and gap areas, and hosting events. Part of the ECG will go from South Hill to Wilmington (near the coast).	http://www.greenway.org/pdf/NC.pdf
WalkBikeNC (2013)	WalkBikeNC, North Carolina's Bicycle and Pedestrian Plan, was adopted by the NCDOT Board of Transportation in 2013 and identifies current conditions for walking and biking in the state. An evaluation of the existing NC bike route system was conducted as part of the 18-month statewide planning effort. NCDOT plans to work with public and private sector partners to improve pedestrian and bicycle travel throughout North Carolina by expanding and connecting the local, regional, and intrastate network. In addition, they plan to expand community-oriented pedestrian facilities and provide ped/bike access to transit.	http://www.walkbikenc.com/

PRIORITY BICYCLE AND GREENWAY PROJECTS ACCORDING TO EXISTING COMMUNITY AND REGIONAL PLANS		
Adjacent Counties/Communities		
Croatan Regional Bicycle and Trails Plan (2014)	The emphasis of this plan is on connectivity of bicycle routes through communities of the Croatan region. The plan focuses on both bicycle routes and trails. Map 2.1 shows existing and planned trails and includes the East Coast Greenway route and the Mountains-to-Sea Trail. Map 4.1 illustrates the regional bicycle route recommendations. Map 4.2 illustrates secondary route improvements, which are alternate, localized improvements to roadways in order to provide access to specific points of interest and to increase safety. Ten trail and bicycle improvement projects were identified as top priorities for implementation and are displayed on Map 4.7. They are: 1) Catfish Lake Road, 2) Forest Roads Connection from Great Lake Road to Forest Route #144, 3) Forest Roads Connection from Forest Route #205 to Millis Road, 4) Newport (see page 4-30), 5) Havelock to Neusiok Trail, 6) Pollocksville to New Bern, 7) Highway 55 Bridge, 8) Highway 58 Bridge, 9) NC 101 Bridge, 10) Ferry accommodations	http://www.ncparks.gov/sites/default/files/ncparks/37/CroatanBikeTrailsPlanJune162014.pdf
Carteret County Comprehensive Transportation Plan (2014)	This long-range, multi-modal transportation plan covers needs of the county through 2040. Modes of transportation covered in this plan include highway, bicycle, pedestrian, rail, and public transportation. The plan recommends that bike lanes will be installed on both sides of US 70 from 35th Street to 4th Street and a multi-use path installed from 35th Street to South Lockhart Street. The bicycle map shows corridors for on-road bicycle facilities in Newport need improvement. They are: Howard Boulevard, East Chatham Street, and McCabe Road. A multi-use path is recommended along Highway 24 near Newport. In terms of pedestrian facilities, East Chatham Street between Westfield Road and McQueen Avenue was identified was a recommended multi-use path. Bicycle recommendations and improvements are outlined on page 2-44. Pedestrian needs are outlined on page 2-46.	https://connect.ncdot.gov/projects/planning/TPBCTP/Carteret%20County/Carteret_Co%20CTP%20Report%20final.pdf
The Atlantic-Seaboard Coast Line Trail (ASCL) Concept Plan	This trail would connect the cities of Wilmington and Fayetteville—a distance of 82 miles—providing recreational and tourism opportunities in these cities and communities along the route and providing an alternate mode of transportation to all individuals living in proximity to the trail. With support from the Sampson County Parks and Recreation Department, North Carolina BlueCross BlueShield, and the Z. Smith Reynolds Foundation, Rails-to-Trails Conservancy was able to spend significant time in Sampson and Pender counties, allowing for this detailed assessment of the 82-mile of corridor.	https://www.yumpu.com/en/document/view/25653931/the-atlantic-seaboard-coast-line-trail-ascl-concept-plan/73

3 Regional Bicycle Network

"Would love to see this region be an example & do what all cities should have done a long time ago. It's a "no brainer" for promoting good health! Honestly can't believe bike trails haven't been a part of transportation plans long ago." - Public Comment, 2016

"Even wide shoulders on roads that connect would help (if dedicated bike lanes/paths are not an option)" - Public Comment, 2016



Committee members provide input on the regional bicycle network.

OVERVIEW

This chapter details the recommended Cape Fear Regional Bicycle Network, featuring a long-term (30-year) concept for connectivity, along with short-term priorities to begin linking communities and regional destinations.

Key Inputs Used to Develop the Recommended Network & Priorities

The recommendations in this chapter build upon previous local planning, existing regional routes, and extensive public and stakeholder input. The table below lists the key types of input used to develop the plan.

INPUT CATEGORY	EXAMPLE INPUTS
PREVIOUS LOCAL PLANNING	*Existing facilities and planned facilities on adopted municipal, county, and regional plans (see plan review in Chapter 2); Each existing plan also had its own public involvement process.*
EXISTING REGIONAL ROUTES	*East Coast Greenway, state bicycle routes, Adventure Cycling Association routes, and group ride routes.*
CONNECTING REGIONAL DESTINATIONS	*Cities, towns, parks, lakes, beach communities, tourism & agritourism destinations. Examples include state parks, camp sites, and vineyards & farms listed as agritourism sites by the NC Department of Agriculture.*
COMMITTEE & PUBLIC INPUT	*Project steering committee meetings (see list of committee members in acknowledgments section), public outreach events, online public survey and online WikiMap input (see results in Chapter 2).*
MEETINGS WITH NCDOT	*Meetings during plan development with NCDOT engineers from Divisions 3 & 6; Gathered input on potential routes and conflict areas.*
CONSULTANT REVIEW	*Review of roadway data, such as bicycle crash history and annual average daily traffic (AADT); Field and remote analysis of opportunities and challenges.*

REGIONAL NETWORK RECOMMENDATIONS

Key Types of Bicycle Infrastructure

A diverse mix of new bicycle infrastructure is recommended for the proposed network of on-road and off-road routes throughout the region. This photo-glossary provides a snapshot of the most common types of facilities recommended in this plan. Due to the largely rural nature of the study area, and the long distances between many destinations, the focus of much of the routing for this plan is on rural roadways with low traffic volumes. These would generally be signed bike routes, ideally with paved shoulder improvements, but most likely with little to no changes to the existing roadways, other than signage. Still, bicycle facilities such as bike lanes, paved shoulders, and sidepaths (a type of shared use path along a roadway) are recommended in many areas, such as in cities and towns, where traffic volumes are higher and where more diverse cycling groups need to be accommodated (see types of bicyclists on page 15)

Another type of recommendation is for the long-term development of "rail-with-trail" projects (or "rail-to-trail" projects), which are basically shared-use paths on or along rail corridors. Similarly, the East Coast Greenway routes are envisioned as shared-use paths in the long-term.

For more information on the design of the many types of facilities and improvements for bicyclists, please see **Appendix A: Design Guidelines.**

SHARED USE PATHS

SEPARATED BIKE LANES

BIKE LANES

PAVED SHOULDERS

SHARED-LANE MARKINGS

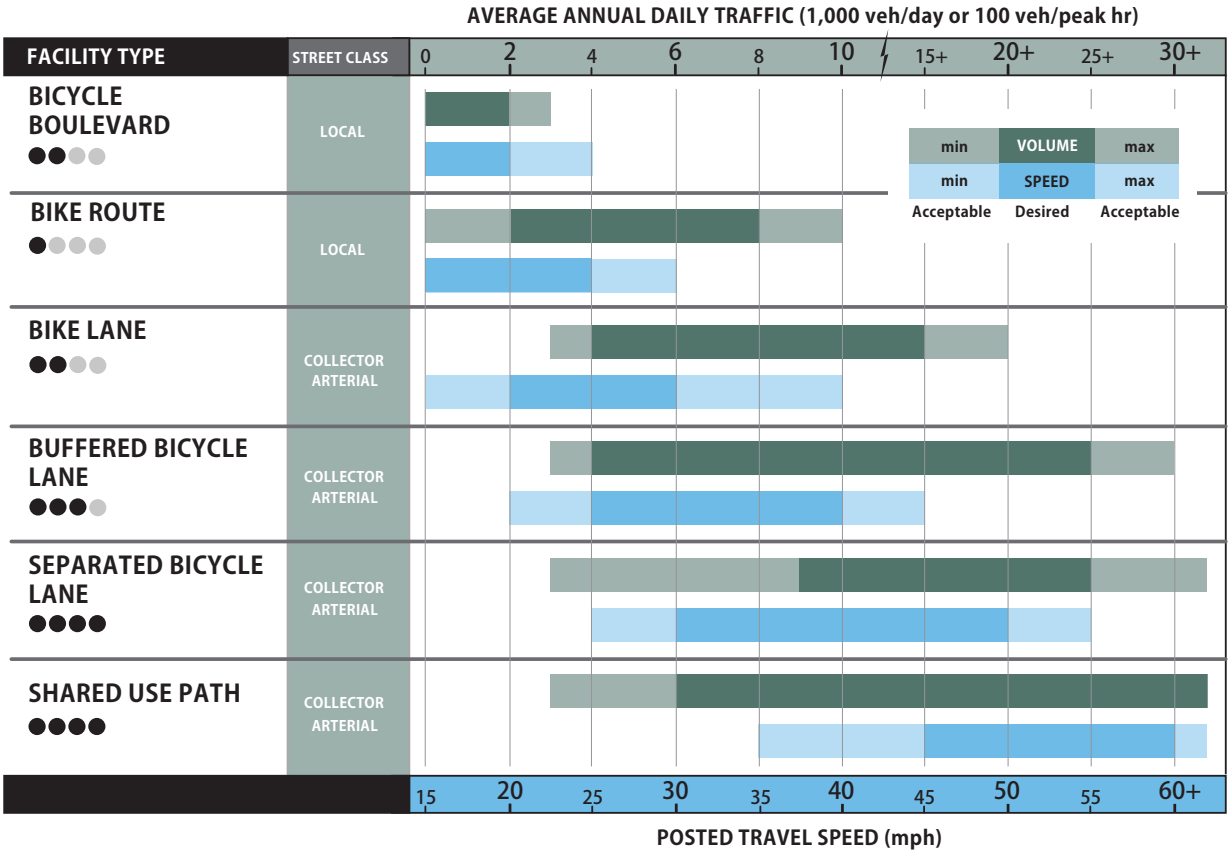
SIGNED BIKE ROUTES

Facility Selection

Selecting the best bikeway facility type for a given roadway can be challenging, due to the range of factors that influence bicycle users' comfort and safety. There is a significant impact on cycling comfort when the speed differential between bicyclists and motor vehicle traffic is high and motor vehicle traffic volumes are high.

This plan identifies recommended facility types for more than 15 specific priority projects, most containing several facility types within each of the corresponding cut-sheets. For recommended routes in this plan where there is no specific facility identified, the chart below can be used to help determine the type of bikeway to be provided in particular roadway speed and volume situations. Keep in mind that many of the route recommendations in this plan are on very rural, low volume roadways, and in many cases no new facility may be needed, other than directional signage. As these routes approach busier roadways and more dense areas, a dedicated facility may be more appropriate, which is where this plan's cut sheets and this chart below factor in.

To use this chart, identify the appropriate daily traffic volume and travel speed on the existing or proposed roadway, and locate the facility types indicated by those key variables (traffic volume, speed, and other data was collected for all NCDOT-owned roadways in this plan and was provided in GIS format to the Cape Fear RPO; it is available upon request to the RPO director). Other factors beyond speed and volume which affect facility selection include traffic mix of automobiles and heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, roadway sight distance, and future development. These factors are not included in the facility selection chart below, but should always be considered in the facility selection and design process. For more information on facility selection, please see **Appendix A: Design Guidelines**.



REGIONAL NETWORK CONCEPT

The Hubs & Spokes Model for Connectivity

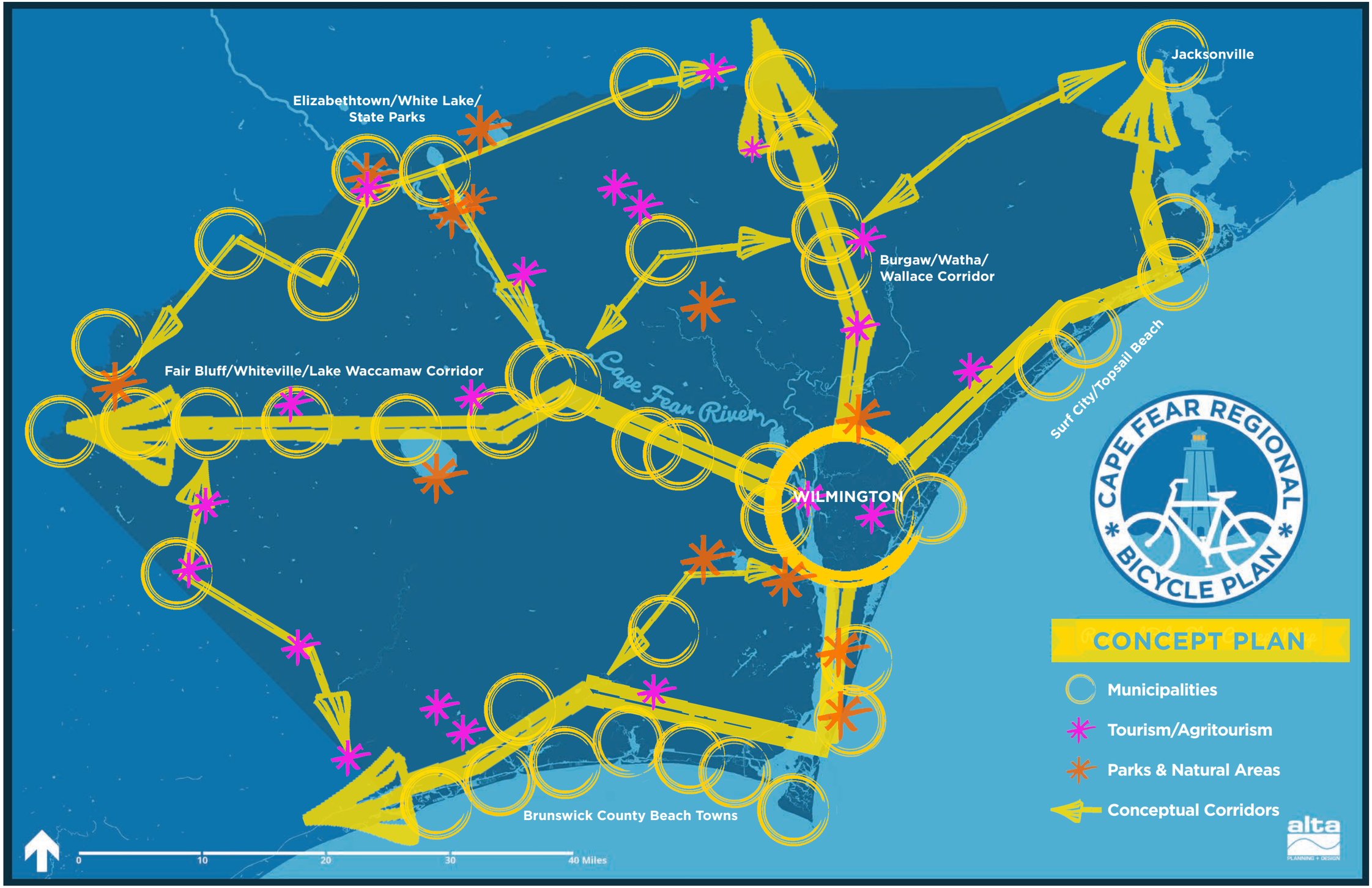
Conceptually, the network recommendations and the destinations they connect can be seen as a network of 'hubs' and 'spokes'. Small towns, beach communities, parks, and other places people like to bike are the 'hubs' of the network, whereas the various bicycle facilities that connect them are the 'spokes' (see graphic below).

Map 3.1: Regional Bicycle Plan Concept Map (on the following page) displays the key routes and destinations of the proposed network, using highly conceptual proposed routes to communicate the overall connections. This map communicates the overall concept of the network.

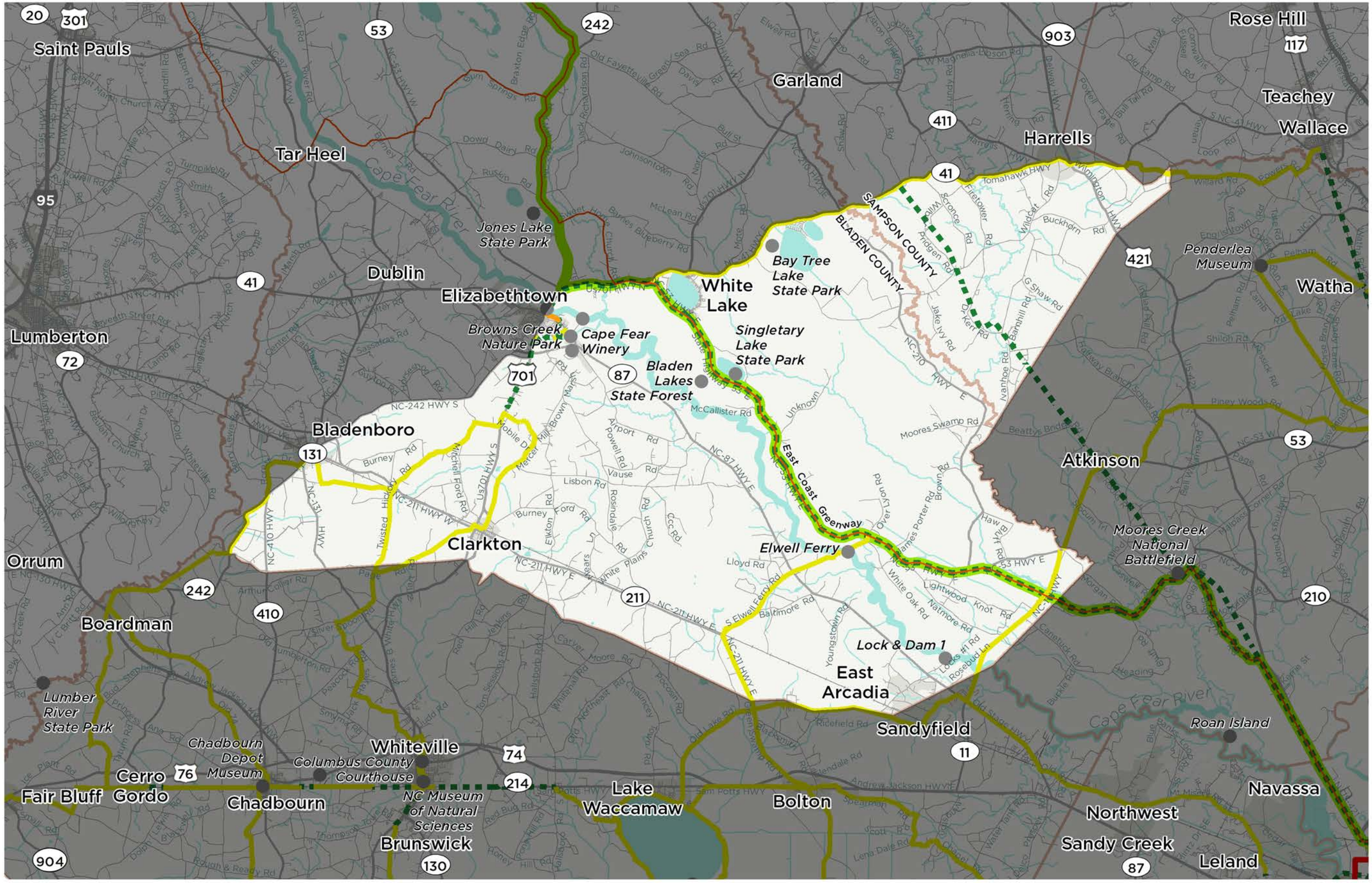
Maps 3.2 to 3.6: Regional Network Maps show the more detailed network of routes and recommendations, representing this plan's long-term vision for a bicycle-friendly region. **In recognition of the fact that greenway trails are long-term projects by nature (and that some of them may be very long term depending on funding and other factors), the on-road recommendations adjacent or parallel to these trails should be pursued and built, regardless of status of future greenway trail projects.** These improvements, along with the program and policy recommendations in subsequent chapters, will allow regional partners to realize the vision and goals of this plan.

Project Cut Sheets are used to show this plan's individual priority projects, followed by brief descriptions of some of the long-term vision projects. Note that where longer-term off-road facilities are recommended, on-road facilities are still desired in the short term on adjacent or nearby roads.

MAP 3.1 - REGIONAL BICYCLE PLAN CONCEPT MAP



MAP 3.2 - LONG-TERM NETWORK: BLADEN + SAMPSON COUNTY

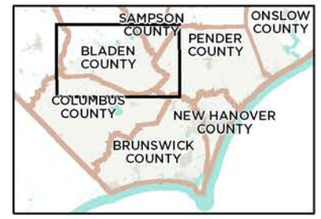


BIKEWAY NETWORK

ON-ROAD BICYCLE FACILITY
- Proposed Regional Network
- Existing

OFF-ROAD SHARED USE PATH
- Proposed Regional Network
- Existing

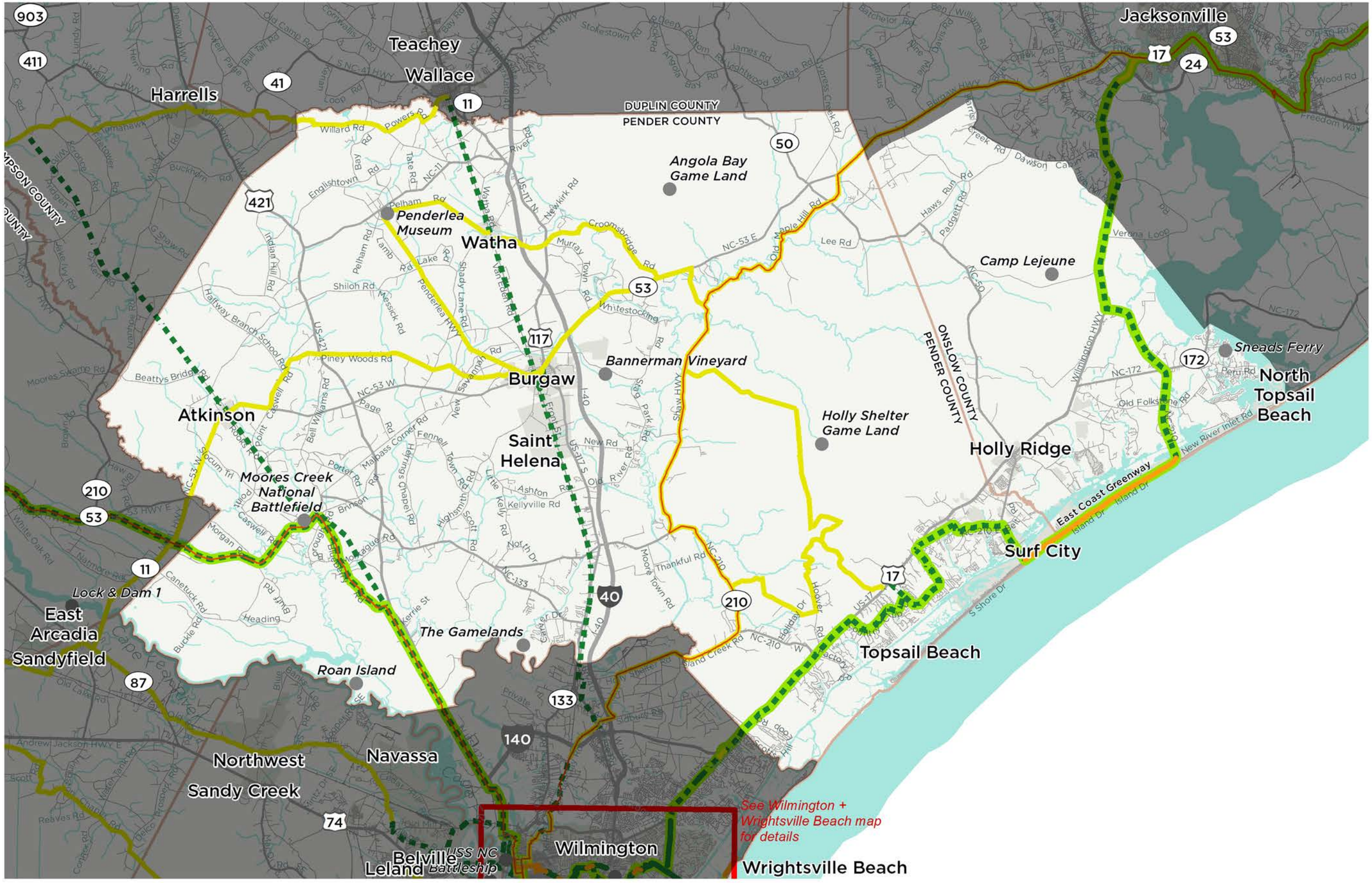
DESTINATIONS + BOUNDARIES
- Regional Destinations
- State Bike Routes
- East Coast Greenway Route
- Water Body
- Municipal Boundary
- Project Study Area
- County Boundary



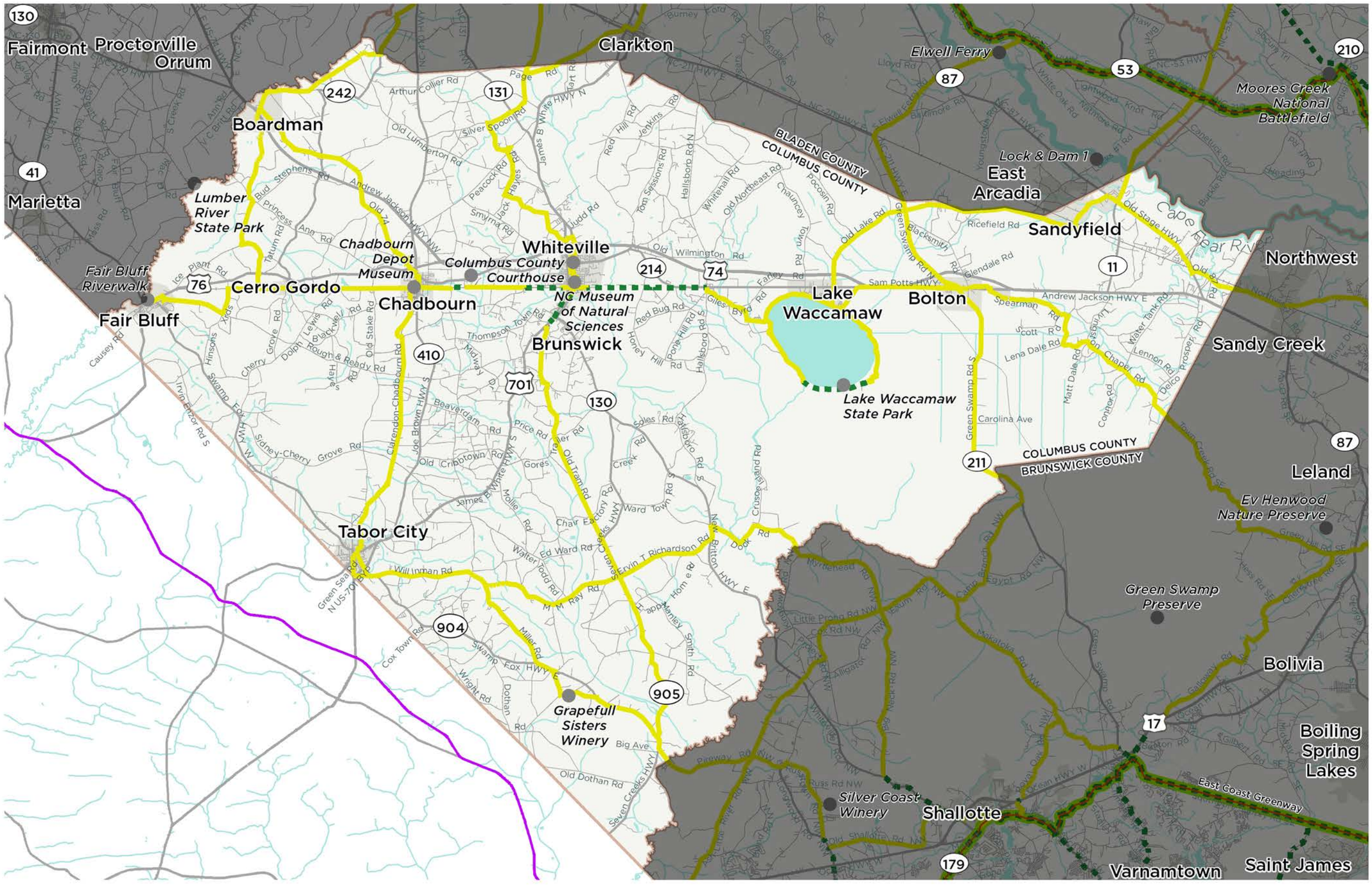
alta PLANNING + DESIGN

0 3 6 MILES

MAP 3.3 - LONG-TERM NETWORK: PENDER + ONSLOW COUNTY



MAP 3.4 - LONG-TERM NETWORK: COLUMBUS COUNTY



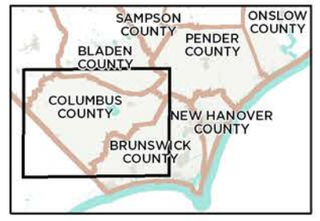
BIKEWAY NETWORK

ON-ROAD BICYCLE FACILITY
- Proposed Regional Network
- Existing

OFF-ROAD SHARED USE PATH
- Proposed Regional Network
- Existing

DESTINATIONS + BOUNDARIES

- Regional Destinations
- State Bike Routes
- East Coast Greenway Route
- South Carolina State Bike Routes
- Water Body
- Municipal Boundary
- Project Study Area
- County Boundary



alta PLANNING + DESIGN

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MAP 3.5 - LONG-TERM NETWORK: BRUNSWICK + NEW HANOVER COUNTY

BIKEWAY NETWORK

ON-ROAD BICYCLE FACILITY

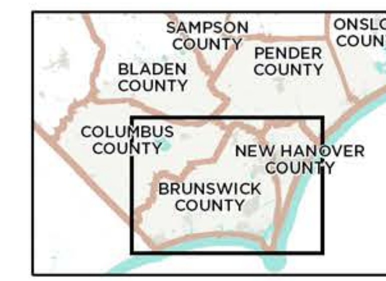
- Proposed Regional Network
- Existing

OFF-ROAD SHARED USE PATH

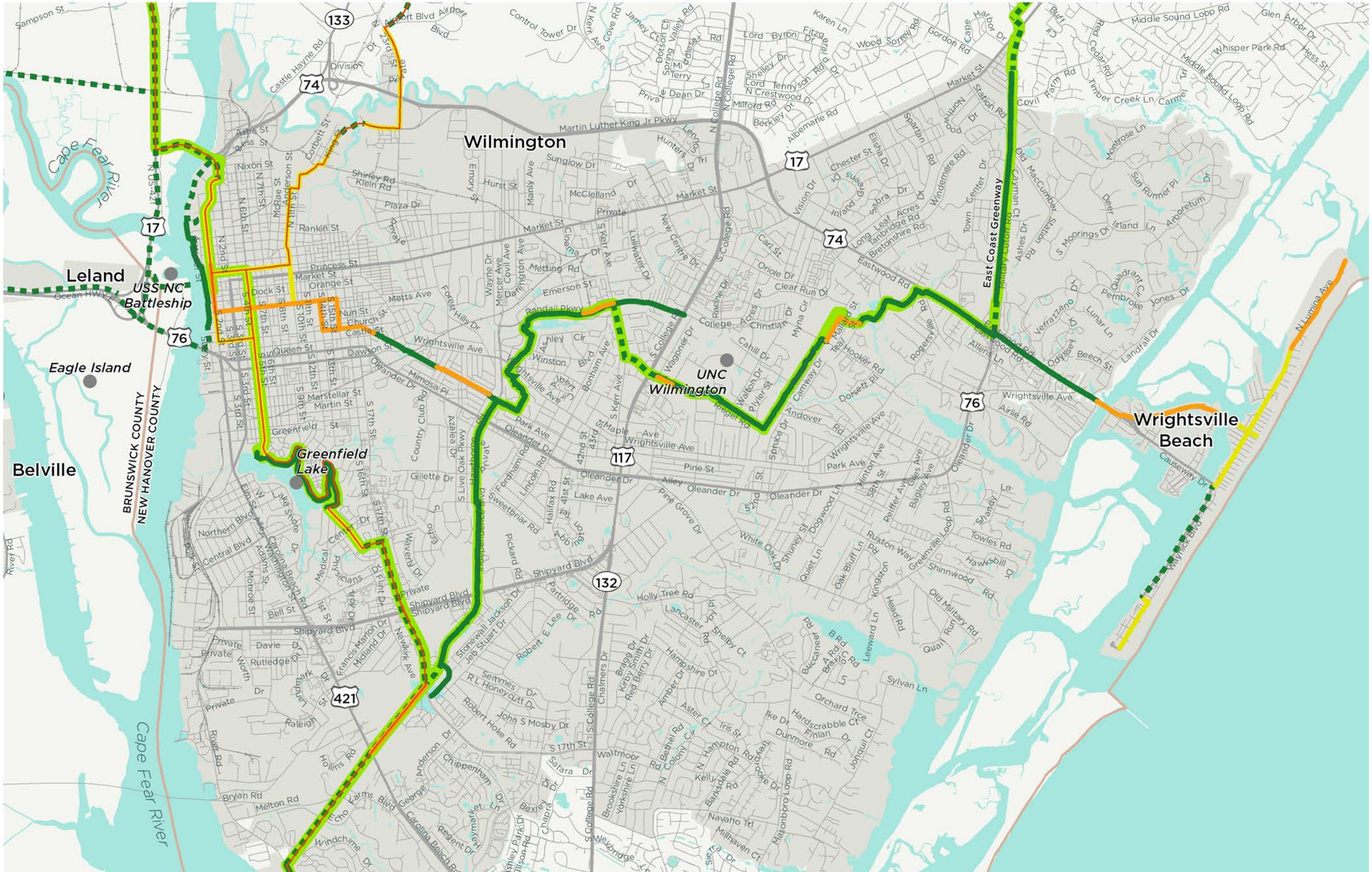
- Proposed Regional Network
- Existing

DESTINATIONS + BOUNDARIES

- Regional Destinations
- State Bike Routes
- East Coast Greenway Route
- South Carolina State Bike Routes
- Water Body
- Municipal Boundary
- Project Study Area
- County Boundary



MAP 3.6 - LONG-TERM NETWORK: WILMINGTON + WRIGHTSVILLE BEACH



BIKEWAY NETWORK

ON-ROAD BICYCLE FACILITY

- Proposed Regional Network
- Existing

OFF-ROAD SHARED USE PATH

- Proposed Regional Network
- Existing

DESTINATIONS + BOUNDARIES

- Regional Destinations
- State Bike Routes
- East Coast Greenway Route
- Water Body
- Municipal Boundary
- Project Study Area
- County Boundary

0 0.6 1.2 MILES

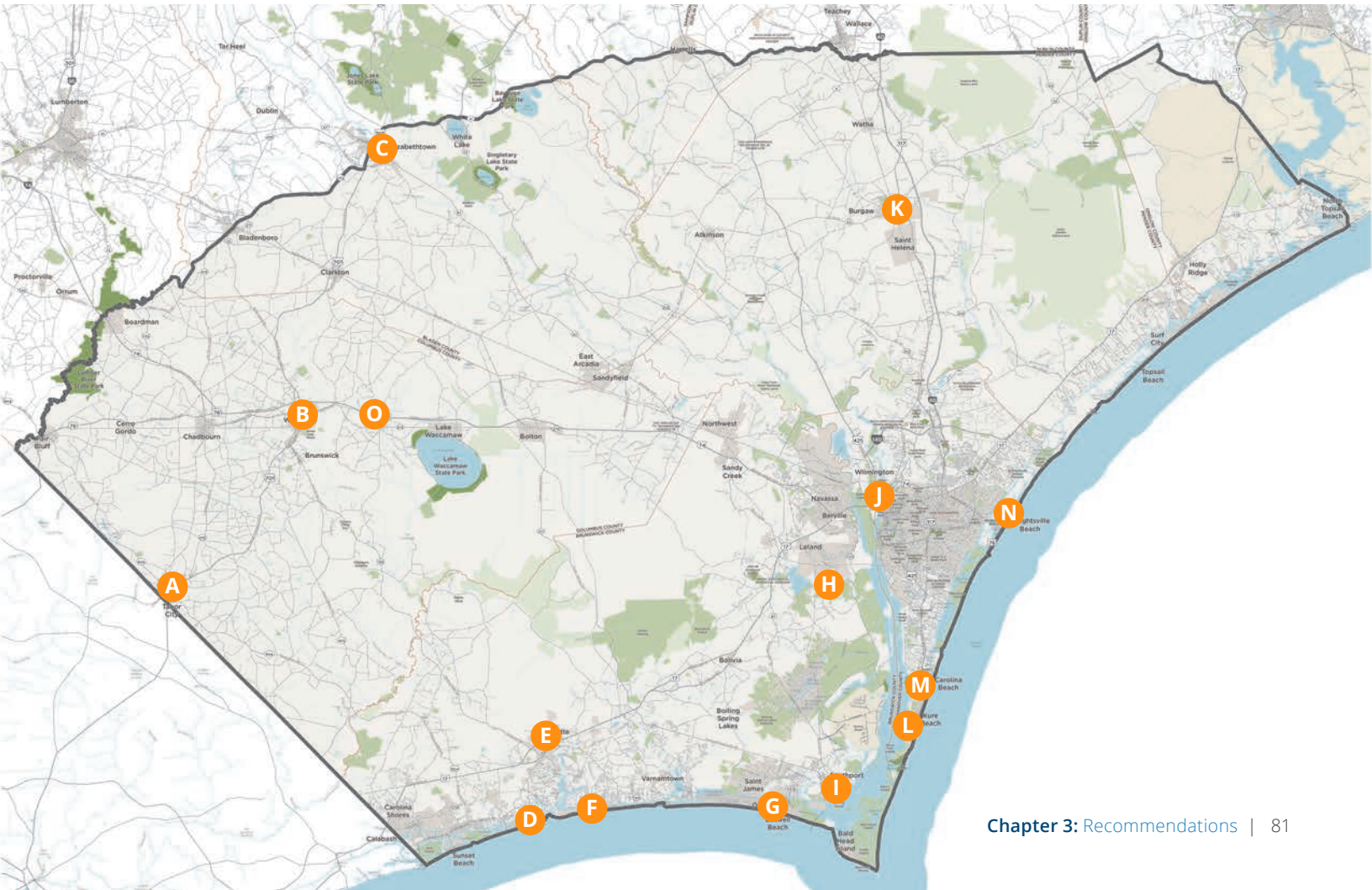
Short Term Priority Projects

The following short-term priority project list was created by utilizing each input category described on page 71 to extract implementable "catalysts" - projects that have the potential to spur further support and momentum in developing the full longer-term network.

Diversity in project type and geography are also key elements across the short-term priority project list. However, most of these projects are located in municipalities for the following reasons: 1) projects in more populated areas increase safety, health, and economic development for a greater number of people, 2) many of the municipal projects are supported in locally adopted plans, and 3) projects in rural areas mainly consist of signage and wayfinding improvements, which are covered in **Chapter 4: Program Recommendations.**

ID	SHORT-TERM PRIORITY PROJECTS
A	*Tabor City Through-Route*
B	*Whiteville Separated Bike Lanes*
C	*Southeast Elizabethtown*
D	*Ocean Isle Beach*
E	*Shallotte Riverfront Town Center*
F	*Holden Beach*
G	*Oak Island & Caswell Beach*
H	*Leland to Brunswick Nature Park*
I	*Southport Through-Route*
J	*Love Grove Bridge - North Wilmington*
K	*Burgaw Osgood Canal Greenway Link*
L	*Kure Beach Through-Route*
M	*Carolina Beach Through-Route*
N	*Wrightsville Beach*
O	*Whiteville to Lake Waccamaw*

PRIORITY PROJECT LOCATIONS (See cut-sheets for details on each project, listed from west to east)



PRIORITY PROJECT

A

TABOR CITY THROUGH-ROUTE

From the Emerson Church Rd/Old Stake Rd intersection to the Swamp Fox Hwy & Will Inman Rd intersection via downtown Tabor City

This project creates a north/south bicycling artery through the heart of Tabor City, with two options through town, and is bookended by lower traffic volume, scenic roadways with greater regional connectivity.

PROJECT AT A GLANCE

- Project location: Tabor City, Columbus County
- Project type: Bike lane and shared lane
- Length: 5.4 miles

PREVIOUS PLANNING

- 2015 Tabor City Comprehensive Transportation Plan

SAFETY

- No bicycle facilities currently exist in Tabor City and this project would create dedicated bicycle facilities through much of this corridor including parts of Old Stake Rd and Complex Rd that have a 55 mph posted speed limit along with other sections that are posted at 35 mph.

ACCESS

- Enhances access to Tabor City Elementary School, downtown Tabor City, and the Tabor City Recreation Complex.

DEMAND

- This project is within one mile of nearly every resident in Tabor City. It also provides direct access to the downtown commercial core.

CONNECTIVITY

- This project would create the first dedicated bicycling facilities in Tabor City and would directly connect to the greater regional network of lower traffic volume, scenic roadways outside of the town limits and across Columbus County.

PLANNING LEVEL COST ESTIMATE

- $1,751,482.08

Existing conditions in Tabor City (above), and a conceptual rendering of what this corridor might look like with bicycle shared-lane markings (right).

Project Opportunities, Constraints, and Details

Construct bike lanes by adding pavement along Stake Rd from Emerson Church Rd to Canal St

Construct bike lanes by restriping along Stake Rd from 8th St to Canal St (38-40' pavement width)

Construct bike lanes by adding pavement along Stake Rd from Carter St to 8th St

Implement shared lane markings along Stake Rd from 5th St to Carter St

Construct bike lanes by restriping along 5th St from Hickman Rd to Stake Rd (32-46' pavement width)

Implement shared lane markings in the downtown core along Hickman Rd from 3rd St to 5th St

Construct bike lanes by restriping Pireway Rd from 5th St to US 701 Byp (34-36' pavement width)

Construct bike lanes by restriping along Hickman Rd from Complex St to 3rd St (40-42' pavement width)

Construct bike lanes by adding pavement along Pireway Rd from US 701 Byp to Swamp Fox Hwy

Construct bike lanes by adding pavement along Complex St/Swamp Fox Hwy from Hickman Rd to Will Inman Rd

All roads in this project are NCDOT maintained

PRIORITY PROJECT B

WHITEVILLE SEPARATED BIKE LANES

From the S Madison St/Lee St/Franklin St intersection to the Government Complex Rd/US 701 Byp intersection

This project provides north/south options for bicyclists through the heart of Whiteville, eventually connecting to rural scenic roads in Columbus County and the greater regional network. Madison St and Pinckney St serve as the backbone of the recommendations while options along Lee St and Franklin St are complementary and viable alternatives.

PROJECT AT A GLANCE

- Project location: Whiteville, Columbus County
- Project type: Separated bike lanes, bike lane, and shared lane
- Length: 5 miles

PREVIOUS PLANNING

- 2014 Whiteville Pedestrian Plan

SAFETY

- Dedicated bicycle facilities are currently non-existent through the downtown core of Whiteville and this project would complete the first separated bike lanes in Columbus County.
- One bicycle crash was recorded along this corridor from 2007-2013; six other bicycle crashes were recorded along JK Powell Blvd that is parallel to Madison St and Pinckney St.

ACCESS

- Enhances access to the Columbus County Community Farmer's Market, Doc Currie Park, the Columbus County Courthouse, North Carolina Museum of Forestry and Whiteville's downtown core.

DEMAND

- This project provides access to multiple neighborhoods and is within 1.5 miles of nearly every resident in Whiteville. It also provides access to the downtown commercial core as well as connectivity to the commercial corridor along JK Powell Blvd via short side streets.

CONNECTIVITY

- This project would include the first on-road separated bike lanes in Columbus County and would further connectivity to scenic, low traffic volume roadways with greater regional connectivity.

PLANNING LEVEL COST ESTIMATE

- $2,269,210.39

Existing conditions in Whiteville (above), and a conceptual rendering of what this corridor might look like with separated bicycle lanes (right).

Project Opportunities, Constraints, and Details

Construct bike lanes by adding pavement to Government Complex Rd from James B White Highway to the US 701B/Campground Rd intersection; ensure bicycle crossing facilities are included at this intersection as part of future improvements to the James K Powell Blvd corridor (NCDOT roadway improvement project)

Construct bike lanes by adding pavement to Pinckney St/James B White Highway N to Government Complex Rd, expanding the sections of existing paved shoulder as appropriate

Construct separated bike lanes on Pinckney St from the Columbus County Courthouse, north to Warrior Trail where the pavement narrows (34-36' pavement width)

Implement shared lane markings along Oliver St and Lee St from Pinckney St to Washington St

See Appendix A: Design Guidelines page A-34 for guidance regarding bicyclists through roundabouts. The recently constructed sidewalks could be retrofitted to accommodate bicyclists

Construct separated bike lanes along Lee St from Washington St to Calhoun St (36-38' pavement width)

Construct separated bikelanes on S Madison St from Webster St to the Columbus County Courthouse (40-46' pavement width)

Implement shared lane markings along Calhoun St from Lee St to Franklin St

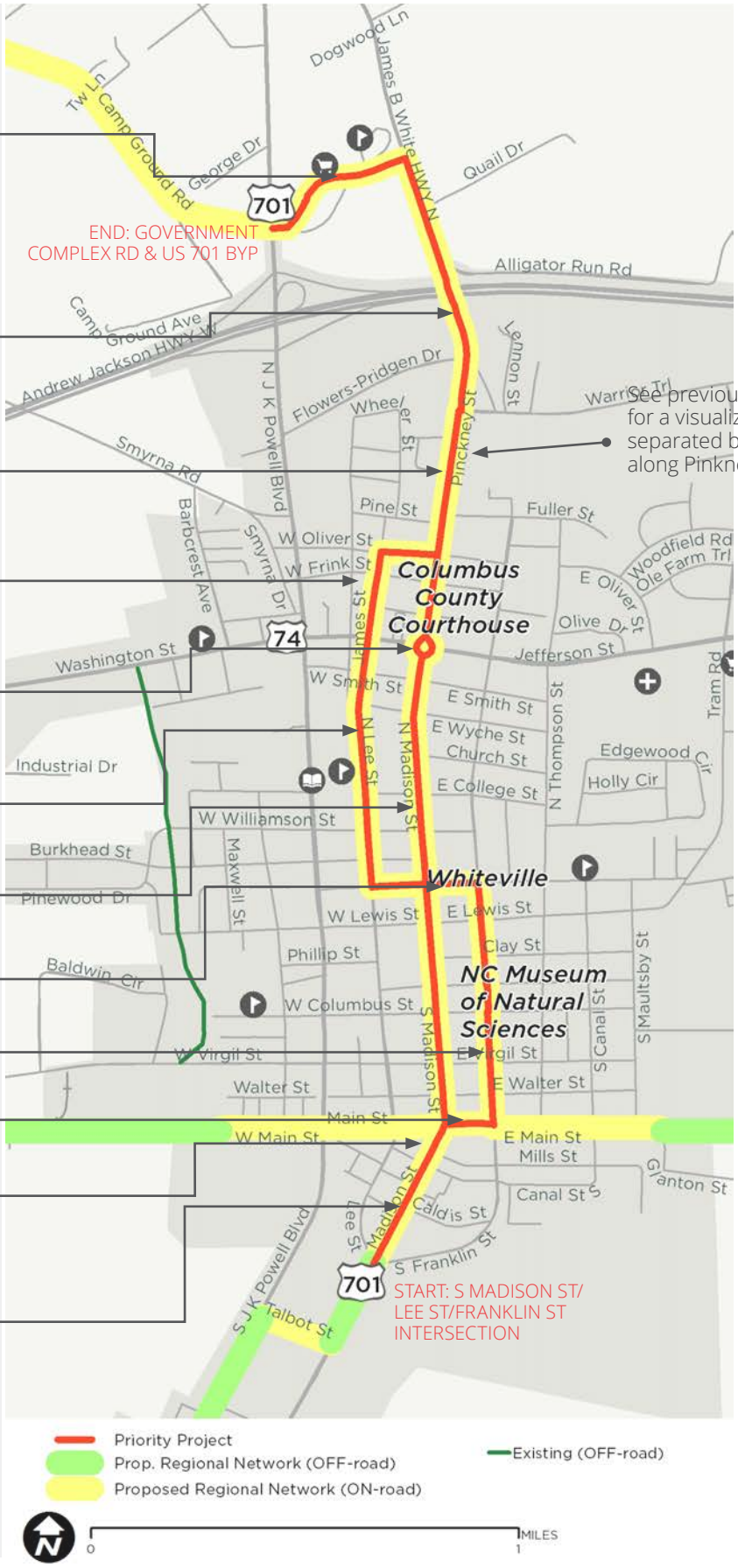
Construct separated bike lanes along Franklin St from Main St to Calhoun St (44-48' pavement width)

Implement shared lane markings along Main St from Madison St to Franklin St

Implement shared lane markings through downtown along S. Madison St from Pecan St to Webster St

Construct separated bike lanes along S Madison St from the Lee St/Franklin St intersection north to Pecan St where the downtown parallel parking begins (40-42' pavement width)

All roads in this project are NCDOT maintained except for Webster St and Lee St north of Washington St



PRIORITY PROJECT C

SOUTHEAST ELIZABETHTOWN

From Elizabethtown Middle School to the Broad St bike lanes via Browns Creek Nature Park

This project creates a bicycling artery through key locations in Elizabethtown where a nascent internal bicycle network is taking form. It will serve as an essential element of the greater regional network in this area of the Cape Fear region.

PROJECT AT A GLANCE

- Project location: Elizabethtown, Bladen County
- Project type: Shared use path and shared lane
- Length: 3.3 miles

PREVIOUS PLANNING

- 2015 Elizabethtown Bicycle Plan
- 2015 Bladen County Comprehensive Transportation Plan Bicycle Map

SAFETY

- The bicycle network is currently incomplete through Elizabethtown. S Poplar St carries high traffic volumes and has a posted speed limit of 45 mph. E Broad St also has a posted speed limit of 45 mph.
- One bicycle crash was recorded along S Poplar St from 2007-2013.

ACCESS

- Enhances access to Elizabethtown Middle School, Browns Creek Nature Park, Cape Fear River Access points, and downtown Elizabethtown.

DEMAND

- This project is within one mile of nearly every resident in Elizabethtown (besides the far west side of town limits) and connects directly to the downtown commercial area.

CONNECTIVITY

- This project would extend bicycle connectivity from downtown Elizabethtown east of the E Broad St bike lanes through Browns Creek Nature Park and serve as the main bicycling artery to the south and east side of the town. This is essential for greater connectivity to the regional network that will extend toward White Lake to the north and toward Bladen County Park, Clarkton, and Bladenboro to the south.

PLANNING LEVEL COST ESTIMATE

- $1,581,339.75

Project Opportunities, Constraints, and Details

Construct a sidepath from the eastern terminus of the E Broad St bike lanes to Eastway Ave

Implement shared lane markings along Eastway Ave and Winding Creek Rd and Winter Circle from E Broad St to Browns Creek Nature Park

Construct a shared use path connection from Winding Creek Rd to the gap between Eastway Ave utilizing existing water/sewer corridors

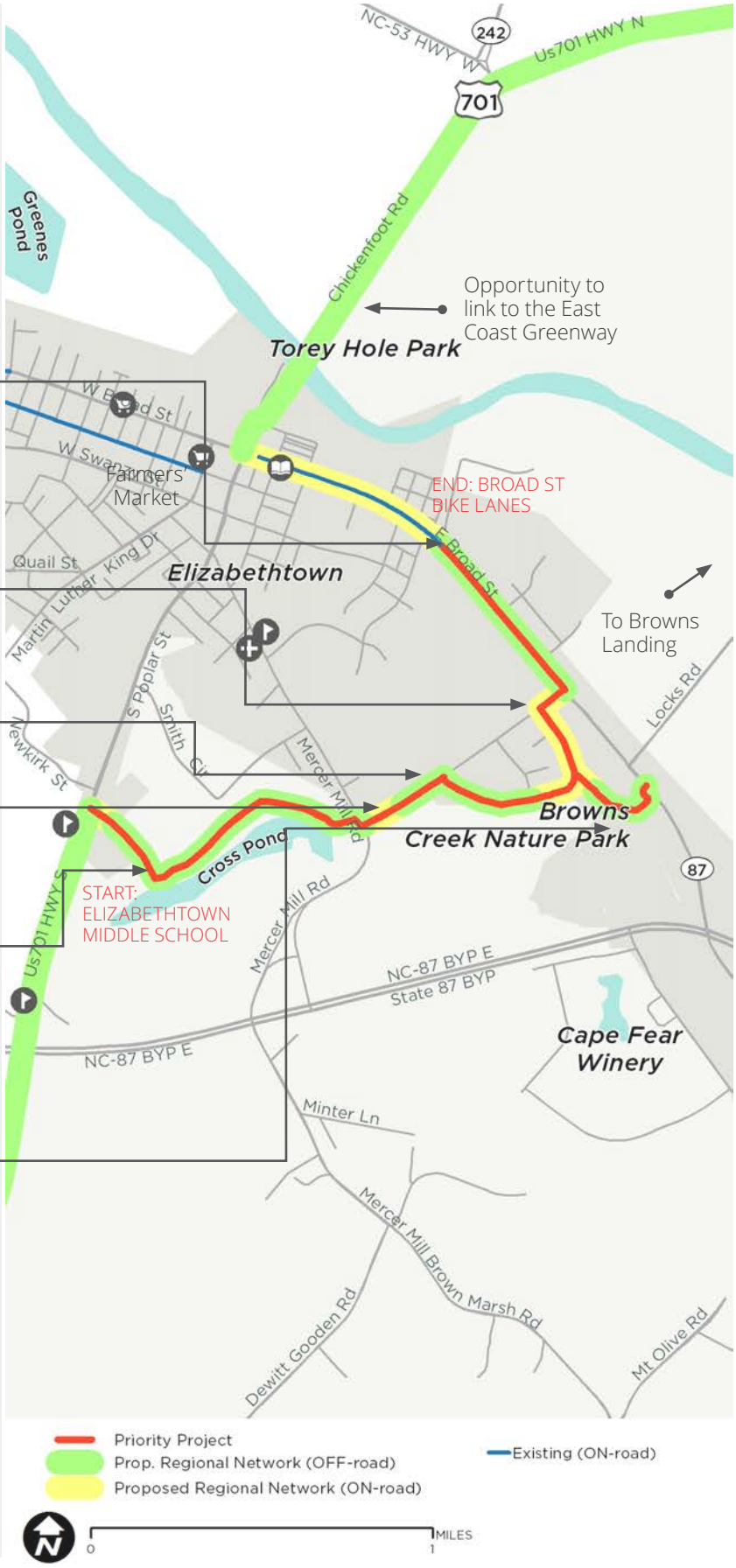
Implement shared lane markings along the short western piece of Eastway Ave to Mercer Mill Rd

Construct a shared use path from Mercer Mill Rd to the access from S Poplar St to the north side of the Bladen County Board of Education Building; implement shared lane markings along the short length of the access road to S Poplar St and create a bicycle crossing of S Poplar St to Elizabethtown Middle School

Construct a shared use path connection from Winter Circle to Browns Creek Nature Park

See the Elizabethtown Bicycle Plan for other recommended bicycle facilities throughout town.

Broad St is the only section of roadway that is NCDOT maintained in this project



PRIORITY PROJECT D

OCEAN ISLE BEACH

From western end of Ocean Isle West Boulevard to Ferry Landing Park

This project would provide connectivity for bicyclists the length of Ocean Isle Beach, including multiple beach access opportunities and easy connectivity to each neighborhood on the island.

PROJECT AT A GLANCE

- Project location: Ocean Isle Beach, Brunswick County
- Project type: Bike lanes, shared lane, and sidepath (the 2014 Ocean Isle Beach Bicycle & Pedestrian Plan recommends a sidepath along this corridor as the highest priority project; However, bike lanes are being proposed in this plan due to right-of-way concerns that have arisen since the 2014 plan.)
- Length: 5 miles

PREVIOUS PLANNING

- 2014 Ocean Isle Beach Bicycle & Pedestrian Plan

SAFETY

- This project provides dedicated space for bicyclists where no such space currently exists along roadways (Ocean Isle West Blvd, and 1st St) that currently have a 35 mph posted speed limit.
- Two bicycle crashes were recorded along E 1st St from 2007-2013.

ACCESS

- This project connects directly to over 20 beach access points, OIB Commercial Center, OIB Community Center, and Ferry Landing Park.

DEMAND

- This project is within a half mile from every resident on the island.
- According to the Town of Ocean Isle Beach website, approximately 25,000 people visit Ocean Isle Beach weekly during the summer months.

CONNECTIVITY

- Presently no bicycle facilities are limited and disconnected and this would be critical project dedicating space to bicyclists the length of the community.

PLANNING LEVEL COST ESTIMATE

- $2,759,955.91

Existing conditions in Ocean Isle Beach (above), and a conceptual rendering of what this corridor might look like with bicycle lanes (right).

Project Opportunities, Constraints, and Details

Implement water taxi service for bicyclists and pedestrians to Holden Beach (see programs chapter)

Construct sidepath along the west side of Shallotte Blvd to complete the connection to Ferry Landing Park

Implement shared lane markings along Winston-Salem St and E 4th St to connect to Shallotte Blvd

Bike lane construction by roadway widening would continue along E 1st St, ending here at Winston-Salem St

Ocean Isle Beach Community Center

Any future bridge replacement should include a road separated sidepath for both bicyclists and pedestrians

Ocean Isle Beach Causeway Commercial Center

From the 2014 OIB Bicycle & Pedestrian Plan: "A sidepath on the north side of 1st street would provide a walking and bicycling connection from the west end to the center of town. This section was the 2nd-most frequently mentioned location in need of walking and bicycling improvements in the 2014 Public Comment Form." *

From the 2014 OIB Bicycle & Pedestrian Plan: "Ocean Isle West Blvd lacks both sidewalks and bicycle facilities and is constrained by bollards, making it difficult for people to walk and bike into town. The Town should work with property owners to have a multi-use path installed on the north side along Ocean Isle West Boulevard and Second Street to fill this gap in the network. This section was the most frequently mentioned location in need of walking and bicycling improvements in the 2014 Public Comment Form." *

Implement water taxi service for bicyclists and pedestrians to Sunset Beach (see programs chapter)

1st St from 2nd St to Winston-Salem St is the only section of this project on NCDOT maintained roads

*The 2014 Ocean Isle Beach Bicycle & Pedestrian Plan recommends a sidepath along this corridor as the highest priority project; However, bike lanes are being proposed in this plan due to right-of-way concerns that have arisen since the 2014 plan.

PRIORITY PROJECT

E

SHALLOTTE RIVERFRONT TOWN CENTER

From the Main St/Village Rd intersection to the Main St/Smith Ave intersection

Combined with the Shallotte Riverfront Town Center development, this project, that features separated bike lanes as part of a Main St redesign, could transform the center of Shallotte into an anchor for the East Coast Greenway, NC bike route 3, and overall regional network in a part of the region that presently offers limited options for bicyclists.

PROJECT AT A GLANCE

- Project location: Shallotte, Brunswick County
- Project type: Separated bike lanes and bike lane
- Length: 1.1 miles

PREVIOUS PLANNING

- 2008 Brunswick County Comprehensive Transportation Plan Bicycle Map
- 2016 Shallotte Riverfront Town Center Development Plan

SAFETY

- Besides intermittent paved shoulder along the east side of Main St (US 17 B), no dedicated bicycle facilities currently exist in Shallotte. Main St (US 17 B) carries very high traffic volumes and has a posted speed limit of 35 mph. Shallotte Ave has a posted speed limit of 35 mph with no space dedicated for bicyclists.
- One bicycle crash was recorded along Main St from 2007-2013.

ACCESS

- This project would serve as a central component to ensuring access for bicyclists to the Shallotte Riverfront Town Center project.

DEMAND

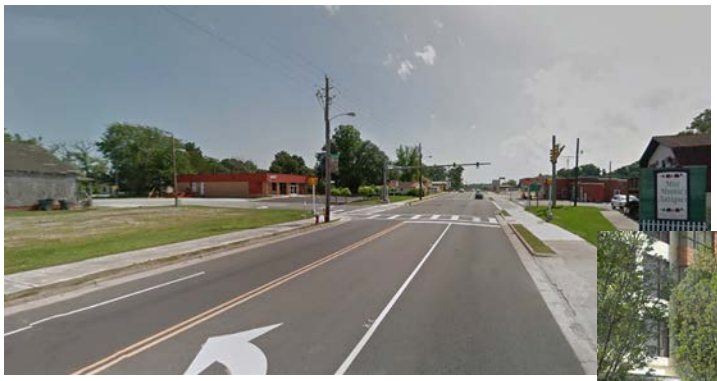
- This project is within 1.5 miles of nearly every resident in Shallotte and would be situated in the center of the Shallotte Riverfront Town Center development.

CONNECTIVITY

- This project would provide a link through the heart of Shallotte and serve as a key addition to the East Coast Greenway and NC bike route 3 with opportunities for expanding connectivity to the north along Smith Ave as well as to the south along Village Ave. The proposed bike lanes along Shallotte Ave would further regional connectivity toward rural, low-traffic volume, scenic roads in western Brunswick County.

PLANNING LEVEL COST ESTIMATE

- $681,003.63



Existing conditions in Shallotte (above), and conceptual improvements that aim to align with preliminary draft redevelopment plans (right).

Project Opportunities, Constraints, and Details

This project should be expanded along with future development and/or conservation in the open space south and east of Main St and Smith Ave

White St will serve as a key corridor in furthering greater regional connectivity to Whiteville Rd and lower-traffic volume, scenic roads in western Brunswick County

Ideally construct bike lanes along Shallotte Ave from Main St to White St by widening the road - due to the recently constructed sidewalks, further study may be needed as to whether dedicated bike lanes or shared lane markings would be more feasible

Construct separated bike lanes on Main St from Village Rd to Smith Ave, working with local partners to incorporate this project as part of the Shallotte Riverfront Town Center development; designate this section as part of the East Coast Greenway as well as NC bike route 3

Provide link to the proposed Riverwalk along the Shallotte River that could also serve as a connection to Mulberry Park (Mulberry St)

All roads in this project are NCDOT maintained

PRIORITY PROJECT

F

HOLDEN BEACH

From the western terminus of the publicly maintained Ocean Blvd West to the eastern terminus of McCray St

This project would provide a link for bicyclists the length of the publicly accessible portion of Holden Beach, including multiple beach access opportunities and easy connectivity to each neighborhood on the island.

PROJECT AT A GLANCE

- Project location: Holden Beach, Brunswick County
- Project type: Bike Lanes
- Length: 6.4 miles

PREVIOUS PLANNING

- The 2012 Town of Holden Beach Parks & Recreation Master Plan

SAFETY

- This project provides dedicated space for bicyclists where no such space currently exists along a roadway (Ocean Blvd) that currently has a 35 mph posted speed limit.

ACCESS

- Enhances access to 22 beach access points, local parks and recreation facilities, and the town center.

DEMAND

- This project is within a half mile from almost every resident on the island.

CONNECTIVITY

- This would be the first project dedicating space to bicyclists in Holden Beach. The 'Olden Holden Bike Tour' is a bike route totaling 20 miles that connects scenic and historical points in Holden Beach. Bike Lanes along Ocean Blvd W would significantly enhance connectivity for this route.

PLANNING LEVEL COST ESTIMATE

- $3,582,632.34

Project Opportunities, Constraints, and Details

Implement water taxi service for bicyclists and pedestrians to Oak Island (see programs chapter)

Connects directly to several historical locations along the northeastern portion of the 'Olden' Holden Bike Tour

Any future bridge replacement should include a road separated sidepath and bicycle lanes similar to the Surf City bridge project that is currently under construction

Holden Beach town center

Bike Lanes (ideally buffered) should be constructed along the length of Ocean Blvd by widening the pavement (currently 21-22') of Ocean Blvd. This should be implemented with resurfacing scheduled for Ocean Blvd FY 2018

Ocean Blvd W is the only roadway corridor for the residents to the west - this project is the only opportunity to ensure connectivity for these residents

This project would link to Butterfly Pocket Park here with neighborhood connectivity to Sand Dollar Park

Another pocket park along the marsh north of Ocean Blvd W would be directly connected by this project and could serve as a scenic resting spot for bicyclists

The western terminus of the publicly maintained stretch of Ocean Blvd W ends just after Shell Dr at the gated entrance of the private community at the southwestern end of the island

Implement water taxi service for bicyclists and pedestrians to Ocean Isle Beach (see programs chapter)

All roads in this project are NCDOT maintained

PRIORITY PROJECT G

OAK ISLAND & CASWELL BEACH

From the Kings Lynn Dr and W Lynn Dr public beach access points to the eastern terminus of Caswell Beach Rd

This project would provide a link for bicyclists along the length of the publicly accessible portion of Oak Island and Caswell Beach, including multiple beach access opportunities and easy connectivity to nearly every neighborhood on the island.

PROJECT AT A GLANCE

- Project location: Oak Island and Caswell Beach, Brunswick County
- Project type: Bike lanes and sidepath
- Length: 11.8 miles

PREVIOUS PLANNING

- 2006 Oak Island Bicycle Transportation Plan
- 2008 Brunswick County Comprehensive Transportation Plan Bicycle Map

SAFETY

- This project provides dedicated space for bicyclists where no such space currently exists along Oak Island Dr and Country Club Dr. This corridor currently has a 35 - 45 mph posted speed limit and carries high traffic volumes.
- Eight bicycle crashes were recorded along Oak Island Dr from 2007-2013; seven other bicycle crashes were recorded along roadways paralleling Oak Island Dr.

ACCESS

- Enhances access to the Town's 65 public beach access points, local parks and recreation facilities, and commercial areas.

DEMAND

- This project is within half a mile from almost every resident on the island.

CONNECTIVITY

- Presently a 4' paved shoulder exists along much of Beach Dr and should be widened and formalized into bicycle lanes. Otherwise, no roadway separated bicycle facilities exist on Oak Island and Caswell Beach and this would be the first project dedicating formalized space to bicyclists.

PLANNING LEVEL COST ESTIMATE

- $5,226,781.74

Project Opportunities, Constraints, and Details

Construct bike lanes along the residential stretch of Caswell Beach Dr by widening the pavement. This would complete the link to the Oak Island Lighthouse and the eastern terminus of Caswell Beach Rd; consider lowering the posted speed limit from 35 mph to 25 mph

Any future bridge replacement should include a road separated sidepath and bicycle lanes similar to the Surf City bridge project that is currently under construction

Construct a sidepath along the east and north side of Country Club Rd/ Caswell Beach Rd utilizing ample space along this stretch from Oak Island Dr to the residential stretch of Caswell Beach Rd east of Oceangreens Lane

A sidepath should be constructed along Oak Island Dr, from the S Middleton Ave bridge to Country Club Dr, replacing the existing sidewalk on the south side of the road

Any future bridge replacement should include a road separated sidepath and bicycle lanes similar to the Surf City bridge project that is currently under construction; in the short term, the existing 4'-6' paved shoulder should be formalized as bicycle lanes

4' paved shoulder exists along the length of Beach Dr; this section should be widened and formalized into bike lanes; consider lowering speed limit from 45 mph to 30 mph

Implement shared lane markings along the length of Kings Lynn Dr to the Kings Lynn beach access

Implement water taxi service for bicyclists and pedestrians to Holden Beach (see programs chapter)

All roads in this project are NCDOT maintained

PRIORITY PROJECT

H

LELAND TO BRUNSWICK NATURE PARK

From US 17 and Westgate Nature Park to Daws Creek Rd just south of Brunswick Nature Park

This project would significantly enhance bicycling opportunities across eastern Brunswick County and provide a key shared use path link through Leland.

PROJECT AT A GLANCE

- Project location: Leland, Brunswick County
- Project type: Shared use path, sidepath
- Length: 7.4 miles

PREVIOUS PLANNING

- 2009 Leland Bicycle Plan
- 2016 Leland Pedestrian Plan

SAFETY

- This project creates a shared use path along a corridor where no bicycle facilities currently exist and allows bicyclists to move safely across Leland, avoiding US 17 which carries high traffic volumes and a 45-55 mph posted speed limit.

ACCESS

- Enhances access to the commercial area along US 17, Westgate Nature Park, and Brunswick County Nature Park.

DEMAND

- This project provides access to multiple neighborhoods that continue to grow in south Leland along with the commercial area along US 17.

CONNECTIVITY

- This project links to an existing shared use path at Westgate Nature Park and an existing network of sidepaths in Leland's southwestern neighborhoods. This project would serve as the main bicycling artery through south/central Leland.

PLANNING LEVEL COST ESTIMATE

- $4,526,592.93

Existing conditions in Leland (above), and a conceptual rendering of what this corridor might look like with a shared use path (right).

Project Opportunities, Constraints, and Details

Crossing US 17 at Ploof Rd will be a key element in greater regional connectivity to the north; significant commercial activity characterizes this stretch of US 17

Construct a sidepath along US 17, Ocean Gate Plaza and W Gate Rd

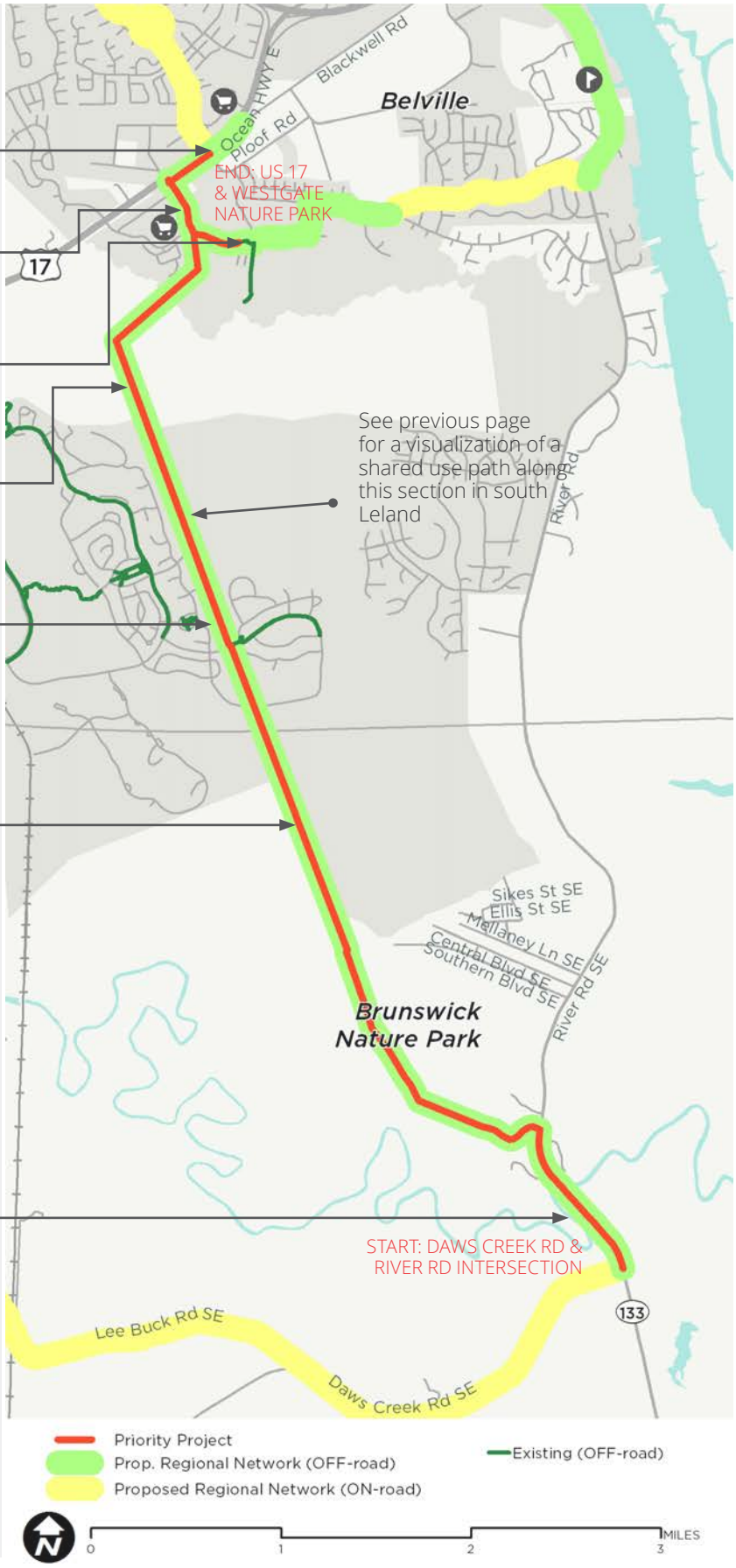
An existing and developing trail network at Westgate Nature Park connects this project to the park and residential neighborhoods to the east and south

Several creeks along this corridor will require bridge and/or boardwalk construction

Several connection opportunities to south Leland neighborhoods and an existing/developing sidepath network

This section continues southeast along Wire Road (dirt); several stream crossings will need further examination

Construct sidepath along this section of River Rd to Daws Creek Rd which is a key link to greater regional connectivity



PRIORITY PROJECT

I

SOUTHPORT THROUGH-ROUTE

From the existing bike lanes along E Moore St to N Howe St

This project directs bicyclists along the scenic waterfront and neighborhood roads in the downtown area of Southport and avoids NC 211 through downtown which currently has limited opportunities for separated bicycle facilities and carries high traffic volumes. This is combined with a priority greenway project recommended in Southport's 2014 Comprehensive Pedestrian Plan. NC bike route 3 and the East Coast Greenway should be rerouted to match the new facilities once constructed.

PROJECT AT A GLANCE

- Project location: Southport, Brunswick County
- Project type: Shared lane and shared use path
- Length: 2.6 miles

PREVIOUS PLANNING

- 2008 Brunswick County Comprehensive Transportation Plan Bicycle Map
- 2014 Southport Comprehensive Pedestrian
- 2016 Conceptual Brunswick County Greenway, Bikeway, and Paddle Trail network

SAFETY

- Currently, bike route signage (NC 3) sends bicyclists through downtown Southport on NC 211 which carries high traffic volumes and has a 35 mph posted speed limit north of downtown. This project routes bicyclists onto scenic-waterfront and quiet-neighborhood roads that carry very low traffic volumes and traffic speeds, terminating at the northern end of N Caswell St. The recommended shared use path along this northern section provides a dedicated facility separated from roadway traffic where no such facilities currently exist.
- 3 bicycle crashes were recorded along this corridor from 2007-2013.

ACCESS

- Enhances access to the waterfront, Waterfront Park, and Brunswick Community College - Southport Center, the Southport Senior Center, and Tidewater Plaza.

DEMAND

- This project provides access to multiple neighborhoods and is within one mile of nearly every resident in Southport. It also provides parallel access to the downtown commercial area.

CONNECTIVITY

- This project links the existing bike lanes along E Moore St and would consolidate the East Coast Greenway and NC bike route 3 through the downtown waterfront and neighborhoods of Southport, eventually connecting back to NC 211 (and future paved shoulders as part of the roadway widening project) via the recommended route. This project also links to multiple local bike routes as well as existing bike lanes on W 9th St.

PLANNING LEVEL COST ESTIMATE

- $411,858.15

Project Opportunities, Constraints, and Details

The NCDOT NC 211 roadway widening project will include 4'-5' paved shoulders along NC 211 from Southport to Supply

Construct shared use path from the end of N Caswell St to Tidewater Plaza, connecting to the Southport Senior Center and Tidewater Plaza

A spur connection could be considered on E Leonard St in the form of a sidepath or bicycle lanes, which would connect many residents in this area to downtown and the waterfront.

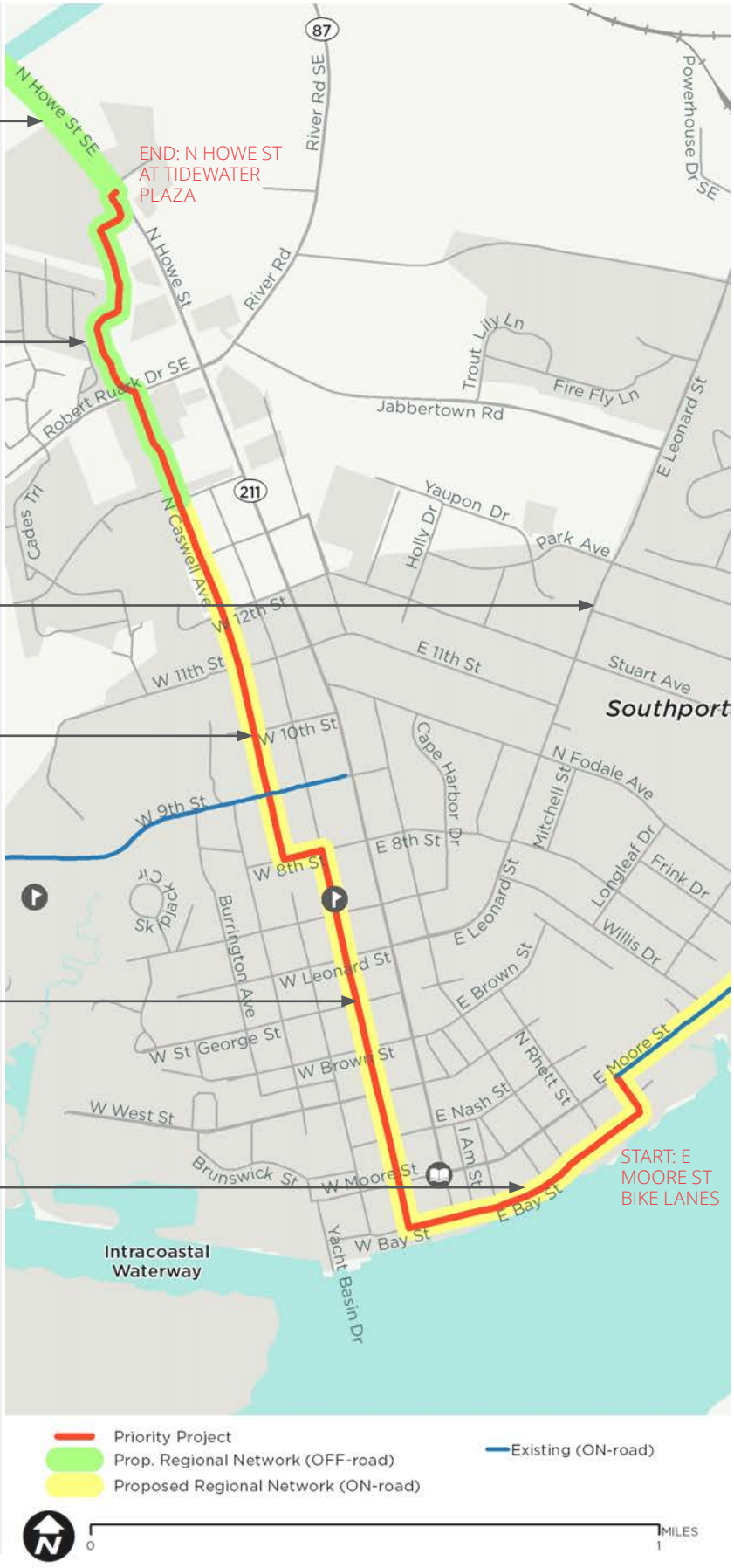
Implement shared lane markings along N Caswell St from 8th St to the northern terminus of N Caswell Ave to the recommended shared use path

Implement shared lane markings along Lord St and 8th St from Bay St to N Caswell Ave, connecting to the Brunswick Community College - Southport Center

Implement shared lane markings along Kingsley St and Bay St from the western terminus of the E Moore St bike lanes to Lord St, connecting to Waterfront Park

This recommended bike route and shared use path should become Southport's section of both the East Coast Greenway and NC bike route 3 (Ports of Call)

All roads in this project are locally maintained



PRIORITY PROJECT J

LOVE GROVE BRIDGE - NORTH WILMINGTON

From the Princess St/10th St intersection to the Smith Creek Blvd/23rd St intersection

This project directs bicyclists through a neighborhood route that utilizes the future Love Grove Bridge sidepath (pending 2017 construction) in connecting to N 23rd St from the downtown Wilmington area. NC bike route 3 should be rerouted accordingly.

PROJECT AT A GLANCE

- Project location: Wilmington, New Hanover County
- Project type: Shared lane, bike lane, and sidepath
- Length: 2 miles

PREVIOUS PLANNING

- 2012 Wilmington/New Hanover County Comprehensive Greenway Plan
- 2013 Walk/Bike NC

SAFETY

- Currently, bike route signage (NC bike route 3) sends bicyclists along Princess St, Chestnut St, and N 23rd St from downtown Wilmington to the north side of Wilmington. While Princess St and Chestnut Street carry low traffic volumes and speeds, N 23rd St carries high traffic volumes, multiple lanes of traffic, and posted speed limits of 45 mph. This project allows bicyclists to avoid approximately one mile of N 23rd St by routing them through the Love Grove neighborhood and utilizing the sidepath to be constructed along the Love Grove bridge.
- 3 bicycle crashes were recorded along existing NC bike route 3 corridor between 10th St and Smith Creek Blvd from 2007-2013.

ACCESS

- Enhances access to Archie Blue Park and improves access to numerous destinations between the downtown Wilmington area and the north side of Wilmington.

DEMAND

- This project provides access to multiple neighborhoods and is within one mile of the downtown Wilmington waterfront/commercial area and a significant residential population. It also provides access to the industrial/commercial area along N 23rd St.

CONNECTIVITY

- This project reroutes NC bike route 3, avoiding one mile of the current route along N 23rd St that is not conducive to bicycling, significantly enhancing connectivity between downtown Wilmington and the north side of Wilmington.

PLANNING LEVEL COST ESTIMATE

- $238,080.19

Project Opportunities, Constraints, and Details

The Love Grove bridge is pending construction in 2017 and will include a sidepath

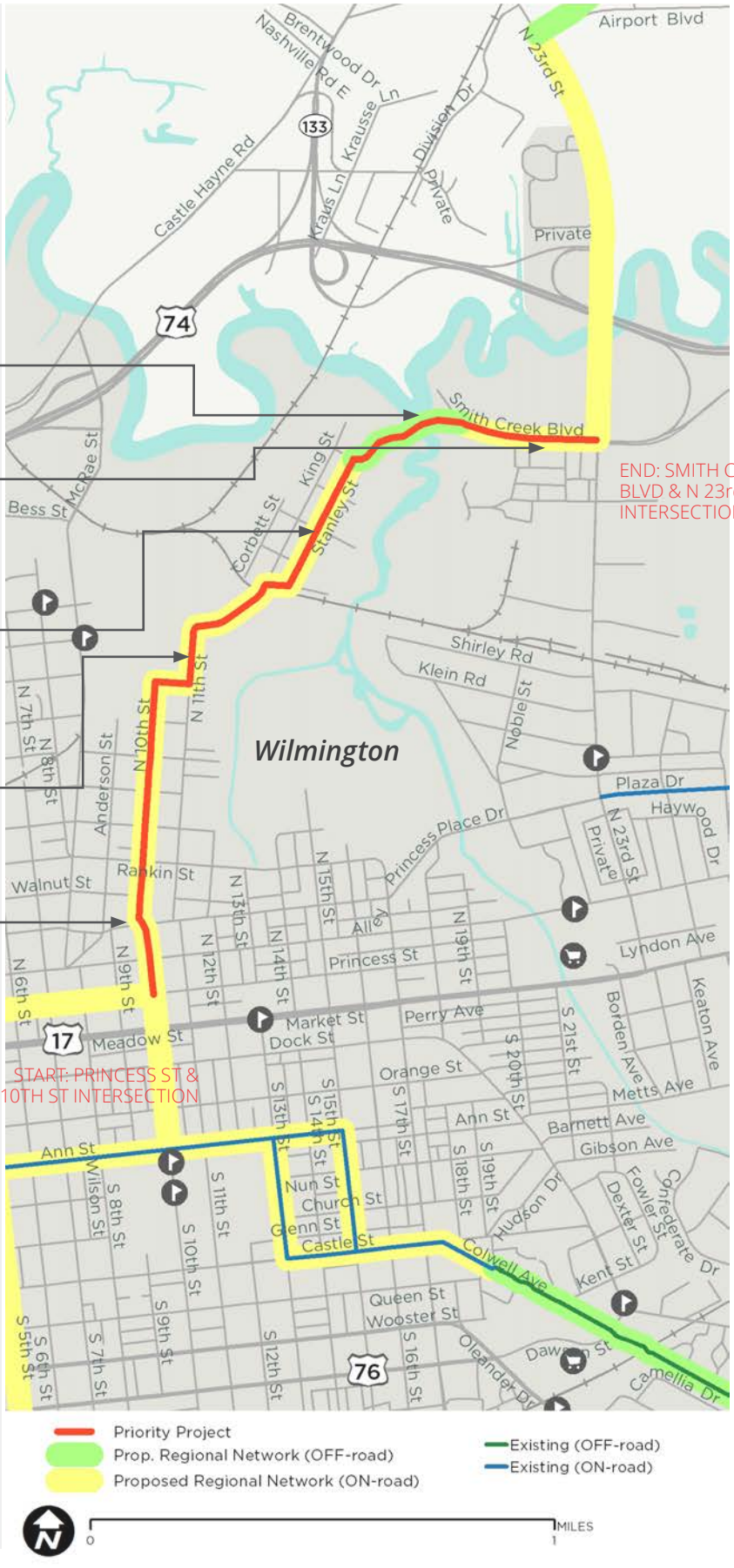
Implement shared lane markings along Smith Creek Blvd from the eastern terminus of the Love Grove bridge sidepath to N 23rd St

Implement shared lane markings along Railroad St and Stanley St from the railroad tracks/King St to the western terminus of the Love Grove bridge sidepath, linking to Archie Blue Community Park

Construct bike lanes along 11th St/ King St from Hall St to Railroad St by widening this section of 11th St and King St

Implement shared lane markings along N 10th St & Hall St from Princess St to 11th St

All roads in this project are locally maintained



PRIORITY PROJECT K

BURGAW OSGOOD CANAL GREENWAY LINK

From the Osgood Canal Greenway intersection at Hayes St to the Osgood Canal Greenway continuing at Fremont St

This project consists of widening the existing pedestrian trail between Hayes St and S Walker St as well as the section along the east side of S Walker St. This is combined with shared lane markings along S Cowan St and Fremont St from S Walker St to the Osgood Canal Greenway (Fremont St entrance) to also accommodate bicyclists.

PROJECT AT A GLANCE

- Project location: Burgaw, Pender County
- Project type: Shared lane markings and sidepath
- Length: 0.5 miles

PREVIOUS PLANNING

- 2014 Pender County Comprehensive Transportation Plan Bicycle Map
- 2015 Burgaw Bicycle & Pedestrian Plan

SAFETY

- No accommodations are made for bicyclists between the Osgood Canal Greenway endpoints at Hayes St and Fremont St. S Walker St has a posted 35 mph speed limit along this section.

ACCESS

- This project would improve access to Burgaw Middle School, Cape Fear Community College, Rotary Park, Johnson Park, Wilmington St Park A& B, Ashe St Park and the library.

DEMAND

- This project is within 1 mile of nearly every resident in Burgaw and lies two blocks from the Pender Memorial Hospital, Pender County Courthouse, and downtown shopping district.

CONNECTIVITY

This short project completes bicycle connectivity between the Osgood Canal Greenway at Hayes St and the Osgood Canal Greenway at Fremont St, complementing the sidewalk that currently accommodates pedestrians between these two sections of the greenway. This would provide a bicycling corridor through most of the east side of Burgaw, furthering regional bicycle connectivity to the east and south.

PLANNING LEVEL COST ESTIMATE

- $166,224.33

Project Opportunities, Constraints, and Details

The northern section of the Osgood Canal Greenway provides further connectivity to future regional network opportunities along NC 53 and Bridger St.

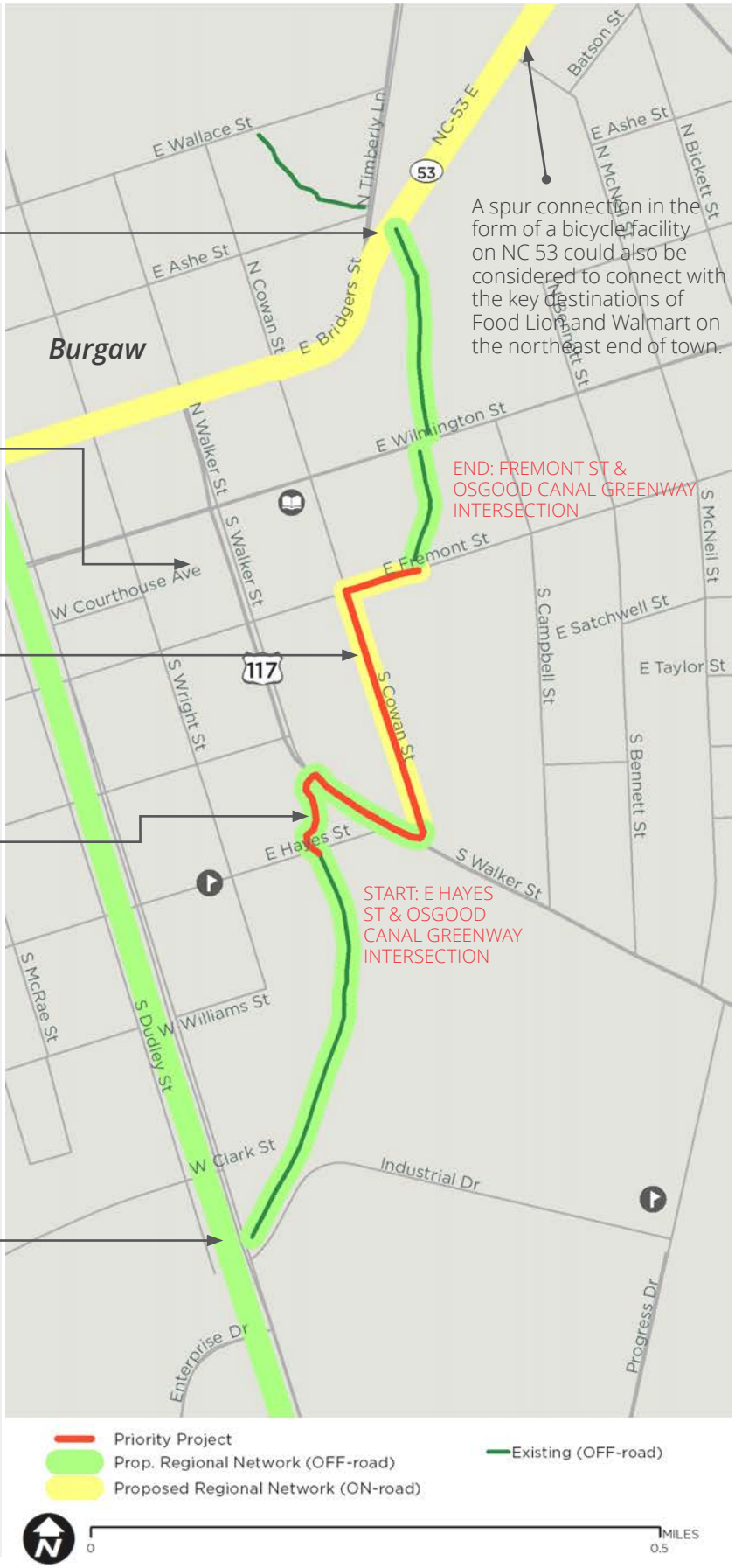
The Pender County Courthouse and downtown shopping district are a short distance away from this project

Implement shared lane markings along S Cowan St and Fremont St from S Walker St to the Osgood Canal Greenway/Fremont St intersection

Widen the section of pedestrian trail between Hayes St and S Walker St as well as the sidewalk on the east side of S Walker St from the marked crosswalk to S Cowan St to accommodate bicyclists

The southern terminus of the existing Osgood Canal Greenway intersects with the NCDOT railroad right of way that would serve as an ideal regional bicycle and pedestrian trail through Pender County and connecting to Wilmington

All roads in this project are locally maintained



PRIORITY PROJECT

L

KURE BEACH THROUGH-ROUTE

From the E Ave and US 421 bike lanes intersection to the N Ave and US 421 bike lanes intersection

This project would provide a key link for bicyclists through the heart of Kure Beach where the US 421 bike lanes terminate. 3rd Ave provides a low-traffic volume neighborhood route that directs bicyclists off a stretch of US 421 between E Ave and N Ave that carries high traffic volumes and no dedicated space for bicyclists. NC bike route 3 and the East Coast Greenway should be rerouted to match the new facilities once constructed.

PROJECT AT A GLANCE

- Project location: Kure Beach, New Hanover County
- Project type: Shared lane
- Length: 1.1 miles

PREVIOUS PLANNING

- 2012 Wilmington/New Hanover County Comprehensive Greenway Plan

SAFETY

- This project directs bicyclists away from a section of US 421 that carries higher traffic volumes and has no space for bicycle facilities due to on-street parking.

ACCESS

- Enhances access through the center of Kure Beach. Multiple short neighborhood street connections link this corridor back to the US 421 commercial area and several beach access points with complementary marked crossings of US 421.

DEMAND

- This project is within one mile of nearly every resident in Kure Beach and is proximate to the Kure Beach commercial center.

CONNECTIVITY

- Combined with the existing bike lanes through the northern and southern sections of Kure Beach, this project would complete the connection through the Town by linking these existing bike lanes. It would also provide a routing opportunity for the East Coast Greenway and NC bike route 3.

PLANNING LEVEL COST ESTIMATE

- $20,479.20

Project Opportunities, Constraints, and Details

Connect to existing bike lanes at the N Ave and US 421 intersection. Construct a marked crossing for pedestrians and bicyclists at this intersection.

Provide wayfinding signage to the marked crosswalk of US 421 and beach access point along M Ave

Implement shared lane markings along the length of 3rd Ave

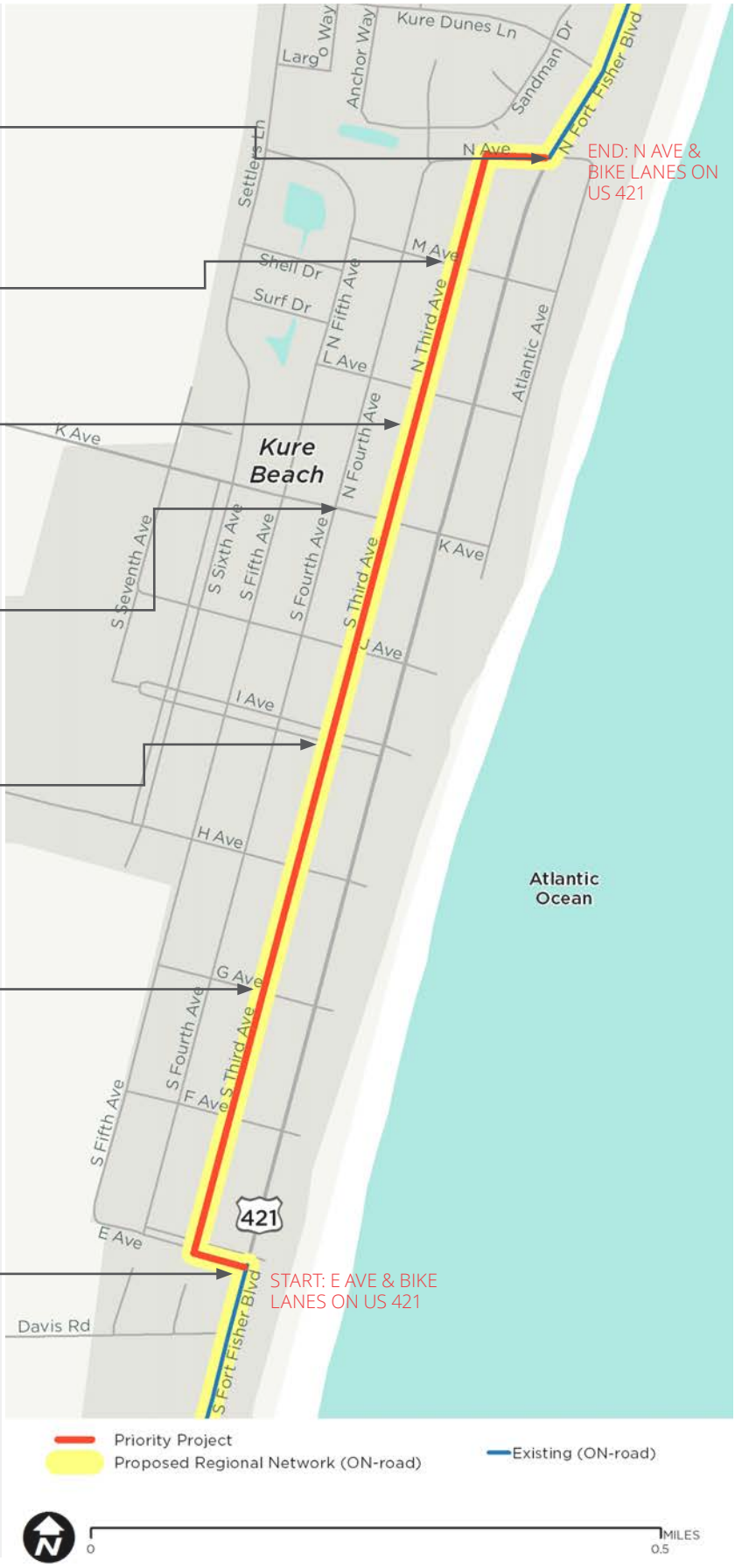
Provide crossing for bicyclists at the K Ave intersection where parking currently obstructs this crossing. This would likely require the removal of 1-2 parking spots; also provide wayfinding signage to the Kure Beach Fishing Pier and Ocean Front Park and Pavilion at the beach front

Provide wayfinding signage to the marked crosswalk of US 421 and beach access point along I Ave

Implement shared lane markings along the length of 3rd Ave

Connect to existing bike lanes at the E Ave and US 421 intersection. Existing marked crossing can be utilized by bicyclists at this intersection as necessary.

All roads in this project are locally maintained



PRIORITY PROJECT

M

CAROLINA BEACH THROUGH-ROUTE

From the northern terminus of the US 421 bike lanes at Carolina Sands Dr to Snows Cut bridge

This project would provide a key link for bicyclists through the heart of Carolina Beach beginning where the US 421 bike lanes terminate to Snows Cut bridge. NC bike route 3 should be rerouted to match the new facilities once constructed. The East Coast Greenway should split with NC 3 via an on-road link along 8th St from Harper Avenue to Mike Chappelle Park to connect with the Island Greenway (funded, construction pending) that will terminate at Alabama Ave once completed.

PROJECT AT A GLANCE

- Project location: Carolina Beach, New Hanover County
- Project type: Shared lane and sidepath
- Length: 2.2 miles

PREVIOUS PLANNING

- 2011 Carolina Beach Bicycle/Multi-Use Transportation Plan
- 2012 Wilmington/New Hanover County Comprehensive Greenway Plan

SAFETY

- This project directs bicyclists away from a section of US 421 that carries high traffic volumes and a pattern of development that is currently incompatible for bicycle facilities.
- Nine bicycle crashes were recorded along US 421 through this part of Carolina Beach from 2007-2013.

ACCESS

- Enhances access through the center of Carolina Beach including the Carolina Beach Boardwalk, Carolina Lake, Carolina Beach Elementary School, and the Town's commercial center. This project also provides access to Carolina Beach State Park.

DEMAND

- This project is within one mile of nearly every resident in Carolina Beach and is proximate to the Carolina Beach commercial center.

CONNECTIVITY

- Combined with the existing bike lanes along US 421 through the southern section of Carolina Beach, this project would complete the connection through the Town by linking these existing bike lanes to the northern terminus of the Town limits at Snows Cut.
- This project also links to the existing Carolina Beach Greenway at Carolina Beach State Park, the existing paved shoulder along Dow Rd and also utilizes the existing shared use path around Carolina Lake. It would provide an excellent routing opportunity for the East Coast Greenway and NC bike route 3.

PLANNING LEVEL COST ESTIMATE

- $827,334.26

Existing conditions in Carolina Beach (above), and a conceptual rendering of what this corridor might look like with a shared use path (right).

Project Opportunities, Constraints, and Details

Any future bridge replacement should include a road separated sidepath and bicycle lanes similar to the Surf City bridge project that is currently under construction

Construct this section of sidepath along the west side of US 421 from the Dow Rd intersection to Snows Cut

Construct this section of sidepath along the northwest side of Dow Rd between Harper Ave and US 421; link to the existing Carolina Beach Greenway

Construct this section of sidepath along the south and west side of Harper Ave, making the connection from 4th St to the existing Carolina Beach Greenway; bike lanes and bicycle boulevard treatments are on-road bicycle facilities that are currently funded along Harper Ave from Dow Rd to Lake Park Blvd

The sidepath along Cape Fear Blvd to Dow Rd is funded and will complete the section from 6th St to Dow Rd

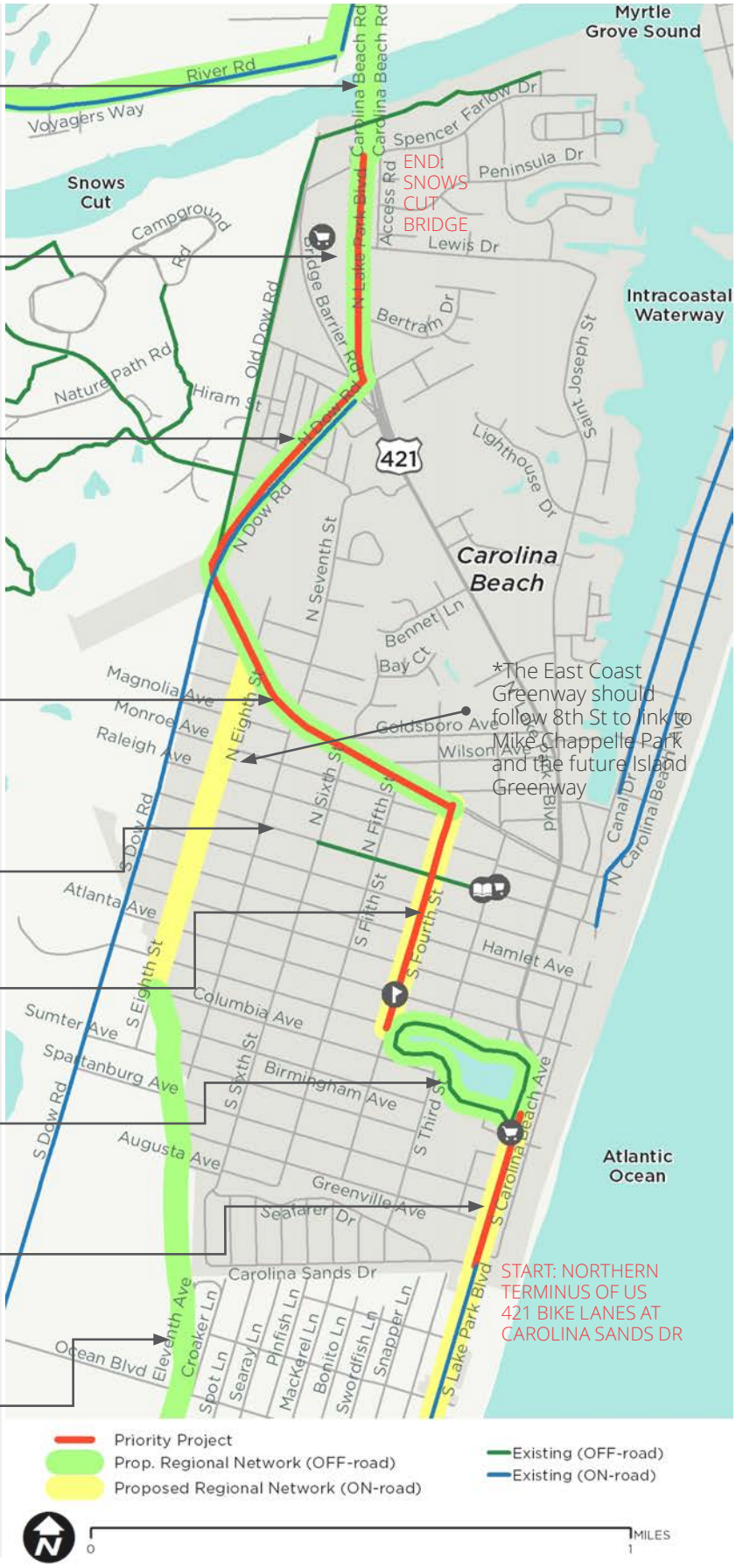
Implement shared lane markings along 4th St from the Carolina Lake shared use path to Harper Ave

Utilize the existing shared use path around Carolina Lake as part of this route through Carolina Beach

Implement shared lane markings and lower speed limit to 25 mph along US 421 from the existing bike lanes to the Carolina Lake shared use path; also provide wayfinding signage to beach access points including the Carolina Beach Boardwalk

*Future Island Greenway - should be designated as part of the East Coast Greenway once complete

Dow Rd and US 421 are NCDOT maintained



PRIORITY PROJECT

N

WRIGHTSVILLE BEACH

From South Beach to North Beach

This project would provide a key link for bicyclists through the length of Wrightsville Beach from South Beach to North Beach.

PROJECT AT A GLANCE

- Project location: Wrightsville Beach, New Hanover County
- Project type: Sidepath, shared lane, and bike lanes
- Length: 4.4 miles

PREVIOUS PLANNING

- 2009 Pelican Drive/Salisbury Street Bicycle Plan
- 2012 Wilmington/New Hanover County Comprehensive Greenway Plan
- 2013 Wrightsville Beach Community Transportation Plan
- 2013 River to Sea Bikeway Master Plan

SAFETY

- This project creates formalized, dedicated bicycle facilities separated from traffic for much of this corridor. Waynick Blvd carries higher traffic volumes and is a four-lane road with a 35 mph posted speed limit. A key component of this project would be reducing this roadway to three lanes to include a striped sidepath.
- 19 bicycle crashes were recorded along this corridor from 2007-2013.

ACCESS

- Enhances access to all 44 beach access points and over a dozen Intracoastal Waterway access points along Wrightsville's commercial strip and other local destinations.

DEMAND

- This project is within a half mile of nearly every resident in Wrightsville Beach.

CONNECTIVITY

- Combined with the existing bike lane along Salisbury St, the River to Sea Bikeway along Pelican Dr, and the future connection under the Heide-Trask drawbridge, this project would significantly enhance connectivity between Wilmington and the length of Wrightsville Beach.
- This project also links to the existing paved shoulders along N Lumina Ave in North Beach with a recommendation of formalizing this space as dedicated bike lanes.

PLANNING LEVEL COST ESTIMATE

- $405,080.16

Project Opportunities, Constraints, and Details

In addition to the 'share the road' signage the length of N Lumina Ave, as recommended in the 2013 Wrightsville Beach Community Transportation Plan, formalize the existing paved shoulders as bike lanes with pavement markings

Implement shared lane markings along N Lumina Ave from Salisbury St to the existing paved shoulders at S Ridge Ln

Conduct a feasibility study to evaluate future accommodation of bicyclists and pedestrians across Banks Channel

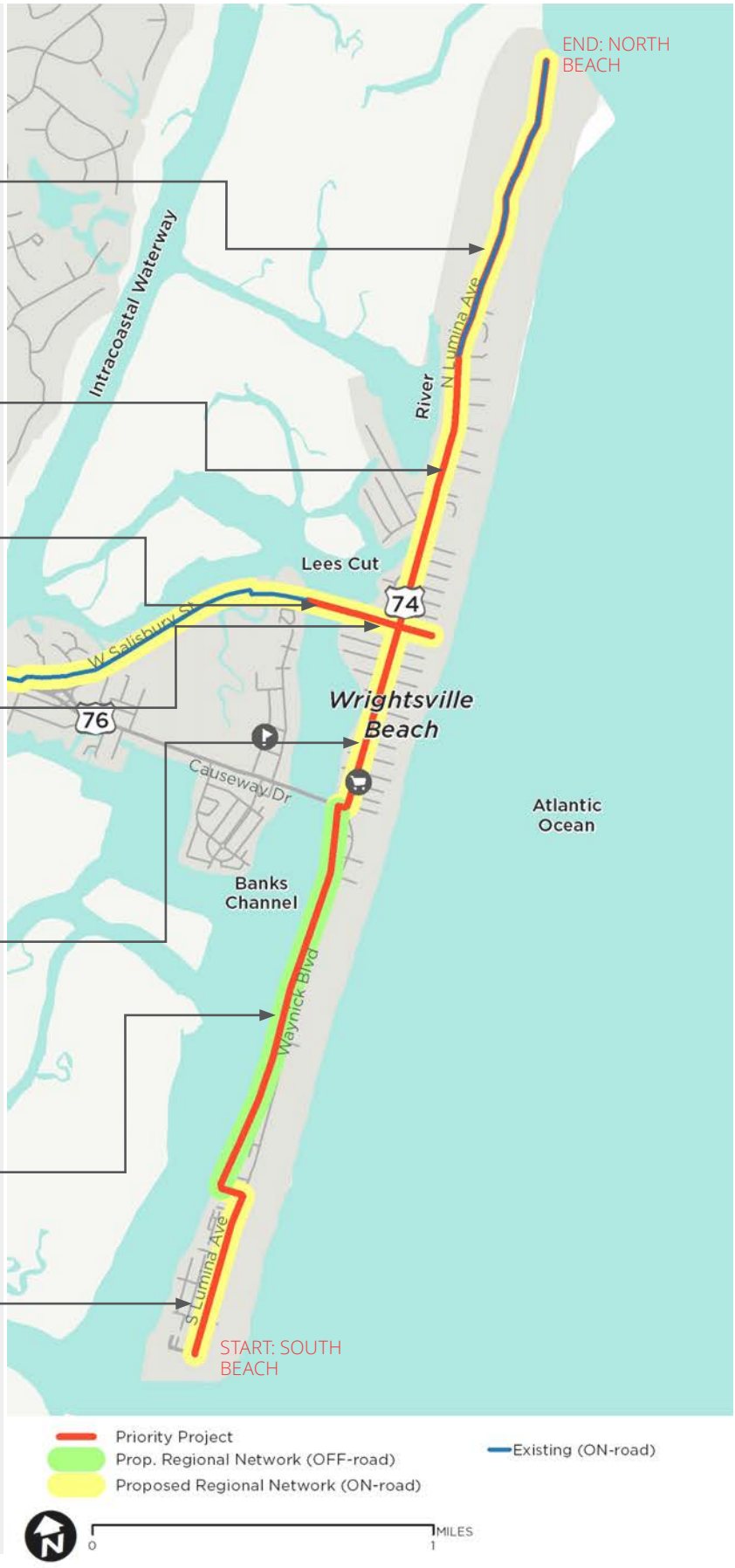
Construct a bicycle lane on Salisbury St east of Bank's Channel in accordance with the Pelican Drive/Salisbury Street Bicycle Plan and as recommended by the Wrightsville Beach Community Transportation Plan

In Center Beach, along Lumina Ave from Waynick Blvd to Salisbury St, consider the two options recommended in the Wrightsville Beach Community Transportation Plan; the ideal option would be to stripe a sidepath (referred to as a multi-use path in the 2013 Wrightsville Beach Community Transportation Plan) by permanently removing parking on the west side of the road while the short-term recommendation is to add shared lane markings

Convert Waynick Blvd to a 3-lane road with a striped sidepath (referred to as a multi-use path in the 2013 Wrightsville Beach Community Transportation Plan) along the west side of the road

Implement shared lane markings along Sunset Ave and S Lumina Ave between Waynick Blvd and the southern terminus of S Lumina Ave at the beach access

All roads in this project are NCDOT maintained



MEDIUM-TERM PROJECT

O

WHITEVILLE TO LAKE WACCAMAW

From downtown Whiteville (Vineland Station) to Lake Waccamaw State Park

This project creates a direct link from the historic Vineland Station in downtown Whiteville to Lake Waccamaw State Park. The key element of this project is a proposed rail-trail (or rail-with-trail if rail line is reactivated) along the old rail bed, east of downtown Whiteville to Hallsboro. Utilizing this rail bed is key for crossing the White Marsh.

PROJECT AT A GLANCE

- Project location: Whiteville, Lake Waccamaw, and Columbus County
- Project type: Shared use path (rail-trail/trail-with-trail), paved shoulder, and shared lane
- Length: 22 miles

PREVIOUS PLANNING

- 2014 Whiteville Pedestrian Plan

SAFETY

- No bicycle facilities currently exist along this corridor and this project would provide a significant east/west bicycling artery for Columbus County.
- One bicycle crash was recorded along an alternative route along this corridor from 2007-2013.

ACCESS

- Downtown Whiteville, Vineland Station, Hallsboro, Hallsboro High School, Lake Waccamaw, and Lake Waccamaw State Park.

DEMAND

- This project is within one mile of nearly every resident in Lake Waccamaw and would be accessible to most residents in Whiteville.

CONNECTIVITY

- This project would serve is a main bicycling artery through central Columbus County, connecting it's largest town (Whiteville) to its most significant regional destination (Lake Waccamaw State Park), providing opportunities for thousands of tourists each year.

PLANNING LEVEL COST ESTIMATE

- $10,313,036.04

Project Opportunities, Constraints, and Details

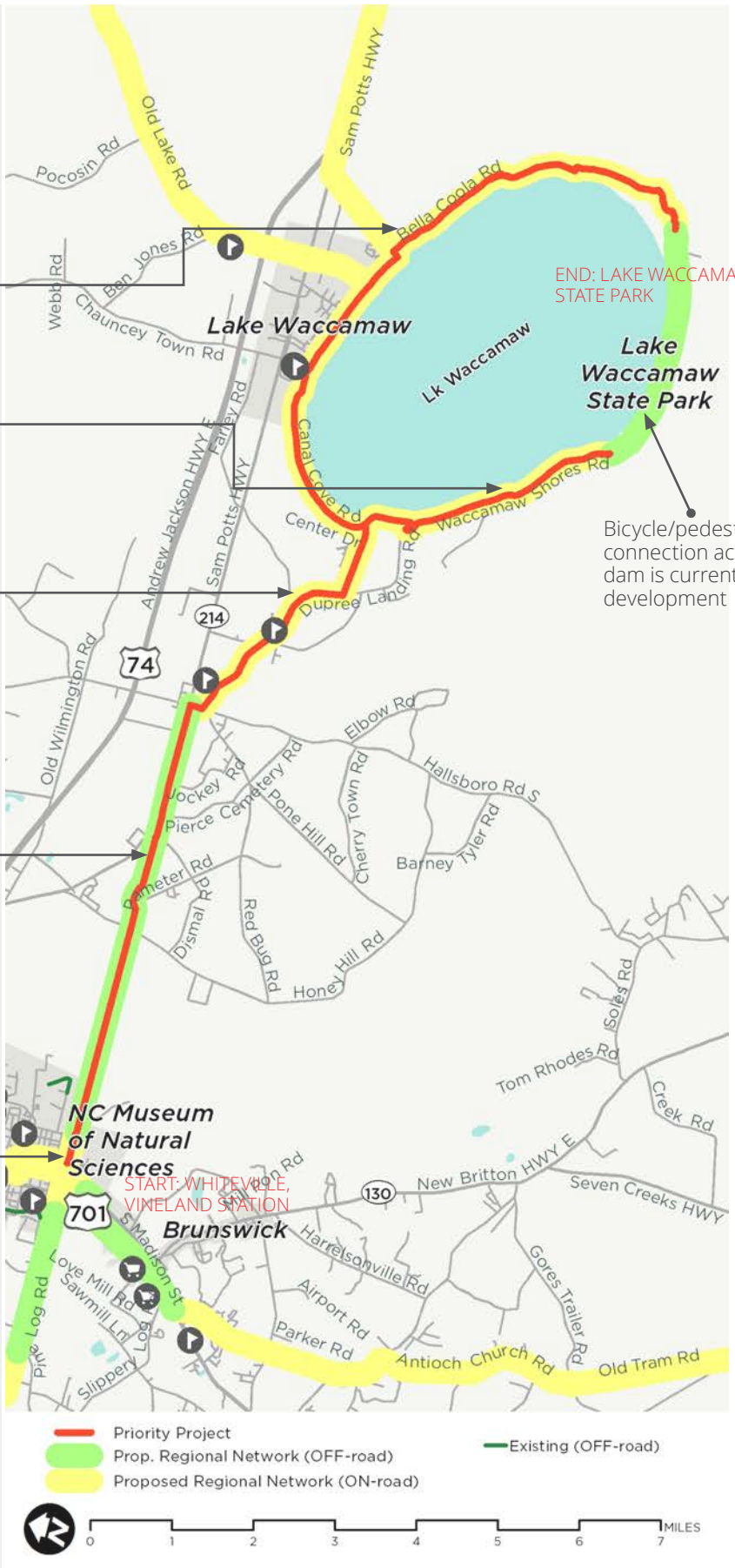
Construct paved shoulder along Waccamaw Shores Rd, Canal Cove Rd, Lakeshore Dr, Bella Coola Rd, and State Park Dr (implement shared lane markings where paved shoulder is not feasible due to geographic constraints) from Hallsboro to Lake Waccamaw State Park, connecting to the bicycle/pedestrian connection across the dam that is currently under development

Construct paved shoulder along Hallsboro Rd, Giles Byrd Rd, Dupree Landing Rd, and Wooded Acres Rd

Construct shared use path (rail-with-trail or rail-trail) from the eastern terminus of Main St in downtown Whiteville to Hallsboro Rd in Hallsboro; a short-term action for this project could be to set up a meeting with RJ Corman RR and tour the rail corridor east of Whiteville over the White Marsh

Implement shared lane markings along Main St from its eastern terminus (connection point to rail-trail) to the Vineland Station in downtown Whiteville

With the exception of Main St in Whiteville, all roads in this project are NCDOT maintained



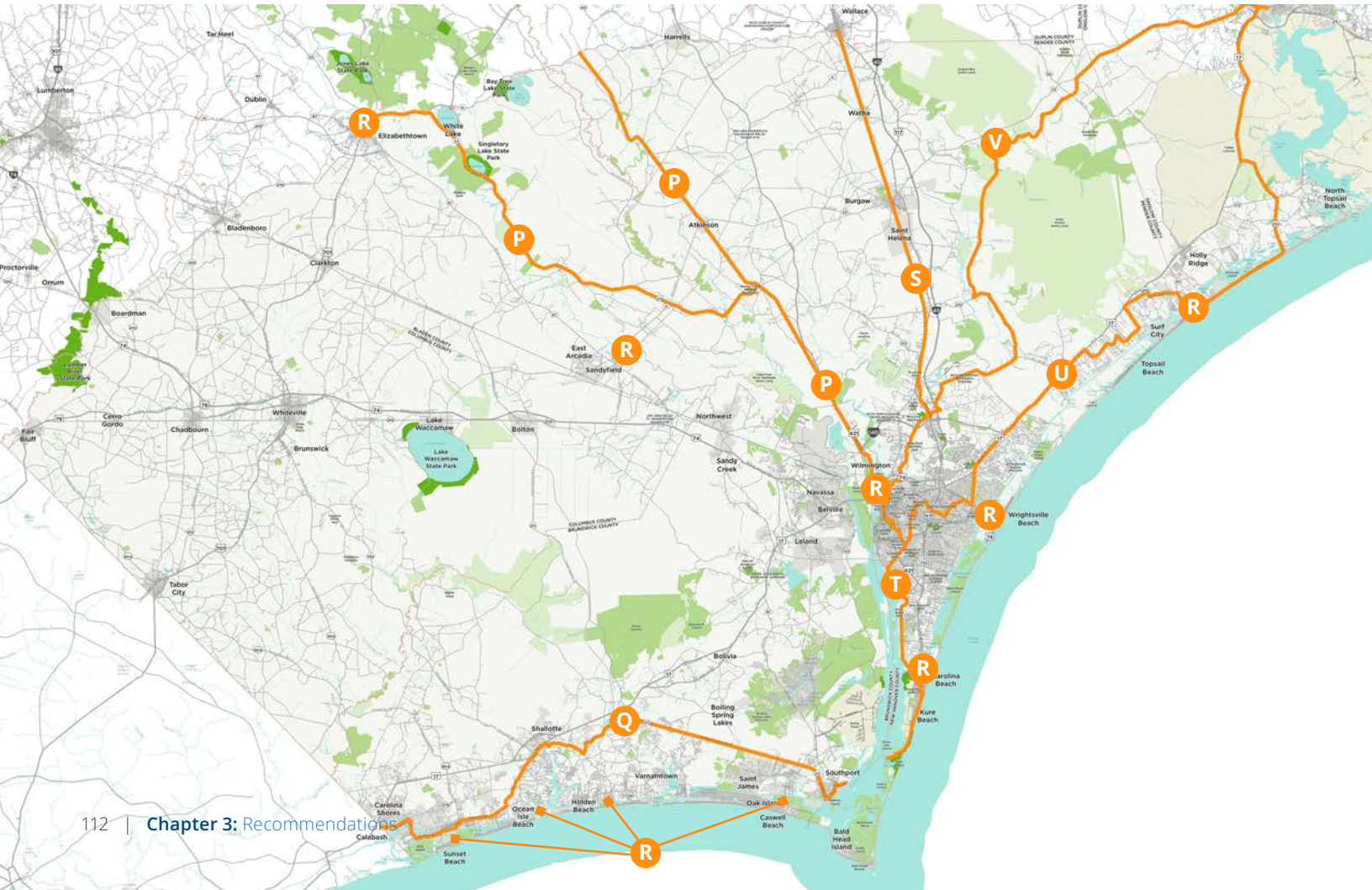
Long-Term Vision Projects

These long-term vision projects were selected based on the key inputs outlined at the beginning of this chapter. These represent projects that will require much larger financial investments and coordinated partnerships across multiple jurisdictions over time. Some projects will likely be completed as development occurs along their respective corridors (such as the East Coast Greenway sections), and others depend on the assembly of major right-of-way corridors (such as the rail-trail projects).

These projects are described on the following pages. See **Chapter 4: Program Recommendations** for additional projects that support the regional network, such as a signage and wayfinding program and bicycle-transit integration.

ID	LONG-TERM VISION PROJECTS
P	*Wilmington to Fayetteville*
Q	*East Coast Greenway and NC 3 Ports of Call: Southport to South Carolina*
R	*Bridge Improvements to Beach Island Communities*
S	*Rail Trail: Wilmington through Burgaw*
T	*ECG and NC 3 Ports of Call: New Hanover County*
U	*ECG: New Hanover County to Jacksonville*
V	*NC 3 Ports of Call: Wilmington to Jacksonville*

LONG-TERM PROJECT LOCATIONS (See following pages and relevant chapters for details on each project)



LONG-TERM PROJECT

P

WILMINGTON TO FAYETTEVILLE: CAPE FEAR RIVER GREENWAY, EAST COAST GREENWAY, NC 5 CAPE FEAR RUN, AND THE ATLANTIC SEABOARD COASTLINE TRAIL

Project Need & Existing Plans:

- Connecting Wilmington and Fayetteville would consist of an approximately 100 mile facility (approximately 60 miles of this corridor is in the Cape Fear region), and would potentially open access to one of the most critical resources in the region, the Cape Fear River. This project could also align with the proposed East Coast Greenway segment between Wilmington and Fayetteville, NC 5 Cape Fear Run through the Cape Fear region, and partially overlap with the Atlantic Seaboard Coastline Trail from Wilmington to southern Pender County before splitting at or near Moores Creek National Battlefield.
- Existing plans that have recommendations directly or indirectly related to one or more of these projects includes the 2010 West Pender County Comprehensive Parks & Recreation Master Plan, 2010 Atlantic-Seaboard Coast Line Trail Concept Plan, 2012 Wilmington/New Hanover County Comprehensive Greenway Plan, 2013 Walk/Bike NC, 2014 Pender County CTP Bicycle Map, 2015 Bladen County CTP Bicycle Map, 2015 Sampson County CTP Bicycle Map, and the 2015 Elizabethtown Bicycle Plan.

Key Challenges:

- Multi-jurisdictional coordination
- Right-of-way acquisition, automobile-oriented roadway design as well as possible rail service development to Pender Commerce Park from Wilmington
- Bridge crossings
- Geographic conditions along the Cape Fear River such as wetlands and topography

Opportunities/Recommended Next Steps:

- This project could combine efforts amongst the four project concepts highlighted above, which speaks to a significant desire to create a corridor for bicycle travel through this part of the region, increasing the possibilities for efficient implementation.
- Develop a Feasibility Study from Wilmington to Fayetteville that examines the opportunities and constraints along these four conceptual trail corridors focusing along/near the Cape Fear River corridor, the old Atlantic Seaboard Coastline Railroad bed (reference 2010 Atlantic-Seaboard Coast Line Trail Concept Plan), and the proposed East Coast Greenway and NC 5 Cape Fear Run (reference 2013 Walk/Bike NC) corridors. This project could split near Moores Creek National Battlefield where the Atlantic Seaboard Coastline Railroad bed continues north through Pender and Sampson Counties while the proposed on-road ECG and NC 5 corridors follow rural roadways paralleling the Cape Fear River toward Elizabethtown and Bladen County. Identifying opportunities for off-road shared use paths and on-road paved shoulders and dedicated bicycle facilities will be key next steps for this project.
- Much of the old Atlantic Seaboard Coastline Railroad bed lies undeveloped with old rail ties removed.
- Although wetlands and topography will be a challenge, much of the land immediately adjacent to the Cape Fear River remains undeveloped.
- NC 5 Cape Fear Run and the ECG are currently signed along several lower traffic volume, rural roadways through Pender and Bladen counties. However, dedicated bicycle facilities are still lacking along these roadways that are generally narrow with high-speed automobile traffic.

LONG-TERM PROJECT

Q

EAST COAST GREENWAY & NC 3 PORTS OF CALL: SOUTHPORT TO SOUTH CAROLINA

Project Need & Existing Plans:

- The East Coast Greenway and NC bike route 3 (Ports of Call) corridors should generally align through the Cape Fear region from Southport to South Carolina, and implementation efforts should be combined. This corridor is approximately 40 miles in length. Existing plans that have recommendations directly or indirectly related to this project include the 2006 Oak Island Bicycle Transportation Plan, 2008 Brunswick County Comprehensive Transportation Plan Bicycle Map, 2013 Walk/Bike NC, 2014 Southport Comprehensive Pedestrian Plan, and the 2035 GSATS LRTP Non-Highway Map.

Key Challenges:

- Multi-jurisdictional coordination
- Right-of-way acquisition, automobile-oriented roadway design combined with high traffic volumes
- Geographical conditions such as beach island connectivity and wetlands

Opportunities/Recommended Next Steps:

- The ECG and NC 3 should generally follow the same route through this part of the region. While a feasibility study is recommended to explore the options further, several considerations are listed below to provide further direction for the development of NC 3 and the ECG.
- Fort Fisher - Southport Ferry to S. Kingsley St - This section includes 5' dedicated bicycle lanes currently. While greater separation between automobile traffic and bicyclists should be achieved through pavement widening, NC 3 currently follows this route and should remain in place. While this serves as the ECG interim route, considerations include the additional need for pedestrian/shared use facilities either along Hwy 211 or exploring shared use path options north and east of Southport along Duke Energy property.
- Priority Project I: Southport Through-Route - this project follows a scenic neighborhood and water front route one block removed from downtown Southport and connects to a proposed shared use path at the north end of town. See Priority Project I cutsheet for route details.
  - » NC 3 - Upon implementation, this should become the NC 3 route through Southport. The S. Kingsley St, Bay St, Lord St, 8th St, N Caswell Ave to the proposed shared use path ending at Hwy 211 near Sandy Ln would replace the existing Hwy 211 section between S. Kingsley St and Sandy Ln.
  - » ECG - The issue for the ECG is that the route from the Fort-Fisher ferry to S. Kingsley St has existing bike lanes that are not physically separated from traffic and no dedicated pedestrian facilities. Part of the neighborhood/water front route does not have existing sidewalks as well. While this on-road section should serve as the ECG's interim route, including dedicated pedestrian facilities to this route or exploring shared use path opportunities north and east of Southport along Duke Energy property should be next steps for the ECG.
- Southport to Shallotte - The proposed corridor for NC 3 and the ECG follow Hwy 211, Stone Chimney Rd, Turnpike Rd, Mt Pisgah Rd, Civietown Rd, Holden Beach Rd, and Smith Ave to Main St in Shallotte. A shared use path (sidepath) is recommended along the length of this route. Current Hwy 211 improvements from Southport to Supply will include 4'-5' paved shoulders, but physical separation between motorists and bicyclists should be required.
- Priority Project E: Shallotte Riverfront Town Center - Combined with the Shallotte Riverfront Town Center development, this project features a separated bikeway as part of a Main St redesign from Smith Ave to Village Rd that should be designated as NC 3 and the ECG. See Priority Project E for further details.
- Shallotte to the South Carolina border - The proposed corridor for NC 3 and the ECG follow Village Rd, Bricklanding Rd, Hale Swamp Rd, and Beach Dr/Sunset Blvd, Park Rd, Shoreline Dr, and Beach Dr to the South Carolina border.

- Note: The Park Rd and Shoreline Dr section along the Intracoastal Waterway near Sunset Beach is a neighborhood route that deviates from the main roadway (Sunset Blvd) for this short section. While this would serve as an excellent, low-traffic volume neighborhood bicycle route alternative to sidepath development along Beach Dr, pedestrian considerations should be considered for the ECG along this section.
- See Chapter 4 Program Recommendations for details on UberBoat that could serve as a shorter term, complementary option in connecting the Brunswick County island communities as a complementary effort to the ECG and NC 3.

Existing conditions along the East Coast Greenway route between Sunset Beach and Ocean Isle Beach (Beach Dr, below), and a conceptual rendering of what a shared use path could look like along that route (bottom). This type of facility could help support local businesses through increased foot traffic (and bike traffic) along the route.

LONG-TERM PROJECT

R

BRIDGE IMPROVEMENTS TO BEACH ISLAND COMMUNITIES AND CAPE FEAR RIVER CROSSINGS

Project Need & Existing Plans:

- Sunset Beach, Ocean Isle Beach, Holden Beach, Oak Island, Pleasure Island, Wrightsville Beach, Topsail Island, US 701 in Elizabethtown, NC 11 in Bladen County, and US 74 and US 17 in Wilmington are islands or Cape Fear River crossing locations that rely on bridge connections to serve automobile transportation. While the Sunset Blvd (Sunset Beach), Middleton Blvd (Oak Island), and US 74 (Wilmington) bridges have wider paved shoulders and higher railings that better serve bicyclists, the rest of these bridges have limited paved shoulder space and/or low railings. Existing plans that have recommendations directly or indirectly related to these bridges include the 2006 Oak Island Bicycle Transportation Plan, 2012 Wilmington/New Hanover County Comprehensive Greenway Plan, 2014 Ocean Isle Beach Bicycle and Pedestrian Plan, and 2016 Surf City Bicycle and Pedestrian Plan.

Key Challenges:

- Existing bridges do not accommodate 'interested but concerned' bicyclists
- Bridge replacement for many of these are decades in the future

Opportunities/Recommended Next Steps:

- The pending Surf City bridge will include a road separated sidepath along with on-road bicycle lanes and should serve as the model for all future bridge replacement projects. The Ocean Isle Beach Bicycle & Pedestrian Plan recommends constructing a bicycle/pedestrian bridge as well as installing a bicycle bridge crossing signal on the existing bridge. This plan recommends exploring a small ferry system to make the short connection between islands. Each of these options should be considered for the short and long-term.

LONG-TERM PROJECT

S

RAIL TRAIL: WILMINGTON THROUGH BURGAW

Project Need & Existing Plans:

- This rail trail would consist of approximately 30 miles of shared use path along the old Wilmington and Weldon rail line from Wilmington to Burgaw, continuing north through Pender County to Wallace where the southern terminus of the existing CSX railroad corridor is located. This project would create a non-motorized transportation and recreation artery through the heart of northern New Hanover County and Pender County and become a segment of NC 3 from Wilmington to Jacksonville, NC 5 from Fayetteville to Wilmington, or even part of the East Coast Greenway. Existing plans that have recommendations directly or indirectly related to this project include the 2012 Wilmington/New Hanover County Comprehensive Greenway Plan.

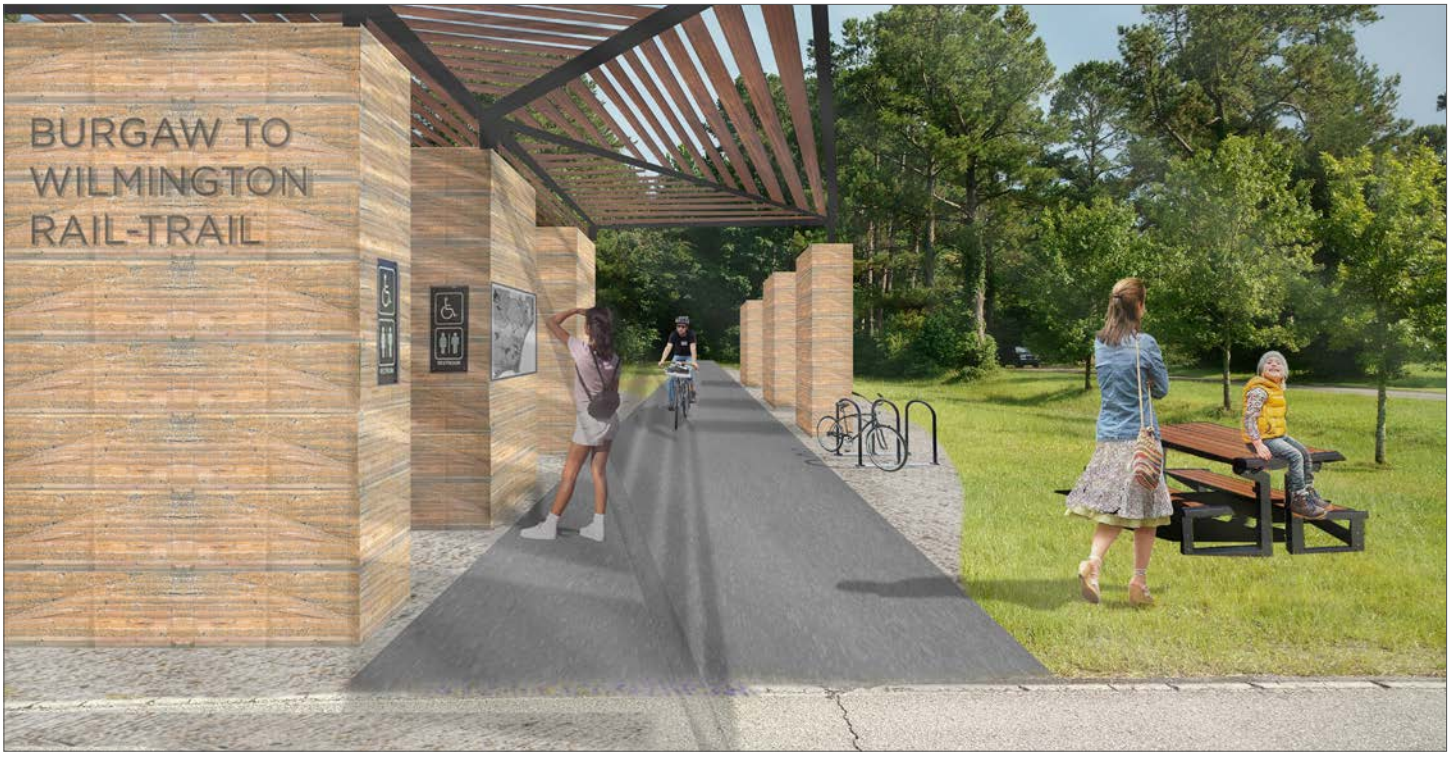
Key Challenges:

- Multi-jurisdictional coordination
- Old bridges along rail corridor will need significant improvements
- Potential future rail service redevelopment

Opportunities/Recommended Next Steps:

- This railroad corridor currently lies in NCDOT right-of-way and the rail ties have been removed
- Develop a Wilmington through Burgaw Rail-Trail Feasibility Study; assessing feasibility for bridge replacement and other infrastructure needs will be key next steps for this project.

Existing conditions along the NCDOT right-of-way between Burgaw and Wilmington (below), and a conceptual rendering of what a rail-trail and trailhead could at this location (bottom). This rail-trail project would completely separate bicyclists (and pedestrians) from automobile traffic and could become a destination in itself.



LONG-TERM PROJECT

T

EAST COAST GREENWAY & NC 3 PORTS OF CALL: NEW HANOVER COUNTY

Project Need & Existing Plans:

- The East Coast Greenway and NC bike route 3 (Ports of Call) corridors generally align through New Hanover County, and implementation efforts could be combined. This corridor is approximately 30 miles in length, and would link through the most densely populated section of the Cape Fear region. Existing plans that have recommendations directly or indirectly related to this project include the 2008 Bicycle Facilities Study for the Blue Clay Corridor, 2011 Carolina Beach Bicycle/Multi-Use Transportation Plan, 2012 Wilmington/New Hanover County Comprehensive Greenway Plan, 2012 Gary Shell Cross-City Trail Master Plan, 2013 Walk/Bike NC, and WMPO Resolution Supporting the Realignment of NC Bicycling Highways 3 and 5.

Key Challenges:

- Multi-jurisdictional coordination
- Right-of-way acquisition, automobile-oriented roadway design/pattern of development
- Bridge crossings - Snows Cut Bridge and the US 74 bridge

Downtown Wilmington to Snows Cut bridge Opportunities/Recommended Next Steps:

- The ECG and NC 3 should generally follow the same route through this part of the region. While a feasibility study is recommended to explore the options further, several considerations are listed below to provide further direction for these projects.
- NC 5 and the ECG from the US 74 bridge to Riverfront Park at Front St and Princess St (NC 5 terminus) - Entering downtown Wilmington from the US 74 bridge, NC 5 should be amended to follow Front St with shared lane markings in connecting to the existing shared lane markings on Front St (which is also part of the River to Sea Bikeway). The ECG interim route should follow the same route, with future consideration for trail development along the Cape Fear River from the US 74 bridge to the existing Riverwalk. NC 3 should be marked from the NC 5 terminus at the Front St/Princess St intersection.
- NC 3 and the ECG from the NC 5 terminus at the Front St/Princess St to Greenfield Lake - NC 3 and the ECG should follow Front St, Castle St, and 5th St to the existing sidepath along Greenfield Lake. 5th St carries lower traffic volumes and has ample width that includes parking and multiple lanes separated by a landscaped median. Separated bicycle facilities (and pedestrian facilities for the ECG) along 5th St should developed along 5th St.
- Greenfield Lake to the intersection with the Gary Shell Cross-City Trail and the ECG Historic Coastal Route:
  - NC 3 - From the existing sidepath along Greenfield Lake (officially designated as part of the ECG), shared lane markings are recommended along Yaupon Dr to Glen Meade Rd. Sidepath development along Glen Meade Rd and 17th St from Yaupon Dr to Independence Blvd will complete the connection. The ECG option noted below should also be considered for NC 3 routing.
  - ECG - The ECG could follow this same route, but Yaupon Dr does not have pedestrian facilities. Further study should be conducted for this section regarding alternatives for connectivity from Greenfield Lake to 17th St. Options should also include sidepath development along the south side of the Lake Shore Commons/Hospital Plaza Dr to 17th St.
- 17th St and Independence Blvd to Snows Cut bridge: Sidepath development along Independence Blvd and River Rd to Snows Cut bridge is recommended for both NC 3 and the ECG. Three existing miles of sidepath exist along this section as part of the recent RiverLights development.

Pleasure Island - Opportunities/Recommended Next Steps:

- Develop East Coast Greenway & NC 3 Ports of Call Feasibility Studies; the ECG and NC 3 could potentially follow different, parallel routes through this part of the region. While a feasibility study is recommended to explore the options further, several considerations are listed below to provide further direction for these projects.
- Priority Project M: Carolina Beach Through-Route - This project proposes utilizing the existing Carolina Lake Trail and proposed sidepaths to direct bicyclists through the heart of Carolina Beach. This includes sidepath development from Snows Cut bridge to and along Dow Rd and Harper Ave to 4th St, with shared lane markings along 4th St connecting to the existing Carolina Lake Trail. Shared lane markings along US 421 from the Carolina Lake Trail to the existing bike lanes are recommended due to parking constraints,
  - » NC 3 - Priority Project M should be designated as NC 3. While the shared lane markings along US 421 from the Carolina Lake Trail to the existing bike lanes are recommended, this section, as well as the existing bike lanes the length of Pleasure Island, should be improved with physical separation from automobile traffic in the long-term. US 421 is a critical transportation corridor that carries high traffic volumes, and future corridor improvements should include separated bicycle facilities (with improved sidewalk separation as well).
  - » ECG - The ECG should partially follow the same route, following the Priority Project M section from Snows Cut bridge to Harper Ave, but splitting with at the 8th St intersection. Shared lane markings should take the ECG (with pedestrian improvements) to Mike Chappell Park along 8th St. The future Island Greenway (funded) will eventually connect Mike Chappelle Park to Alabama Ave, and the ECG should be designated along this section. Barring future greenway development continuing to the south, shared lane markings should direct bicyclists (with complementary pedestrian accommodations) down Alabama Ave to US 421 and continue south on the existing bicycle lanes. Similarly noted above, US 421 is a critical transportation corridor that carries high traffic volumes, and future corridor improvements should include separated bicycle facilities with improved sidewalk separation as well. In the short-term, Priority Project M will serve as a significant next step for the ECG through Carolina Beach, in conjunction with the upcoming development of the Island Greenway from Mike Chappelle Park to Alabama Ave.
- Carolina Beach to Kure Beach - As noted above, US 421 is a critical transportation corridor that carries high traffic volumes, and future corridor improvements should include separated bicycle facilities with improved sidewalk connectivity and separation as well to become complete facilities as part of NC 3 and the ECG.
- Priority Project L: Kure Beach Through-Route
  - » This project would provide a key link for bicyclists through the heart of Kure Beach where the US 421 bike lanes terminate. 3rd Ave provides a low-traffic volume neighborhood route that directs bicyclists off a stretch of US 421 between E Ave and N Ave that carries high traffic volumes and no dedicated space for bicyclists due to parking. NC 3 and the ECG should be routed along this section. Specific to the ECG, it should be noted that 3rd Ave does not have a pedestrian facility currently - the parallel sidewalk along the east side of US 421 is narrow and unbuffered from automobile traffic at certain locations, and is not an ideal alternative.
- Kure Beach to Fort Fisher - Southport Ferry - US 421 offers the only roadway linking to the ferry. The ECG and NC 3 should follow this section of US 421, utilizing the existing bike lanes. Long-term improvements should include separated bicycle facilities with complementary pedestrian facilities to accommodate ECG multiple user types as well.

LONG-TERM PROJECT

U

EAST COAST GREENWAY: NEW HANOVER COUNTY TO JACKSONVILLE

Project Need & Existing Plans:

- This section of the East Coast Greenway corridor is approximately 40 miles in length and would serve as the main artery for non-motorized transportation and recreation connecting some of the largest population centers in the region. Existing plans that have recommendations directly or indirectly related to this project include the 2009 Topsail Area CTP Bicycle Map, 2012 Wilmington/New Hanover County Comprehensive Greenway Plan, 2012 Gary Shell Cross-City Trail Master Plan, 2013 Walk/Bike NC, 2016 Surf City Bicycle and Pedestrian Plan, and 2040 JUMPO Long Range Transportation Plan.

Key Challenges:

- Multi-jurisdictional coordination
- Right-of-way acquisition, automobile-oriented pattern of development
- Geographical conditions such as beach island connectivity and wetlands

Opportunities/Recommended Next Steps:

- Develop East Coast Greenway Feasibility Study; While a feasibility study is recommended to explore ECG options further, several considerations are listed below to provide further direction for these projects.
  - » Small updates to the proposed ECG coastal route corridor are recommended along this section in accordance with the 2015 Surf City Bicycle and Pedestrian Plan. This includes shared use path development along the utility corridor from just east of the US 17/Sloop Point Rd intersection to NC 210 just south of the Harris Teeter shopping Center in the northern section of Surf City.
  - » Continue sidepath development from the existing Military Cutoff sidepath toward Hampstead and Surf City. From Surf City to Jacksonville, continue sidepath development to Jacksonville via Island Dr, NC 210, and US 17.
  - » The pending Surf City bridge, with sidepath and bike lanes, will serve as a critical element for the development of this section and model for bridge connectivity.

LONG-TERM PROJECT

V

NC 3 PORTS OF CALL: WILMINGTON TO JACKSONVILLE

Project Need & Existing Plans:

- NC bike route 3 (Ports of Call) is currently signed for most of the 80+ miles from Wilmington to Jacksonville. However, due to Camp Lejeune access restrictions and subsequent re-routing to the north, the existing route is unsigned from the Shaw Hwy heading toward Jacksonville. The recommended route (2013 Walk/Bike NC) continues through Pender County toward downtown Jacksonville and would serve as a key bicycling highway through two of the region's largest population centers. Existing plans that have recommendations directly or indirectly related to this project include the 2008 Bicycle Facilities Study for the Blue Clay Corridor, 2012 Wilmington/New Hanover County Comprehensive Greenway Plan, 2013 Walk/Bike NC, and 2040 JUMPO Long Range Transportation Plan.

Key Challenges:

- Multi-jurisdictional coordination
- Automobile-oriented roadway design and higher traffic volumes in the Wilmington & Jacksonville areas

Opportunities/Recommended Next Steps:

- Develop NC 3 Ports of Call Feasibility Study; while a feasibility study is recommended to explore NC 3 options further, several considerations are listed below to provide further direction for these projects.
  - » Priority Project J - From Princess Street in downtown Wilmington, this project directs bicyclists through a neighborhood route that utilizes the future Love Grove Bridge sidepath (pending 2017 construction) in connecting to N 23rd St from the downtown Wilmington area. NC bike route 3 should be rerouted accordingly to avoid the section of N 23 St between Chestnut St and One Tree Hill Way.
  - » N 23rd St to Holly Shelter Rd - Construct a sidepath along Airport Blvd and Gardner Rd in accordance with the Wilmington MPO Greenway Plan. Continue sidepath development north along Blue Clay Rd to the intersection with the railroad. Continue with the addition of wide paved shoulders north to Holly Shelter Rd via Sidbury Rd and Dairy Farm Rd.
  - » Holly Shelter Rd to Jacksonville - Construct wide paved shoulders along Holly Shelter Rd, NC 210, Shaw Hwy, Old Maple Hill Rd, and NC 53 leading toward downtown Jacksonville.
  - » Wilmington to Burgaw rail-trail - This rail-trail project could serve as an opportunity for routing NC 3 completely off-road from north Wilmington to Burgaw. Connectivity to Jacksonville would continue from Burgaw east along Hwy 53 with the addition of wide paved shoulders.

4 Program Recommendations

"Encourage bicycle related and river related tourism." - Public Comment, 2016

"Education & enforcement is needed for both cyclists and motorists." - Public Comment, 2016

Bicyclists choosing their next route.

OVERVIEW

This chapter focuses on program recommendations that support and supplement the infrastructure and routing recommendations highlighted in the previous chapter.

The Cape Fear Region cannot achieve the goals of this plan through infrastructure improvements alone. The program recommendations in this chapter are critical to making bicycling in the region more attractive and accessible to new bicyclists within the region, and for drawing new bicycle tourism from outside of the region.

Programs may be implemented as a campaign, on-going initiative, or one-time event, depending on their purposes. In essence, these different efforts market bicycling to the general public and ensure the maximum return on investment in bicycling facilities.

These initiatives can be undertaken by local agencies, regional organizations, community organizations, or by any combination of partnerships between such agencies and organizations. They were developed with guidance and input from the project's Steering Committee.

Materials that support bicycle-related programs and initiatives could be distributed at local public events, such as the Carolina Beach Farmer's Market (above).

BIKE-FRIENDLY TRANSIT & CROSSING THE CAPE FEAR RIVER *(POTENTIAL PRIORITY PROGRAM)*

Purpose: To encourage and support bicycle-transit integration, especially for travel over the Cape Fear River between Brunswick County and Wilmington.

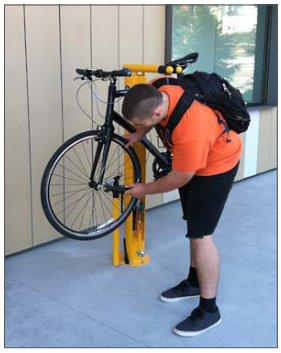
Audience: Bicycle commuters and long-distance touring bicyclists.

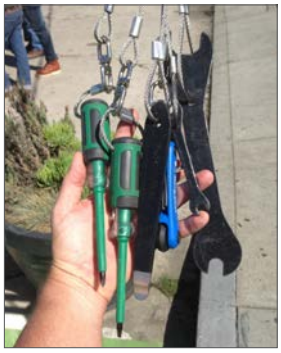
Partners: WAVE Transit, Brunswick County Transit, City of Wilmington, Town of Leland, and Cape Fear RPO.

Description: These improvements are aimed at making the option of using bicycles with transit more attractive to current and potential users who are either commuting to Wilmington or who are long-distance cycling and wanting a safer way to cross the Cape Fear River into Wilmington.

One of the most important features for bicycle-transit integration is having bike racks on buses, and fortunately the WAVE Transit bus fleet is already equipped with them. Another essential need is for proper bicycle racks and bicycle storage options at key stops. For example, "Bike n' Ride Shelters" provide long-term, secure and weather protected bicycle storage for commuters making connections to and from local or regional transit routes. Transit riders would have the option to leave a bike at a secure shelter for the first, last or both legs of their commute over the Cape Fear River, extending their transit trip to locations not directly served by transit. The structures are often designed to be open-air with a roof, walls, and a locked door to protect parked bicycles from theft, vandalism and the elements. Entry into these locked structures is limited to members that sign up for the program.

For many bicyclists, public bicycle maintenance stands are also popular amenities, because they provide bicyclists with access to tools on-the-go





Public bicycle maintenance and tool stand example (top) and an example bike n' ride shelter (bottom).

and encourage people to teach and learn bicycle maintenance in an informal setting. They can also help to reduce the number of abandoned or trashed bikes in a community; bikes are often abandoned by their owners when they have a minor mechanical issue that they do not have the tools or knowledge to fix. Public maintenance stands encourage people to learn bicycling skills from one another and send a message to residents and visitors that bicycling is supported in the community. These fixtures can be placed in a park or in another public place and require little upkeep or oversight, since the tools and stand are designed to be self-contained and theft-resistant. Such stands are currently in use along the Gary Shell Cross City Trail in Wilmington, but they would also be excellent features to pair with WAVE Transit's key stops and Park and Ride sites.

Transit connections over the Cape Fear River are currently served by WAVE Transit's "204 Brunswick Connector", which runs Monday–Friday, from 6:00am to 6:00pm, every 60 minutes.

Resource: WAVE Transit Pocket Map: http://www.wavetransit.com/Portals/0/pdfMaps/204_pocket-map.pdf

CONNECTING BEACH ISLAND COMMUNITIES WITH UBERBOAT OR WATER TAXI SERVICE

Purpose: To offer a cost-efficient and near-term option for connecting nearly 30 miles of beach island bicycling.

Audience: Beach community residents, visitors, and touring bicyclists.

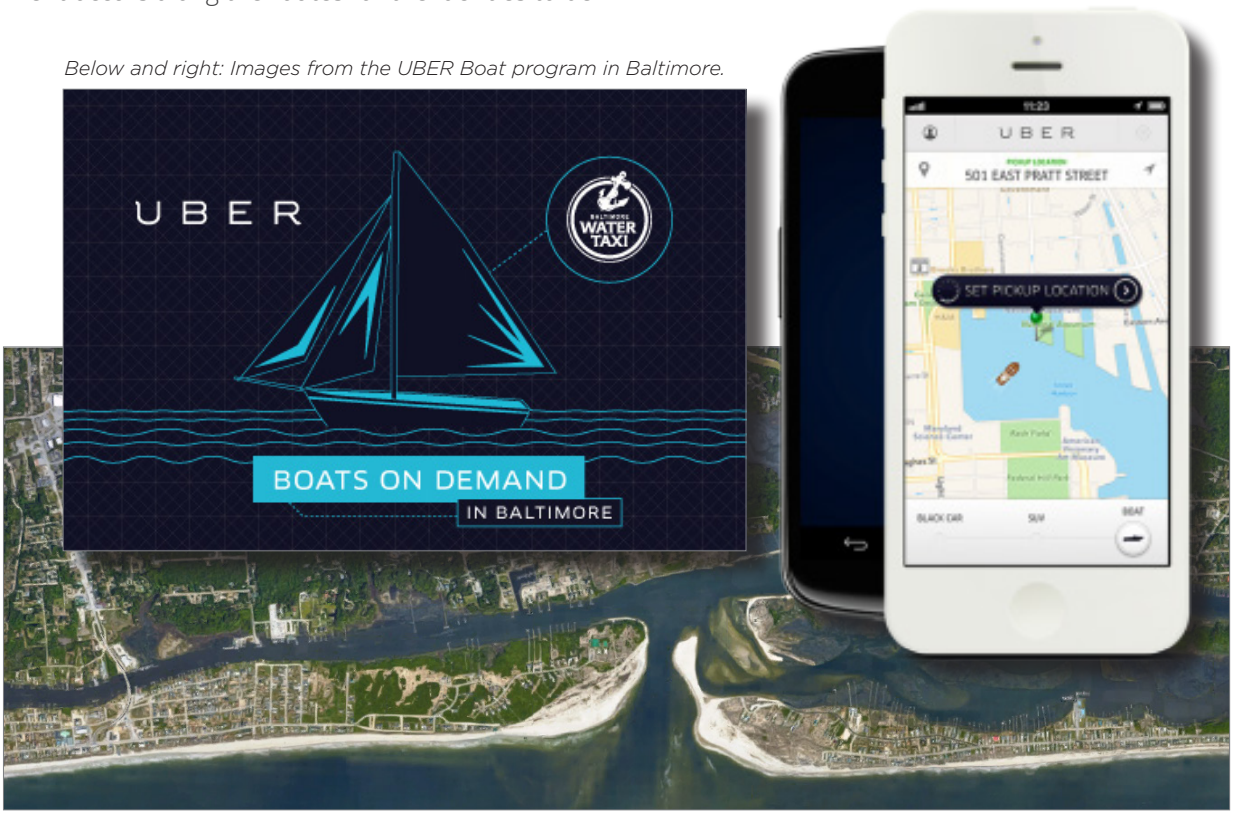
Partners: Local water taxi operators, UBER, Brunswick County, beach communities, Sea Tow, and the East Coast Greenway Alliance.

Description: When promoting bicycling in the region (especially to potential bicycle tourists from outside the region), one of the main selling points will be the region's beautiful coast. In fact, the largest planned trail is called the East "Coast" Greenway, yet very little of the route is actually along the coast. Many of the planned routes are more inland, and will require major long-term investments to complete, or will be postponed until enough development occurs along the routes for the facilities to be dedicated and developed. These efforts and plans should still remain in place for the long-term, but a shorter-term, lower-cost solution is also needed to provide safer and more enjoyable connectivity. The idea is to connect these beach island communities with a water taxi service that is marketed specifically towards bicyclists, making it clear what operators provide this service, at what times, and for what price. This will generate local business for boat operators and beach island destinations such as shops and restaurants. Any costs associated with supporting such a program would be insignificant compared to the cost of constructing nearly 30 miles of sidepaths and multiple major bridge upgrades.

UBER Boat programs could be used for special events or at peak hours in high season, as they are in Baltimore, Boston, Miami, and Toronto.

Resources: UBER Boat Boston: https://newsroom.uber.com/us-massachusetts/insights-from-bostons-uberboat/

Below and right: Images from the UBER Boat program in Baltimore.



Brunswick County's beaches are separated by short distances. For example, there is only 500 feet between Holden Beach and Oak Island (above). It takes over 20 miles to make the same connection by road.

BICYCLE SUITABILITY MAPS AND BROCHURES

Purpose: Encourage bicycling by highlighting bicycling routes, destinations, and tips for safe bicycling.

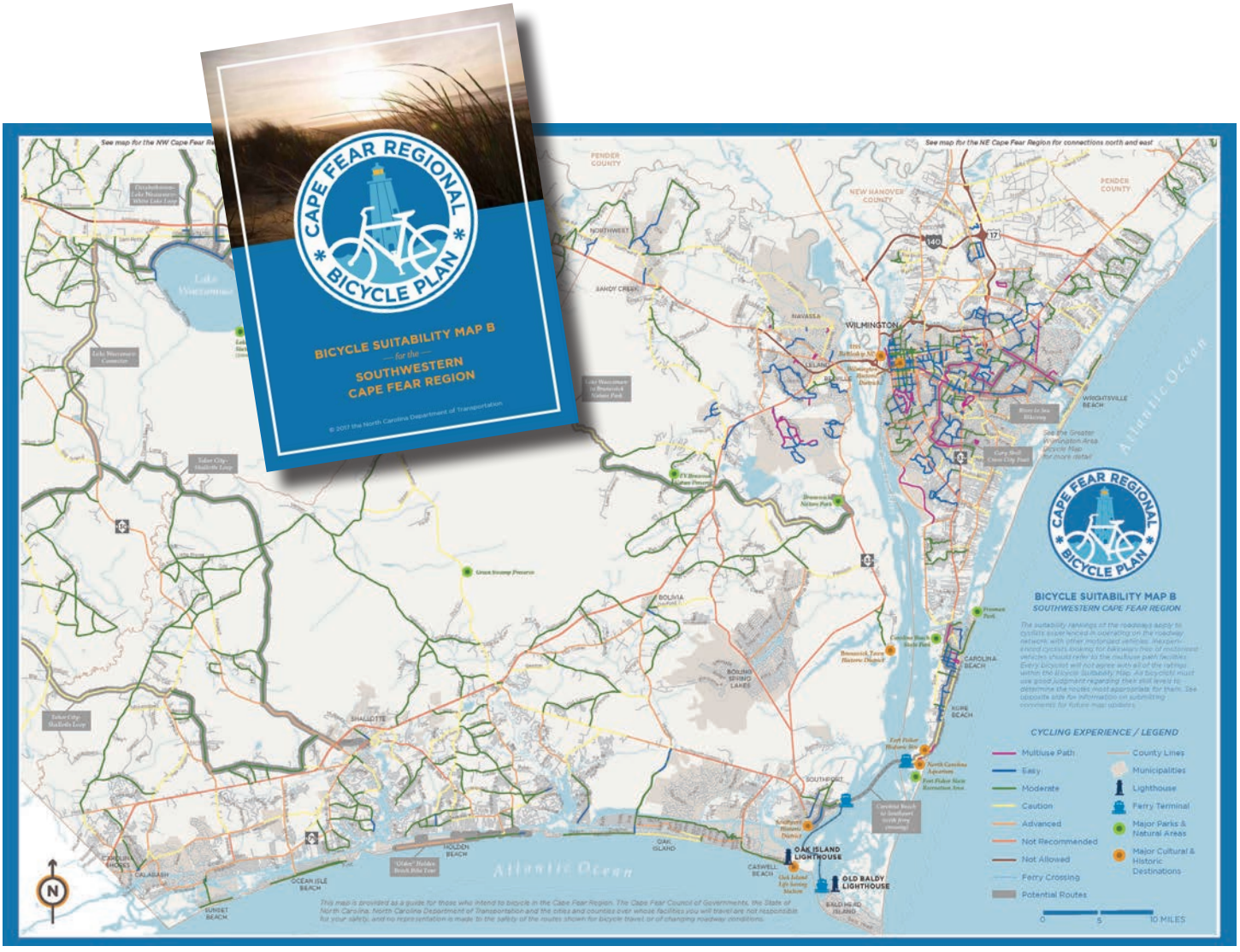
Audience: General public, tourists.

Partners: NCDOT, all study area MPOs & RPOs, counties, municipalities, businesses, local advocates, cycling groups, tourism agencies, and chambers of commerce.

Description: One of the most effective ways of encouraging people to bike is through the use of brochure guides describing enjoyable routes and destinations for bicycling. Three such maps have been developed for the Cape Fear Region showing the suitability of existing roadways and routes for bicycling. These maps should be printed as needed and actively distributed to residents and visitors by the partners noted at left; they should also be updated on a regular basis as new facilities are implemented (every five years or less).

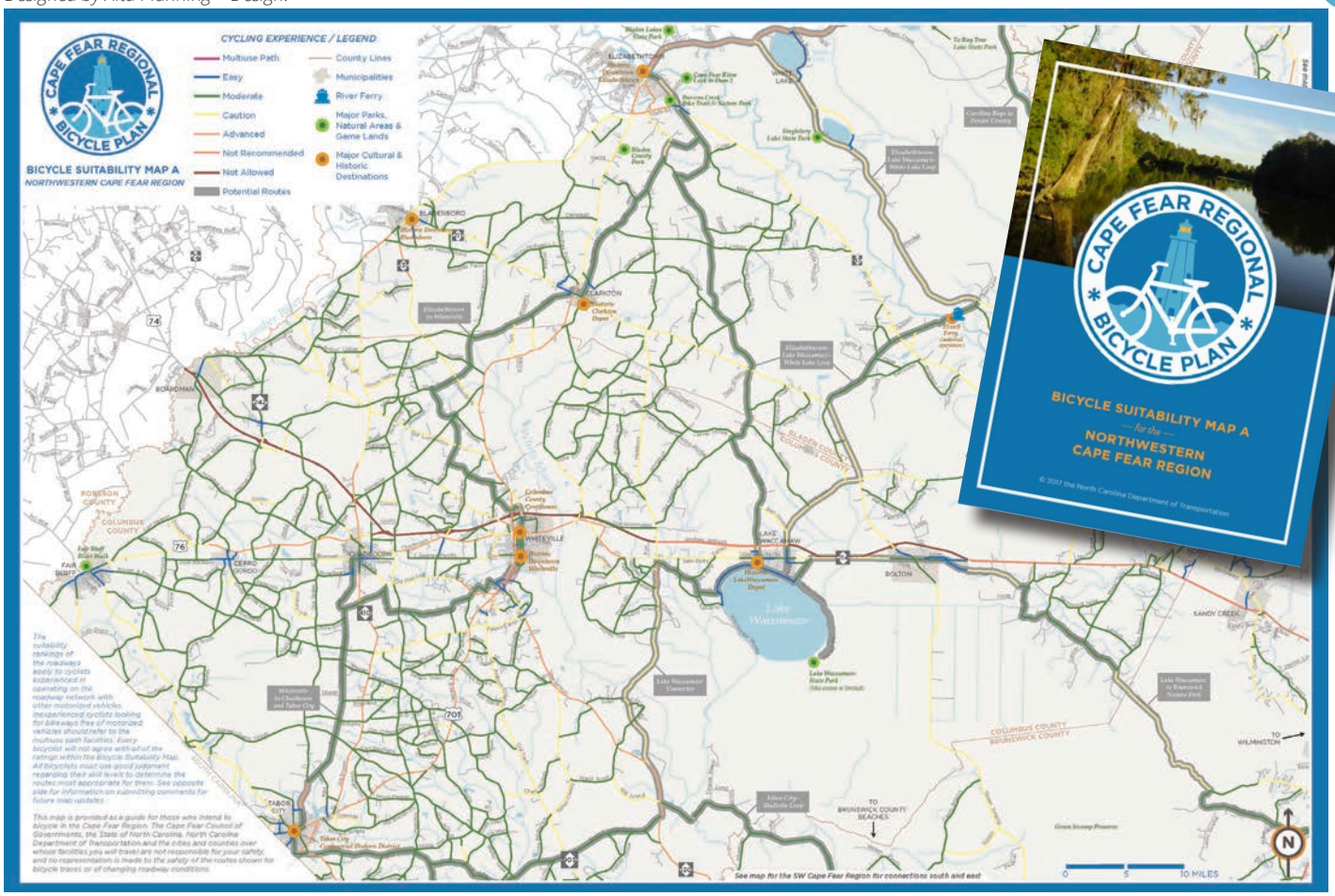
Online & Print Versions: Contact the Cape Fear Council of Governments

http://capefearcog.org/regionalbikeplan/



Designed by Alta Planning + Design.

Designed by Alta Planning + Design.



BICYCLE WAYFINDING SIGNAGE

Purpose: Encourage bicycling to and from tourism destinations; help bicyclists navigate along suggested bicycling routes.

Audience: General public

Partners: NCDOT, all study area MPOs & RPOs, counties, municipalities, and cycling groups.

Description: The Cape Fear Region should develop and install standardized, branded wayfinding signs to support the circulation of bicyclists along proposed signed routes.

Wayfinding signage enhances resident and visitor orientation. A clear wayfinding system should support the character of the region and contribute to economic development by indicating key tourism and agritourism destinations.

A regional plan logo was developed during this planning process, featuring the Old Baldy lighthouse, overlaid with a bicycle silhouette. This logo could be updated for the regional routes logo as well (see opposite page). This establishes a brand for bicycling in the Cape Fear Region and communicates to current and potential cyclists that they are riding on one piece of a broader network of facilities, while also creating an awareness of the bikeway system to all roadway users.

The jurisdictions of the Cape Fear Region have varying levels of bicycle and automobile wayfinding currently in place, and varying branding strategies. Appendix A: Design Guidelines offers detail about wayfinding sign types and sign placement that can be applied in versatile ways by the many jurisdictions in the region.

The signage details in Appendix A present options that follow the Manual on Uniform Traffic Control Devices guidelines followed by NCDOT, as well as options that allow for local community identification logos. Since all signs carry a cohesive element – the regional logo – the MUTCD-based signs can be applied on state-owned roads and localized signs on locally-owned roads. Upon implementation, local jurisdictions can work with NCDOT to select signage for a particular roadway.

See Appendix A: Design Guidelines for detail about wayfinding sign types, wayfinding sign placement, typical applications, and design features.

Bicycle wayfinding signage from Wilmington, NC.

Signage for the State Bike Route 5 and the East Coast Greenway.

Cape Fear Regional Bike Route Logo

Versions of the logo are available in .ai and .eps formats with the fonts outlined. CMYK color palette below:

Yellow/Gold: C0 M31 Y87 K0

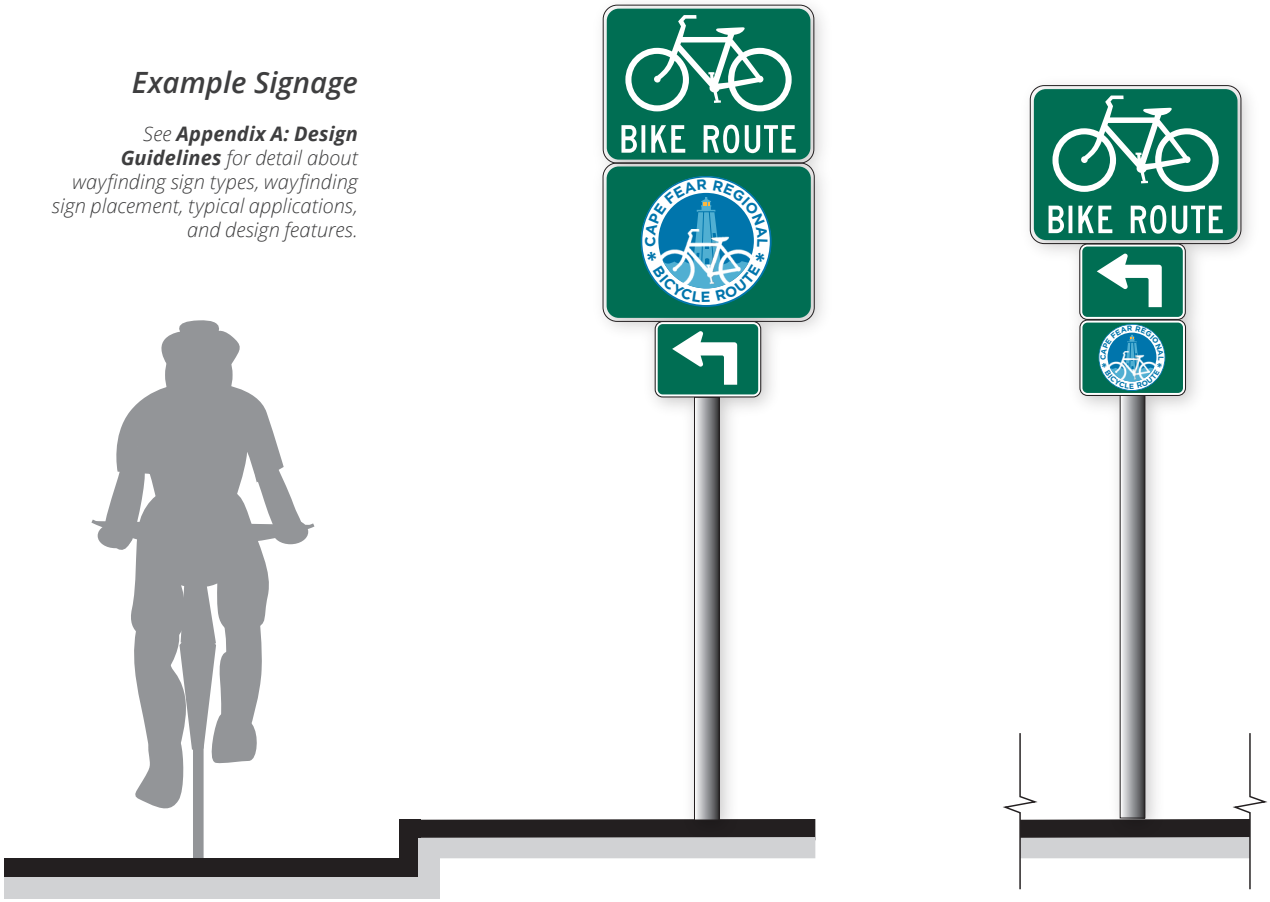
Light Blue: C64 M14 Y10 K0

Dark Blue: C88 M49 Y11 K0

A CMYK color palette is provided for the logo (but gray-scale or black and white versions would also be acceptable in approved instances). The font used in the logo is "Gotham Bold" and should not be altered or changed. The logo should not be reproduced or duplicated without the approved vectorized typeface.

Example Signage

*See **Appendix A: Design Guidelines** for detail about wayfinding sign types, wayfinding sign placement, typical applications, and design features.*



REGIONAL BICYCLING WEBSITE

Purpose: Make bicycling information easier to find by providing resources, maps, safety information, events, group listings, and more, in one central place.

Audience: General public

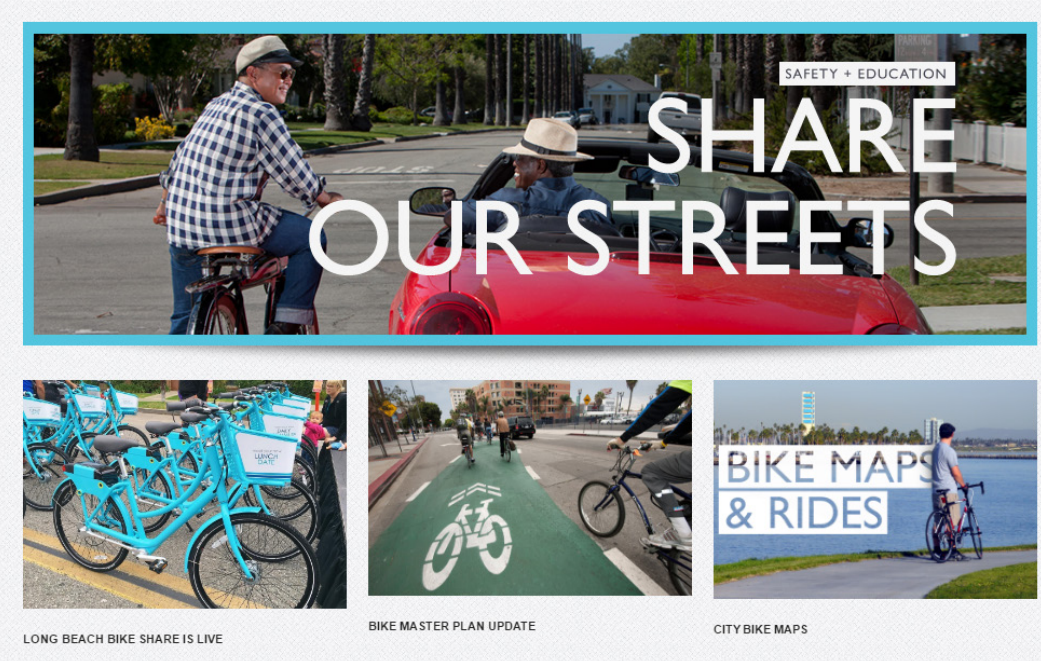
Partners: Cape Fear Regional Bicycle Committee (see page 152), municipalities and counties, local advisory committees (BPACs), local advocates, and cycling groups,

Description: Many current and potential bicyclists do not know where to turn to find out about bicycling routes, destinations, events, maps, tips, and groups. The Cape Fear RPO should launch a regional walking and bicycling "one-stop" website that includes:

- A list of links and descriptions to all walking and bicycling groups in the region, including clubs, racing teams, and advocacy groups;
- Information about the specific committees that discuss bicycling and trail issues in different areas (including how to get involved, with basic information such as meeting times and and contact persons);
- Information about current projects and public input opportunities (e.g., public meetings, comment periods);
- Maps and brochures (e.g., links to on-line maps and brochures, where to find hard copies, and how to request mailed materials);
- Links to laws and statutes relating to bicycling;
- Information about bicycling events (e.g., rides, classes, volunteer opportunities) and an events calendar;
- A list of local bike shops and bicycle rentals, including phone numbers and addresses; and
- Relevant contact information for the public.

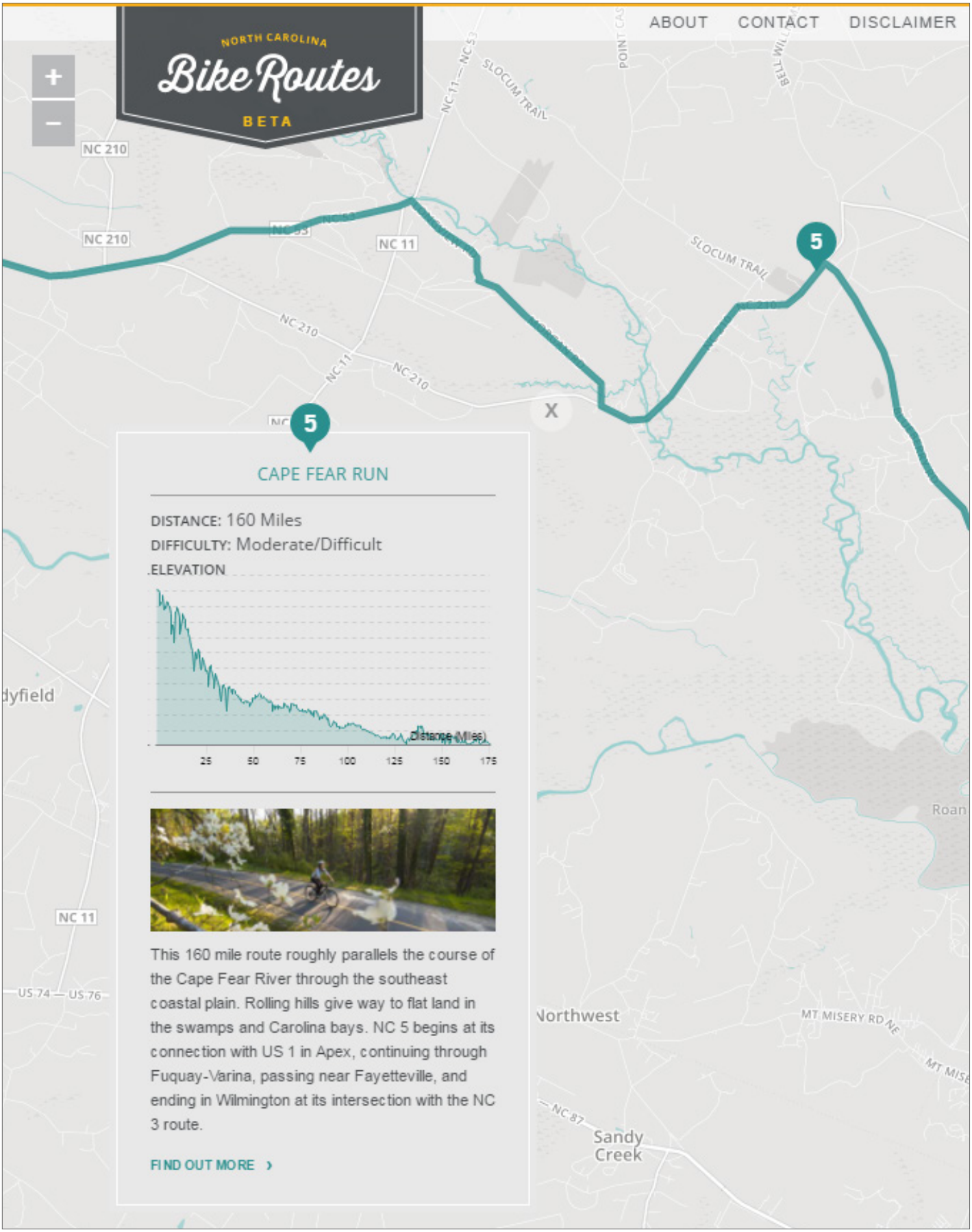
A one-stop bike website will not be difficult to set up, but it will only be successful if the site is both easy to use and updated regularly. All website content should be reviewed regularly for accuracy. The RPO can look to local BPAC groups to provide updates for the website in order to regularly showcase new content.

Sample Website: Bike Long Beach (CA): http://www.bikelongbeach.org/ (below)



Bike Long Beach offers links to programs, infrastructure, maps, events, and other resources.

The regional website could also feature an online interactive map, with features similar to NCBikeways.com (below), developed by Alta Planning + Design.



CYCLE TO FARM EVENTS: LEVERAGING BICYCLE TOURISM WITH AGRITOURISM

Purpose: Create and promote opportunities for bicycle-oriented tourism and agritourism; support communities as they seek to define themselves as a good place for bicycle tourism.

Audience: Bicycle tourists; visitors who enjoy recreational cycling, and fresh, local food.

Partners: Farm owners and operators, North Carolina Department of Agriculture and Consumer Services Agritourism Office, local and regional visitors bureaus, cycling clubs, and private tour managers that specialize in these types of tours (see following page); Cape Fear Regional Bicycle Committee (see page 152)

Description: Many rural communities throughout the U.S. are looking to tourism as a priority within their economic development plans, and bicycle tourism and agritourism are two popular and growing niche markets. Rural communities often have unique assets to offer visitors as bicyclists seek open spaces, lightly traveled roads, and the intimate experience that only small towns can provide. Efficiently identifying opportunities and creating targeted marketing plans can help the Cape Fear Region become a bicycling destination and reap the benefits of this low-impact, sustainable tourism segment.

Interested communities and organizations in the region should convene a working group to complete an opportunity analysis and action plan for fostering bicycle tourism. The working group should start by educating themselves about the market sector (what cycle tourists want; submarkets within the overall niche and how they differ; demographics of cycle tourists) and develop a shared understanding of the benefits of bicycle tourism to communities. Next, the group should organize a pilot program event or series of events that includes rides to multiple destinations, such as farms, vineyards, historic sites, and natural areas. The involvement of a group tour manager is recommended, specifically ones that have experience working in rural areas.

The presence of inns, bed and breakfasts, and quality camping areas could be an asset to the development of this program as connections between lodging and destinations would be important to the success of this program. An action plan should be created to prioritize efforts that will make the biggest difference, followed by a media outreach strategy to market the region to potential bicycle tourists.

Sample Programs and Resources:

Cycle to Farm: Cycle. Eat. Repeat. (Black Mountain, NC): http://cycletofarm.com/

North Carolina Department of Agriculture and Consumer Services Agritourism Office: http://www.ncagr.gov/markets/agritourism/

Oregon Bicycle Tourism Partnership http://industry.traveloregon.com/industry-resources/product-development/bicycle-tourism-development/oregon-bicycle-tourism-partnership/

A vineyard just south of Tabor City, NC, is one example of more than a dozen sites in the region that could be highlighted along a regional network of signed bicycle routes.

cycle to farm®

CYCLE. EAT. REPEAT.

created by velo girl RIDES®

The Cape Fear Region could boost agritourism in its rural landscapes by leveraging it with bicycle tourism.

Images on this page used with permission from Cycle to Farm by Velo Girl Rides. For more information go to ***cycletofarm.com****.*

WATCH FOR ME NC: MEDIA CAMPAIGN

Purpose: To improve pedestrian safety by influencing the behaviors of drivers and pedestrians through safety messaging and enforcement.

Audience: Pedestrians, cyclists, motorists, law enforcement officers

Partners: NCDOT, Cape Fear RPO, municipalities and counties

Description: Watch for Me NC is a comprehensive campaign aimed at reducing the number of bicyclists and pedestrians hit and injured in crashes with vehicles. The campaign consists of educational messages on traffic laws and safety, and an enforcement effort by area police.

Watch for Me NC is an ongoing statewide grant program administered by the NCDOT Division of Bicycle and Pedestrian Transportation (NCDOT DBPT). The Cape Fear RPO should contact NCDOT DBPT to request materials and guidance. Additionally, the Wilmington MPO is already actively engaged in the program and the Cape Fear RPO should request guidance from them as well. As a part of this program, the Cape Fear RPO in partnership with local agencies could:

- Distribute the educational materials made available by NCDOT at local festivals and other events, at local bike shops and other businesses, and in renters' information packets and property owners' guest information books.
- Work with police officers to hand out bicycle lights along with bicycle and pedestrian safety cards.
- Broadcast program promotions and educational videos on the local government access channel.
- Enforce motorist rates of yielding to pedestrians.
- Watch for Me NC website: http://watchformenc.org/

Sample Programs and Resources:

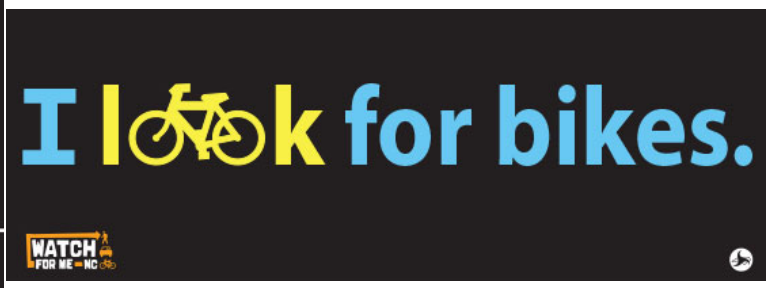
New Hanover County - http://www.watchformenc.org/about/partner-community-profiles/new-hanover-county-2014/

Surf City - http://www.watchformenc.org/about/partner-community-profiles/surf-city/

Comprehensive list of 2015 participants - http://www.watchformenc.org/about/partner-community-profiles/

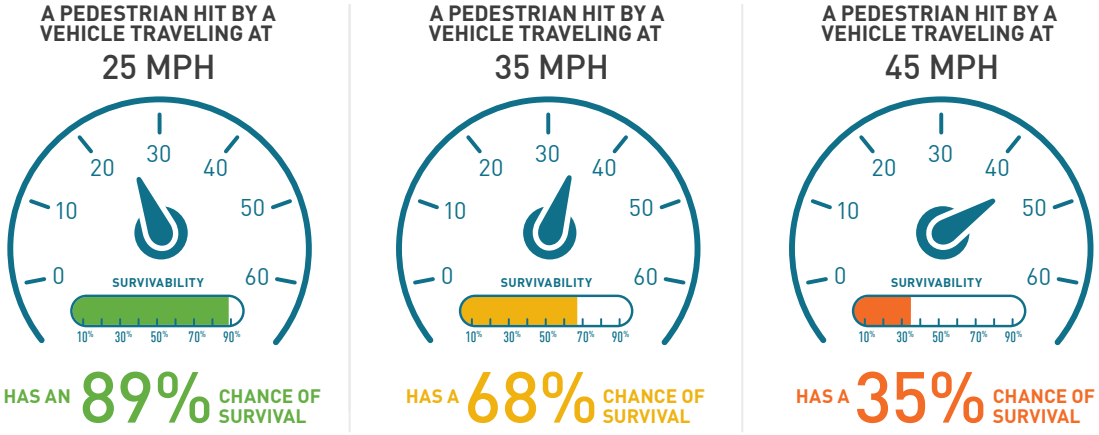
Watch for ME NC materials can be placed in strategic places throughout the Cape Fear region.

WATCH FOR ME NC



SPEED LIMIT REDUCTION & TRAFFIC CALMING

Lowering speed limits has enormous safety benefits for all users, including bicyclists, by lowering both the rate and severity of crashes. In addition to a media campaign spreading awareness, enforcement of existing speed limits as well as strategic speed limit reduction and traffic calming measures, can save lives. Guidance regarding speed limits and facility selection can be found on page 73 as well as in Appendix A: Design Guidelines.



Tefft, B. C. *Impact speed and a pedestrian's risk of severe injury or death*. Accident Analysis & Prevention 50 (2013) 871-878.

5 Policy Recommendations

"A place to ride a bike should be a consideration any time a road needs to be resurfaced ." - Public Comment, 2016

Bike Lane in Wrightsville Beach

OVERVIEW

The policy objectives and associated strategies presented in this chapter aim to improve the underlying land use and transportation conditions that fundamentally promote bicycle use at the regional and local level.

Bicycling needs must be considered within the context of the Cape Fear Region's transportation and land use system. To improve safety, community character, and transportation choices requires investment in public transit, bikeways, sidewalks and land use patterns that put a variety of destinations and services within close proximity. Through the statewide adoption of Complete Street design guidelines, and by working to advance Context-Sensitive Solutions (CSS), the North Carolina Department of Transportation is a willing partner to those communities desiring a transportation system that reinforces community character for economic development, community health, and livability. With this in mind, the following policy objectives and associated strategies aim to improve the underlying land use and transportation conditions that fundamentally promote bicycle use at the regional and local level. Such policies:

- Recognize the interrelationship between land use decisions (planning and development) and transportation decisions.
- Reinforce basic urban design principles that result in development of sustainable and attractive districts, neighborhoods, and corridors supportive of bicycling and walking and other modes of travel.
- Improve the balance of protected rural areas and vibrant village, town, and city environments that make the Cape Fear region special.

One of the most cost effective implementation strategies for the Cape Fear Region and its communities is to establish land use and transportation policies and development regulations that promote bikeable new development, programs, and capital projects. As part of a comprehensive approach to developing recommendations for a more bikeable region, planning consultants reviewed the development standards for New Hanover County to identify general issues and opportunities impacting the bicycling environment that can be a model for other local governments in the region.

This chapter concludes with a more general set of policy recommendations that they may be considered and applied in different communities throughout the region.

PRIORITY POLICY RECOMMENDATIONS

Regulatory standards and policies were analyzed through the lens of the project vision and goals, specifically, the vision of making the Cape Fear Region a place where: *"Bicycling is a safe and accessible form of transportation and recreation for residents and visitors....Key destinations are served by well-connected bikeways, increasing tourism and promoting economic development."*

The policy review tables (Tables 5.1 to 5.4) are organized into these overall categories:

1. Complete Streets and Greenways
2. Bicycle-oriented Urban Design Elements
3. Connectivity
4. Policy Considerations by Settlement Type

These categories are interrelated, but based on the existing conditions analysis, and the goals of this plan, the following key recommendations from the table below should be implemented first:

PRIORITY POLICY *and* REGULATORY RECOMMENDATIONS:

1. **Develop and adopt local Complete Street Policies for each regional community. Update development regulations and engineering standards to include and reflect best practices for Complete Streets and bikeway design.**
2. **Include requirements to include bikeways and bicycle friendly crossings in new development.**
3. **Require dedication or reservation of adopted greenway alignments in new developments and along major roadways, as appropriate to regional connectivity, adopted plans, and roadway context. Consider application of a corridor overlay district that would preserve right-of-way or require dedication or construction of planned greenway alignments and promote other trail-oriented-development.**
4. **Adopt bicycle parking requirements and standards in local zoning codes.**
5. **Revise and update connectivity requirements to promote comprehensive bikeway networks.**
6. **Assign greenway construction and maintenance to appropriate municipal and county departments, including park and recreation or public works departments.**
7. **Work with the local NCDOT Division Engineers to develop a bicycle-friendly specific Rumble Strip Policy and application process that enhances the NCDOT R-44 Practice Memo. This could be modeled on the policy developed by NCDOT Division 14 and/or include references to state and national best practices for bicycle-friendly rumble strip application, especially on bike routes and roads with shoulders likely to be used by cyclists:**
   - **League of American Bicyclists "Bicycling and Rumble Strips": http://www.advocacyadvance.org/docs/rumble_strips.pdf**
   - **NCDOT Division 14 rumble strip guidelines (noted in Appendix A Design Guidelines).**
8. **Develop a policy to require NCDOT and local and regional agencies to review the recommendations of this plan to ensure that NCDOT corridor projects include the recommended bikeways and treatments.**

These approaches complement the infrastructure and program recommendations provided in this planning document.

EXAMPLE DEVELOPMENT REGULATIONS

Given the large number of jurisdictions in the Cape Fear Region, this plan offers example municipal ordinances to be referenced as models for local communities. In addition, the project team identified appropriate model regulatory and policy language from around North Carolina and the U.S. for elements including land use/transportation integration, connectivity, Complete Streets, and bicycle parking. These provide example methods for regional communities to maximize on-road bicycle and multi-use trail improvements in conjunction with new development, redevelopment, and corridor improvement projects. Recommended policy language to enhance multi-use trail development is also included.

The subsections below include recommendations for bicycle-related elements of Complete Streets and complete bicycle networks. Designated bikeways and trails and end-of trip facilities such as bicycle parking are some of the most fundamental elements of Complete Streets for bicycle users. Access management, multi-modal level of service assessments, and traffic calming are also critical for developing complete street networks for bicycling through the development review and capital project implementation process. The NCDOT *Complete Street Planning and Design Guidelines* and the design guidelines that accompany this plan also include detailed recommendations on complete street design elements for implementing communities. These guidelines provide an excellent basis for locally-adopted complete street policy, regulatory tools, and design guidance.

NC MUNICIPALITIES *with* MODEL REGULATORY POLICIES

The following NC communities have model development polices that serve as good examples for communities in the Cape Fear Region. These model ordinances support bicycling and the development of bikeways and greenway trails (some sections of these documents are also referenced in the tables on the following pages):

- **Town of Wilson, North Carolina, Unified Development Ordnance**
- **Town of Wake Forest, North Carolina, Unified Development Ordnance**
- **Town of Davidson, North Carolina, Planning Ordinance**

TABLE 5.1 COMPLETE STREETS & GREENWAYS

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
1.1 Implement Complete Streets Policy A Complete Streets policy allows cities and towns to work towards creating a street network that encourages pedestrian and bicycle travel and provides safe and comfortable roadways for all users.	In addition to the very thorough NCDOT Complete Streets Planning and Design Guidelines (https://connect.ncdot.gov/projects/BikePed/Pages/Complete-Streets.aspx), the National Complete Streets Coalition provides great guidelines for designing streets that cater to all users: (http://www.completestreets.org/resources/complete-streets-best-practices/).
1.2 Develop Complete Street Design Guidelines for a variety of contexts and all street/roadway user groups The topics below include recommendations for bicycle-related elements of Complete Streets. Designated bikeways and trails and end-of trip facilities such as bicycle parking are some of the most fundamental elements of Complete Streets for bicycle users. Access management, multi-modal level of service assessments, and traffic calming are also critical for developing complete street networks through the development review and capital project implementation process. The NCDOT Complete Street Guidelines and the design guidelines that accompany this plan also include detailed recommendations on complete street design elements for bicycle users.	Cape Fear communities could adopt and endorse the NCDOT guidelines and other national guidelines, including the NACTO *Urban Street Design Guide*: http://nacto.org/publication/urban-street-design-guide/ The design guidelines would then need to be integrated into development standards for new development, as was done with the *Raleigh Street Design Manual* (http://www.raleighnc.gov/content/extra/Books/PlanDev/StreetDesignManual/#1) and The *Charlotte Urban Street Design Guidelines*: http://charmeck.org/city/charlotte/transportation/plansprojects/pages/urban%20street%20design%20guidelines.aspx See also the excellent *Major & Collector Street Plan: Implementing Complete Streets* for Nashville/Davidson County, TN.
1.3. Require bike accommodations by roadway type	See Chapter 4 of the NCDOT *Complete Streets Planning and Design Guidelines* for recommendations of bikeway type by roadway type. Consider including these guidelines by reference in local design guidance or requirements. Also: The design guidelines recommended as part of the Cape Fear Regional Bicycle Plan should be considered for incorporation or inclusion by reference in the regional communities' engineering and design standards and subdivision regulations. The NACTO *Urban Bikeway Design Guide* provides additional design details for various on-street bikeway treatments and could be adopted by reference in regional ordinances and/or engineering standards. Many cities have taken this approach. http://nacto.org/cities-for-cycling/design-guide/
1.4. Require designated bikeways (bike lanes, shoulders, greenways, etc) during new development or redevelopment	Generally, as traffic volumes exceed 3,000 vehicles per day and traffic speeds exceed 25mph, facilities to separate bicycle and motor vehicle traffic are recommended. Multi-lane roads are typically more dangerous for all users because of the increased traffic volume, the potential for higher speeds, and the additional number of conflict locations due to turning vehicles. See Chapter 4 of the NCDOT *Complete Streets Planning and Design Guidelines* for guidance. Also, see: Chapters 6 of Wake Forest, NC UDO for recommendations for bikeways and greenways, esp. sections 6.8.2, 6.9, 6.10. http://www.wakeforestnc.gov/udo.aspx Chapter 7 of the Wilson, NC UDO regarding greenways. http://www.wilsonnc.org/attachments/pages/545/CH%207-Parks%20&%20Open%20Space.pdf

TABLE 5.1 COMPLETE STREETS & GREENWAYS *(CONTINUED)*

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
1.5. Require dedication, reservation or development of greenways	Consider expanding requirements for greenway reservation, dedication, or provision in new developments where a greenway or trail is shown on an adopted plan or where a property connects to an existing or proposed greenway. Where greenway construction cannot politically or legally be required, consider offering incentives in the form of reduced fees, cost sharing, density bonuses, or reduction in other open space requirements when adopted greenways are constructed through private development. See the incentives offered by the City of Asheville to promote public policy goals. For example: http://www.ashevillenc.gov/Portals/0/city-documents/sustainability/Planning%20incentives%20new%20marketing%20packet.pdf For additional examples of incentives, see also: https://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/incentive_strategies.pdf Ideally, development regulations should require the construction and maintenance of greenways to local standards unless a maintenance agreement is established with a local government. See requirements in Wake Forest, NC UDO, Section 6.8.2 Greenways: *"When required by Wake Forest Open Space & Greenways Plan or the Wake Forest Transportation Plan, greenways and multi-use paths shall be provided according to the provisions [that follow in the section cited above]."* http://www.wakeforestnc.gov/udo.aspx Good Local Model: (New Hanover County Zoning Ordinance): The Riverfront Mixed Use District includes the following provision: *"Riverfront facilities **shall provide multi-modal transportation opportunities, including public boating, walking, bicycling,** and public bus or water taxi uses and the facilities necessary for such uses."*
1.6. Require new bike lanes, greenways, etc., to connect to existing facilities	Connectivity of facilities is critical for walking and biking conditions. New development should be required to connect to or extend existing bicycle and pedestrian facilities. See: • Chapters 6 of Wake Forest, NC UDO for recommendations for bikeways and greenways, esp. sections 6.5.3, 6.8.2, 6.9, 6.10. http://www.wakeforestnc.gov/udo.aspx • Chapter 7 of the Wilson, NC UDO regarding greenways. http://www.wilsonnc.org/attachments/pages/545/CH%207-Parks%20&%20Open%20Space.pdf Good Local Model: (New Hanover County Zoning Ordinance): The EDZD Zoning District provides points for new developments that connect to the existing bikeway network and key destinations and provides a good definition of the bikeway network. (Section 54.1-14 and following.)

TABLE 5.1 COMPLETE STREETS & GREENWAYS *(CONTINUED)*

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
1.7. Consider bicycle concerns and Level of Service (LOS) in Traffic Impact Analyses and other engineering studies	Cape Fear communities should consider adopting multi-modal of service standards where active transportation and transit use are expected to be high. Consideration of bicycle and pedestrian levels of service assure adequate facilities for bicyclists and pedestrians in new development and capital improvements. This also helps promote walking and bicycling as a legitimate means of transportation. The NCDOT *Complete Streets Planning and Design Guidelines* provides factors of "Quality of Service " and LOS for bicycle, pedestrian, and transit modes (See Chapter 3, page 39 and Chapter 5): http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf The City of Raleigh uses a multimodal level of service approach in determining road improvements and traffic mitigation: http://www.raleighnc.gov/content/extra/Books/PlanDev/StreetDesignManual/#71 Charlotte, NC uses Pedestrian LOS and Bicycle LOS Methodologies for intersection improvements in their *Urban Street Design Guidelines*: http://charmeck.org/city/charlotte/transportation/plansprojects/pages/urban%20street%20design%20guidelines.aspx
1.8. Adopt traffic calming programs, policies, and standards Traffic calming on local streets increases safety and comfort for all roadway users, including cyclists. It also increases neighborhood livability.	Traffic calming tools are especially important where bike routes or bike boulevards are proposed on local residential or sub-collector streets. The National Complete Streets Coalition provides good guidelines for traffic calming through their best practices manual: (http://www.completestreets.org/resources/complete-streets-best-practices/). See also the NACTO *Urban Bikeway Design Guid*e section on Bicycle Boulevards.
1.9. Develop an access management program or policy Limiting turning movements on major roadways and requiring cross-access between adjacent parcels of land, including commercial developments, is a great tool for reducing the amount of traffic and turning movements on major roads while increasing safety and connectivity for pedestrians, bicycles, and cars.	The NCDOT *Complete Streets Planning and Design Guidelines* provides recommended "Access Density" guidelines (See Chapter 4, page 61 and following). These guidelines could be the basis for regulatory updates to the county or municipal codes: http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf
2.1. Adopt bicycle parking requirements	Bicycles should receive equal consideration when calculating parking needs with specific calculations provided for determining the amount of bicycle parking provided by district type or land use type. Design and location standards for bicycle parking should be clearly stated to provide for safe and convenient access to destinations. Different standards of bicycle parking are needed for short-term visitors and customers and for longer term users like employees, residents, and students. See City of Wilson UDO, Chapter 9: Parking & Driveways, Section 9.4 and 9.6: http://www.wilsonnc.org/attachments/pages/545/CH%209-Parking%20&%20Driveways.pdf Good standards for bicycle parking design can be found through the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines*. (www.apbp.org) Bicycle Parking Model Ordinance, Change Lab Solutions: http://changelabsolutions.org/publications/bike-parking

TABLE 5.2 BICYCLE-ORIENTED URBAN DESIGN ELEMENTS

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
2.1. Adopt bicycle parking requirements	Bicycles should receive equal consideration when calculating parking needs with specific calculations provided for determining the amount of bicycle parking provided by district type or land use type. Design and location standards for bicycle parking should be clearly stated to provide for safe and convenient access to destinations. Different standards of bicycle parking are needed for short-term visitors and customers and for longer term users like employees, residents, and students. See City of Wilson UDO, Chapter 9: Parking & Driveways, Section 9.4 and 9.6: http://www.wilsonnc.org/attachments/pages/545/CH%209-Parking%20&%20Driveways.pdf Good standards for bicycle parking design can be found through the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines*. (www.apbp.org) Bicycle Parking Model Ordinance, Change Lab Solutions: http://changelabsolutions.org/publications/bike-parking City of San Francisco Zoning Administrator Bulletin for designs/layout/etc. The bulletin is in itself a great document that includes limits on hanging racks, how to park family bikes, and various configurations: http://208.121.200.84/ftp/files/publications_reports/bicycle_parking_reqs/Leg_BicycleParking_ZABulletin-No.9.pdf

TABLE 5.3 CONNECTIVITY

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
3.1. Revise block size requirements *"[A]* ***Good [street] network provides more direct (shorter) routes for bicyclists and pedestrians to gain access to the thoroughfares and to the land uses along them (or allows them to avoid the thoroughfare altogether)****. Likewise, good connections can also allow short-range, local [motor] vehicular traffic more direct routes and access, resulting in less traffic and congestion on the thoroughfares. This can, in turn, help make the thoroughfare itself function as a better, more complete street. For all of these reasons,* ***a complete local street network should generally provide for multiple points of access, short block lengths, and as many connections as possible."*** (NCDOT Complete Streets Planning and Design Guidelines, p 59)	Development density should determine the length of a block, with shorter blocks being more appropriate in areas of higher density. **Maximum block length in any situation should rarely exceed 800-1000 feet for good connectivity. In areas with highest development density (urbanized, mixed use centers and high density neighborhoods), block lengths can be as little as 200 feet.** In areas with blocks as long as 800 feet or greater, a pedestrian and/or bicycle path of 6-8 feet in width should be required, with an easement of 15-20 feet wide. See the example table on page 59 of the NCDOT *Complete Streets Planning and Design Guidelines* for a context-based approach to block size. Consider allowing larger blocks – up to a maximum, such as 800 feet – where development densities are expected be lower (> 4 dua). See City of Charlotte Subdivision Ordinance, Section 20-23 for example of connectivity requirements and block standards: http://ww.charmeck.org/Planning/Subdivision/Subdivision-OrdinanceCity.pdf

TABLE 5.3 CONNECTIVITY *(CONTINUED)*

TOPICS/STRATEGIES	GENERAL RECOMMENDATIONS
3.2. Require connectivity/ cross-access between adjacent land parcels *"[A]* ***Good [street] network provides more direct (shorter) routes for bicyclists and pedestrians to gain access to the thoroughfares and to the land uses along them (or allows them to avoid the thoroughfare altogether).*** *Likewise, good connections can also allow short-range, local [motor] vehicular traffic more direct routes and access, resulting in less traffic and congestion on the thoroughfares. This can, in turn, help make the thoroughfare itself function as a better, more complete street. For all of these reasons,* ***a complete local street network should generally provide for multiple points of access, short block lengths, and as many connections as possible."*** *(NCDOT Complete Streets Planning and Design Guidelines, p 59)*	See notes above regarding Block Size. Requiring connectivity or cross-access between adjacent developments is a great tool for reducing the amount of traffic on major roads while increasing connectivity for pedestrians, bicycles, service vehicles, and neighborhood access. For good model language, see City of Wilson, NC UDO, Section 6.4: Connectivity: http://www.wilsonnc.org/attachments/pages/545/CH%206-Infrastructure%20Standards.pdf Or City of Wake Forest, NC UDO, Section 6.5, Connectivity: http://www.wakeforestnc.gov/udo.aspx Both codes above also provide requirements for when bicycle/pedestrian connections between parcels, public open space, and between cul-de-sacs is required. See also the excellent *Major & Collector Street Plan: Implementing Complete Streets* for Nashville/Davidson County, TN. EXCELLENT local model (New Hanover County Zoning Ordinance): The EDZD Zoning District provides points for developments that "Locate and/or design the project such that a through **street and/or non-motorized right-of-way intersects the project boundary at least every 800 feet**, connecting with an existing street and/or right-of-way outside the project." (Section 54.1-14 and following.) The Riverfront Mixed Use District provisions include the following: "**Bicycle and/or pedestrian connectivity to adjacent or nearby developments is required**, when feasible." (However, "connectivity" and "when feasible" are not defined.)
3.3. Limit dead end streets or cul-de-sacs Dead end streets or Cul-de-sacs, while good at limiting motor vehicular traffic in an area, are a severe hindrance to pedestrian and bicycle connectivity and overall neighborhood accessibility, including for emergency access and other services.	• Consider requiring other traffic calming measures that allow for connectivity and improve the pedestrian and biking environment such as street trees, narrow street width standards, and T intersections. • Make the maximum length for Cul-de-sacs 250-300 feet to limit the distance that a person would have to travel along a cul-de-sac. For good model language, see City of Wilson, NC UDO, Section 6.4: Connectivity: http://www.wilsonnc.org/attachments/pages/545/CH%206-Infrastructure%20Standards.pdf Or City of Wake Forest, NC UDO, Section 6.5, Connectivity: http://www.wakeforestnc.gov/udo.aspx EXCELLENT local model (New Hanover County Zoning Ordinance): The EDZD Zoning District provides points for developments that "Provide an internal bicycle and pedestrian network that includes **a pedestrian or bicycle through-connection in at least 90% of any new cul-de-sacs**, except where prohibited by topographical conditions." (Section 54.1-14 and following.)
The following documents were referenced for this policy and regulatory review. Other references for best practices are listed in the column on the far right.	REFERENCED DOCUMENTS AND RESOURCES: 1. NCDOT *Complete Streets Planning and Design Guidelines* (July 2012): http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf 2. NCDOT Traditional Neighborhood Development (TND) Guidelines: http://ntl.bts.gov/lib/22000/22600/22616/tnd.pdf 3. City of Wilson, NC UDO:https://www.wilsonnc.org/development-services/unified-development-ordinance/ 4. Town of Wendell, NC UDO: http://www.townofwendell.com/departments/planning/development/zoning/udo-unified-development-ordinance 5. City of Wake Forest, NC UDO: http://www.wakeforestnc.gov/udo.aspx 6. See Town of Davidson, NC Planning Ordinance, https://nc-davidson2.civicplus.com/DocumentCenter/View/4126 7. Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines*. (www.apbp.org) 8. *Making Neighborhoods More Walkable and Bikeable*, ChangeLab Solutions: http://changelabsolutions.org/sites/default/files/MoveThisWay_FINAL-20130905.pdf 9. *Getting the Wheels Rolling: A Guide to Using Policy to Create Bicycle Friendly Communities*, ChangeLab Solutions http://changelabsolutions.org/bike-policies And other documents noted in this column in the preceding tables.

TABLE 5.4 POLICY CONSIDERATIONS BY SETTLEMENT TYPES

Table 5.4 presents a general set of policy considerations that are organized in tabular form and calibrated to the region's range of settlement types, so that they may be considered and applied in different communities throughout the region.


Natural


Farmland


Hamlet


Village


Town


City


Beach District

Transportation Network *Objective: Accommodate bicyclists through the ongoing development of a context-sensitive regional and local transportation infrastructure network.*													
Ensure that the region's thoroughfare system is compatible with adjacent land uses and natural/built character.	●		●		●		●		●		●		●
Promote positive health, recreation, transportation, economic, and environmental benefits of bicycle investments.	●		●		●		●		●		●		●
Coordinate with NCDOT Context Sensitive Solutions and the Complete Streets Policy along and across state roadways.	●		●		●		●		●		●		●
Require new development to minimize driveway access in order to reduce conflict points.							●		●		●		●
Partner with State and local entities to explore alternative funding sources that support transportation options throughout the region, including integrating bicycle and pedestrian facilities.	●		●		●		●		●		●		●
Encourage local jurisdictions to require development to fund proportional share of transportation infrastructure costs.					●		●		●		●		●

TABLE 5.4 POLICY CONSIDERATIONS BY SETTLEMENT TYPES *(CONTINUED)*


Natural


Farmland


Hamlet


Village


Town


City


Beach District

	Natural	Farmland	Hamlet	Village	Town	City	Beach District
Work with all jurisdictions to reduce motor vehicle speeds by implementing proven traffic-calming measures.				•	•	•	•
Implement a bicycle share pilot program in Wilmington and/or at UNCW and beach communities.						•	•
Supplement subdivision regulations with context-appropriate block size and street connectivity standards.			•	•	•	•	•
Bikeway Infrastructure *Objective: Accommodate bicyclists through the ongoing development of context-appropriate bikeways, bicycle parking, and bikeway signing and wayfinding.*							
Ensure that the maintenance/expansion of the regional thoroughfare system serves bicyclists and pedestrians.	•	•	•	•	•	•	•
Coordinate planning, design, and implementation of context-sensitive bicycle improvements with the Facility Continuum.	•	•	•	•	•	•	•
Use this Cape Fear Regional Bicycle Plan to guide future planning, design, and implementation of bicycle infrastructure in conjunction with other local and regional planning and development projects.	•	•	•	•	•	•	•
Encourage county/municipal parking requirements to include bicycle parking at areas of regional and local significance, such as schools, government offices, churches etc.			•	•	•	•	•

TABLE 5.4 POLICY CONSIDERATIONS BY SETTLEMENT TYPES *(CONTINUED)*


Natural


Farmland


Hamlet


Village


Town


City


Beach District

	Natural	Farmland	Hamlet	Village	Town	City	Beach District
Encourage county/municipal parking requirements to follow the Association for Pedestrian and Bicycle Professional's (APBP) bicycle parking design and location guidelines, including provisions for short- and long-term parking.			•	•	•	•	•
Work with state, county, local entities to enhance the safety and visibility of the regional bicycle network by implementing appropriate safety and wayfinding signage improvements.	•	•	•	•	•	•	•
Environmental Protection *Objective: Protect natural land by directing public infrastructure spending and private development to areas where they will have the greatest social and economic benefit and the least environmental impact and transportation cost.*							
Establish a regional Transfer of Development Rights (TDR) program and/or support existing or new conservation easement, land trusts, and other tools to preserve the region's rural and working landscapes.	•	•					
Protect regional wetlands, wetland buffers, floodways, floodplains, aquifer recharge areas, woodland, productive farmland, wildlife habitat and important scenic views by disallowing new development along certain scenic roadways.	•	•					
Help property owners maintain the agricultural use of their land through a regional tax relief or land valuation mechanisms calibrated to agricultural production value, as opposed to its commercial or residential real estate value.		•					

TABLE 5.4 POLICY CONSIDERATIONS BY SETTLEMENT TYPES *(CONTINUED)*


Natural


Farmland


Hamlet


Village


Town


City


Beach District

	Natural	Farmland	Hamlet	Village	Town	City	Beach District
Avoid the location of public facilities (schools, government offices etc.) within Natural or Farmland areas.	•	•					
To protect regional open space, enhance environmental health, and increase recreational opportunities, establish Hamlet, Village, Town, City, and Beach District areas as regional (TDR) "receiving areas."			•	•	•	•	•
Encourage local municipalities to identify and maintain a permanent rural "green" preserve around the Hamlet, Village, Town, and City areas with a focus on improving and protecting ecological areas.			•	•	•	•	
Encourage the protection, preservation and enhancement of riparian corridors within new development and the redevelopment of existing, underutilized parcels to maximize public access, connectivity, and recreational bicycling.			•	•	•	•	•
Regional Growth *Objective: Direct public infrastructure spending and private development to developed areas where the greatest social and economic benefit can be realized with the least environmental and transportation costs.*							
Ensure that adequate public services, infrastructure, and facilities are available or funded prior to approval of new development to ensure that the cost is not unnecessarily burdensome to existing residents.			•	•	•	•	•

TABLE 5.4 POLICY CONSIDERATIONS BY SETTLEMENT TYPES *(CONTINUED)*

	 Natural	 Farmland	 Hamlet	 Village	 Town	 City	 Beach District
If adequate public facilities are not available, require new development of a certain size to fund its proportional share of infrastructure costs.			•	•	•	•	•
Encourage county and local governments to replace use-based zoning code with form-based, pedestrian-oriented zoning, especially within existing or proposed residential neighborhoods and mixed-use main street / commercial corridors.				•	•	•	•
Prioritize application processing and/or create other financial incentives for projects within previously developed areas or areas regulated by form-based codes zoning.				•	•	•	•
Wherever practical, incentivize land devoted to surface parking lots to be developed into more productive uses.					•	•	•
Encourage and support the evolution of auto-oriented, strip-style commercial development into mixed-use activity centers that support a more walkable and bicycle-friendly environment.				•	•	•	•
Encourage the Cape Fear Region counties and local municipalities to evaluate the strength of proposed development projects through the creation of a smart growth scorecard, or similar tool.	•	•	•	•	•	•	•

6 Implementation

"Develop a long term plan (10 - 15 years) and prioritize which projects are most critical. Use various funding sources (taxes, bonds, grants, local government up to state government, etc). Be committed." - Public Comment, 2016

"Very happy to see this type of awareness and action in our area." - Public Comment, 2016

Sidepath under construction in Wilmington.

OVERVIEW

The recommendations in this plan represent a major investment with enormous positive impacts for residents, businesses, and visitors in the Cape Fear Region. Successful implementation will require a consistent, coordinated effort by regional planners, NCDOT, and the many counties, municipalities, private partners, stakeholders, and advocates in the region.

This chapter details priority action steps for the region. The action steps presented do not cover every individual infrastructure, policy, and program recommendation of this plan. Rather, they call out priority items within each of these categories in order to provide guidance for moving forward on the most important items. For each action step, a lead agency, potential support agencies, and time frame for completion are suggested.

STAKEHOLDER COORDINATION FOR IMPLEMENTATION

Successful implementation will take both individual efforts from local governments, as well as coordinated efforts among a wide variety of stakeholders that cover this plan's entire 7-County regional study area.

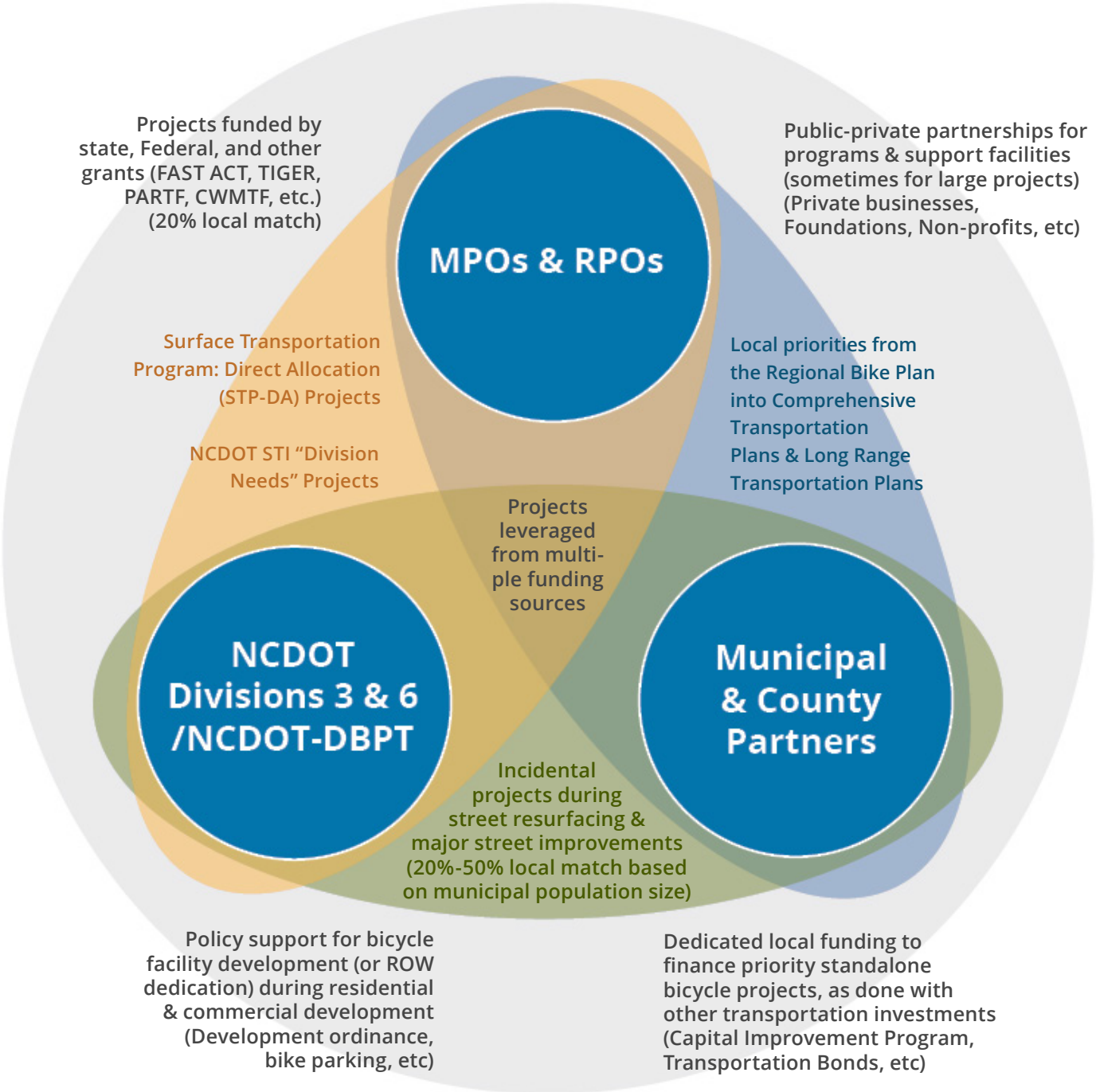
MPOs and RPOs, in particular, can play a key role in coordination of this plan's recommendations for project development (see project development examples on the following page). They can do that by coordinating project funding with NCDOT Divisions 3 and 6, and by adding progress reports about this plan's implementation to the agendas of regularly scheduled MPO and RPO meetings.

Ideally, some of MPO and RPO representatives would champion this plan, and would be sure its recommendations stay at the forefront of regional discussions for top projects. These representatives could also draw upon the input and guidance of other stakeholders, including non-governmental representatives from groups like the East Coast Greenway, or local and regional cycling clubs.

MPOs, RPOs, and local governments in the region should have the topic of this Plan's implementation as an agenda item at least biannually, and could use the action steps listed in this chapter for guidance. The purpose of discussing this plan at these meetings should be to identify specific tasks that could be completed before the next meeting (i.e., applying for grants, securing local funding matches, initiating bicycle education programs, incorporating recommended facilities into design plans, updating local policies, etc.).

PROJECT DEVELOPMENT OPPORTUNITIES *for the* REGIONAL BICYCLE PLAN RECOMMENDATIONS

Some of the project development opportunities shown below may require involvement from all three of the major groups listed (MPOs/RPOs, municipal/county partners, and NCDOT), but are placed in rough proximity of the groups that might lead such efforts.



SUMMARY OF KEY ACTION STEPS

These action steps draw from the project development opportunities shown on the previous page. These should be the guiding steps for local governments, MPOs, and RPOs to initiate plan implementation and to begin on top projects.

1

YEARS 1-5: **PILOT PROJECTS** & **STRATEGIC PREPARATION** *for* **PROJECT DEVELOPMENT**

1. **Adopt/endorse the plan locally and regionally. Adoption signals intent to complete projects over time, but *does not* commit to funding. Having an adopted plan is helpful in securing funding from federal, state, and private agencies.**
2. **Update Comprehensive Transportation Plans (CTPs) & Long Range Transportation Plans (LRTPs) with recommendations from this Regional Bicycle Plan.**
3. **Local governments should update their development regulations to better support bicycling, and to ensure dedication of right-of-way (ROW) for bicycle facilities on adopted plans (see Chapter 5). This is a key step to the long-term development of recommended greenway trail corridors, like the East Coast Greenway.**
4. **Local governments should submit projects for funding through MPOs and RPOs, coordinating with NCDOT on STP-DA funding and STI Division Needs projects.**
5. **Local governments, MPOs, and/or RPOs should identify 1-3 pilot projects or programs that can be implemented in partnership with one another, with relatively low overall costs (restriping, signage, education programs, etc.).**
6. **Local governments should consider dedication of regularly recurring local funding for top projects and for incidental projects. A 20% local match is required for most state/federal funding; this can be met through local Capital Improvement Programs (CIPs), local bonds, or similar (see Appendix B).**
7. **Local governments, MPOs, and RPOs should explore potential program or project funding through public-private partnerships (see section on 'Engaging Private Funding' in this chapter).**
8. **Prepare "shovel-ready", high-impact projects for future U.S. DOT TIGER Grant funding (or similar), by securing project corridor ROW & initiating the design phase.**
9. **Research & prepare grant applications for bicycle & trail projects (see Appendix B).**

2

YEARS 6-10: **CONTINUED PROJECT DEVELOPMENT**

By this phase, if the majority of steps above are complete, many of this plan's projects should be at various stages of funding, design, and development. A plan update should be completed after year 5, including a review of changes to infrastructure and land use. Years 6-10 will mainly be a continuation of this process, seeing projects through to completion. Based on similar planning and implementation efforts in North Carolina and nationally, this plan would be a success if all 14 of the top projects were completed by year 10, along with key policy and program recommendations.

3

YEAR 10: **FULL PLAN UPDATE**

Reconfirm regional priorities and long-term projects; update recommendations accordingly. Evaluate what has worked and what has not for project implementation.

Project Development Examples in the Cape Fear Region

There are several models of how bicycle facilities have been implemented in the Cape Fear Region. A few key examples are outlined below to show how this has been done in the past (and is currently being done) for different communities and with different methods in the region.

Lead Agencies	Bicycle Facility Development Method	Project Description
City of Wilmington & the WMPO	Private Partnership: Blue Cross-Blue Shield North Carolina (BCBSNC)	BCBSNC's GO NC! program donated funds to complete the final phase of the 15-mile Gary Shell Cross City Trail from Wade Park to the drawbridge at Wrightsville Beach. In addition to completing the trail, other enhancements included mile markers along the 15-mile trail and five bicycle fix-it stations along the trail.
NCDOT Division 3 & Brunswick County	Incidental project associated with major roadway project	NCDOT Division 3 to add paved shoulders as part of a road widening and resurfacing project in Brunswick County along NC 211.
NCDOT Division 3 & the Town of Surf City	Incidental project associated with major bridge project	The Topsail Island Bridge Replacement Project is in development. The recommended bridge typical section includes a 10-foot multi-use path on the north side of the bridge, separated from the travel lanes by a concrete barrier, and a 7.5-foot bicycle lane/shoulder in each direction.
NCDOT Division 6 & the Town of Elizabethtown	Incidental project associated with major roadway resurfacing	The Town of Elizabethtown coordinated closely with NCDOT Division 6 on several resurfacing projects to include bicycle lanes. These included bicycle lanes on E Broad Street and W King Street.
Town of Shallotte	Major corridor redevelopment	As of 2017, the Town of Shallotte is undergoing a re-visioning and redesign of their main thoroughfare. Bicycle facilities are being incorporated into the new design. Bicycle lanes are being considered at a minimum, with the potential of a separated bikeway design treatment.
City of Wilmington	Standalone project funding through a bond referendum	In 2014, the City of Wilmington passed a bond referendum that included funding for several greenway trail projects. These are in the design phase, with additional funding for trail-related improvements being sought in a 2016 bond referendum.
City of Wilmington	Dedicated and developed trail through a major residential development project	Three miles of the East Coast Greenway (ECG) were constructed as part of the "River Lights" development by Newland Communities. This trail runs along a newly constructed section of River Road between Independence Blvd and the Mott Creek neighborhood entrance. This section was identified as a proposed alignment of the ECG in the 2012 Wilmington/New Hanover County Comprehensive Greenway Plan.
Town of Burgaw	Local funds and PARTF Grant	A 2008 PARTF (Parks and Recreation Trust Fund) grant with local matching dollars provided the funding to construct Burgaw's Osgood Greenway and Urban Trail.

Grand opening of the Razorback Greenway, a regional trail project that benefited from $40M in private investment and USDOT funding.

ENGAGING PRIVATE FUNDING

In the Cape Fear Region, many of the recommended long-term bicycle facility projects are in the form of greenway trails (see projects proposed at the end of Chapter 3). According to public comment forms, greenway trails and other types of separated bikeways are the preferred facility type of many current and potential bicyclists, yet they are also the most challenging to develop. This is due to the costs related to trail construction and assembling trail right-of-way (as opposed to many on-road bicycle projects that can be achieved through restriping within existing public right-of-way). With cost as a major deterrent to realizing these long-term, long-distance greenway projects, it is important to look at how other communities are achieving success in this area.

Across the United States, one of the fastest emerging funding sources for greenway development is the private sector. Philanthropic organizations, corporate and family foundations, non-profit organizations and corporations have stepped up their involvement in greenway facility development in the form of financial support. This trend is occurring for various reasons, including support for improvements to quality of life, health and wellness, alternative transportation, conservation of natural resources and economic development. Most importantly, private financial support has enabled the greenway development process to move faster, so that facilities can be completed more efficiently. Two exemplary projects illustrate how this works:

1) In Northwest Arkansas, the Razorback Regional Greenway was conceived by the Northwest Arkansas Regional Planning Commission as a network of primarily on-road trails spanning the two-county region (Benton and Washington counties). In 2009, the Walton Family Foundation stepped in and spearheaded a public-private partnership that resulted in the development of a 36-mile, primarily off-road, world class regional

greenway. The Razorback Regional Greenway was funded from a combination of public and private funds, including a USDOT TIGER 2 grant of $15 million, and a dollar for dollar gift from the Walton Family Foundation of $15 million. Other grant funds were added later bringing the total funding to more than $40 million. Without the lead gift from the Family Foundation, the project would never have happened. The Foundation based its gift on two community goals: 1) improve the health of local residents, and 2) support economic development throughout the region to keep Northwest Arkansas competitive for years to come. The 36-mile Razorback Regional Greenway was officially completed and opened for use in May 2015.

2) In Memphis, Tennessee, the 36-mile Wolf River Greenway has been the brainchild of the Wolf River Conservancy (a non-profit land trust based in Memphis) for more than 35 years. Using a traditional approach of relying on public sector leadership and funding to build the project, the Conservancy became frustrated with the glacial pace of greenway facility development – in 35 years, approximately 5 miles of trail had been completed. In 2014, the Conservancy decided to fund the development of 22 miles of the trail within the Memphis city limits using private sector funds. As of 2016, the Conservancy has raised approximately $40 million in support of facility development, with more than half of that coming from private sector sources. The Conservancy has then leveraged the private sector support to gain public sector support from the City of Memphis and Shelby County. The Conservancy expects to design, permit and build the entire 22 mile Memphis portion of the Greenway by 2019.

These are just two examples of ways in which private sector funding is used to support greenway facility development. There are many more examples just like the ones mentioned above occurring across the United States.

Completion of the East Coast Greenway in the Cape Fear Region would be a huge undertaking financially, with incredible benefits for the region in terms of transportation, recreation, health and economic development. Private sector funding could help propel this project forward. Right & below: Existing and proposed sections of the East Coast Greenway in Brunswick County.

Key Steps to Engaging Private Funding

Assuming that a worthy greenway project has been identified, there are four key steps in the process: 1) develop the "pitch", 2) make the ask, 3) leverage the lead gift, and 4) invite private sector and public sector groups to participate.

Step One: Develop the "Pitch"

The first step is to finalize the vision and scope of the project, along with its benefits to the community. The "pitch" is typically summarized in the form of marketing materials, such as reports, digital media presentations, and informational handouts that define the important elements of the greenway project.

The Carolina Thread Trail in the Charlotte Metro Region offers an excellent example for "developing the pitch." The Catawba Land Conservancy (CLC) and the Trust for Public Land (TPL) worked with Greenways Incorporated to prepare a vision statement and economic case statement that together defined the goals and objectives of "The Thread Trail," a regional greenway project. The "pitch" was carefully crafted so that it could be distilled into simple terms and delivered through a concise presentation. CLC and TPL worked with other Charlotte based firms to develop graphic elements of the pitch, including a logo that defined the "brand" for the project. The combination of these materials constituted "the pitch," and enabled CLC and TPL to take the next step in the process – making the ask for financial support.

Likewise, both the Razorback Regional Greenway in Northwest Arkansas and the Wolf River Greenway in Memphis, Tennessee, undertook similar efforts in developing the pitch. In Northwest Arkansas, a compressed timeframe, centered around a design charrette, produced the pitch. The Walton Family Foundation funded the design charrette process that resulted in the preparation of a vision, conceptual framework and economic case statement for the Razorback Regional Greenway. In Memphis, the Wolf River Conservancy used a similar approach, and also commissioned Alta Planning + Design to prepare an economic study regarding the benefits of the Greenway to the regional community.

Step Two: Making the Ask

Once the pitch has been prepared, it is time to "make the ask." For greenway projects, making the ask can occur in different ways. Generally, two different strategies can be employed, one that targets public funding sources and the other that targets private funding sources.

For the Carolina Thread Trail, the major "ask" occurred during a breakfast meeting of philanthropic and corporate groups. The invitation only breakfast generated more than $15 million in support of the Thread Trail project, and was the catalytic event that launched the project. Both CLC and TPL worked extremely hard in advance of the breakfast to deliver the pitch to participants so that when the time came for the ask, the results were more or less expected.

Other "asks" can be more complicated. The Razorback Regional Greenway went through a protracted ask that involved an application for federal funding. The federal grant was matched dollar for dollar by the Walton Family Foundation, creating the opportunity for full project development. In Memphis, the Wolf River Conservancy's

support came from $24 million in private sector funding with an additional $16 million in public sector funding. Sometimes, the "ask" can stretch for months and more than a year. Depending on the size of the greenway project, raising large sums of money to support greenway development takes time.

Step Three: Leverage the Lead Gift

All three of the projects used as examples in this chapter utilized a "lead gift" as leverage for raising additional funds. A lead gift is important for several reasons. First, a lead gift from a prominent and respected local project sponsor signifies the importance of the project throughout the entire community. Second, a lead gift is often used to leverage other private funds. The lead sponsor will often call upon other private funders to support the greenway. Third, a lead gift may be used as a matching source of funding for public sector grants.

To secure a lead gift, it will be necessary to spend time with a potential project sponsor to thoroughly explain the merits and benefits of the greenway project. Most importantly, the greenway benefits must align with the interests and goals of the sponsor, and represent an opportunity to fulfill a specific mission of the sponsor.

Lead gifts typically are significant in order to be effective. Some project sponsors will pledge a lead gift premised on the ability to raise the balance of funds within a defined time period. Some project sponsors will specify that the lead gift must be matched in a defined proportion to the balance of funds raised.

Lead gifts are very important to the success of fund raising as they typically establish credibility for the greenway initiative and provide the first tangible evidence of financial support.

Step Four: The Invite List

Which groups, organizations and entities should be on a "short list" of invitees to help fund greenway projects in North Carolina? The following is not a complete list, but helps to narrow the field of likely candidates for consideration. See Appendix B for more potential participants.

- *Foundation for the Carolinas:* This foundation strengthens regions through innovative community initiatives. Since 1958, Foundation for the Carolinas has served as a catalyst for charitable good, connecting individuals, companies and organizations to needs and philanthropic opportunities across the region and beyond. This community foundation is dedicated to the collective strength of communities, working in close partnership with donors, civic leaders and nonprofits to help achieve a wide variety of charitable goals and to inspire philanthropy that will benefit generations to come. Today, Foundation for the Carolinas is one of the largest community foundations in the United States.
- *Trust for Public Land (TPL):* TPL's mission is to create parks and protect land for people, ensuring healthy, livable communities for generations to come. Every park, playground, and public space they create is an open invitation to explore, wonder, discover, and play. TPL has been connecting communities to the outdoors—and to each other—since 1972. Today, millions of Americans live within a 10-minute walk of a park or natural area they helped create, with more visitors every year.
- *The Conservation Fund*: The Conservation Fund practices conservation to achieve environmental and economic outcomes. Their staff

throughout the country create and implement innovative, practical ways to benefit the natural world and the well-being of Americans from every walk of life. Conservation takes many forms, and The Fund's programs interpret and practice conservation in a mutually-reinforcing way - working in concert to make sure the value of natural resources in America remain essential to our prosperity. The Fund's focus is on conservation and communities - creating as many pathways possible for people and organizations to protect their natural resources and save the places that matter most - properties with ecological, historic and/or cultural significance. They deliver conservation and economic vitality through strong partnerships with government, business and colleague organizations.

- *Blue Cross Blue Shield Foundation of North Carolina:* Their mission is to improve the health and well-being of all North Carolinians. They recognize that a North Carolina with healthy people living in active communities reduces health risks and improves health outcomes. Health is a complex equation that is as much determined by the environment as it is by the individual. Their strategy is to look ahead to get at the core drivers of poor health and to support lasting system-wide changes.
- *North Carolina Community Foundation*: The NCCF is the single statewide community foundation serving North Carolina and has made $101 million in grants since its inception in 1988. With more than $237 million in assets, the NCCF sustains 1,200 endowments established to provide long-term support of a broad range of community needs, nonprofit organizations, institutions and scholarships.
- *Duke Energy Foundation*: The Duke Energy Foundation provides philanthropic support to address the needs vital to the health of communities. Annually, the Foundation funds more than $25 million in charitable grants, with a focus on education, environment, economic and workforce development and community impact.

FUNDING RESOURCES IN APPENDIX B

See Appendix B for information on more than 50 potential funding resources, in the following funding categories. While some are directly related to bicycle infrastructure, others are focused on land conservation that could assist in establishing greenway trail right-of-way.

- **FEDERAL FUNDING** (18 resources)
- **STATE FUNDING** (12 resources)
- **LOCAL GOVERNMENT FUNDING** (12 resources)
- **PRIVATE AND NON-PROFIT FUNDING** (22 Resources)

ORGANIZATIONAL FRAMEWORK *for* IMPLEMENTATION

Elected Officials

Recognize the value of a bicycle-friendly region by adopting this plan, thereby supporting quality of life in each community of the Cape Fear Region

NCDOT-DBPT

Guidance on bicycle policy & project funding; Support in coordinating with local division & district offices

MPOs/RPOs

- Coordinate with NCDOT and municipal & county partners on leveraging funding opportunities through STP-DA funds and the STI process;
- Incorporate this Plan's projects into CTPs and LRTPs;
- Provide continuity from planning to implementation by adding progress reports about this plan's implementation to the agendas of regularly scheduled MPO and RPO meetings, at least semi-annually.
- Use this plan's action steps table as a guide for progress reports and action items

Private Sector

Potential partners in bikeway system promotion & development; Potential program sponsors

NCDOT Divisions 3 & 6; NCDOT-DBPT

- Become familiar with the recommendations in this plan
- Communicate with MPOs & RPOs on potential projects that could incorporate bicycle facilities, especially when on roadways with recommendations from this plan
- Coordinate with MPOs/RPOs on STP-DA funds and the STI process for bicycle projects

Municipal & County Partners

- Include funding for bicycle projects in Capital Improvement Programs (CIPs), at least to provide a 20% match for outside funding sources
- Coordinate with MPOs and RPOs to leverage local bicycle project funding on specific projects
- Coordinate with NCDOT Division 3 or 6 for bicycle facilities as incidental projects during roadway reconstruction and resurfacing
- Update local development regulations to better support bicycle facility development
- Promote public awareness and use of local and regional bikeways through local tourism and economic development agencies
- Provide GIS updates to MPOs and RPOs for bicycle-related projects (completed or in-development)

Local Residents and Civic Organizations

- Help build public support for bicycling in the region and for funding bicycle projects and programs
- Reach out to elected officials and other decision-makers to let them know you and your organization support bicycling in the Cape Fear Region

Consultants

Assist project partners by providing guidance on project development, and by providing bicycle & trail design services

Regional Partners

Continued support, coordination, & outreach for bicycling from:

- East Coast Greenway Alliance
- North Carolina State Parks
- Tourism & Visitors Bureaus
- Healthcare Providers and Advocates
- Private Developers
- Duke Energy Corporation
- Cape Fear SORBA
- Cape Fear Cyclists
- Brunswick County Pedalers
- Down East cyclists
- Neighboring Jurisdictions

Acronym Legend:

- *NCDOT: North Carolina Department of Transportation*
- *DBPT: Division of Bicycle and Pedestrian Transportation*
- *MPO: Metropolitan Planning Organization / RPO: Rural Planning Organization*
- *STP-DA: Surface Transportation Program – Direct Attributable*
- *STI: Strategic Transportation Investments*
- *CTP: Comprehensive Transportation Plan / LRTP: Long Range Transportation Plan*
- *GIS: Geographic Information Systems*
- *SORBA: Southern Off-road Bicycle Association*

IMPLEMENTATION ACTION STEPS TABLE

POLICY ACTION STEPS					
#	Task	Lead Agency	Support	Details	Phase
1	Present Plan to Local Communities for Adoption or Endorsement	Cape Fear RPO	Project Steering Committee Members	The plan should be presented to elected officials in Summer 2017. Focus on the health and economic benefits of bicycling (Chapter 1) and key recommendations (Chapter 3-5). Adoption signals intent to implement the plan over time; it *does not* commit funding.	Short Term (2017)
2	Meet with NCDOT to coordinate on key recommendations	County and Municipal Partners + MPOs, RPOs	NCDOT Division 6 & 3 + NCDOT-DBPT	This plan and the recommended bicycle facilities should be officially recognized by NCDOT. For example, NCDOT should refer to this document when assessing the impact of future projects and plans, such as bicycle facilities on future bridge improvements. Effort should be made between state and local partners to include parallel bicycle facilities on planned future roadways and roadway reconstruction projects, especially where they appear on adopted plans.	Short Term (2017)
3	Amend county and local development ordinances and technical standards	County and Municipal Partners	County & Local Planning Boards	County and local development ordinances should be considered for amendment to ensure that, as developments are planned and reviewed, the recommended bicycle facilities and trail corridors identified in this plan are protected. This would entail amending development regulations to have developers set aside land for facilities whenever a development proposal overlaps with the proposed routes, as adopted. Local governments should also consider requirements and tools like dedicating easements, connections to adjacent land uses, issuing credits, and offering some form of recognition to developers who go above and beyond the requirements for trail development. See Chapter 5 for more information.	Short Term (2017)
4	Revise sewer, stormwater and utility easement policies	County and Municipal Partners	County & Local Planning Boards	All new sewer, stormwater and utility easements should be considered for allowing public access as a matter of right. Such a consideration should allow for access that does not require landowner approval for each parcel the easement overlaps. As trails are developed, also review applicable existing easements for similar revision considerations.	Short Term (2017)
5	Develop a corporate sponsorship policy	County and Municipal Partners	Local Private Sector Partners	For a comprehensive sponsorship policy example, see that of Portland Parks and Recreation: www.portlandonline.com/shared/cfm/image.cfm?id=155570. For a sponsorship brochure example, see that of the 'Mountains to Sound Greenway': http://mtsgreenway.org/events-calendar/greenway-365-sponsorship-brochure	Short Term (2017)
6	Develop a coordinated operations & maintenance plan	County and Municipal Partners	NCDOT Division 6 & 3	This plan will help to apportion responsibility between agencies where facilities cross jurisdictional boundaries or where pooled efforts can reduce costs.	Short Term (2017)

PROGRAM ACTION STEPS					
#	Task	Lead Agency	Support	Details	Phase
1	Release the brochure maps produced for this plan	Cape Fear RPO	Local & Regional agencies	This brochure will complement the Greater Wilmington Area Bicycle Map, covering the Cape Fear study area. Consider providing a similar web-based and/or mobile component.	Short Term (2017)
2	Establish a directory of stakeholder contacts for the Cape Fear region	Cape Fear RPO	All Project Stake-holders	The group could include representatives listed in the acknowledgments of this plan, plus others from the groups listed in the organizational framework chart. The directory should be posted on a MPO and RPO websites.	Short Term (2017)
3	Regularly discuss progress on plan implementation & the next steps that are needed	MPOs and RPOs	All Project Stake-holders	Progress reports about this plan's implementation should be added to the agendas of regularly scheduled MPO and RPO meetings. The purpose is to establish regional coordination for bicycle facility development between the member agencies. Meeting discussions should evaluate implementation progress and set goals to be achieved before the next meeting. These meeting agendas could also feature special presentations by stakeholders and invited guests related to plan progress.	Short Term (Fall 2017); Semi-annual meetings thereafter
4	Share GIS data with the PBIN as updates are made to both existing and planned bicycle facilities in the region	County and Municipal Partners	MPOs and RPOs	The Pedestrian and Bicycle Infrastructure Network (PBIN) is a statewide Geographic Information System (GIS) inventory of existing and planned bicycling and walking facilities in North Carolina. The PBIN is maintained by the North Carolina Department of Transportation Division of Bicycle and Pedestrian Transportation and Institute for Transportation Research and Education (ITRE). More information can be found here: www.itre.ncsu.edu	Ongoing; Consider Semi-annual updates (consider same time as workshop)
5	Conduct bicycle facility ridership counts	MPOs and RPOs, or County and Municipal Partners	Planning Consultant or Using In-House Equipment	Bicycle facility usage data is needed to strengthen grant requests and influence policy and funding decisions. A complete picture of bicyclist characteristics can be developed and outcomes can help to identify if additional amenities would improve the bicyclist experience.	Short Term (2017-2018)
6	Coordinate with school systems on bicycle connectivity	County Schools/ Partners	County Planners, Active Routes to School	Connectivity must be considered as 'essential' not 'bonus' on the front end of school site development. Also coordinate programming efforts with the Region 8 Active Routes to School Coordinator (Let's Go NC Pedestrian & Bicycle Safety Curriculum can also be accessed at - https://connect.ncdot.gov/projects/BikePed/Pages/LetsGoNC.aspx)	Short Term (2017-2018)
7	Establish a regional branding and wayfinding system for bicycle routes and other points of interest throughout the region	MPOs and RPOs	Planning Consultant or In-House Design	A wayfinding system is recommended to create a cohesive and easy-to-use platform for navigating the regional bicycle route system, once more of the longer-distance routes are connected throughout the region. The system should be designed so that it is flexible enough to be updated as new projects are completed, and should be implemented in conjunction with a statewide and national marketing strategy. See Chapter 4 and Appendix A for more information about bicycle signage and wayfinding.	Medium Term (2018 -2019)
8	Launch Priority Programs	MPOs and RPOs, or County and Municipal Partners	All Project Stake-holders	Stakeholders should coordinate to launch new programs, such as those described in Chapter 4, including bike friendly transit, Uber boat, bicycling maps/brochures, a wayfinding program, a regional website, Cycle to Farm events (explore tourism opportunities), and apply to Watch for Me NC	Medium Term (2018 -2019)

INFRASTRUCTURE ACTION STEPS					
#	Task	Lead Agency	Support	Details	Phase
1	Identify and secure specific funding sources for Priority Projects & begin design and construction phases as possible	MPO/RPO, County, and Municipal Partners	NCDOT Division 6 & 3 + NCDOT-DBPT	Partnerships for joint funding opportunities should be pursued (see graphics/tables on pages 152, 153, and 160). Combine financial and management resources for bicycle facility development with surrounding municipalities, regional entities, and private sector partners (also see 'Engaging Private Funding' section of this Chapter). Potential TIGER ready projects should be identified for the 1-5 year time frame. "Shovel-ready" designed projects should be prepared in the event that future federal stimulus funds become available.	Short Term (2017); Ongoing
2	Gather further public support and input during the design phase for projects	County & Municipal Partners	Local Advocates & Public	Involve the general public in the design stage for bicycle facility development. Some groups can help with both routing ideas and public support from specific neighborhoods.	Short Term (2017); Ongoing
3	Develop a long term funding strategy	County & Municipal Partners	MPOs and RPOs	To allow continued development of the overall system, capital funds for bicycle facility construction should be set aside every year, even if only a small amount; small amounts of local and county funding can be matched to outside funding sources, such as federal, state and private funds. Funding for an ongoing maintenance program should also be included in local operating budgets. Cross-jurisdictional trail projects lend themselves well to collaboration on funding as coordinated multi-jurisdictional projects are looked upon more favorably by outside funding sources than single-jurisdiction applications.	Short Term (2017); Ongoing
4	Re-evaluate and reconfirm the short term priorities	MPO/RPO, County & Municipal Partners	Project Consultants	Every year, reevaluate short-term priorities based on what has been completed, and reconfirm the agenda of "priority" projects. Consider sticking with earlier projects that were not successful to-date, versus new opportunities that may have arisen or become more feasible since 2017.	Medium Term (2018-ongoing)
5	Update this Plan	MPOs and RPOs	Project Consultants	In year 5 of this plan (2022), reassess overall systemwide goals and reevaluate the overall approach to implementation. In year 10 (2027), complete a full plan update.	Long Term (2022 & 2027)
6	Measure performance	MPOs and RPOs	County & Municipal Partners	See the following pages for potential performance measures that can be used to monitor progress of plan implementation over time.	Ongoing

PERFORMANCE MEASURES

Measuring performance over time is essential to implementation. Tracking performance measures within communities and across the region will allow implementing agencies to understand progress, communicate successes and challenges, and motivate leaders to take further actions. The following performance measures were selected to track progress toward the goals of this plan. Implementation progress updates at MPO and RPO meetings could be used as an opportunity to evaluate progress against these measures. Individual counties or municipalities may also be interested in tracking and reporting progress independently.

Goal 1: Increase the quality of bicycling throughout the region

Objectives	Performance Measures
• Encourage and support regional, sub-regional, and local bicycle advocacy groups • Increase connections between neighborhoods, schools, and businesses • Increase bicycle facilities	• Number of advocacy groups promoting bicycling • Measure of connectivity: Percentage of new projects built as Complete Streets with connectivity to surrounding destinations • Percentage of roadways that have designated or separated bicycle facilities • Percentage of signalized intersections that have bike and pedestrian friendly accommodations • Percentage of bridges with bicycle facilities • Total funding devoted to the construction of bicycle facilities

Goal 2: Improve health outcomes in the region

Objectives	Performance Measures
• Increase access to recreational bicycle facilities • Increase bicycle exercise and activity rates among all age groups	• Mileage of greenways per person (residents and visitors) • Percentage of East Coast Greenway through the region with a separated bicycle facility • Physical inactivity rates & obesity rates • Reduction in transportation-related emissions from increase in bicycling trips

Goal 3: Improve safety for all cyclists

Objectives	Performance Measures
• Reduce cyclist crashes • Engage law enforcement in bicycle safety • Improve cyclist and driver adherence to traffic laws	• Bicyclist crash and fatality rates per capita • Percentage of police departments completing bicycle education courses • Number of citations related to bicycle safety violations to bicyclists and motorists • Distribute 'Ride Guide: North Carolina Bicycle Laws' - https://www.bikelaw.com/wp-content/uploads/2014/11/BIKELAW_RG_NC_Web.pdf

Goal 4: Increase bicycling trips by residents and visitors

Objectives

- Increase education on the social, economic, and health benefits of bicycling
- Increase bicycle mode share for commuting
- Improve resources for bicycle tourists

Performance Measures

- Towns, businesses, and colleges designated as Bicycle Friendly by the League of American Bicyclists
- Number of schools participating in bicycle safety education/ encouragement programs
- Bicyclist mode share
- Bicyclist counts
- Number of tourism websites promoting cycling
- Number of brochures or guides available to tourists

Goal 5: Promote and encourage growth of tourism economy

Objectives

- Increase economic growth, job creation, and tourism revenue through bicycling

Performance Measures

- Return on investment measures such as job creation, small business development, tourism, home prices
- Number of Chambers of Commerce, Visitor Bureaus, and other groups promoting bicycling
- Number of bike events in region and corresponding economic impact
- Number of visitors coming to region partially due to bicycling amenities

A Design Guidelines

This regional plan focuses on connecting regional nodes, such as Wilmington, NC (Gary Shell Cross-City Trail shown above). Photo credit: City of Wilmington

CONTEXT: GUIDANCE BASIS

The sections that follow serve as an inventory of bicycle and trail design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating a safe and accessible community. The guidelines are not, however, a substitute for a more thorough evaluation by a landscape architect or engineer upon implementation of facility improvements.

NATIONAL GUIDANCE

The following standards and guidelines are referred to in this guide:

- The Federal Highway Administration's (FHWA) ***Manual on Uniform Traffic Control Devices (MUTCD)*** defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.
- American Association of State Highway and Transportation Officials (AASHTO) ***Guide for the Development of Bicycle Facilities*** (2012) provides guidance on dimensions, use, and layout of specific bicycle facilities.
- The National Association of City Transportation Officials' (NACTO) ***Urban Bikeway Design Guide*** (2012) is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs.
- The ***AASHTO A Policy on Geometric Design of Highways and Streets*** (2011) commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.
- NCDOT's Bicycle & Pedestrian Project Development & Design Guidance webpage provides a comprehensive list of links to national guidance resources. For more information - https://connect.ncdot.gov/projects/BikePed/Pages/Guidance.aspx

IMPACT ON SAFETY AND CRASHES

Bicycle facilities can have a significant influence on user safety. The Federal Highway Administration ***Crash Modification Factor Clearinghouse*** (http://www.cmfclearinghouse.org/) is a web-based database of Crash Modification Factors (CMF) to help transportation engineers identify the most appropriate countermeasure for their safety needs. Where available and appropriate, CMFs or similar study results are included for each treatment.

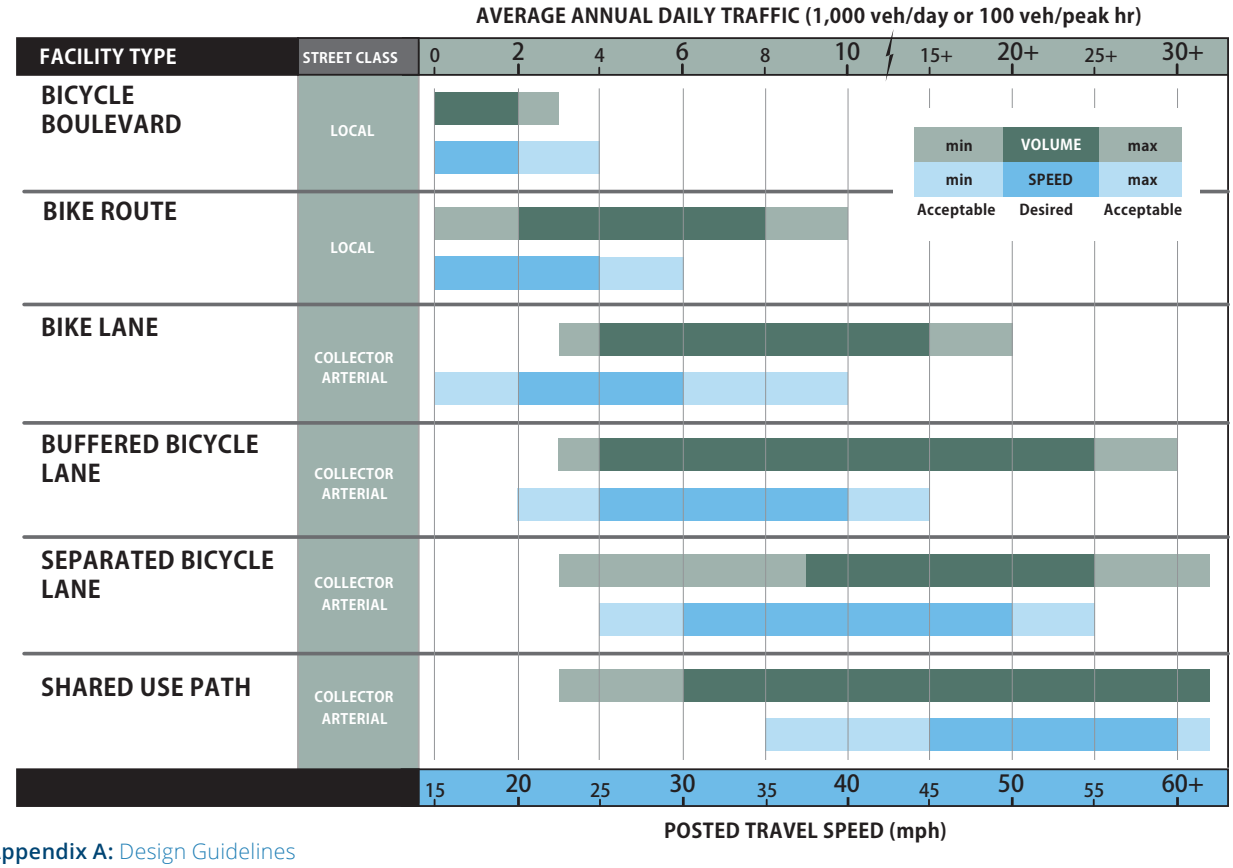
FACILITY SELECTION

Selecting the best bikeway facility type for a given roadway can be challenging, due to the range of factors that influence bicycle users' comfort and safety. There is a significant impact on cycling comfort when the speed differential between bicyclists and motor vehicle traffic is high and motor vehicle traffic volumes are high.

FACILITY SELECTION TABLE

As a starting point to identify a preferred facility, the chart below can be used to determine the recommended type of bikeway to be provided in particular roadway speed and volume situations. To use this chart, identify the appropriate daily traffic volume and travel speed on or the existing or proposed roadway, and locate the facility types indicated by those key variables.

Other factors beyond speed and volume which affect facility selection include traffic mix of automobiles and heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, and roadway sight distance. These factors are not included in the facility selection chart below, but should always be considered in the facility selection and design process.



BICYCLIST USER TYPE

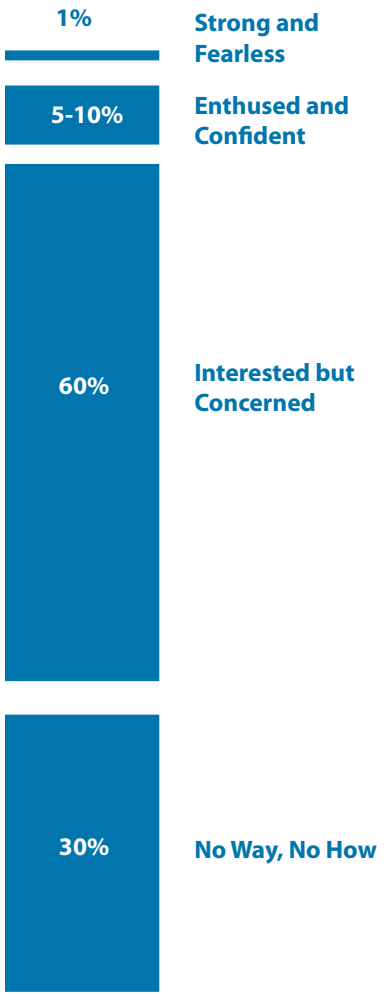
The current AASHTO Guide to the Development of Bicycle Facilities encourages designers to identify their rider type based on the trip purpose (Recreational vs Transportation) and on the level of comfort and skill of the rider (Causal vs Experienced). A user-type framework for understanding a potential rider's willingness to bike is illustrated in the figure below. Developed by planners in Portland, OR* and supported by research**, this classification identifies four distinct types of bicyclists.

Strong and Fearless – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared-use paths.

Enthused and Confident - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

Interested but Concerned – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.

No Way, No How – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.



Typical Distribution of Bicyclist Types

* Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. http://www.portlandonline.com/transportation/index.cfm?&a=237507. 2009.

** Dill, J., McNeil, N. Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential. 2012.

USER DESIGN DIMENSIONS

The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction, and maintenance practices than motor vehicle drivers.

Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

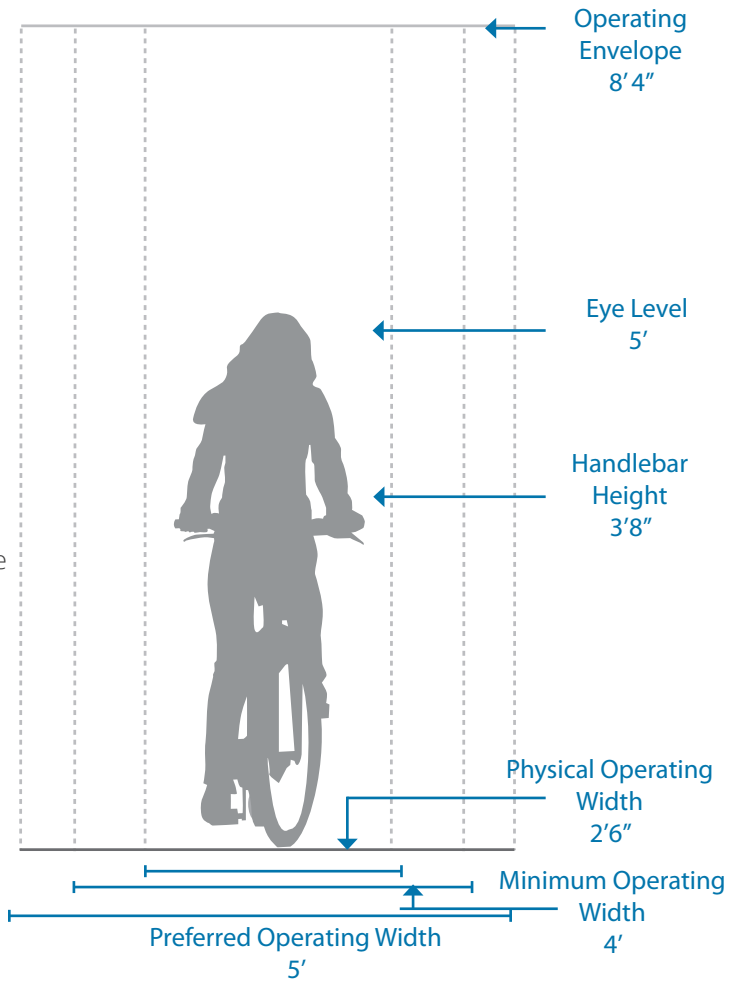
BICYCLE AS A DESIGN VEHICLE

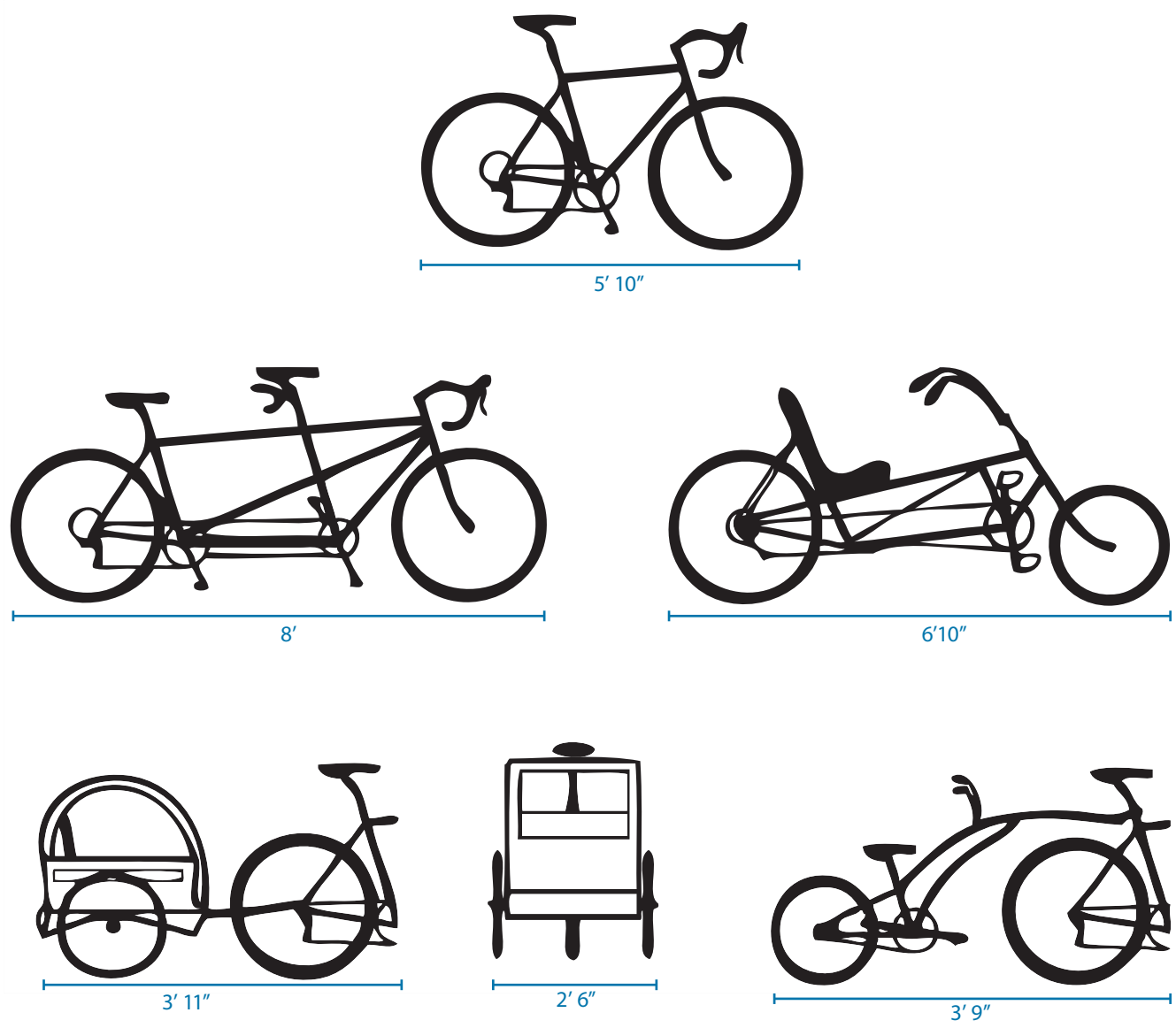
Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

The figure to the right illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five ft or more operating width, although four ft may be minimally acceptable.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure to the left summarizes the typical dimensions for bicycle types.

Bicycle Rider - Typical Dimensions





Source: AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

Bicycle as Design Vehicle - Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	8-12 mph*
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

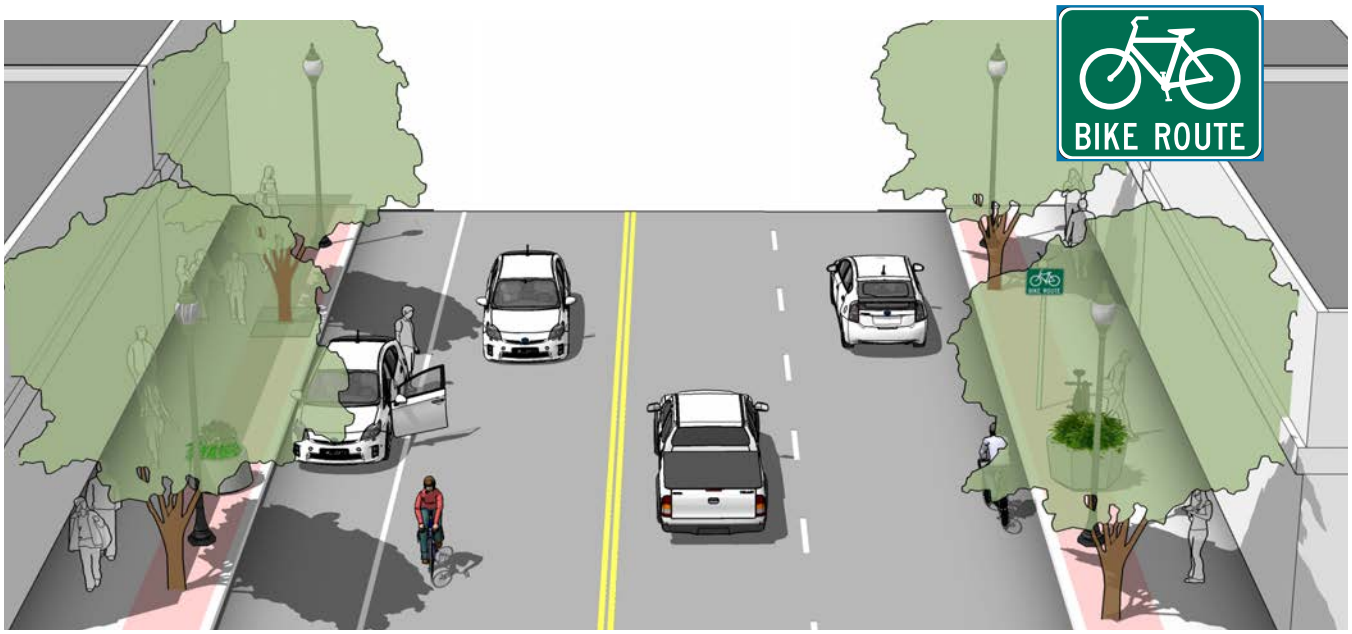
* Typical speed for causal riders per AASHTO 2013.

SHARED ROADWAYS

SIGNED SHARED ROADWAYS

Signed shared roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

MUTCD D11-1



TYPICAL APPLICATION

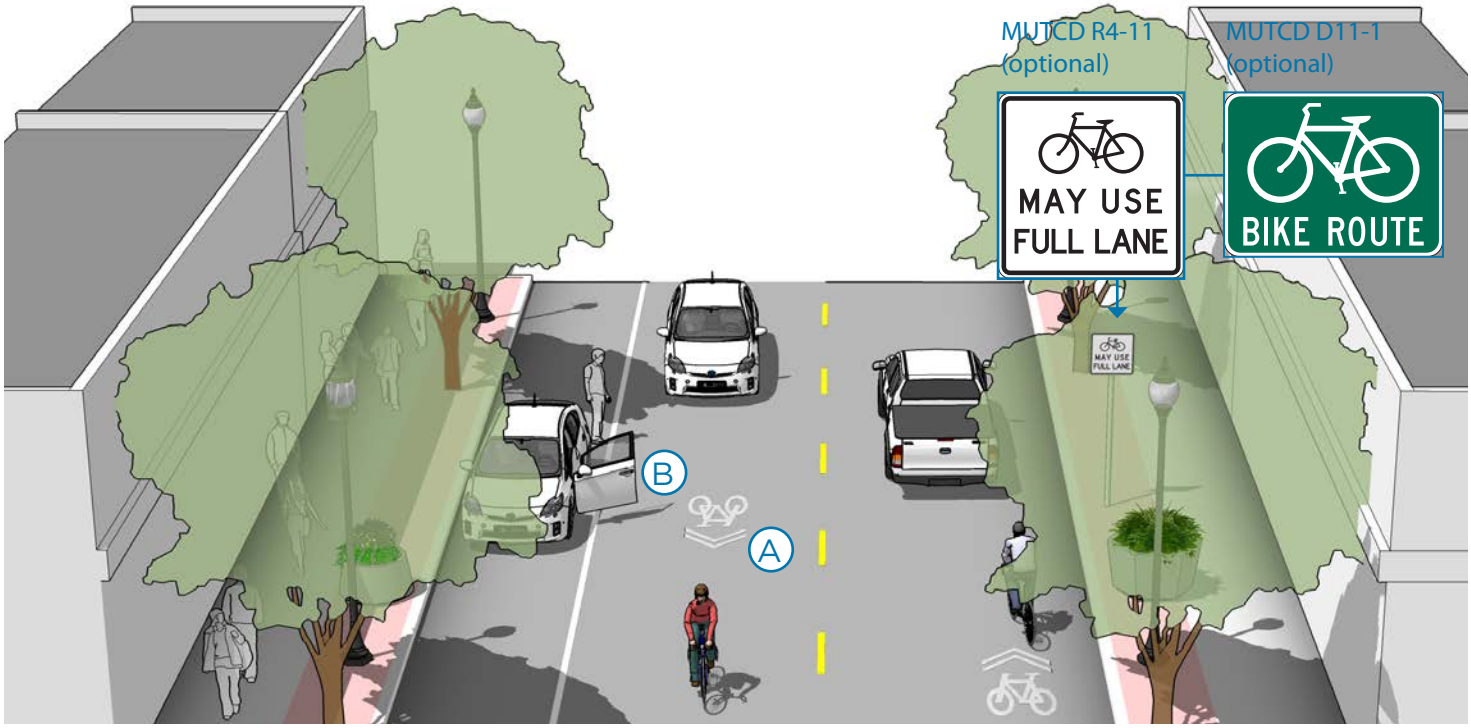
- Signed Shared Roadways serve either to provide continuity with other bicycle facilities (usually bike lanes) or to designate preferred routes through high-demand corridors.
- This configuration differs from a bike boulevard due to a lack of traffic calming, wayfinding, pavement markings and other enhancements designed to provide a higher level of comfort for a broad spectrum of users.

DESIGN FEATURES

- Lane width varies depending on roadway configuration.
- Bike route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:
  - Beginning or end of Bicycle Route.
  - At major changes in direction or at intersections with other bicycle routes.
  - At intervals along bicycle routes not to exceed ½ mile.

MARKED SHARED ROADWAY

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.



TYPICAL APPLICATION

- In constrained conditions, the SLMs are placed in the middle of the lane. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles.
- In all conditions, SLMs should be placed outside of the door zone of parked cars.

DESIGN FEATURES

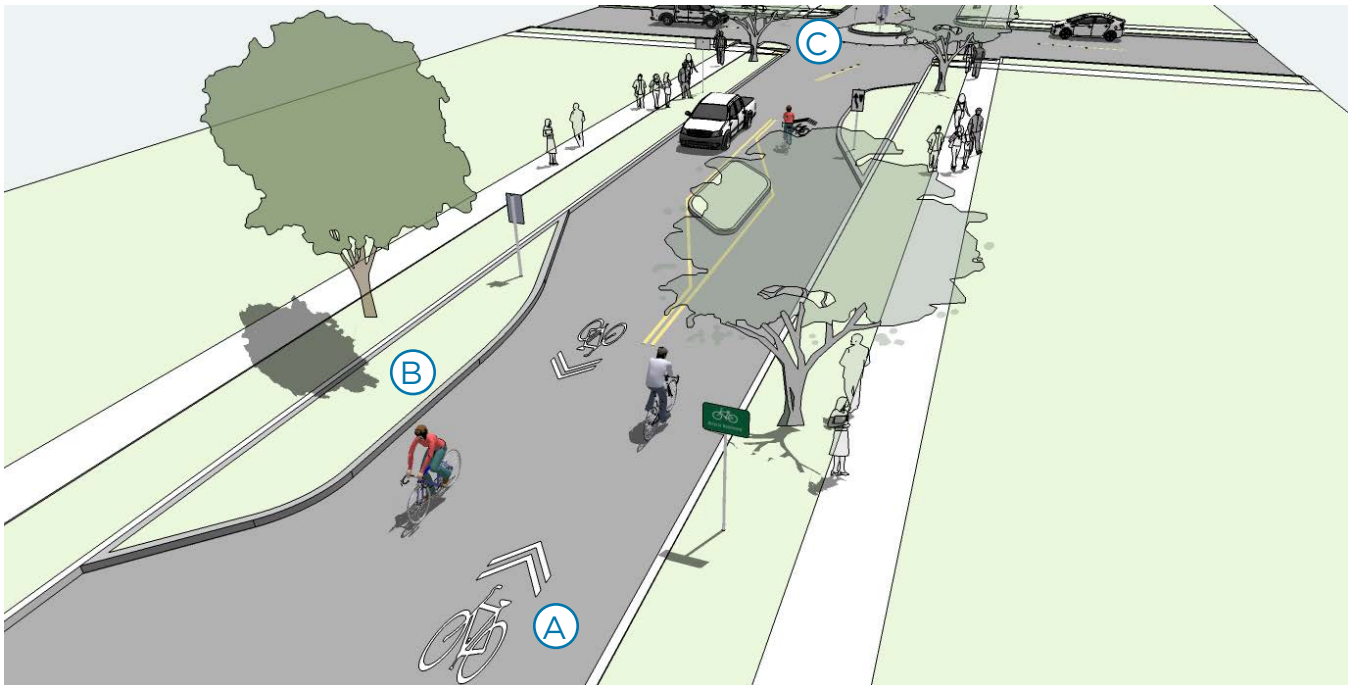
- May be used on streets with a speed limit of 35 mph or under. Lower than 30 mph speed limit preferred.

(A) In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.

(B) Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present, 4 feet from edge of curb with no parking. If parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.

BICYCLE BOULEVARDS

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.



TYPICAL APPLICATION

- Parallel with and in close proximity to major thoroughfares (1/4 mile or less).
- Follow a desire line for bicycle travel that is ideally long and relatively continuous (2-5 miles).
- Avoid alignments with excessive zigzag or circuitous routing. The bikeway should have less than 10 percent out of direction travel compared to shortest path of primary corridor.
- Streets with travel speeds at 25 mph or less and with traffic volumes of fewer than 3,000 vehicles per day.

DESIGN FEATURES

(A) Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.

(B) Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.

(C) Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.

Bicycle Boulevards

Bicycle boulevards are established on streets that improve connectivity to key destinations and provide a direct, low-stress route for bicyclists, with low motorized traffic volumes and speeds, designated and designed to give bicycle travel priority over other modes.

Traffic Calming

Streets along classified neighborhood bikeways may require additional traffic calming measures to discourage through trips by motor vehicles.

FURTHER CONSIDERATIONS

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

Traffic calming can deter motorists from driving on a street. Anticipate and monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

CRASH REDUCTION

In a comparison of vehicle/cyclist collision rates on traffic-calmed side streets signed and improved for cyclist use, compared to parallel and adjacent arterials with higher speeds and volumes, the bicycle boulevard as found to have a crash reduction factor of 63 percent, with rates two to eight times lower when controlling for volume (CMF ID: 3092).

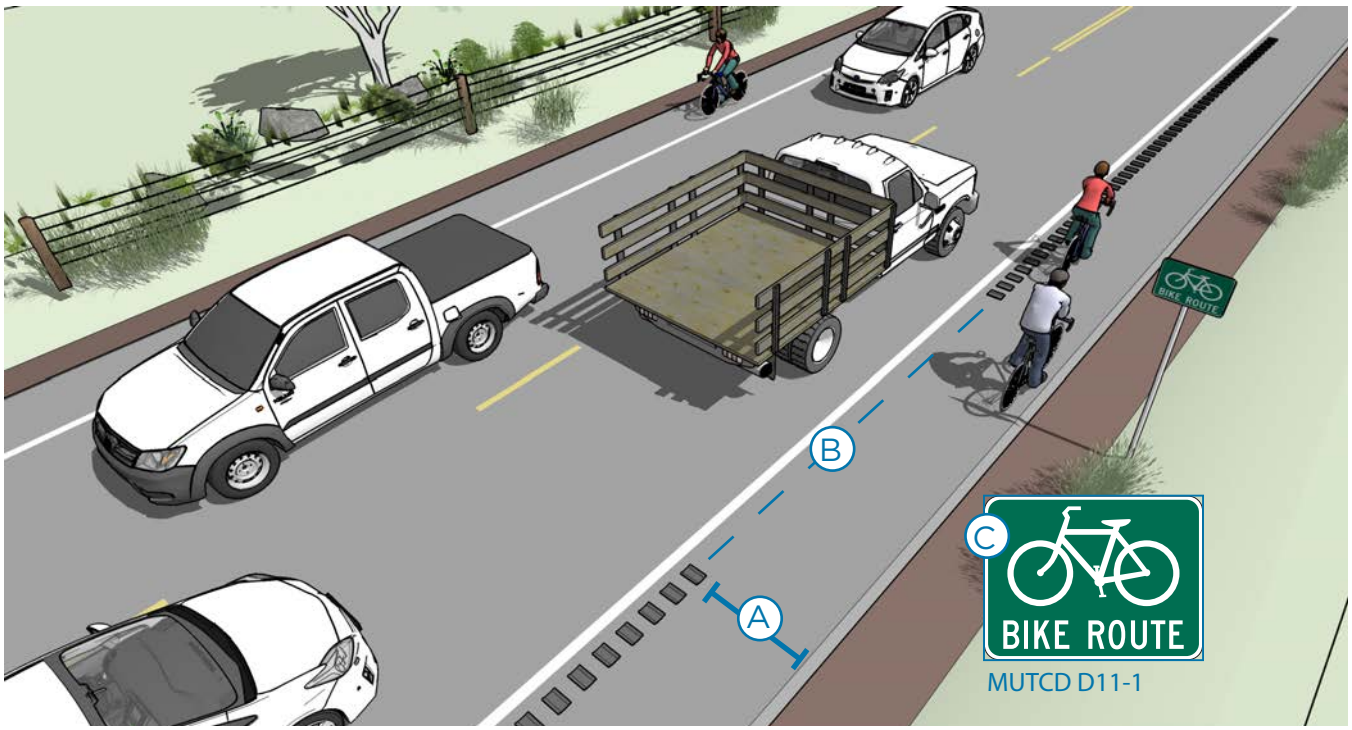
CONSTRUCTION COSTS

Costs vary depending on the type of treatments proposed for the corridor. Simple treatments such as wayfinding signage and markings are most cost-effective, but more intensive treatments will have greater impact at lowering speeds and volumes, at a higher cost.

ON-STREET BIKEWAYS

SHOULDER BIKEWAYS

Typically found in less-dense areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway.



MUTCD D11-1

TYPICAL APPLICATION

- Located in more rural environments where there are no curbs or gutters.
- Suitable for roadways with higher speeds and lower bicycle volumes.
- Shoulder bikeways should be considered a temporary treatment, with full bike lanes planned for construction when the roadway is widened or completed with curb and gutter.

DESIGN FEATURES

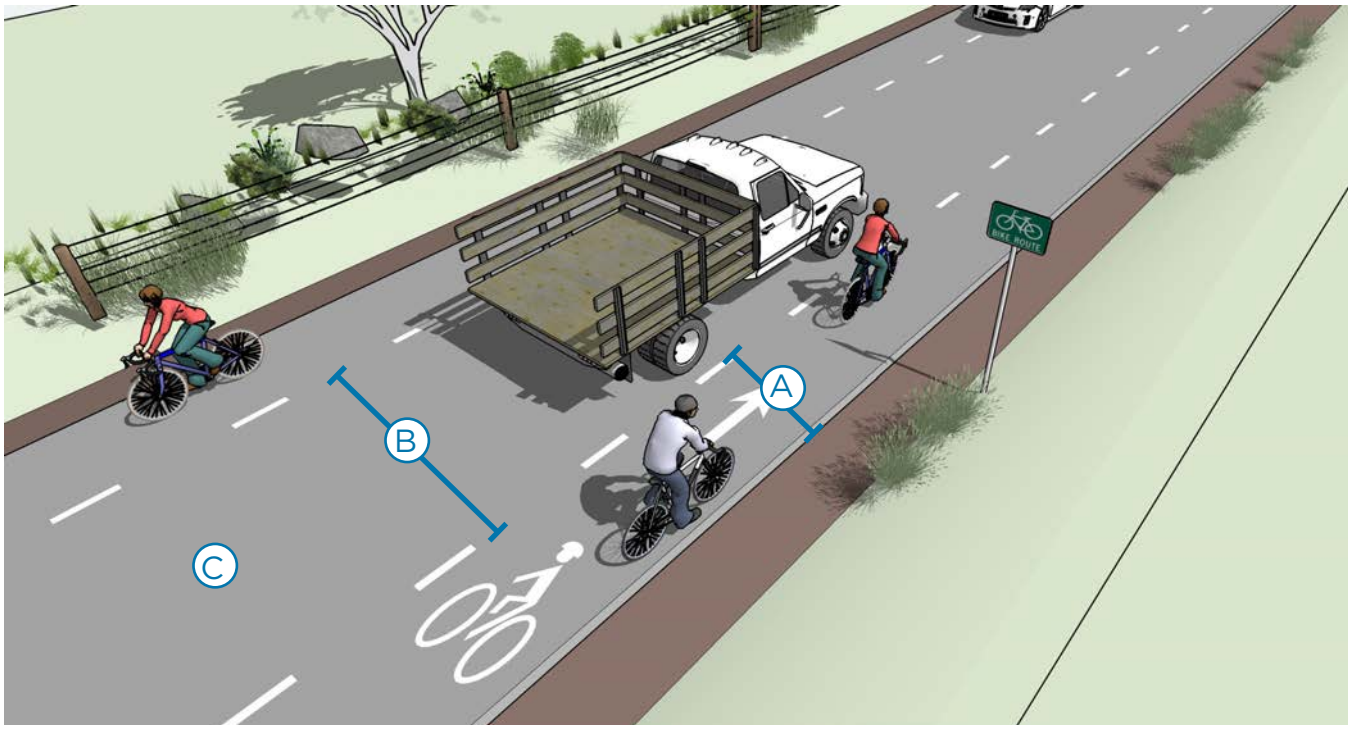
(A) A minimum of 4 feet of ridable surface should be available for bicycle travel. (AASHTO 2012)

(B) Rumble strips are not recommended on shoulders used by bicyclists unless there is a minimum 4 foot clear path. 12 foot gaps every 40-60 feet should be provided to allow access as needed.

(C) MUTCD D11-1 "Bike Route" wayfinding signage is optional.

ADVISORY BIKE LANES

Advisory bike lanes are bicycle priority areas delineated by broken white lines, separate from a center one-lane two-way travel area. Motorists may only enter the bicycle zone when no bicycles are present. Motorists must overtake bicyclists with caution due to potential oncoming traffic.



TYPICAL APPLICATION

- Most appropriate on streets where motor vehicle traffic volumes are low-moderate (1,500-4,500 ADT), and where there is insufficient room for conventional bicycle lanes.
- If on-street parking is present, parking lanes should be highly utilized or occupied with curb extensions to separate the parking lane from the advisory bike lane.
- This treatment may be appropriate on roadways with low volumes if the road is straight with few bends, inclines or sightline obstructions.

DESIGN FEATURES

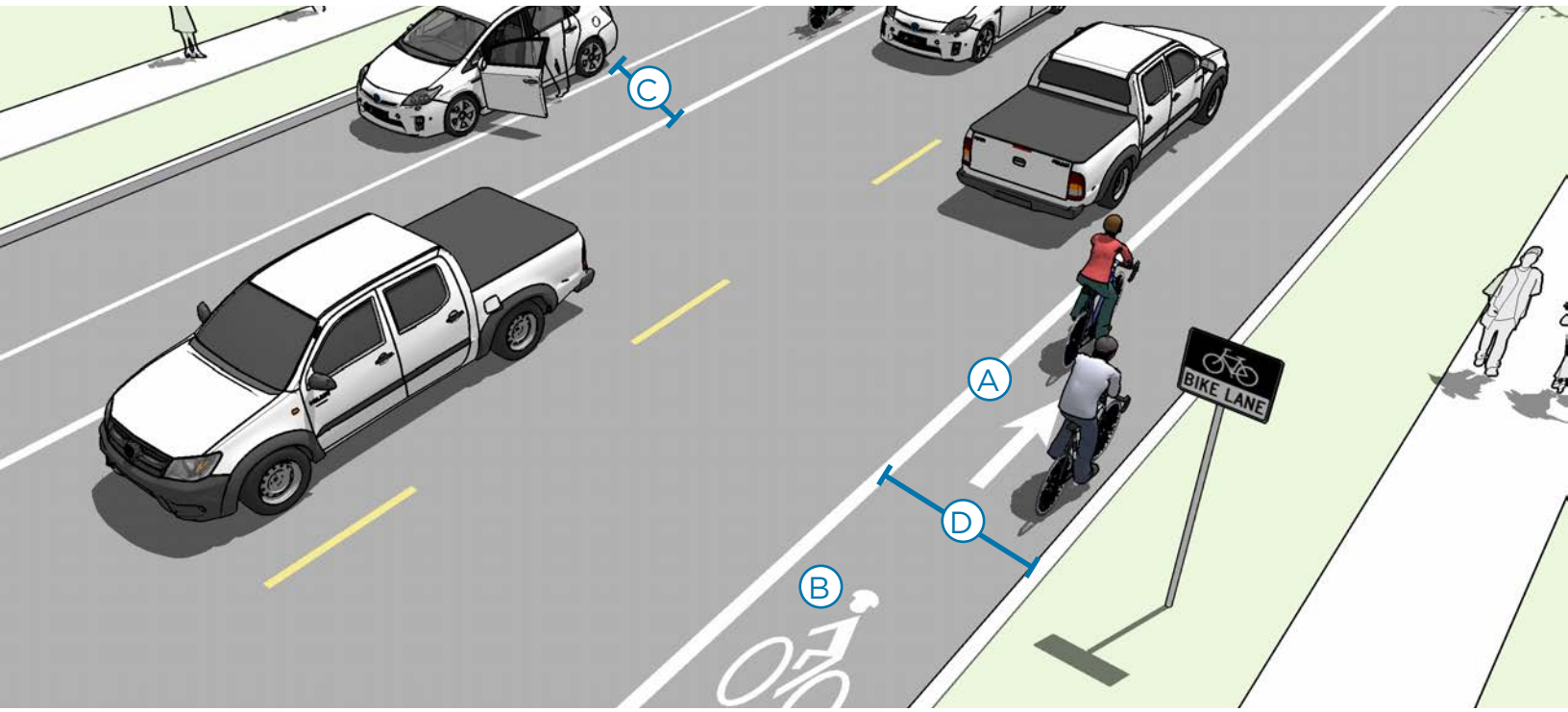
(A) Advisory bike lane width of 6 ft, 5 ft minimum.

(B) The automobile zone should be configured narrowly enough so that two cars cannot pass each other in both directions without crossing the advisory lane line. Minimum 2-way motor vehicle travel lane width of 16 ft.

(C) No centerline on roadway..

BICYCLE LANES

On-street bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signs. The bike lane is located directly adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.



TYPICAL APPLICATION

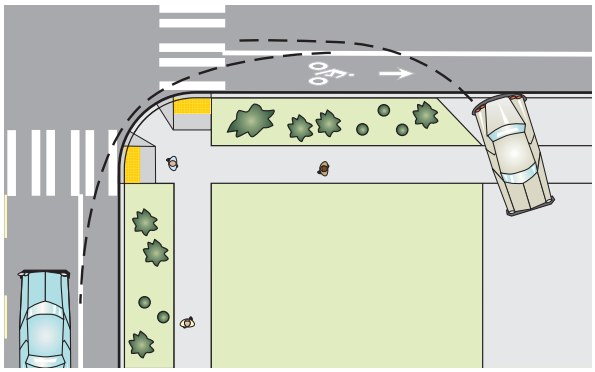
- Bike lanes may be used on any street with adequate space, but are most effective on streets with moderate traffic volumes ≥ 6,000 ADT (≥ 3,000 preferred).
- Bike lanes are most appropriate on streets with moderate speeds ≥ 25 mph.
- Appropriate for skilled adult riders on most streets.
- May be appropriate for children when configured as 6+ ft wide lanes on lower-speed, lower-volume streets with one lane in each direction.

DESIGN FEATURES

- Mark inside line with 6" stripe. Mark 4" parking lane line or "Ts".[1]
- Include a bicycle lane marking **(MUTCD Figure 9C-3)** at the beginning of blocks and at regular intervals along the route **(MUTCD 9C.04).**
- 6 ft width preferred adjacent to on-street parking (5 ft min.).
- 5–6 ft preferred adjacent to curb and gutter (4 ft min.) or 4 ft more than the gutter pan width.

1 Studies have shown that marking the parking lane encourages people to park closer to the curb. FHWA. Bicycle Countermeasure Selection System. 2006.

Place Bike Lane Symbols to Reduce Wear



Bike lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed outside of the motor vehicle tread path in order to minimize wear from the motor vehicle path (NACTO 2012).

Bicycle Lane

Bicycle lanes provide an exclusive space, but may be subject to unwanted encroachment by motor vehicles.

FURTHER CONSIDERATIONS

On high speed streets (≥ 40 mph) the minimum bike lane should be 6 ft**.**

On streets where bicyclists passing each other is to be expected, where high volumes of bicyclists are present, or where added comfort is desired, consider providing extra wide bike lanes up to 7 ft wide, or configure as a buffered bicycle lane.

It may be desirable to reduce the width of general purpose travel lanes in order to add or widen bicycle lanes.

On multi-lane and/or high speed streets, the most appropriate bicycle facility to provide for user comfort may be buffered bicycle lanes or physically separated bicycle lanes.

MANHOLE COVERS AND GRATES:

Manhole surfaces should be manufactured with a shallow surface texture in the form of a tight, nonlinear pattern

If manholes or other utility access boxes are to be located in bike lanes within 50 ft of intersections or within 20 ft of driveways or other bicycle access points, special manufactured permanent nonstick surfaces will be required to ensure a controlled travel surface for cyclists breaking or turning.

Manholes, drainage grates, or other obstacles should be set flush with the paved roadway. Roadway surface inconsistencies pose a threat to safe riding conditions for bicyclists. Construction of manholes, access panels or other drainage elements will be constructed with no variation in the surface. The maximum allowable tolerance in vertical roadway surface will be 1/4 of an inch.

CRASH REDUCTION

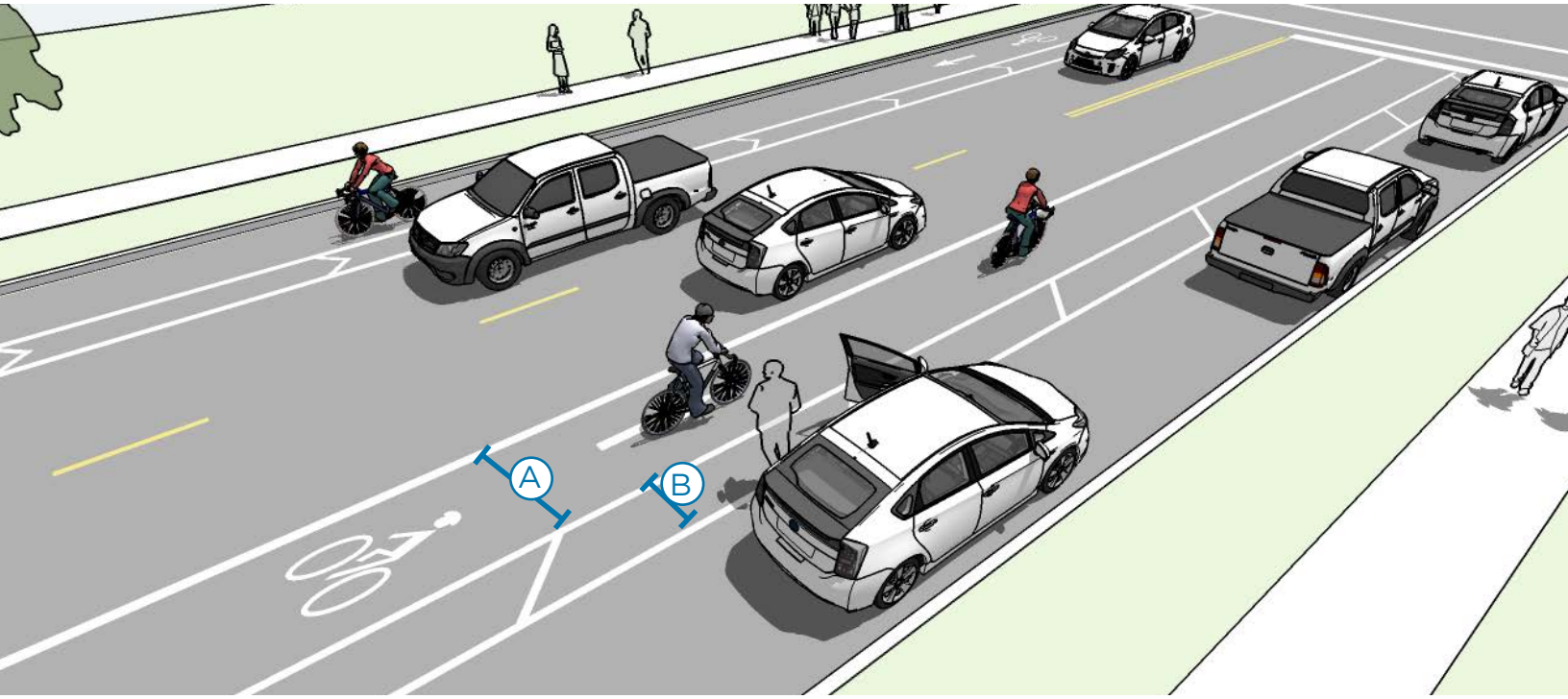
Before and after studies of bicycle lane installations show a wide range of crash reduction factors. Some studies show a crash reduction of 35 percent (CMF ID: 1719) for vehicle/bicycle collisions after bike lane installation.

CONSTRUCTION COSTS

The cost for installing bicycle lanes will depend on the implementation approach. Typical costs are $16,000 per mile for restriping.

BUFFERED BICYCLE LANES

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.



TYPICAL APPLICATION

- Anywhere a conventional bike lane is being considered.
- On streets with high speeds and high volumes or high truck volumes.
- On streets with extra lanes or lane width.
- Appropriate for skilled adult riders on most streets.

DESIGN FEATURES

(A) The minimum bicycle travel area (not including buffer) is 5 ft wide.

(B) Buffers should be at least 2 ft wide. If buffer area is 4 ft or wider, white chevron or diagonal markings should be used.

- For clarity at driveways or minor street crossings, consider a dotted line.
- There is no standard for whether the buffer is configured on the parking side, the travel side, or a combination of both.

Buffered Bicycle Lane

The use of pavement markings delineates space for cyclists to ride in a comfortable facility.

Buffered Bicycle Lane

The use of pavement markings delineates space for cyclists to ride in a comfortable facility.

FURTHER CONSIDERATIONS

- Color may be used within the lane to discourage motorists from entering the buffered lane.
- A study of buffered bicycle lanes found that, in order to make the facilities successful, there needs to also be driver education, improved signage and proper pavement markings.[1]
- On multi-lane streets with high vehicles speeds, the most appropriate bicycle facility to provide for user comfort may be physically separated bike lanes.
- NCHRP Report #766 recommends, when space in limited, installing a buffer space between the parking lane and bicycle lane where on-street parking is permitted rather than between the bicycle lane and vehicle travel lane.[2]

1 Monsere, C.; McNeil, N.; and Dill, J., "Evaluation of Innovative Bicycle Facilities: SW Broadway Cycle Track and SW Stark/Oak Street Buffered Bike Lanes. Final Report" (2011).Urban Studies and Planning Faculty Publications and Presentations.
2 National Cooperative Highway Research Program. Report #766: Recommended Bicycle Lane Widths for Various Roadway Characteristics.

CRASH REDUCTION

A before and after study of buffered bicycle lane installation in Portland, OR found an overwhelmingly positive response from bicyclists, with 89 percent of bicyclists feeling safer riding after installation and 91 percent expressing that the facility made bicycling easier.[3]

CONSTRUCTION COSTS

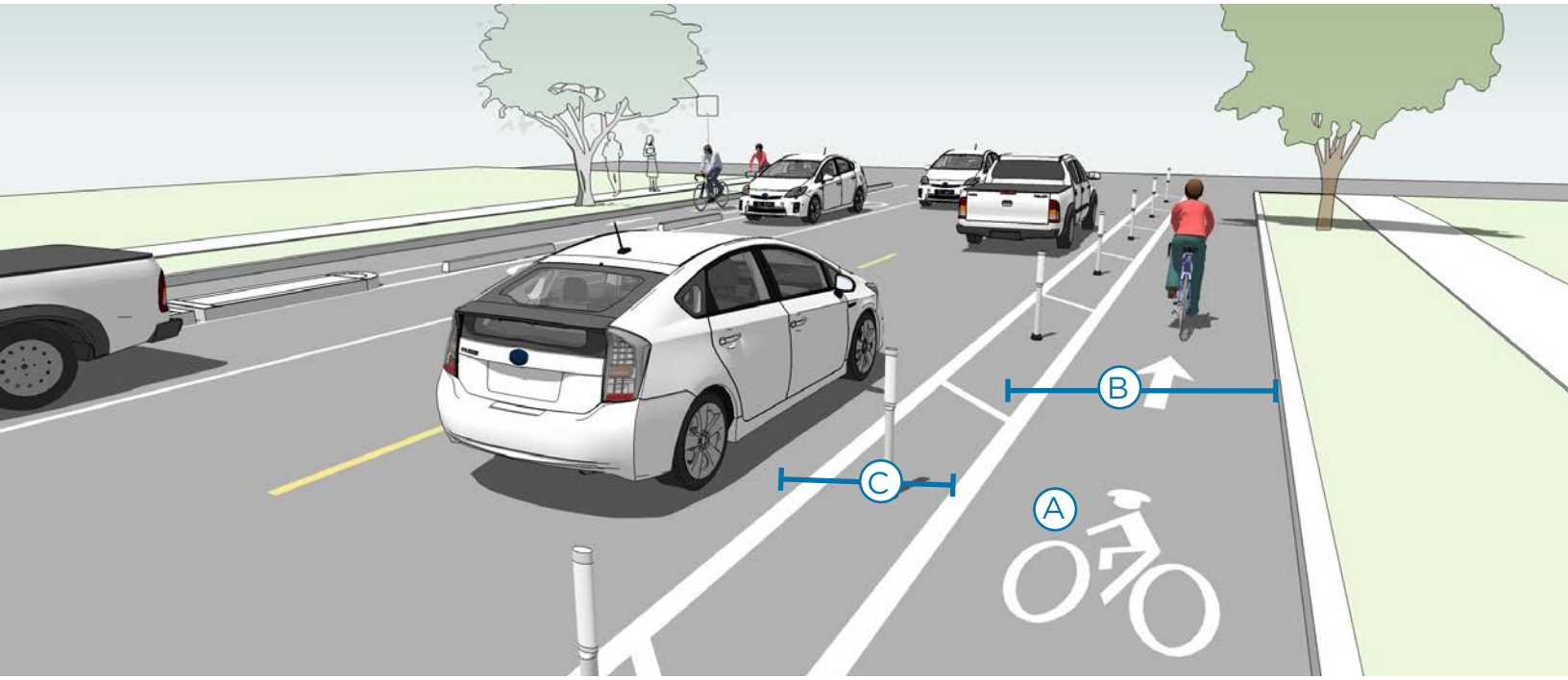
The cost for installing buffered bicycle lanes will depend on the implementation approach. Typical costs are $16,000 per mile for restriping. However, the cost of large-scale bicycle treatments will vary greatly due to differences in project specifications and the scale and length of the treatment.

3 National Cooperative Highway Research Program. Report #766: Recommended Bicycle Lane Widths for Various Roadway Characteristics.

PHYSICALLY SEPARATED BICYCLE LANES

ONE-WAY SEPARATED BICYCLE LANES

When retrofitting separated bike lanes onto existing streets, a one-way street-level design may be most appropriate. This design provides protection through physical barriers and can include flexible delineators, curbs, on-street parking or other barriers. A street level separated bike lane shares the same elevation as adjacent travel lanes.



TYPICAL APPLICATION

- Street retrofit projects with limited funds for relating curbs and drainage.
- Streets with high motor vehicle volumes and/or speeds and high bicycle volumes.
- Streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bicycle markings through the intersection, and other signalized intersection treatments.
- Appropriate for most riders on most streets.

DESIGN FEATURES

(A) Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bike lane and at intervals along the facility (MUTCD 9C.04).

(B) 7 ft width preferred (5 ft minimum).

(C) 3 ft minimum buffer width adjacent to parking. 18 inch minimum adjacent to travel lanes (NACTO, 2012). Channelizing devices should be placed in the buffer area.

- If buffer area is 4 ft or wider, white chevron or diagonal markings should be used.

Street Level Separated Bicycle Lanes

Street Level Separated Bicycle Lanes can be separated from the street with parking, planters, bollards, or other design elements.

FURTHER CONSIDERATIONS

- Separated bike lane buffers and barriers are covered in the MUTCD as preferential lane markings (section 3D.01) and channelizing devices (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- A retrofit separated bike lane has a relatively low implementation cost compared to road reconstruction by making use of existing pavement and drainage and by using parking lane as a barrier.
- Gutters, drainage outlets and utility covers should be designed and configured as not to impact bicycle travel.
- Special consideration should be given at transit stops to manage bicycle & pedestrian interactions.

CRASH REDUCTION

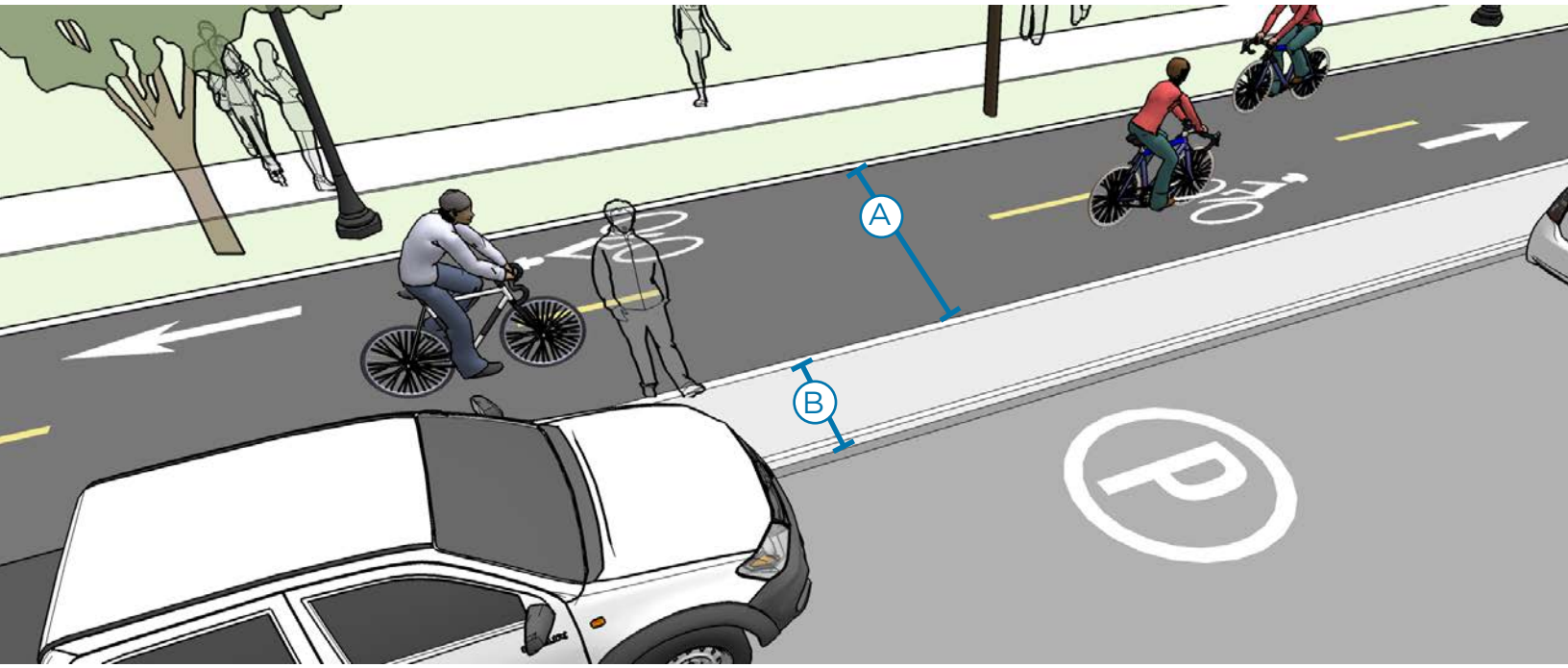
A before and after study in Montreal of physically separated bicycle lanes shows that this type of facility can result in a crash reduction of 74 percent for collisions between bicyclists and vehicles. (CMF ID: 4097) In this study, there was a parking buffer between the bike facility and vehicle travel lanes. Other studies have found a range in crash reductions due to SBL, from 8 percent (CMF ID: 4094) to 94 percent (CMF ID: 4101).

CONSTRUCTION COSTS

The implementation cost is low if the project uses existing pavement and drainage, but the cost significantly increases if curb lines need to be moved. A parking lane is the low-cost option for providing a barrier. Other barriers might include concrete medians, bollards, tubular markers, or planters.

TWO-WAY SEPARATED BICYCLE LANES

Two-Way Separated Bicycle Lanes are bicycle facilities that allow bicycle movement in both directions on one side of the road. Two-way separated bicycle lanes share some of the same design characteristics as one-way separated bicycle lanes, but may require additional considerations at driveway and side-street crossings.



TYPICAL APPLICATION

- Works best on the left side of one-way streets.
- Streets with high motor vehicle volumes and/or speeds.
- Streets with high bicycle volumes.
- Streets with a high incidence of wrong-way bicycle riding.
- Streets with few conflicts such as driveways or cross-streets on one side of the street.
- Streets that connect to shared use paths.

DESIGN FEATURES

(A) 12 ft operating width preferred (10 ft minimum) width for two-way facility.

(B) In constrained an 8 ft minimum operating width may be considered.

- Adjacent to on-street parking a 3 ft minimum width channelized buffer or island shall be provided to accommodate opening doors **(NACTO, 2012) (MUTCD 3H.01, 3I.01).**
- A separation narrower than 5 ft may be permitted if a physical barrier is present **(AASHTO, 2013).**
- Additional signalization and signs may be necessary to manage conflicts.

Two-Way Separated Bicycle Lanes

A two-way facility can accommodate cyclists in two directions of travel.

FURTHER CONSIDERATIONS

- On-street bike lane buffers and barriers are covered in the MUTCD as preferential lane markings (section 3D.01) and channelizing devices, including flexible delineators (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- A two-way separated bike lane on one way street should be located on the left side.
- A two-way separated bike lane may be configured at street level or as a raised separated bicycle lane with vertical separation from the adjacent travel lane.
- Two-way separated bike lanes should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

CRASH REDUCTION

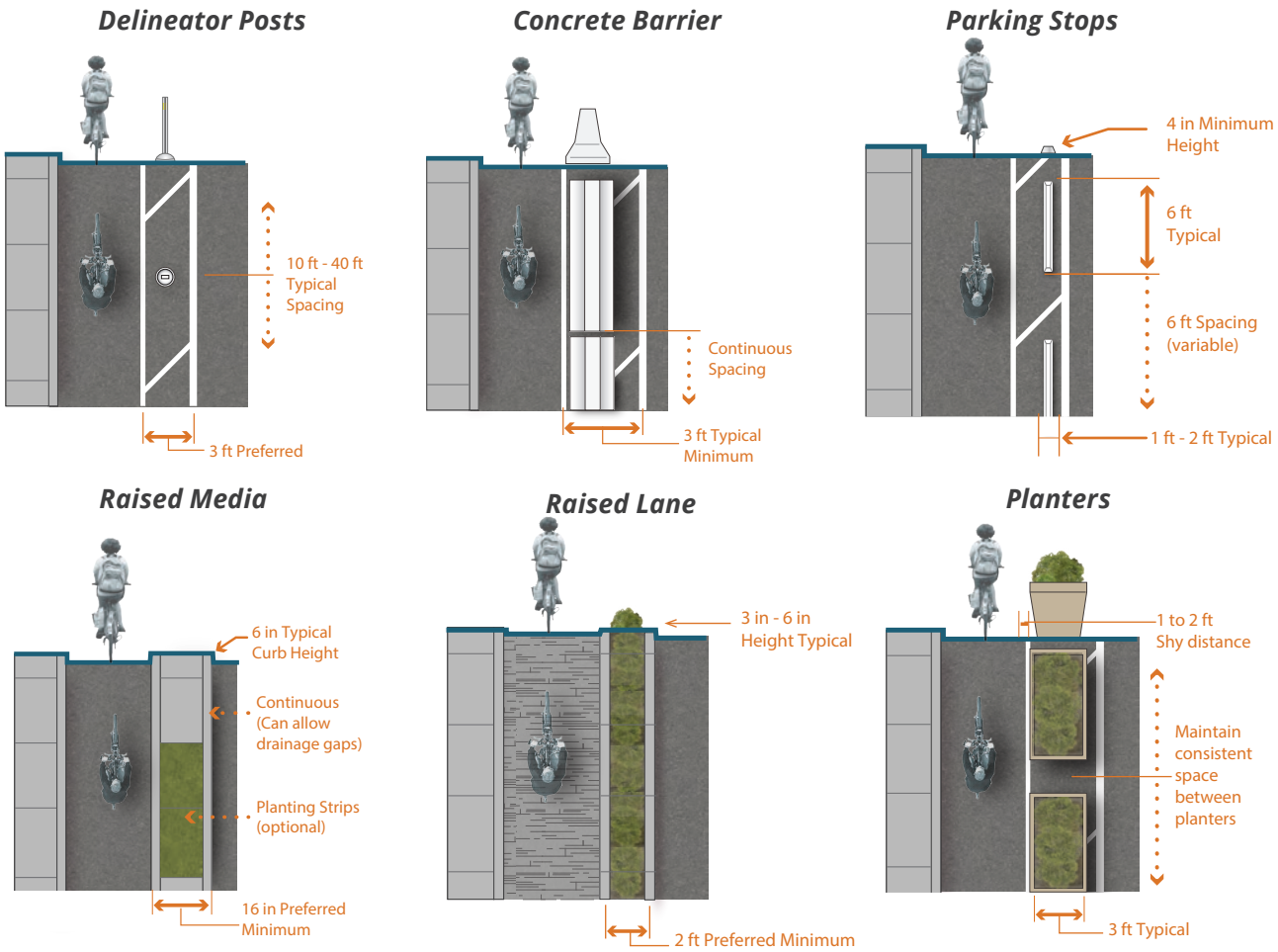
A study of bicyclists in two-way separated facilities found that accident probability decreased by 45 percent at intersections where the separated facility approach was detected between 2-5 meters from the side of the main road and when bicyclists had crossing priority at intersections. (CMF ID: 3034) Installation of a two-way separated bike lane 0-2 meters from the side of the main road resulted in an increase in collisions at intersections by 3 percent (CMF ID: 4033).

CONSTRUCTION COSTS

The implementation cost is low if the project uses existing pavement and drainage, but the cost significantly increases if curb lines need to be moved. A parking lane is the low-cost option for providing a barrier. Other barriers might include concrete medians, bollards, tubular markers, or planters.

SEPARATION METHODS

Separated bikeways may use a variety of vertical elements to physically separate the bikeway from adjacent travel lanes. Barriers may be robust constructed elements such as curbs, or may be more interim in nature, such as flexible delineator posts.



TYPICAL APPLICATION

Appropriate barriers for retrofit projects:

- Parked Cars
- Flexible delineators
- Bollards
- Planters
- Parking stops

Appropriate barriers for reconstruction projects:

- Curb separation
- Medians
- Landscaped Medians
- Raised separated bike lane with vertical or mountable curb
- Pedestrian Safety Islands

BIKEWAY SEPARATION METHODS

Raised separated bikeways are bicycle facilities that are vertically separated from motor vehicle traffic.

DESIGN FEATURES

- Maximize effective operating space by placing curbs or delineator posts as far from the through bikeway space as practicable.
- Allow for adequate shy distance of 1 to 2 ft from vertical elements to maximize useful space.
- When next to parking allow for 3 ft of space in the buffer space to allow for opening doors and passenger unloading.
- The presences of landscaping in medians, planters and safety islands increases comfort for users and enhances the streetscape environment.

CRASH REDUCTION

A before and after study in Montreal of separated bikeways shows that this type of facility can result in a crash reduction of 74 percent for collisions between bicyclists and vehicles. (CMF ID: 4097) In this study, there was a parking buffer between the bike facility and vehicle travel lanes. Other studies have found a range in crash reductions due to SBL, from 8 percent (CMF ID: 4094) to 94 percent (CMF ID: 4101).

FURTHER CONSIDERATIONS

- Separated bikeway buffers and barriers are covered in the MUTCD as preferential lane markings (section 3D.01) and channelizing devices (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- With new roadway construction a raised separated bikeway can be less expensive to construct than a wide or buffered bicycle lane because of shallower trenching and sub base requirements.
- Parking should be prohibited within 30 ft of the intersection to improve visibility.

CONSTRUCTION COSTS

Separated bikeway costs can vary greatly, depending on the type of material, the scale, and whether it is part of a broader construction project.

BIKEWAY INTERSECTION TREATMENTS

INTERSECTION CROSSING MARKINGS

Bicycle pavement markings through intersections guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and vehicles in the adjacent lane.

TYPICAL APPLICATION

- Streets with conventional, buffered, or separated bike lanes.
- At direct paths through intersections.
- Streets with high volumes of adjacent traffic.
- Where potential conflicts exist between through bicyclist and adjacent traffic.

DESIGN FEATURES

- Intersection markings should be the same width and in line with leading bike lane.

(A) Dotted lines should be a minimum of 6 inches wide and 4 ft long, spaced every 12 ft.

- All markings should be white, skid resistant and retro reflective (MUTCD 9C.02.02).

(B) Green pavement markings may also be used.

Intersection Crossing Markings

Intersection crossing markings can be used at signalized intersections or high volume minor street and driveway crossings, as illustrated above.

FURTHER CONSIDERATIONS

The National Committee on Uniform Traffic Control Devices has submitted a request to include additional options bicycle lanes extensions through intersections as a part of future MUTCD updates[1]. Their proposal includes the following options for striping elements within the crossing:

- Bicycle lane markings
- Double chevron markings, indicating the direction of travel.
- Green colored pavement.

1 Letter to FHWA from the Bicycle Technical Committee for the MUTCD. Bicycle Lane Extensions through Intersections. June 2014.

CRASH REDUCTION

A study on the safety effects of intersection crossing markings found a reduction in accidents by 10 percent and injuries by 19 percent.[2]

A study in Portland, OR found that significantly more motorists yielded to bicyclists after the colored pavement had been installed (92 percent in the after period versus 72 percent in the before period).[3]

CONSTRUCTION COSTS

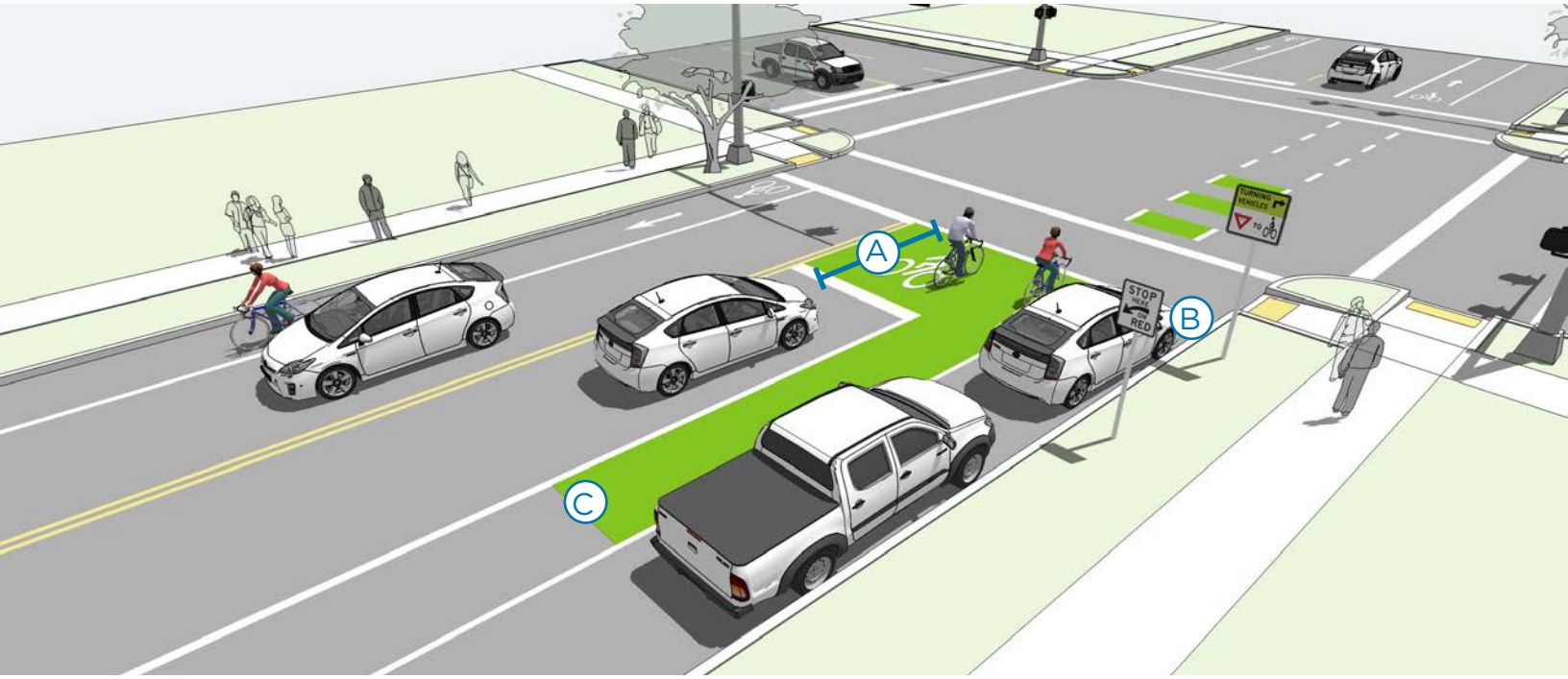
The cost for installing intersection crossing markings will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects.

Typical shared lane markings cost $180 each.

2 Jensen, S.U. (2008). Safety effects of blue cycle crossings: A before-after study. Accident Analysis & Prevention, 40(2), 742-750.
3 Hunter, W.W. et al. (2000). Evaluation of Blue Bike-Lane Treatment in Portland, Oregon. Transportation Research Record, 1705, 107-115.

BIKE BOX

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box. On a green signal, all bicyclists can quickly clear the intersection.



TYPICAL APPLICATION

- At potential areas of conflict between bicyclists and turning vehicles, such as a right or left turn locations.
- At signalized intersections with high bicycle volumes.
- At signalized intersections with high vehicle volumes.

DESIGN FEATURES

(A) 14 ft minimum depth from back of crosswalk to motor vehicle stop bar (NACTO, 2012).

(B) A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box. A "Stop Here on Red" (MUTCD R10-6) sign should be post mounted at the stop line to reinforce observance of the stop line.

(C) A 50 ft ingress lane should be used to provide access to the box.

- Use of green colored pavement is optional.

Bike Box

A bike box allows for cyclists to wait in front of queuing traffic, providing high visibility, and a head start over motor vehicle traffic.

FURTHER CONSIDERATIONS

- This treatment positions bicycles together and on a green signal, all bicyclists can quickly clear the intersection, minimizing conflict and delay to transit or other traffic.
- Pedestrians also benefit from bike boxes, as they experience reduced vehicle encroachment into the crosswalk.

CRASH REDUCTION

A study of motorist/bicyclist conflicts at bike boxes indicate a 35 percent decrease in conflicts (CMF ID: 1718). A study done in Portland in 2010 found that 77 percent of bicyclists felt bicycling through intersections was safer with the bike boxes.[1]

CONSTRUCTION COSTS

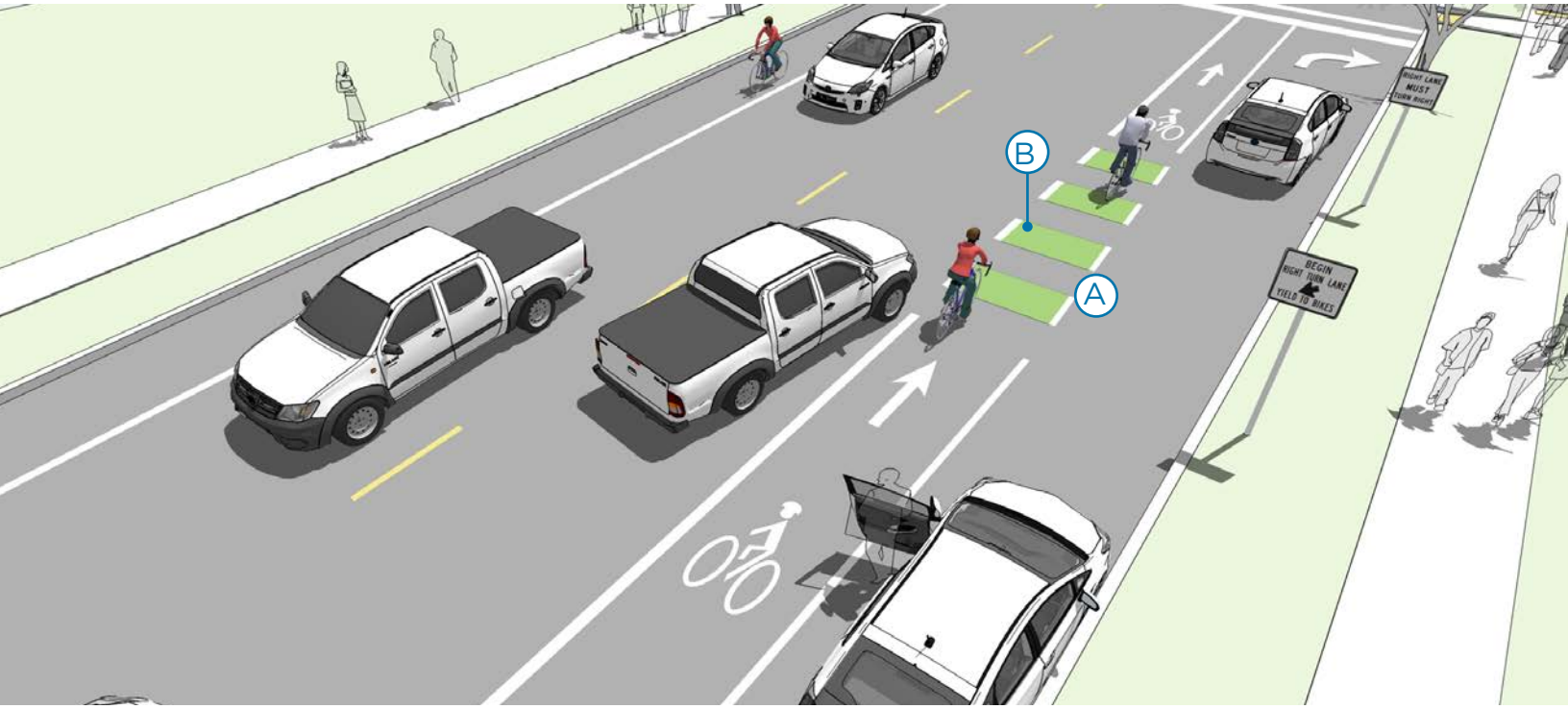
Costs will vary due to the type of paint used and the size of the bike box, as well as whether the treatment is added at the same time as other road treatments.

The typical cost for painting a bike box is $11.50 per square ft.

1 Monsere, C. & Dill, J. (2010). Evaluation of Bike Boxes at Signalized Intersections. Final Draft. Oregon Transportation Research and education Consortium.

COLORED BICYCLE LANES

Colored pavement within a bicycle lane may be used to increase the visibility of the bicycle facility, raise awareness of the potential to encounter bicyclists and reinforce priority of bicyclists in conflict areas.



TYPICAL APPLICATION

- Within a weaving or conflict area to identify the potential for bicyclist and motorist interactions and assert bicyclist priority.
- Across intersections, driveways and Stop or Yield-controlled cross-streets.

DESIGN FEATURES

(A) Typical white bike lanes (solid or dotted 6" stripe) are used to outline the green colored pavement.

(B) In weaving or turning conflict areas, preferred striping is dashed, to match the bicycle lane line extensions.

- The colored surface should be skid resistant and retro-reflective **(MUTCD 9C.02.02).**
- In exclusive use areas, such as bike boxes, color application should be solid green.

Colored Bicycle Lane

A colored bicycle lane on Laurel Street in Santa Cruz, CA alterts users to potential merging in advance of an intersection. Photo by Richard Masoner via Flickr (CC BY-SA 2.0).

FURTHER CONSIDERATIONS

- Green colored pavement shall be used in compliance with FHWA Interim Approval **(FHWA IA-14.10).**[1]
- While other colors have been used (red, blue, yellow), green is the recommended color in the US.
- The application of green colored pavement within bicycle lanes is an emerging practice. The guidance recommended here is based on best practices in cities around the county.

1 FHWA. Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14). 2011.

CRASH REDUCTION

Before and after studies of colored bicycle lane installations have found a reduction in bicycle/vehicle collisions by 38 percent and a reduction in serious injuries and fatalities of bicyclists by 71 percent.[2] A study in Portland, OR found a 38 percent decrease in the rate of conflict between bicyclists and motorists after colored lanes were installed.[3]

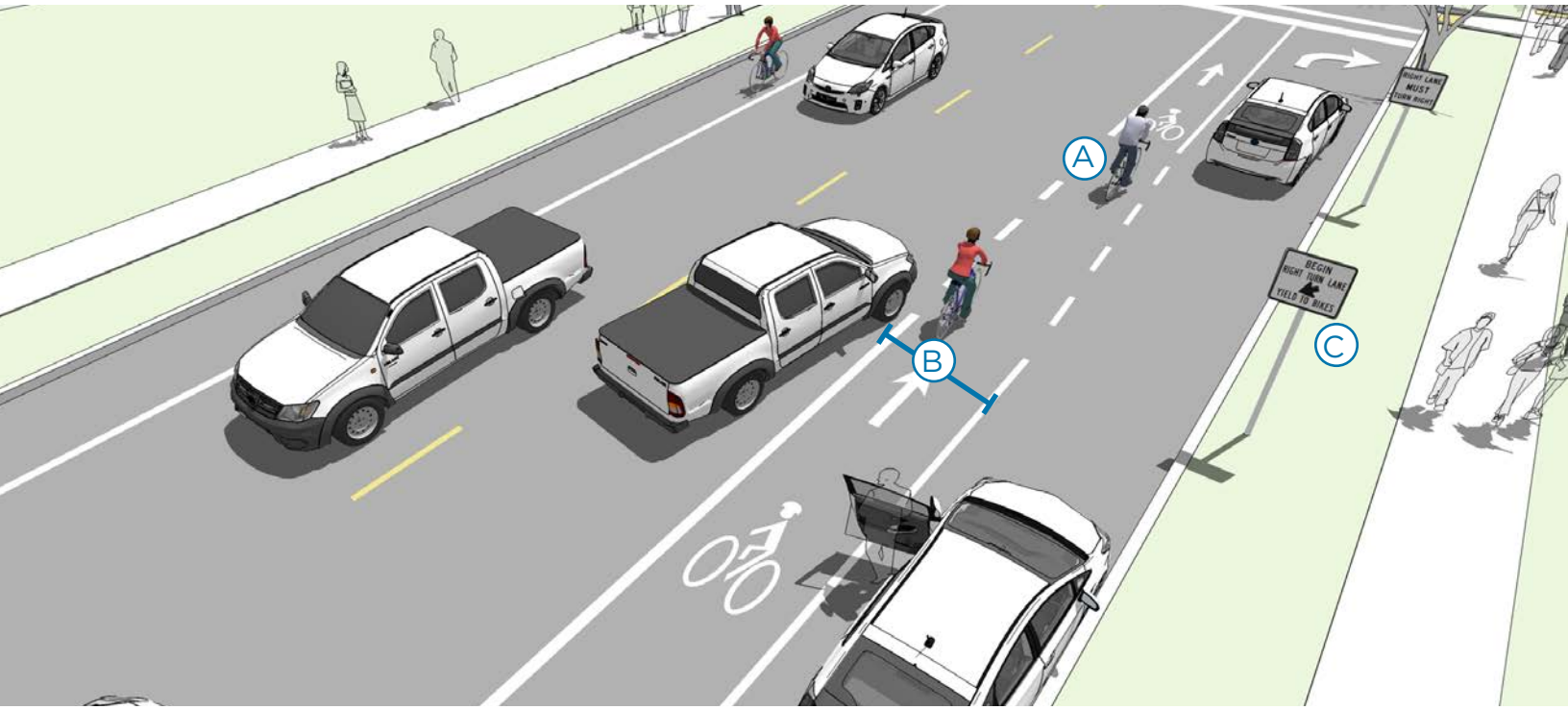
2 Jensen, S.U., et. al., "The Marking of Bicycle Crossings at Signalized Intersections," Nordic Road and Transport Research No. 1, 1997, pg. 27.
3 Hunter, W. W., et. al., Evaluation of the Blue Bike-Lane Treatment Used in Bicycle/Motor Vehicle Conflict Areas in Portland, Oregon, McLean, VA: FHWA, 2000, pg. 25.

CONSTRUCTION COSTS

The cost for installing colored bicycle lanes will depend on the materials selected and implementation approach. Typical costs range from $1.20/sq. ft installed for paint to $14/sq. ft installed for Thermoplastic. Colored pavement is more expensive than standard asphalt installation, costing 30-50 percent more than non-colored asphalt.

BIKE LANES AT ADDED RIGHT TURN LANES

The appropriate treatment at right turn only lanes is to introduce an added turn lane to the outside of the bicycle lane. The area where people driving must weave across the bicycle lane should be marked with dotted lines to identify the potential conflict areas. Signage should indicate that motorists must yield to bicyclists through the conflict area.



TYPICAL APPLICATION

- Streets with right-turn lanes and right side bike lanes.
- Streets with left-turn lanes and left side bike lanes.

DESIGN FEATURES

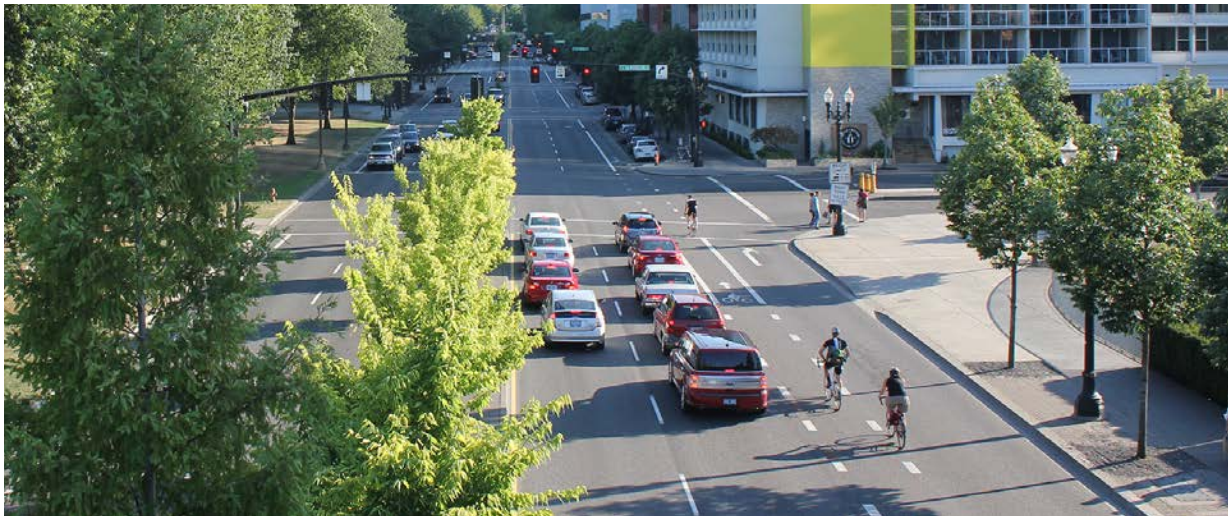
(A) Mark inside line with 6" stripe.

(B) Continue existing bike lane width; standard width of 5 to 6 ft (4 ft in constrained locations).

(C) A "Begin Right Turn Lane Yield To Bikes" (MUTCD R4-4) signs indicates that motorists should yield to bicyclists through the conflict area.

- Consider using colored in the conflict areas to promote visibility of the dashed weaving area.

Through Bicycle Lane to the Left of a Right Turn Only Lane



Drivers wishing to enter the right turn lane must transition across the bicycle lane in advance of the turn.

FURTHER CONSIDERATIONS

- The bicycle lane maintains a straight path, and drivers must weave across, providing clear right-of-way priority to bicyclists.
- Maintaining a straight bicycle path reinforces the priority of bicyclists over turning cars. Drivers must yield to bicyclists before crossing the bike lane to enter the turn only lane.
- Through lanes that become turn only lanes are difficult for bicyclists to navigate and should be avoided.
- The use of dual right-turn-only lanes should be avoided on streets with bike lanes (AASHTO, 2013). Where there are dual right-turn-only lanes, the bike lane should be placed to the left of both right-turn lanes, in the same manner as where there is just one right-turn-only lane.

CRASH REDUCTION

Studies have shown a 3 percent decrease in crashes at signalized intersections with exclusive right turn lanes when compared to sharing the roadway with motor vehicles (CMF ID: 3257).

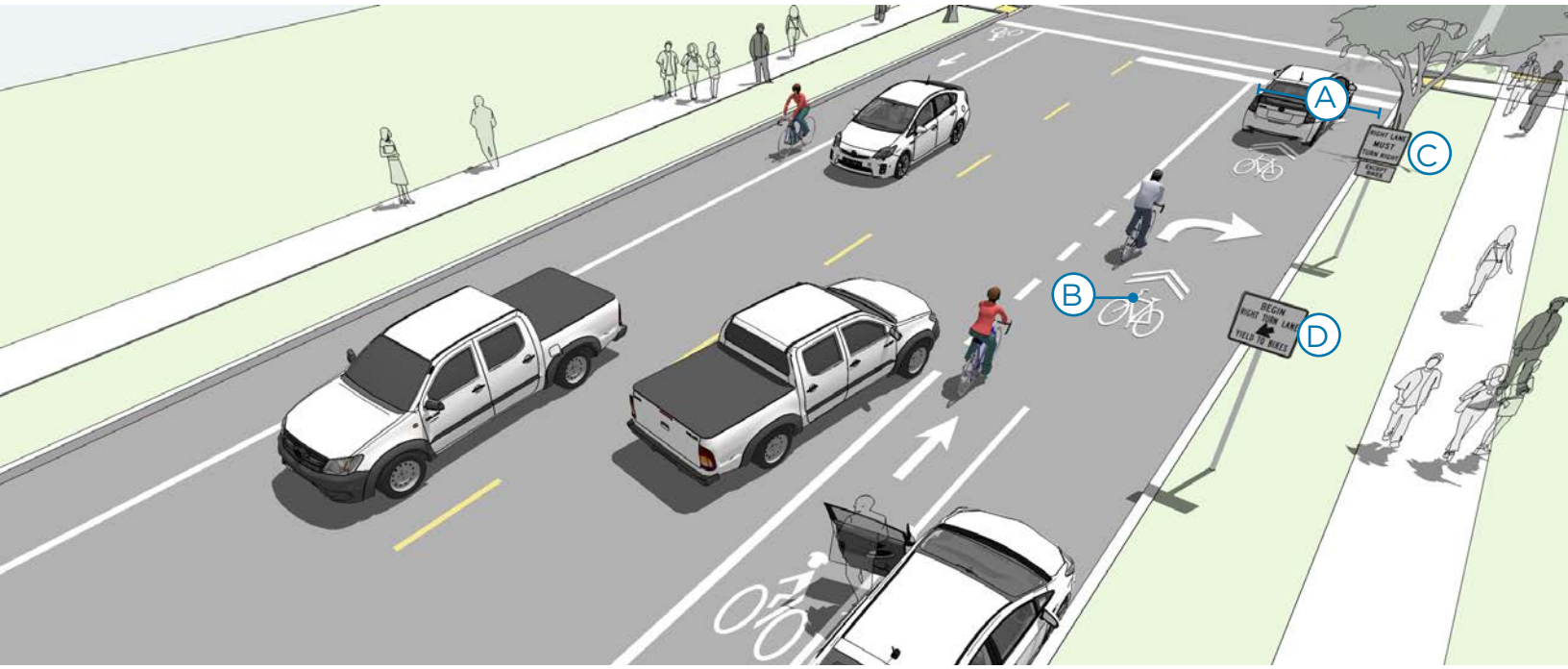
CONSTRUCTION COSTS

The cost for installing bicycle lanes will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects.

Typical costs are $16,000 per mile for restriping.

COMBINED BIKE LANE/TURN LANE

Where there isn't room for a conventional bicycle lane and turn lane a combined bike lane/turn lane creates a shared lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. The combined bicycle lane/turn lane places shared lane markings within a right turn only lane.



TYPICAL APPLICATION

- Most appropriate in areas with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less).
- May not be appropriate for high speed arterials or intersections with long right turn lanes.
- May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

DESIGN FEATURES

(A) Maximum shared turn lane width is 13 ft; narrower is preferable (NACTO, 2012).

(B) Shared Lane Markings should indicate preferred positioning of bicyclists within the combine lane.

(C) A "Right Lane Must Turn Right" (MUTCD R3-7R) sign with an "EXCEPT BIKES" plaque may be needed to permit through bicyclists to use a right turn lane.

(D) Use "Begin Right Turn Lane Yield To Bikes" signage (MUTCD R4-4) to indicate that motorists should yield to bicyclists through the conflict area.

Combined Bike Lane/Turn Lane (Billings, MT)

Shared lane markings and signs indicate that bicyclists should right in the left side of this right turn only lane.

FURTHER CONSIDERATIONS

- This treatment is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.
- Not recommended at intersections with high peak motor vehicle right turn movements.
- Combined bike lane/turn lane creates safety and comfort benefits by negotiating conflicts upstream of the intersection area.

CRASH REDUCTION

A survey in Eugene, OR found that more than 17 percent of the surveyed bicyclists using the combined turn lane felt that it was safer than the comparison location with a standard-width right-turn lane, and another 55 percent felt that the combined-lane site was no different safety-wise than the standard-width location.[1]

1 Hunter, W.W. (2000). Evaluation of a Combined Bicycle Lane/Right-Turn Lane in Eugene, Oregon. Publication No. FHWA-RD-00-151, Federal Highway Administration, Washington, DC.

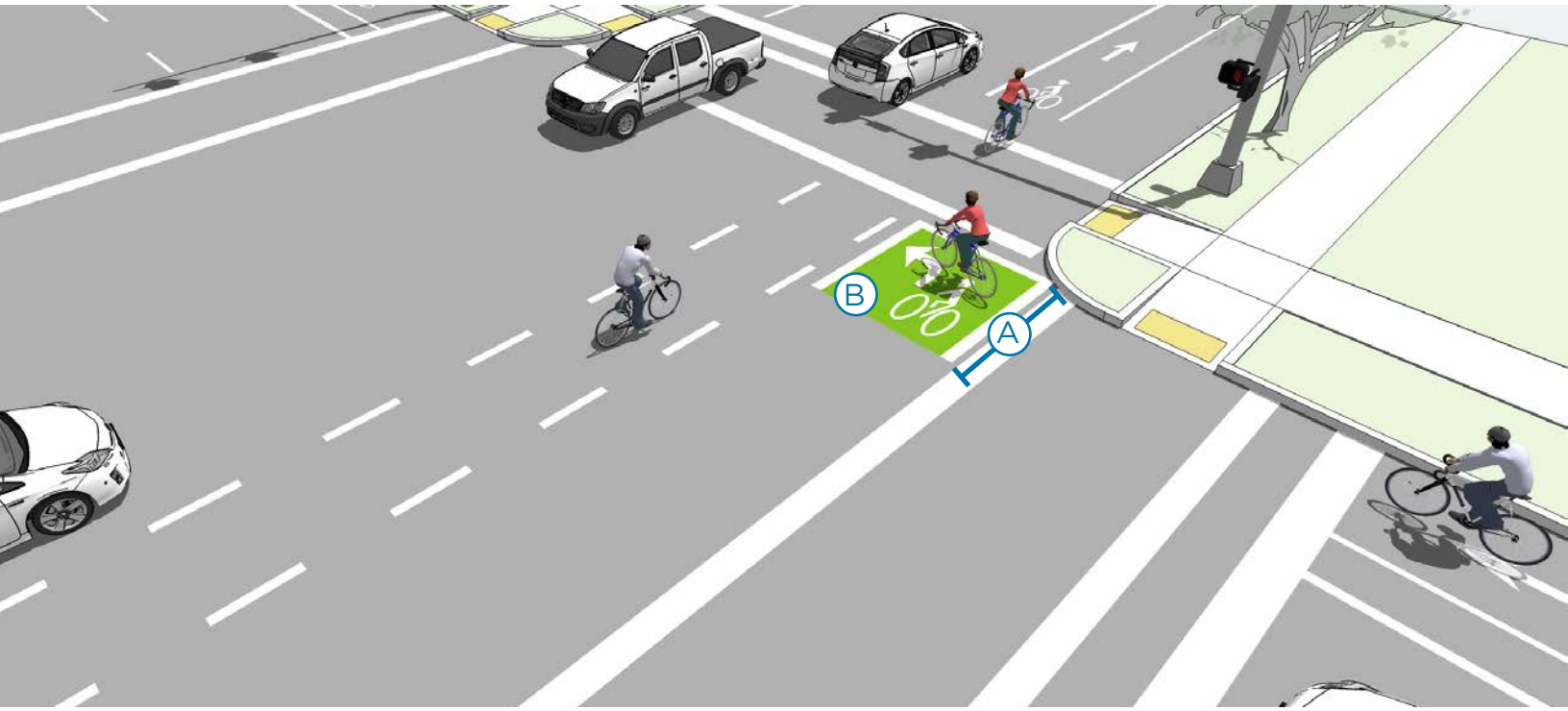
CONSTRUCTION COSTS

The cost for installing a combined turn lane will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects.

Typical costs are $16,000 per mile for restriping. Typical yield lines cost $10 per square ft or $320 each. Typical shared lane markings cost $180 each.

TWO-STAGE TURN BOXES

Two- stage turn boxes offer bicyclists a safe way to make turns at multi-lane signalized intersections from a physically separated or conventional bike lane. On physically separated bike lanes, bicyclists are often unable to merge into traffic to turn due to physical separation, making the provision of two-stage turn boxes critical.



TYPICAL APPLICATION

- Streets with high vehicle speeds and/or traffic volumes.
- At intersections locations of multi-lane roads with signalized intersections.
- At signalized intersections with a high number of bicyclists making a left turn from a right side facility.

DESIGN FEATURES

- The two-stage turn box shall be placed in a protected area. Typically this is within the shadow of an on-street parking lane or separated bike lane buffer area and should be placed in front of the crosswalk to avoid conflict with pedestrians.

(A) 8 ft x 6 ft preferred depth of bicycle storage area (6 ft x 3 ft minimum).

(B) Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning (NACTO, 2012).

Jughandle Turn Box

This MUTCD compliant design carves a jughandle out of the sidewalk to provide space for waiting bicyclists.

Separated Bike Lane Turn Box

On separated bike lanes, the two-stage turn box can be located in the protected buffer/parking area.

FURTHER CONSIDERATIONS

- Consider providing a "No Turn on Red" (MUTCD R10-11) on the cross street to prevent motor vehicles from entering the turn box.
- This design formalizes a maneuver called a "box turn" or "pedestrian style turn."
- Some two-stage turn box designs are considered experimental by FHWA.
- Design guidance for two-stage turns apply to both bike lanes and separated bike lanes.
- Two-stage turn boxes reduce conflicts in multiple ways; from keeping bicyclists from queuing in a bike lane or crosswalk and by separating turning bicyclists from through bicyclists.
- Bicyclist capacity of a two-stage turn box is influenced by physical dimension (how many bicyclists it can contain) and signal phasing (how frequently the box clears).

CRASH REDUCTION

There are no Crash Modification Factors (CMFs) available for this treatment.

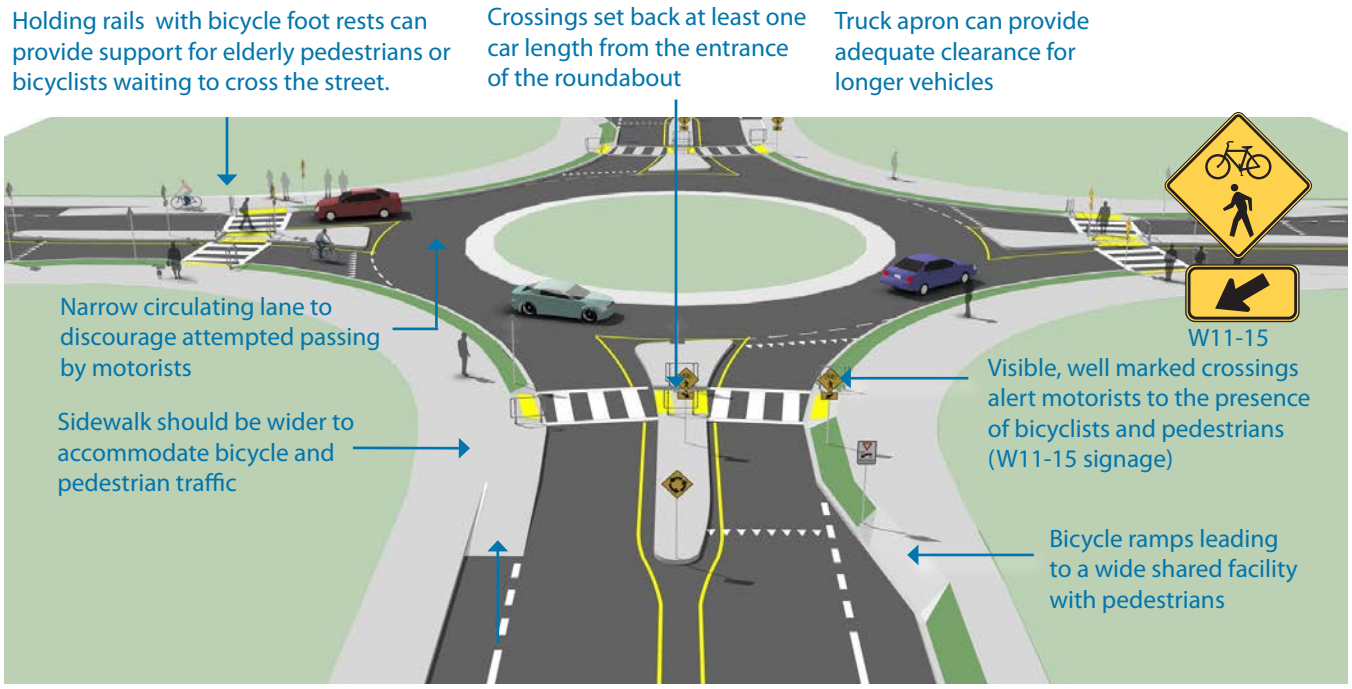
CONSTRUCTION COSTS

Costs will vary due to the type of paint used and the size of the two-stage turn box, as well as whether the treatment is added at the same time as other road treatments.

The typical cost for painting a two-stage turn box is $11.50 per square ft.

BICYCLISTS AT SINGLE LANE ROUNDABOUTS

Roundabouts are circular intersection designed with yield control for all entering traffic, channelized approaches and geometry to induce desirable speeds. They are used as an alternative to intersection signalization.



TYPICAL APPLICATION

- On bicycle routes a roundabout or neighborhood traffic circle is preferable to stop control as bicyclists do not like to lose their momentum due to physical effort required. At intersections of multi-use paths, pedestrian and bicycle only roundabouts are an excellent form of non-motorized user traffic control.

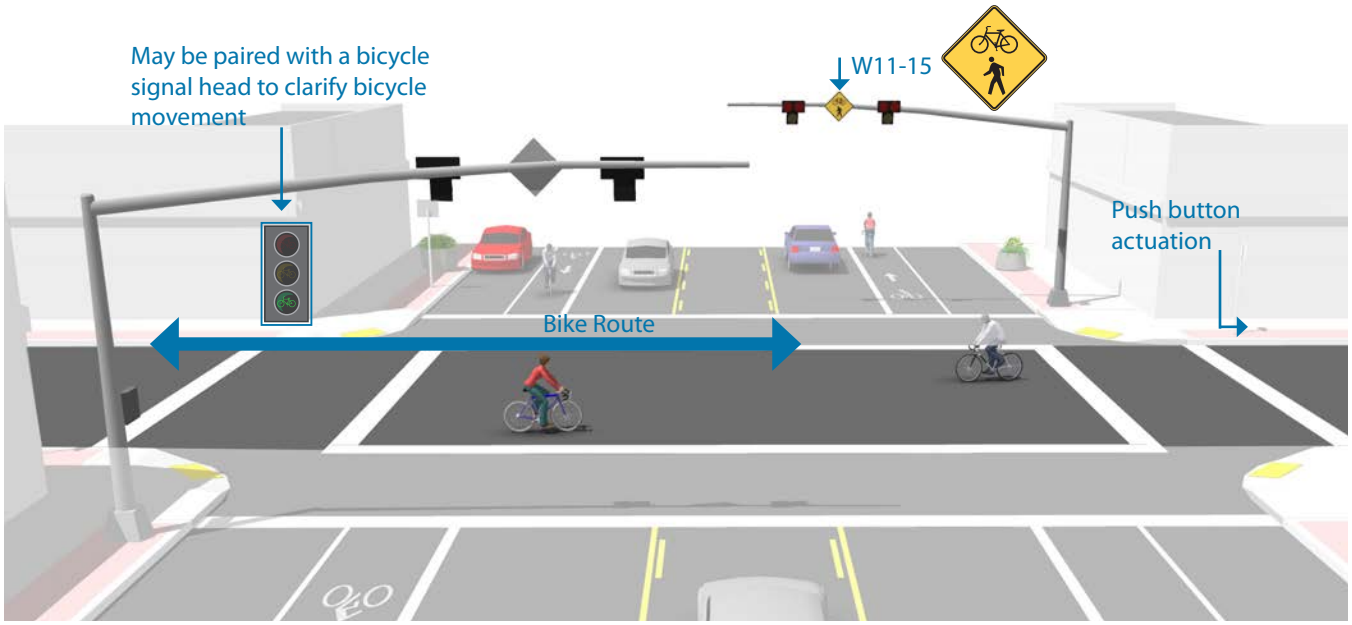
DESIGN FEATURES

It is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

- 25 mph maximum circulating design speed.
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to "take the lane."
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.

HYBRID BEACON FOR BICYCLE ROUTE CROSSING

A hybrid beacon, previously known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street. There are no signal indications for motor vehicles on the minor street approaches.



TYPICAL APPLICATION

- Hybrid beacons are used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal (or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street).
- Hybrid beacons may also be used at mid-block crossing locations.
- Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

DESIGN FEATURES

Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable user crossing.

- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

BIKEWAY AMENITIES

WAYFINDING SIGN TYPES

The ability to navigate through a city is informed by landmarks, natural features, and other visual cues. Signs throughout the city should indicate to bicyclists the direction of travel, the locations of destinations and the travel time/distance to those destinations. A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes.

TYPICAL APPLICATION

- Wayfinding signs will increase users' comfort and accessibility to the bicycle network.
- Signage can serve both wayfinding and safety purposes including:
    - Helping to familiarize users with the bicycle network
    - Helping users identify the best routes to destinations
    - Helping to address misperceptions about time and distance
    - Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

DESIGN FEATURES

- (A) Confirmation signs indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route. Can include destinations and distance/time but do not include arrows.
- (B) Turn signs indicate where a bikeway turns from one street onto another street. These can be used with pavement markings and include destinations and arrows.
- (C) Decisions signs indicate the junction of two or more bikeways and inform bicyclists of the designated bike route to access key destinations. These include destinations, arrows and distances. Travel times are optional but recommended.

Community Logos on Signs

Wayfinding signs can include a local community identification logo, as this example from Oakland, CA.

Custom Street Signs (Berkeley, CA)

Custom street signs can also act as a type of confirmation sign, to let all users know the street is prioritized for bicyclists.

FURTHER CONSIDERATIONS

- Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes.
- Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.
- A community-wide bicycle wayfinding signage plan would identify:
    - Sign locations
    - Sign type – what information should be included and design features
    - Destinations to be highlighted on each sign – key destinations for bicyclists
    - Approximate distance and travel time to each destination
- Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.
- Check wayfinding signage along bikeways for signs of vandalism, graffiti, or normal wear and replace signage along the bikeway network as-needed.

CRASH REDUCTION

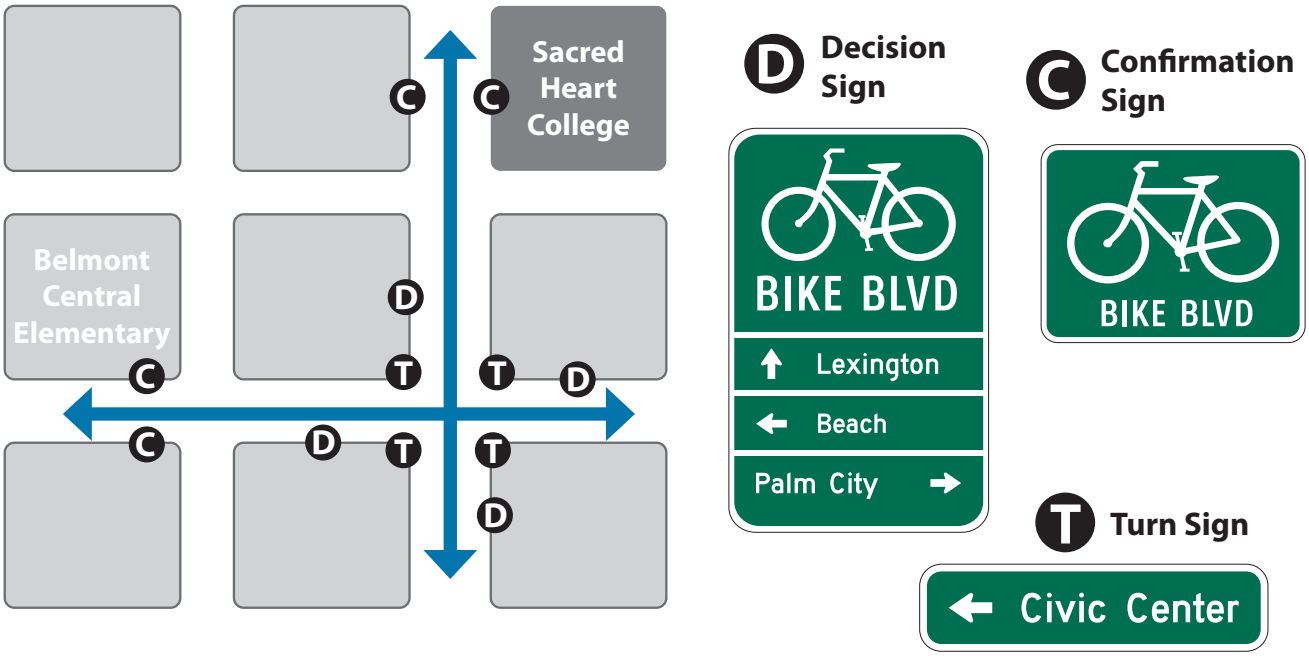
There is no evidence that wayfinding signs have any impact on crash reduction or user safety.

CONSTRUCTION COSTS

Wayfinding signs range from $150 to $500.

WAYFINDING SIGN PLACEMENT

Signs are placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.



TYPICAL APPLICATION

Confirmation Signs

- Placed every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign).
- Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs

- Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through).
- Pavement markings can also indicate the need to turn to the bicyclist.

Decision Signs

- Near-side of intersections in advance of a junction with another bicycle route.
- Along a route to indicate a nearby destination.

DESIGN FEATURES

- MUTCD guidelines should be followed for wayfinding sign placement, which includes mounting height and lateral placement from edge of path or roadway.
- Pavement markings can be used to reinforce routes and directional signage.

Wayfinding Pavement Markings

Some cities use pavement markings to indicate required turns or jogs along the bicycle route.

FURTHER CONSIDERATIONS

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

CRASH REDUCTION

There is no evidence that wayfinding signs have any impact on crash reduction or user safety.

CONSTRUCTION COSTS

The cost of a wayfinding sign placement plan depends on the scale and scope of the approach. Trail wayfinding signage range from $500-$2000.

BIKE PARKING

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of two hours or less, or long-term parking for employees, students, residents, and commuters.

TYPICAL APPLICATION

- Bicycle parking facilities shall be located in highly visible well-lighted areas. In order to maximize security, whenever possible short-term bicycle parking facilities shall be located in areas highly visible from the street and from the interior of the building they serve (i.e., placed adjacent to windows).
- Bike racks provide short-term bicycle parking and is meant to accommodate visitors, customers, and others expected to depart within two hours. It should be an approved standard rack, appropriate location and placement, and weather protection.
- On-street bike corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.

DESIGN FEATURES

- All bicycle facilities shall provide a minimum 4 ft aisle to allow for unobstructed access to the designated bicycle parking area.
- Bicycle parking facilities within auto parking facilities shall be protected from damage by cars by a physical barrier such as curbs, wheel stops, poles, bollards, or other similar features capable of preventing automobiles from entering the designated bicycle parking area.
- Bicycle parking facilities should be securely anchored so they cannot be easily removed and shall be of sufficient strength and design to resist vandalism and theft.

Bike Racks

Ⓐ 2 ft minimum from the curb face to avoid 'dooring.'

Ⓑ 4 ft between racks to provide maneuvering room.

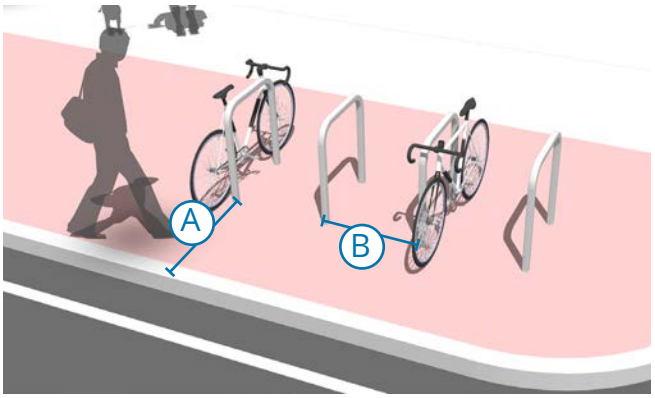
- Locate close to destinations; 50 ft maximum distance from main building entrance.
- Minimum clear distance of 6 ft should be provided between the bicycle rack and the property line.

Bike Corrals

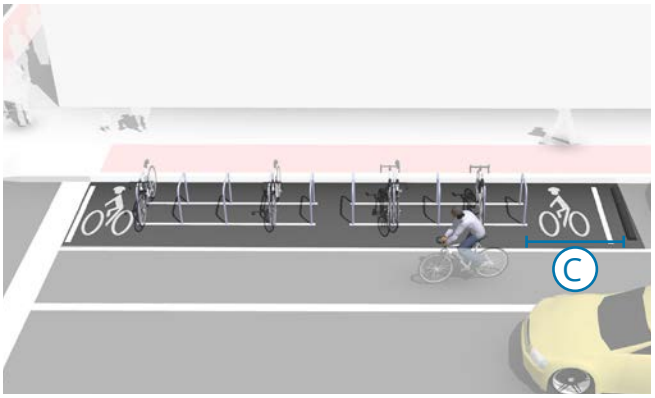
Ⓒ Bicyclists should have an entrance width from the roadway of 5-6 ft for on-street corrals.

- Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for on-street bicycle corrals since the concrete extension serves as delimitation on one side.
- Off-street bike corrals are appropriate where there is a wide sidewalk furnishing zone (7 ft or greater), or as part of a curb extension.

Perpendicular Bike Racks



Bike Corral

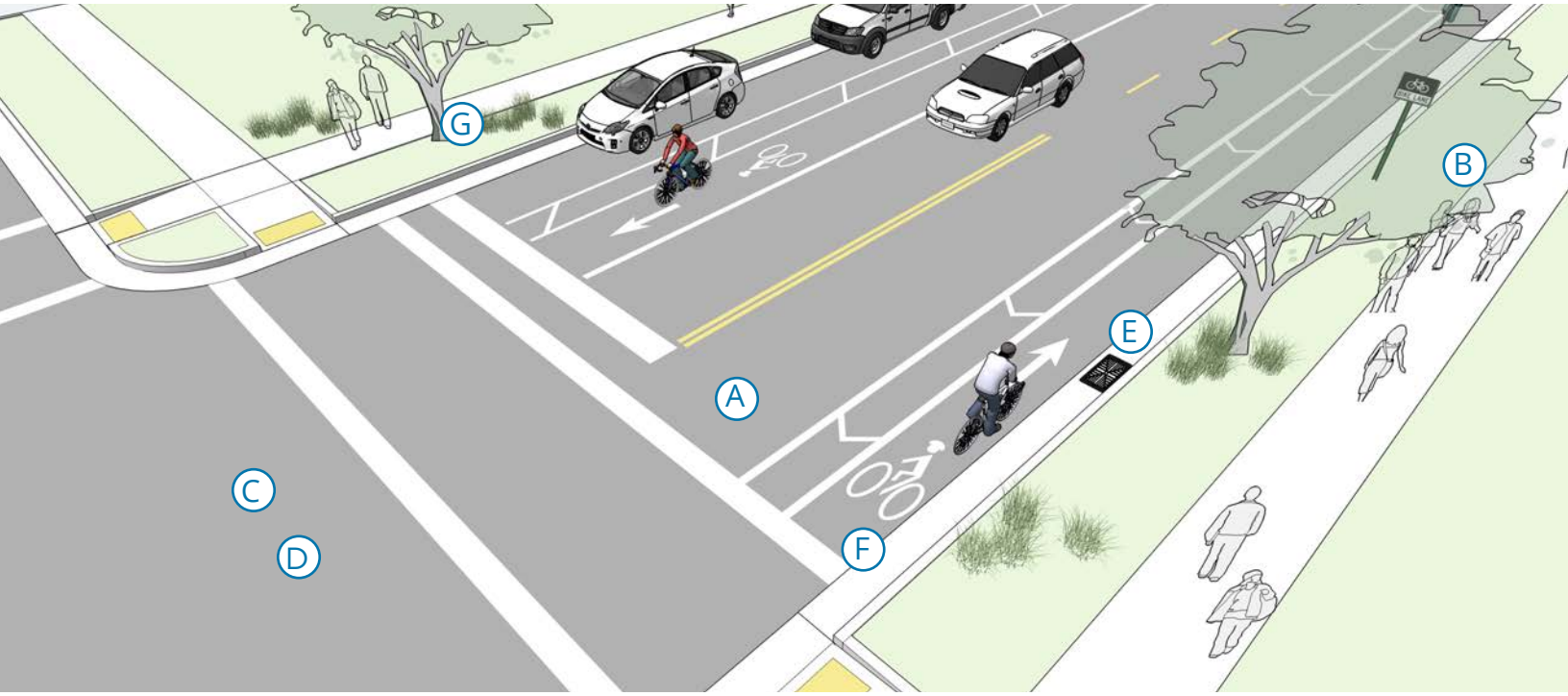


CONSTRUCTION COSTS

Costs can vary based on the design and materials used. Bicycle rack costs can range from approximately $60 to $3,600, depending on design and materials used. On average the cost is approximately $660. Bicycle lockers costs range from $1,280 to $2,680.

BIKEWAY MAINTENANCE

Regular bicycle facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flush, and installing bicycle-friendly drainage grates. Pavement overlays are a good opportunity to improve bicycle facilities. The following recommendations provide a menu of options to consider to enhance a maintenance regimen.



MAINTENANCE

(A) Sweeping

- Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes.
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility.
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders.

(B) Signage

- Check regulatory and wayfinding signage along bikeways for signs of vandalism, graffiti, or normal wear.
- Replace signage along the bikeway network as-needed.
- Perform a regularly-scheduled check on the status of signage with follow-up as necessary.
- Create a Maintenance Management Plan.

Ⓒ Roadway Surface

- Maintain a smooth pothole-free surface.
- Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼".
- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings.
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred.

Ⓓ Pavement Overlays

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge.
- If the shoulder or bike lane pavement is of good quality, it may be appropriate to end the overlay at the shoulder or bike lane stripe provided no abrupt ridge remains.
- Ensure that inlet grates, manhole and valve covers are within ¼ inch of the finished pavement surface and are made or treated with slip resistant materials.

Ⓔ Drainage Grates

- Require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires and assistive devices do not fall through the vertical slats.
- Create a program to inventory all existing drainage grates, and replace hazardous grates as necessary – temporary modifications such as installing rebar horizontally across the grate should not be an acceptable alternative to replacement.

Ⓕ Gutter to Pavement Transition

- Ensure that gutter-to-pavement transitions have no more than a ¼" vertical transition.
- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.

Ⓖ Landscaping

- Ensure that shoulder plants do not hang into or impede passage along bikeways
- After major damage incidents, remove fallen trees or other debris from bikeways as quickly as possible

Maintenance Management Plan

- Provide fire and police departments with map of system, along with access points to gates/ bollards
- Enforce speed limits and other rules of the road
- Enforce all trespassing laws for people attempting to enter adjacent private properties

Recommended Walkway and Bikeway Maintenance Activities

Maintenance Activity	Frequency
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping/ blowing	As needed, with higher frequency in the early Spring and Fall
Pavement sealing	5 - 15 years
Pothole repair	1 week – 1 month after report
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	As needed
Signage replacement	As needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

BICYCLE ACCESS TO TRANSIT

Safe and easy access to transit stations and secure bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Bicycling to transit reduces the need to provide expensive and space consuming car parking spaces.

DESIGN FEATURES

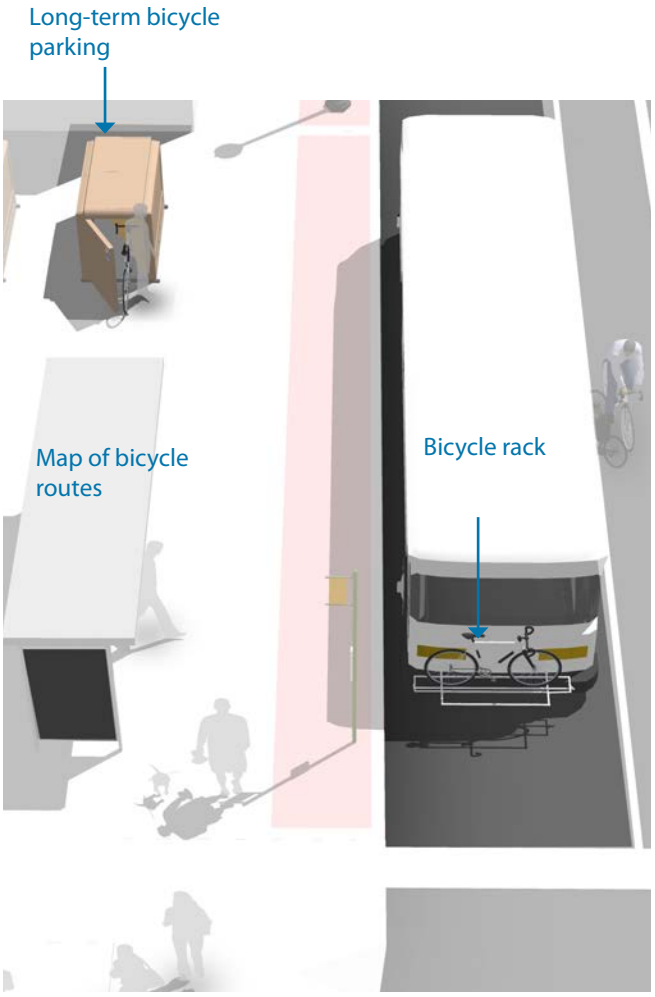
Many people who ride to a transit stop will want to bring their bicycle with them on the transit portion of their trip, so buses and other transit vehicles should be equipped accordingly.

Access

- Provide direct and convenient access to transit stations and stops from the bicycle and pedestrian networks.
- Provide maps at major stops and stations showing nearby bicycle routes.
- Provide wayfinding signage and pavement markings from the bicycle network to transit stations.
- Ensure that connecting bikeways offer proper bicycle actuation and detection.

Bicycle Parking

- The route from bicycle parking locations to station/stop platforms should be well-lit and visible.
- Signing should note the location of bicycle parking, rules for use, and instructions as needed.
- Provide safe and secure long-term parking such as bicycle lockers at transit hubs. Parking should be easy to use and well maintained.



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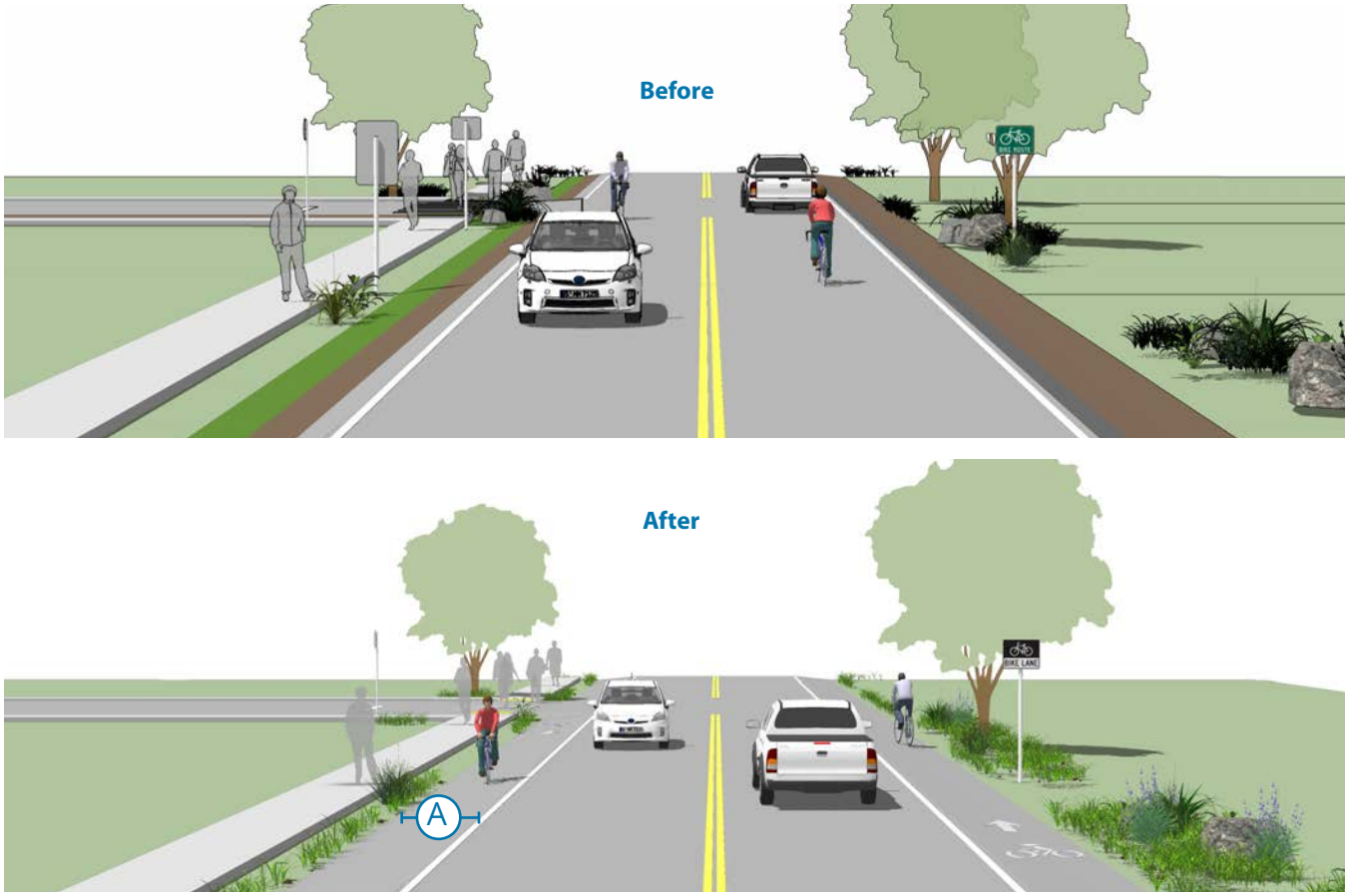
RETROFITTING STREETS

ROADWAY WIDENING

Bike lanes can be accommodated on streets with excess right-of-way through shoulder widening. Although roadway widening incurs higher expenses compared with re-striping projects, bike lanes can be added to streets currently lacking curbs, gutters and sidewalks without the high costs of major infrastructure reconstruction.



TYPICAL APPLICATION

- Roadway widening is most appropriate on roads lacking curbs, gutters and sidewalks.
- If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.

DESIGN FEATURES

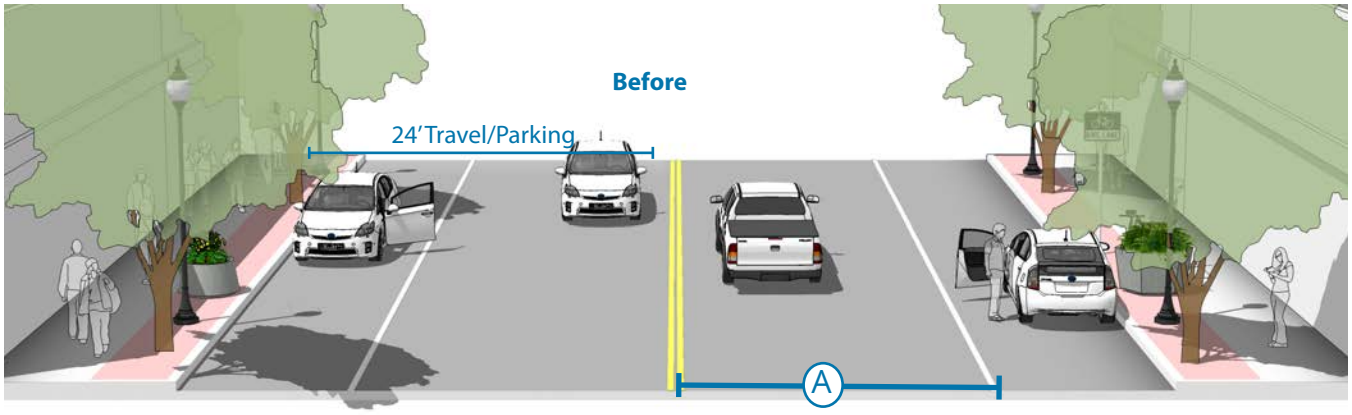
- Guidance on bicycle lanes applies to this treatment.

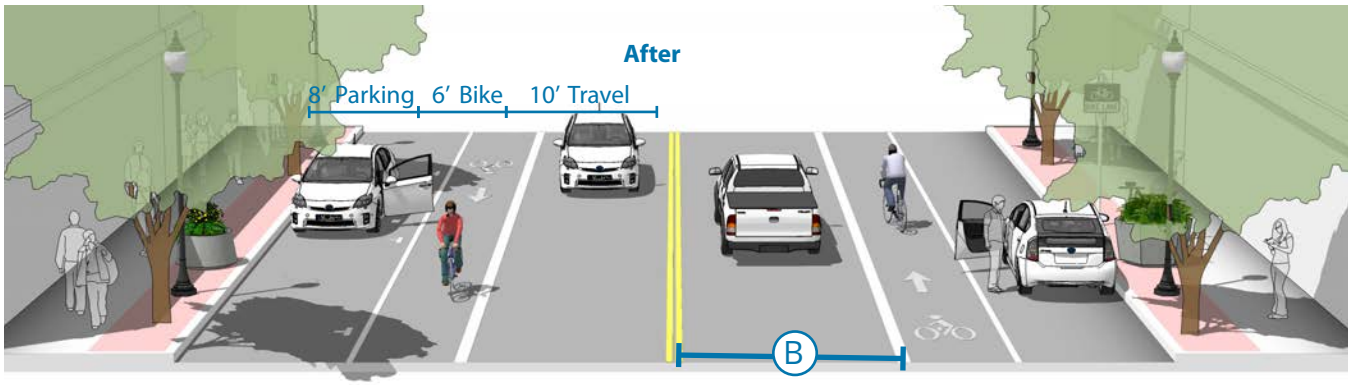
(A) 4 foot minimum width when no curb and gutter is present.

- 6 foot width preferred.

LANE NARROWING

Lane narrowing utilizes roadway space that exceeds minimum standards to provide the needed space for bike lanes. Many roadways have existing travel lanes that are wider than those prescribed in local and national roadway design standards, or which are not marked.





TYPICAL APPLICATION

- On roadways with wide lane widths. Most standards allow for the use of 11 foot and sometimes 10 foot wide travel lanes to create space for bike lanes.
- Special consideration should be given to the amount of heavy vehicle traffic and horizontal curvature before the decision is made to narrow travel lanes. Center turn lanes can also be narrowed in some situations to free up pavement space for bike lanes.

DESIGN FEATURES

Vehicle lane width:

(A) Before: 10-15 feet

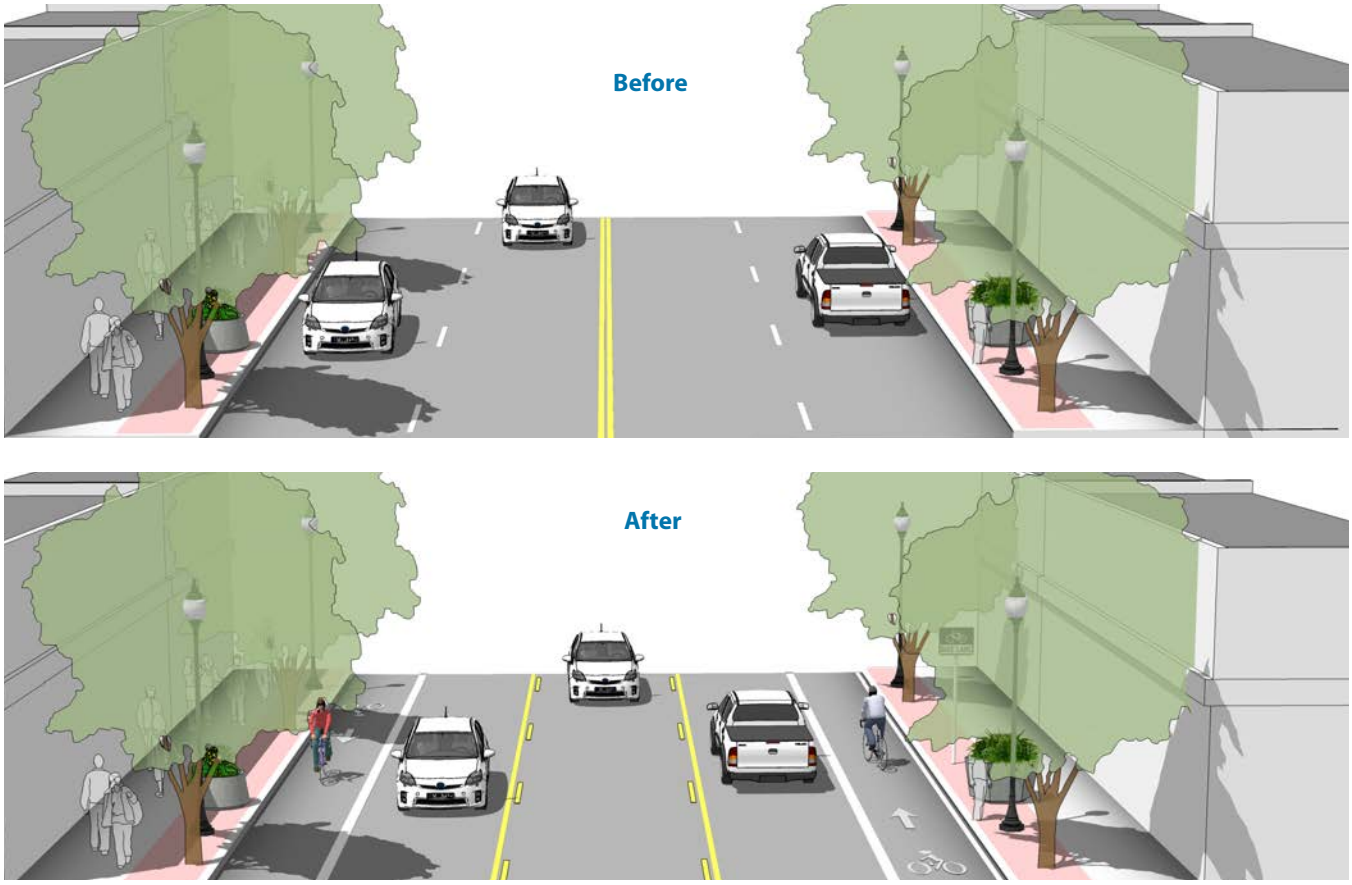
(B) After: 10-11 feet

Bicycle lane width:

- Guidance on bicycle lanes applies to this treatment.

LANE RECONFIGURATION

The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects.



TYPICAL APPLICATION

Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations may apply. For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes. Prior to implementing this measure, a traffic analysis should identify potential impacts.

DESIGN FEATURES

Vehicle lane width:

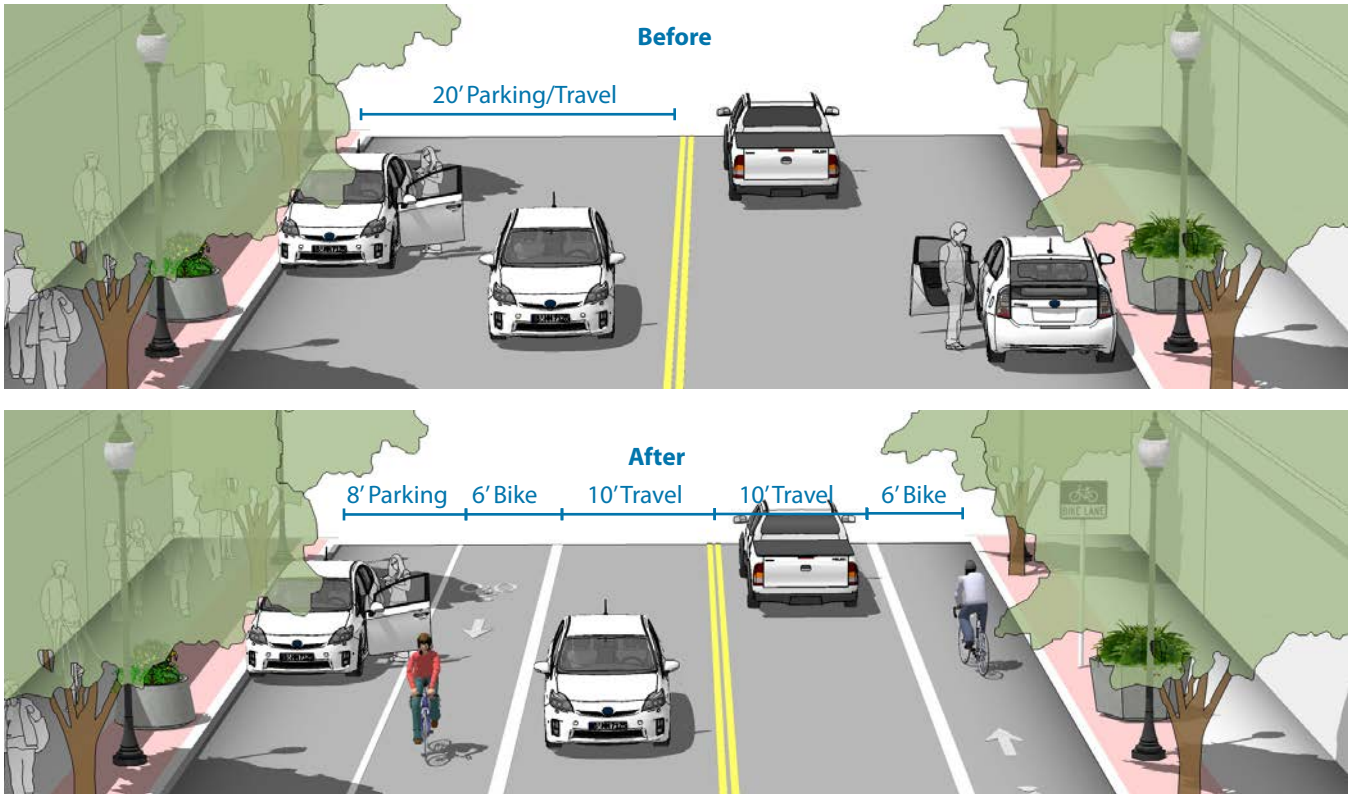
- Width depends on project. No narrowing may be needed if a lane is removed.

Bicycle lane width:

- Guidance on bicycle lanes applies to this treatment.

PARKING REDUCTION

Bike lanes can replace one or more on-street parking lanes on streets where excess parking exists and/or the importance of bike lanes outweighs parking needs. For example, parking may be needed on only one side of a street. Eliminating or reducing on-street parking also improves sight distance for bicyclists in bike lanes and for motorists on approaching side streets and driveways.



TYPICAL APPLICATION

Removing or reducing on-street parking to install bike lanes requires comprehensive outreach to the affected businesses and residents. Prior to reallocating on-street parking for other uses, a parking study should be performed to gauge demand and to evaluate impacts to people with disabilities.

DESIGN FEATURES

Vehicle lane width:

- Parking lane width depends on project. No travel lane narrowing may be required depending on the width of the parking lanes.

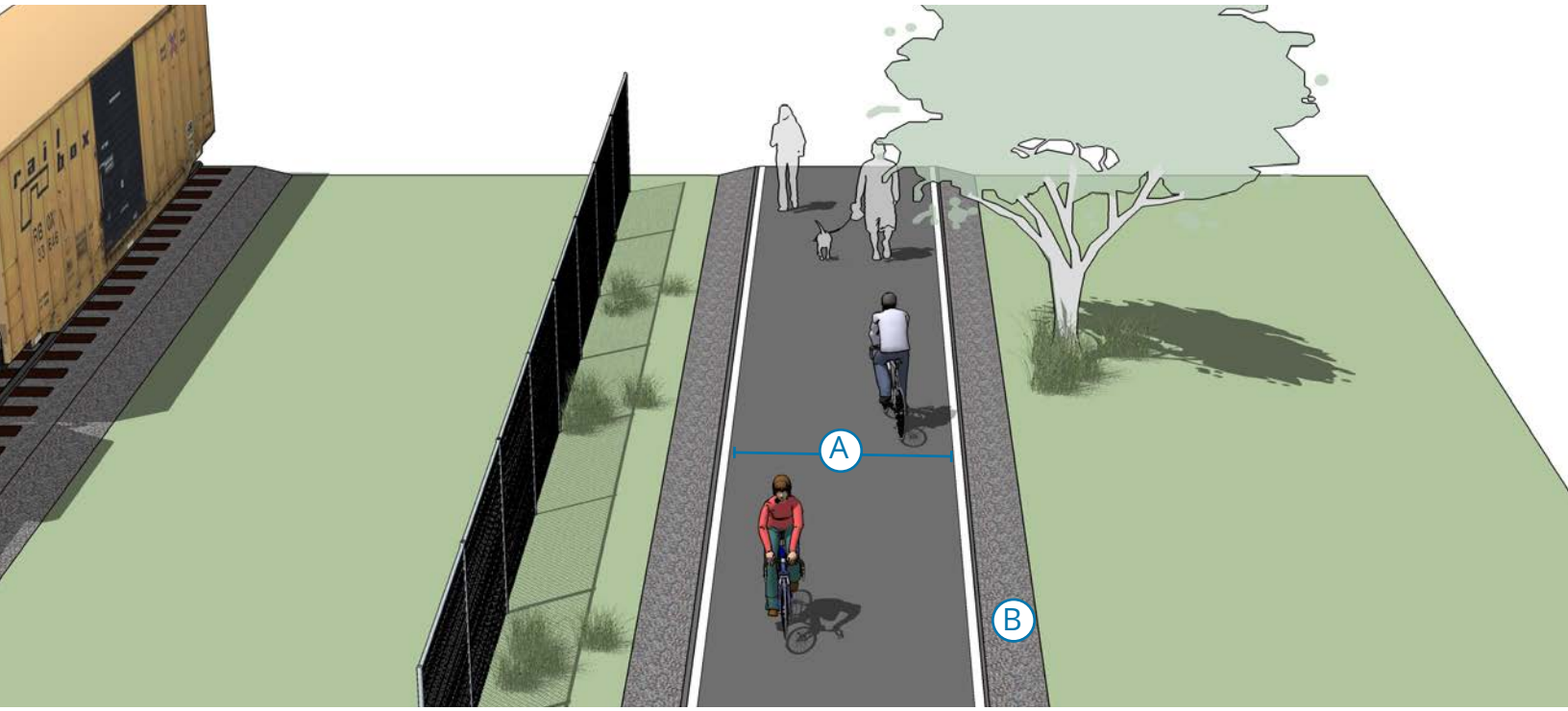
Bicycle lane width:

- Guidance on bicycle lanes applies to this treatment.

OFF-STREET FACILITIES

SHARED USE PATH

Shared use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.



TYPICAL APPLICATION

- In abandoned rail corridors (commonly referred to as Rails-to-Trails or Rail-Trails.
- In active rail corridors, trails can be built adjacent to active railroads (referred to as Rails-with-Trails.
- In utility corridors, such as powerline and sewer corridors.
- In waterway corridors, such as along canals, drainage ditches, rives and beaches.
- Along roadways.

DESIGN FEATURES

Width

Ⓐ 8 ft is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.

- 10 ft is recommended in most situations and will be adequate for moderate to heavy use.
- 12 ft is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

Ⓑ A 2 ft or greater shoulder on both sides of the path should be provided. An additional ft of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.

- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be 8 ft minimum, with 10 ft recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

FURTHER CONSIDERATIONS

The provision of a shared use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities.

To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

CRASH REDUCTION

Shared use paths reduce injury rates for cyclists, pedestrians, and other nonmotorized modes by 60 percent compared with on street facilities.[1]

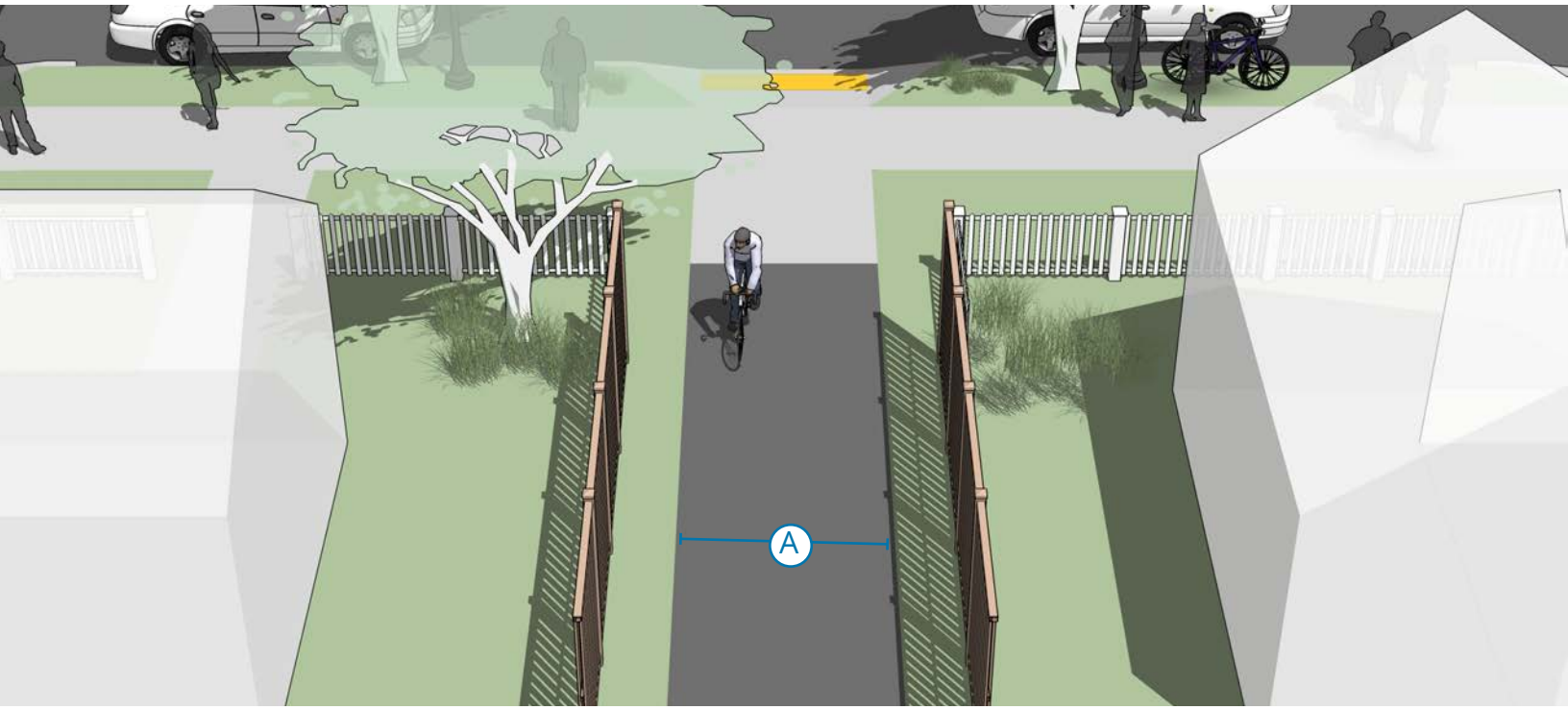
CONSTRUCTION COSTS

The cost of a shared use path can vary, but typical costs are between $65,000 per mile to $4 million per mile.

1Teschke, Kay. Route Infrastructure and the Risk of Injuries to Bicyclists. American Public Health Association. December 2012.

LOCAL NEIGHBORHOOD ACCESSWAYS

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, greenspaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements.



TYPICAL APPLICATION

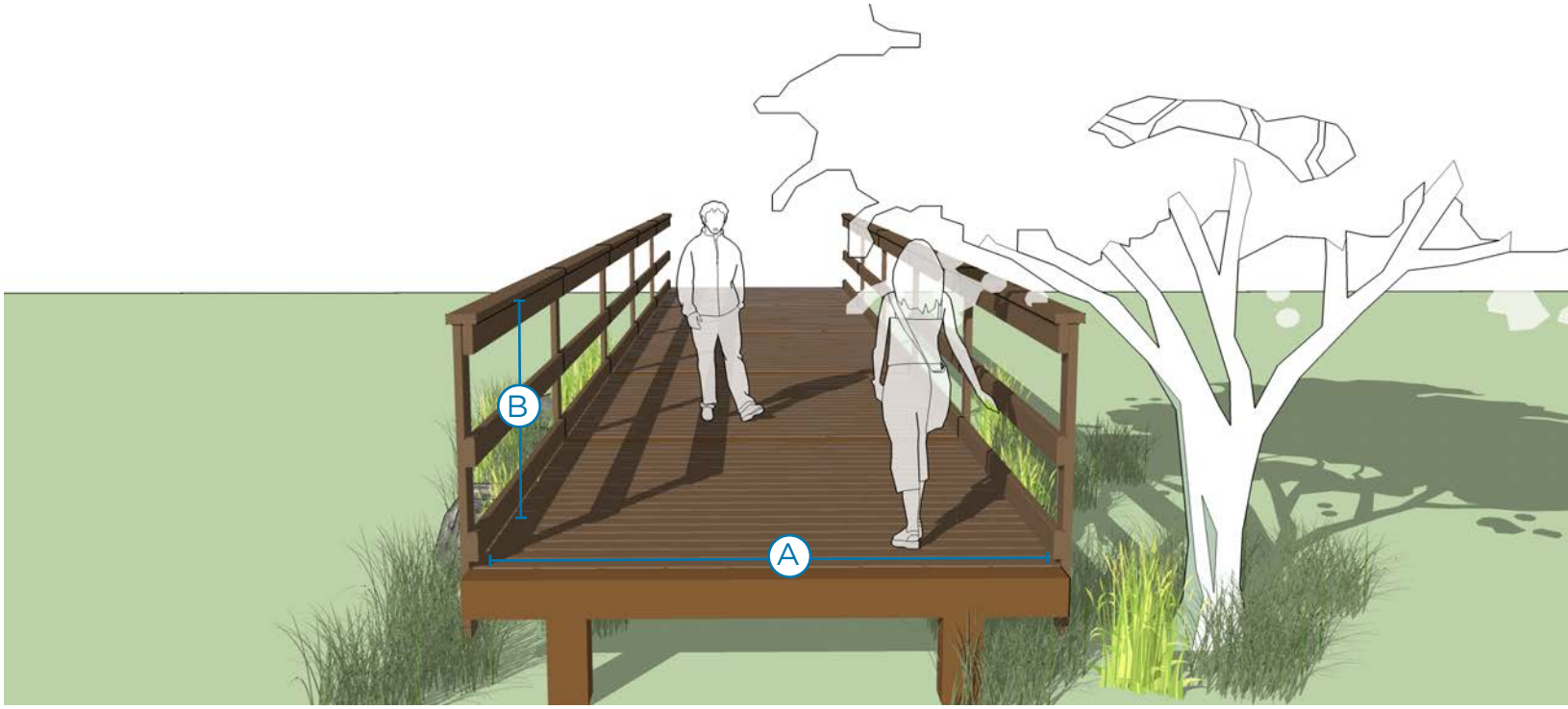
- Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations.
- For existing subdivisions, neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

DESIGN FEATURES

- Neighborhood accessways should remain open to the public.
- (A) Trail pavement shall be at least 8 ft wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 8 ft wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible.

BOARDWALKS

Boardwalks are typically required when crossing wetlands or other sensitive natural areas. A number of low-impact support systems are also available that reduce the disturbance within wetland areas to the greatest extent possible.



TYPICAL APPLICATION

- Boardwalks are usually constructed of wooden planks or recycled material planks that form the top layer of the boardwalk. The recycled material has gained popularity in recent years since it lasts much longer than wood, especially in wet conditions.
- In general, building in wetlands is subject to regulations and should be avoided.

DESIGN FEATURES

(A) A boardwalk width should be a minimum of 10 ft when no rail is used. A 12 ft width is preferred in areas with average anticipated use and whenever rails are used.

(B) When the height of a boardwalk exceeds 30", railings are required.

- If access by vehicles is desired, boardwalks should be designed to structurally support the weight of a small truck or a light-weight vehicle.

TRAIL INTERSECTION TREATMENTS

MARKED CROSSING

A marked/unsignalized crossing typically consists of a marked crossing area, signage, and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

TYPICAL APPLICATION

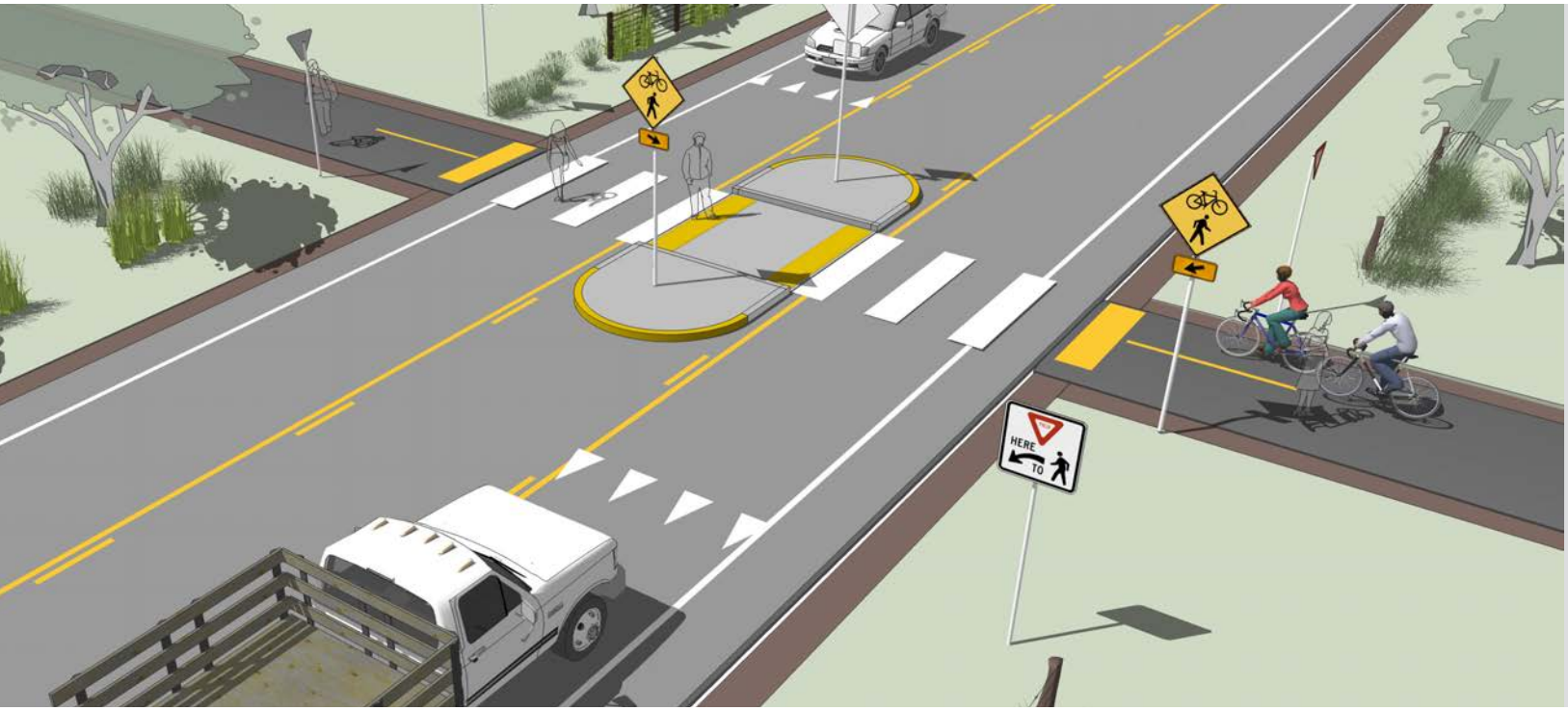
- Maximum Traffic Volumes
    - ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Maximum travel speed of 35 MPH
- Minimum Sight Lines
    - 25 MPH zone: 155 ft
    - 35 MPH zone: 250 ft
    - 45 MPH zone: 360 ft

DESIGN FEATURES

- On roadways with low to moderate traffic volumes (<12,000 ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety.

MEDIAN CROSSING

On roadways with higher volumes, higher speeds and multi-lanes of vehicular traffic, a median crossing is preferred. A median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.



TYPICAL APPLICATION

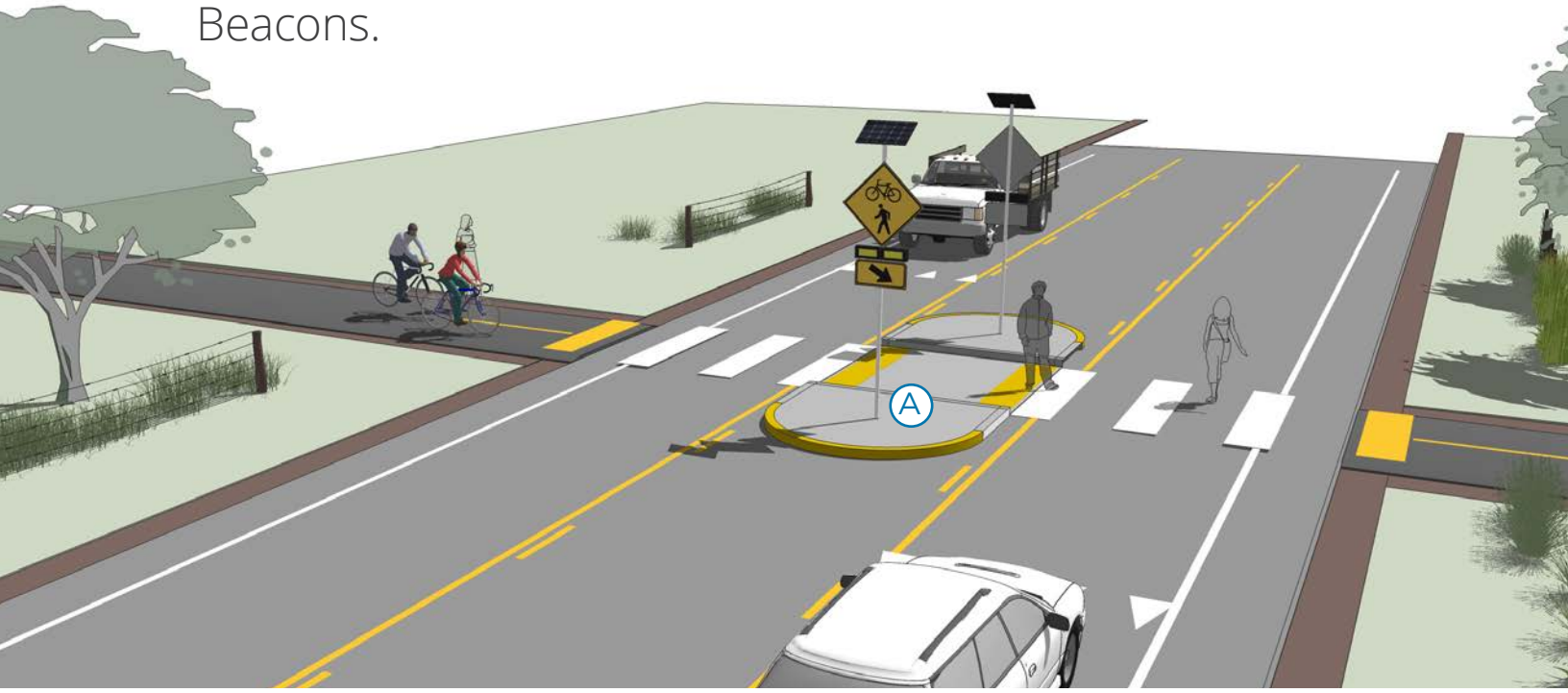
- Maximum Traffic Volumes
    - Up to 15,000 ADT on two-lane roads, preferably with a median
    - Up to 12,000 ADT on four-lane roads with median

DESIGN FEATURES

- Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons or in-pavement flashers, and excellent sight distance. For more information see the discussion of active warning beacons.

ACTIVE ENHANCED CROSSING

Active enhanced crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on multi-lane or high volume roadways. These enhancements include pathway user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB) shown below, or Pedestrian Hybrid Beacons.



TYPICAL APPLICATION

- Guidance for marked/unsignalized crossings applies.
- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Warning beacons shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.

DESIGN FEATURES

(A) RRFBs are user actuated lights that supplement warning signs at unsignalized intersections or mid-block crossings.

- Pedestrian hybrid beacons provide a high level of comfort for crossing users through the use of a red-signal indication to stop conflicting motor vehicle traffic. Hybrid beacon installation faces only cross motor vehicle traffic, stays dark when inactive, and uses a unique 'wig-wag' signal phase to indicate activation. Vehicles have the option to proceed after stopping during the final flashing red phase, which can reduce motor vehicle delay when compared to a full signal installation.

ROUTE USERS TO SIGNALIZED CROSSING

Path crossings within approximately 400 ft of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal.

TYPICAL APPLICATION

- For this restriction to be effective, barriers and signing may be needed to direct path users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.
- Path crossings should not be provided within approximately 400 ft of an existing signalized intersection. If possible, route path directly to the signal.

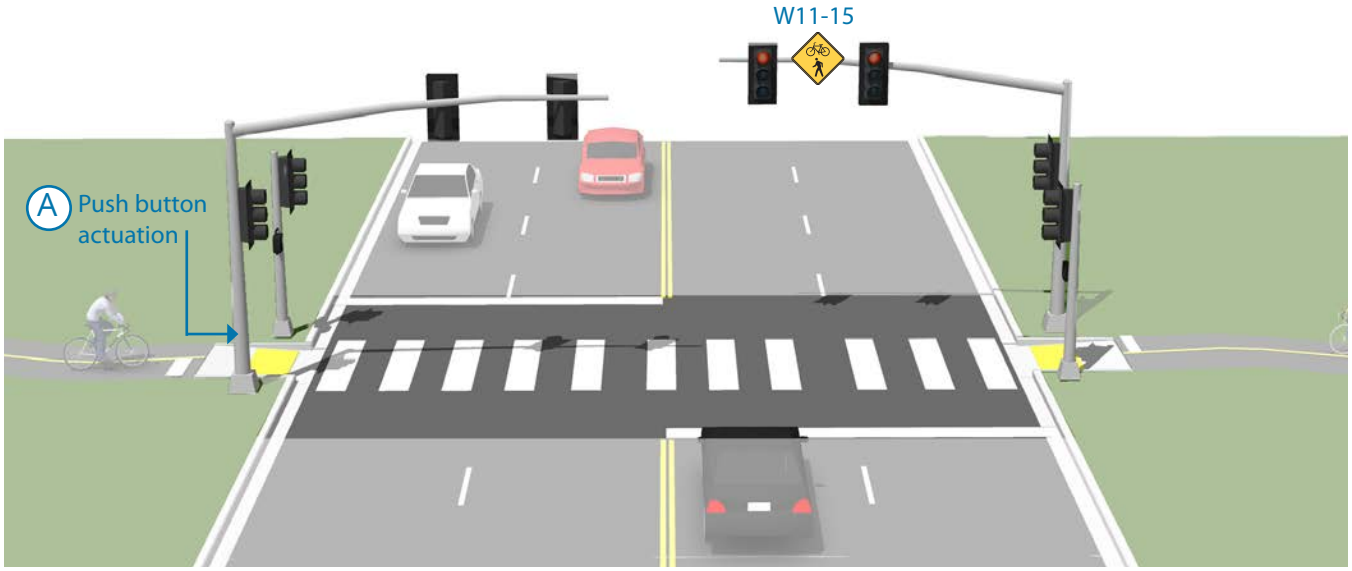
DESIGN FEATURES

- In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 ft.
- Engineering judgment and the context of the location should be taken into account when choosing the appropriate allowable setback. Pedestrians are particularly sensitive to out of direction travel and undesired mid-block crossing may become prevalent if the distance is too great.

FULL TRAFFIC SIGNAL CROSSINGS

Signalized crossings provide the most protection for crossing path users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

A full traffic signal installation treats the path crossing as a conventional 4-way intersection and provides standard red-yellow-green traffic signal heads for all legs of the intersection.



TYPICAL APPLICATION

Full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Additional guidance for signalized crossings:

- Located more than 300 feet from an existing signalized intersection
- Roadway travel speeds of 40 MPH and above
- Roadway ADT exceeds 15,000 vehicles

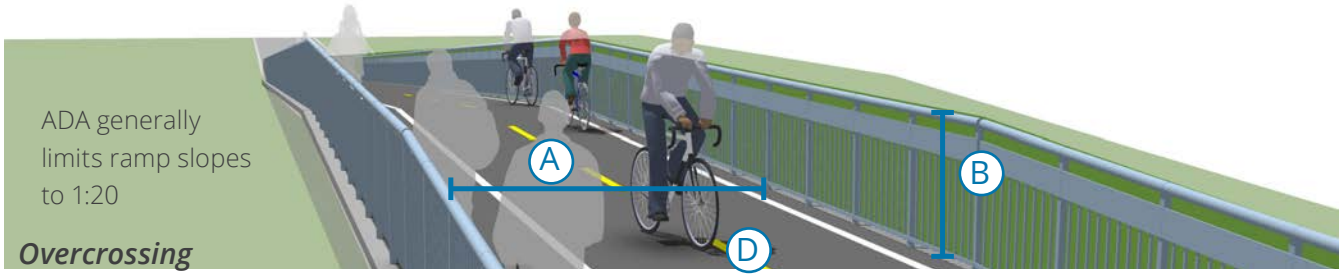
DESIGN FEATURES

(A) Shared use path signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

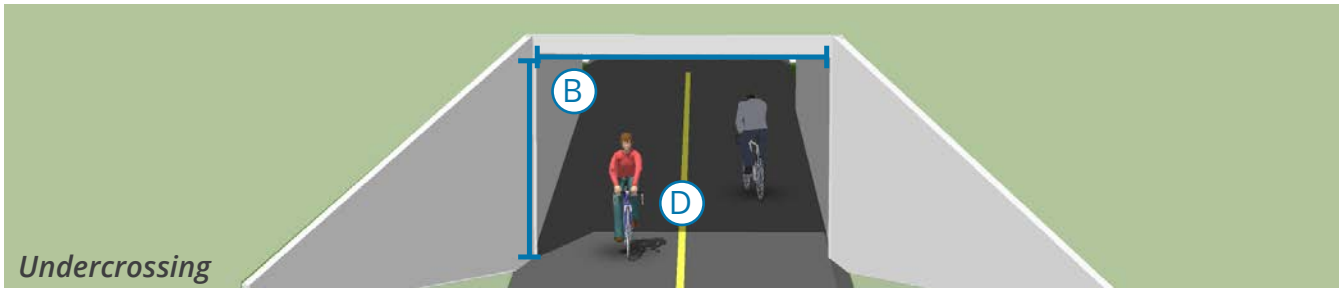
- Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

GRADE-SEPARATED CROSSINGS

Grade-separated crossings provide critical non-motorized system links by joining areas separated by barriers such as railroads, waterways, and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. There are no minimum roadway characteristics for considering grade separation.



Overcrossing



Undercrossing

TYPICAL APPLICATION

- Where shared-use paths cross high-speed and high-volume roadways where an at-grade signalized crossing is not feasible or desired, or where crossing railways or waterways.
- Depending on the type of facility or the desired user group, grade separation may be considered in many types of projects.

DESIGN FEATURES

(A) Overcrossings should be at least 8 ft wide with 14 ft preferred and additional width provided at scenic viewpoints.

(B) Railing height must be a minimum of 42 inches for overcrossings.

(C) Undercrossings should be designed at minimum 10 ft height and 14 ft width, with greater widths preferred for lengths over 60 ft.

- Centerline stripe is recommended for grade-separated facility.

B Funding Resources

"I do not live in the Cape Fear area today but plan to retire there. It would be a wonderful benefit if there was a planned bicylcle trail system that could take you to the scenic areas in the Cape Fear region." - Public Comment, 2016

This regional plan focuses on connecting regional nodes, such as downtown Burgaw, NC (bicycle parked next at a store in downtown Burgaw shown above).

OVERVIEW

Multiple approaches should be taken to support bicycle facility development and programming. It is important to secure the funding necessary to undertake priority projects but also to develop a long-term funding strategy to allow continued development of the overall system. Dedicated local funding sources will be important for the implementation of this plan.

Local government funds for bicycle facilities should be set aside every year, even if only for a small amount. Small amounts of local funding can be matched to outside funding sources. A variety of local, state, and federal options and sources exist and should be pursued.

The following section identifies federal, state, local and private/non-profit foundation sources of funding for planning, design, implementation and maintenance of bicycle infrastructure. The descriptions are intended to provide an overview of available options and do not represent a comprehensive list. It should be noted that this section reflects the funding available at the time of writing. The funding amounts, fund cycles, and even the programs themselves are susceptible to change without notice.

Trail oriented development at a recent development near the intersection of Eastwood Rd and Wrightsville Ave

FEDERAL FUNDING SOURCES

Federal funding is typically directed through state agencies to local governments either in the form of grants or direct appropriations. Federal funding typically requires a local match of five percent to 50 percent, but there are sometimes exceptions. The following is a list of possible Federal funding sources that could be used to support the construction of bicycle facilities.

FIXING AMERICA'S SURFACE TRANSPORTATION (FAST ACT)

In December 2015, President Obama signed the FAST Act into law, which replaces the previous Moving Ahead for Progress in the Twenty-First Century (MAP-21). The Act provides a long-term funding source of $305 billion for surface transportation and planning for FY 2016-2020. Overall, the FAST Act retains eligibility for larger programs - Transportation Investments Generating Economic Recovery (TIGER), Surface Transportation Program (STP), Congestion Mitigation and Air Quality (CMAQ), and Highway Safety Improvement Program (HSIP). The FAST Act maintains the federal government's focus on safety, preserves the established structure of various highway-related programs, streamlines project delivery, and provides a dedicated funding source for freight projects.

In North Carolina, federal monies are administered through the North Carolina Department of Transportation (NCDOT) and Metropolitan Planning Organizations (MPOs). Most, but not all, of these programs are focused on transportation rather than recreation, with an emphasis on reducing auto trips and providing intermodal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system. Most FAST ACT funds are available through the STI process.

For more information: **http://www.fhwa.dot.gov/fastact/summary.cfm**

Transportation Alternatives (TA)

Transportation Alternatives (TA) is a funding source under the FAST Act that consolidates three formerly separate programs under SAFETEA-LU: Transportation Enhancements (TE), Safe Routes to School (SRTS), and the Recreational Trails Program (RTP). Funds are available through a competitive process. These funds may be used for a variety of pedestrian, bicycle, and streetscape projects. These include:

- SRTS programs - infrastructure and non-infrastructure programs
- Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation, including sidewalks, bikeways, pedestrian and bicycle signals, traffic calming techniques, and lighting and other safety-related infrastructure
- Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, seniors, and individuals with disabilities
- Construction of rail-trails
- Recreational trails program

Eligible entities for TA funding include local governments, regional transportation authorities, transit agencies, natural resource or public land agencies, school districts or schools, tribal governments, and any other local or regional government entity with responsibility for oversight of transportation

or recreational trails that the State determines to be eligible.

The FAST Act provides $84 million for the Recreational Trails Program. Funding is prorated among the 50 states and Washington D.C. in proportion to the relative amount of off-highway recreational fuel tax that its residents paid. To administer the funding, states hold a statewide competitive process. The legislation stipulates that funds must conform to the distribution formula of 30% for motorized projects, 30% for non-motorized projects, and 40% for mixed used projects. Each state governor is given the opportunity to "opt out" of the RTP.

For more information: **https://www.fhwa.dot.gov/fastact/factsheets/transportationalternativesfs.cfm**

Surface Transportation Block Grant (STBG) Program

The FAST Act converts the Surface Transportation Program into the Surface Transportation Block Grant (STBG) program. This program is among the most flexible eligibilities among all Federal-aid and highway programs. Funding for the STBG Program will increase from $819 million per year to $835 million in 2016 and 2017 and to $850 million in 2018 through 2020.

The Surface Transportation Program (STP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of pedestrian improvements are eligible, including trails, sidewalks, crosswalks, pedestrian signals, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Safe Routes to School programs, congestion pricing projects and strategies, and recreational trails projects are other eligible activities. Under the FAST Act, a State may use STBG funds to create and operate a State office to help design, implement, and oversee public-private partnerships eligible to receive Federal highway or transit funding. In general, projects cannot be located on local roads or rural minor collectors. However, there are exceptions. These exceptions include recreational trails, pedestrian and bicycle projects, and Safe Routes to School programs.

For more information: **https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm**

Highway Safety Improvement Program (HSIP)

HSIP provides $2.2 - $2.4 billion nationally (FY 2016-2020) for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, including non-state-owned public roads and roads on tribal lands. The HSIP requirements prior to the enactment of the FAST Act are still applicable, including the need for a comprehensive, data-driven State Highway Safety Plan (SHSP) that defines the State's safety goals and describes strategies to improve safety.

HSIP funds must be used for safety projects that are consistent with the State's SHSP and that correct or improve a hazardous road location or features to address a highway safety problem. Most eligible activities are infrastructure-related. Bicycle and pedestrian safety improvements, traffic calming projects, and crossing treatments for non-motorized users in school zones are eligible for these funds. Examples include pedestrian hybrid beacons, medians, and pedestrian crossing

islands. Workforce development, training, and education activities are other eligible uses of HSIP funds.

For more information: **http://www.fhwa.dot.gov/fastact/factsheets/hsipfs.cfm**

Safe Routes to School (SRTS) Program

SRTS enables and encourages children in grades K-8 to walk and bike to school. The program helps make walking and bicycling to school a safe and more appealing method of transportation for children. SRTS facilitates 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. Funding is administered by State Departments of Transportation (DOTs). Eligible recipients are state, local, and regional agencies as well as nonprofit organizations. Project sponsors may be school or community based groups. Around 10-30% of each state's funding is to be spent on non-infrastructure activities, such as encouragement programs, additional law enforcement activities, and educational curricula.

Infrastructure-related projects improve the ability of students to walk or bike to and from school. Types of projects include sidewalk improvements, traffic calming and speed reduction improvements, pedestrian and bike crossing improvements, bicycle facilities, pedestrian facilities, and secure bike parking.

For more information: **http://www.fhwa.dot.gov/environment/safe_routes_to_school/guidance/#toc123542170**

OTHER FEDERAL FUNDING SOURCES

TIGER Discretionary Grants

The U.S. Department of Transportation's (DOT) Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants are intended to support multimodal projects, surface transportation projects, rail, transit, and port projects. Applicants must describe how their proposed project would achieve TIGER's five long-term outcomes - safety, economic competitiveness, state of good repair, quality of life, and environmental sustainability.

Eligible applicants for TIGER Discretionary Grants are State, local and tribal governments. This includes U.S. territories, transit agencies, port authorities, and metropolitan planning organizations (MPOs). Eligible projects are capital projects that include highway or bridge projects (including bicycle and pedestrian related projects), certain public transportation projects, passenger and freight rail transportation projects, and intermodal projects.

For more information: **https://www.transportation.gov/policy-initiatives/tiger/2016-tiger-applications-faqs**

Federal Transit Administration Enhanced Mobility of Seniors and Individuals with Disabilities

This program aims to improve mobility for seniors and individuals with disabilities by removing barriers to transportation service and expanding transportation mobility options. This program can be used for capital expenses that support transportation and non-emergency medical transportation to meet the special needs of older adults

and persons with disabilities, including providing access to an eligible public transportation facility when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs. States and designated recipients are direct recipients. Eligible sub-recipients include nonprofit organizations, states or local governments, or operators of public transportation. Types of eligible projects include transit-related information technology systems, building an accessible path to a bus stop (curb cuts, sidewalks, accessible pedestrian signals), and improving signage.

For more information: **https://www.transit.dot.gov/funding/grants/enhanced-mobility-seniors-individuals-disabilities-section-5310**

Economic Development Administration

Under Economic Development Administration's (EDA) Public Works and Economic Adjustment Assistance programs, grant applications are accepted for projects that promote economic development. State and local entities may apply for funding for projects that address a wide range of economic challenges. Under this program, Implementation Grants support infrastructure improvements, including site acquisition, site preparation, construction, and rehabilitation of facilities. Selection criteria emphasize projects that are able to start quickly, create jobs faster, and that will enable the community or region to become more economically prosperous. Application deadlines are typically in March and June.

For more information: **https://www.eda.gov/funding-opportunities/index.htm**

Federal Lands Transportation Program (FLTP)

The FLTP funds projects that improve transportation infrastructure owned and maintained by the following Federal Lands Management Agencies: National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), USDA Forest Service, Bureau of Land Management (BLM), U.S. Army Corps of Engineers, Bureau of Reclamation, and independent Federal agencies with land and natural resource management responsibilities. FLTP funds are for available for program administration, transportation planning, research, engineering, rehabilitation, construction, and restoration of Federal Lands Transportation Facilities. Transportation projects that are on the public network that provide access to, adjacent to, or through Federal lands are also eligible for funding. Under the FAST Act, $335 - $375 million has been allocated to the program per fiscal year from 2016 - 2020.

For more information: **https://flh.fhwa.dot.gov/programs/fltp/documents/FAST%20FLTP%20fact%20sheet.pdf**

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities (PSC) is a joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). The partnership aims to "improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide."

PSC is based on six livability principles, one of which explicitly addresses the need for alternative

transportation options. ("Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health"). PSC is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including both TIGER I and TIGER II grants). North Carolina jurisdictions should track PSC communications and be prepared to respond proactively to announcements of new grant programs. Initiatives that speak to multiple livability goals are more likely to score well than initiatives that are narrow in scope. PSC livability principles include: provide more transportation choices, promote equitable, affordable housing, enhance economic competitiveness, support existing communities, coordinate and leverage federal policies and investment, and value communities and neighborhoods.

For more information:

http://www.sustainablecommunities.gov/

https://www.epa.gov/smartgrowth/hud-dot-epa-partnership-sustainable-communities

Resource for Rural Communities: **http://www.sustainablecommunities.gov/sites/sustainablecommunities.gov/files/docs/federal_resources_rural.pdf**

Federal Land and Water Conservation Fund

The Land and Water Conservation Fund (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. Funds can be used for right-of-way acquisition and construction. The program is administered by the Department of Environment and Natural Resources as a grant program for states and local governments. Maximum annual grant awards for county governments, incorporated municipalities, public authorities, and federally recognized Indian tribes are $250,000. The local match may be provided with in-kind services or cash.

For more information: **https://www.nps.gov/subjects/lwcf/stateside.htm**

Rivers, Trails, and Conservation Assistance Program

The Rivers, Trails, and Conservation Assistance Program (RTCA) is a National Parks Service (NPS) program that provides technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program only provides planning assistance; there are no implementation funds available. Projects are prioritized for assistance based on criteria, including conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation, and focusing on lasting accomplishments. Project applicants may be state and local agencies, tribes, nonprofit organizations, or citizen groups. National parks and other federal agencies may apply in partnership with other local organizations. This program may benefit trail development in North Carolina indirectly through technical assistance, particularly for community organizations, but is not a capital funding source.

Annual application deadline is August 1st.

For more information: **https://www.nps.gov/orgs/rtca/index.htm** or contact the Southeast Region RTCA Program Manager Deirdre Hewitt at (404) 507- 5691 or deirdre_hewitt@nps.gov

For more information: **https://flh.fhwa.dot.gov/programs/fltp/documents/FAST%20FLTP%20fact%20sheet.pdf**

Environmental Contamination Cleanup Funding Sources

EPA's Brownfields Program provides direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training. EPA's Brownfields Program collaborates with other EPA programs, other federal partners, and state agencies to identify and leverage more resources for brownfields activities. The EPA provides assessment grants to recipients to characterize, assess, and conduct community involvement related to brownfields sites. They also provide Area-wide planning grants (AWP) which provides communities with funds to research, plan, and develop implementation strategies for areas affected by one or more brownfields.

For more information: **https://www.epa.gov/brownfields/types-brownfields-grant-funding**

National Fish and Wildlife Foundation: Five Star & Urban Waters Restoration Grant Program

The Five Star & Urban Waters Restoration Grant Program seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships for wetland, riparian, forest and coastal habitat restoration, urban wildlife conservation, stormwater management as well as outreach, education and stewardship. Projects should focus on water quality, watersheds and the habitats they support. The program focuses on five priorities: on-the-ground restoration, community partnerships, environmental outreach, education, and training, measurable results, and sustainability. Eligible applicants include nonprofit organizations, state government agencies, local governments, municipal governments, tribes, and educational institutions. Projects are required to meet or exceed a 1:1 match to be competitive.

For more information: **http://www.nfwf.org/fivestar/Pages/home.aspx**

STATE FUNDING SOURCES

There are multiple sources for state funding of bicycle and pedestrian transportation projects. However, beginning July 1, 2015, state transportation funds cannot be used to match federally funded transportation projects, according to a law passed by the North Carolina Legislature.

North Carolina Department of Transportation (NCDOT) Strategic Transportation Investments (STI)

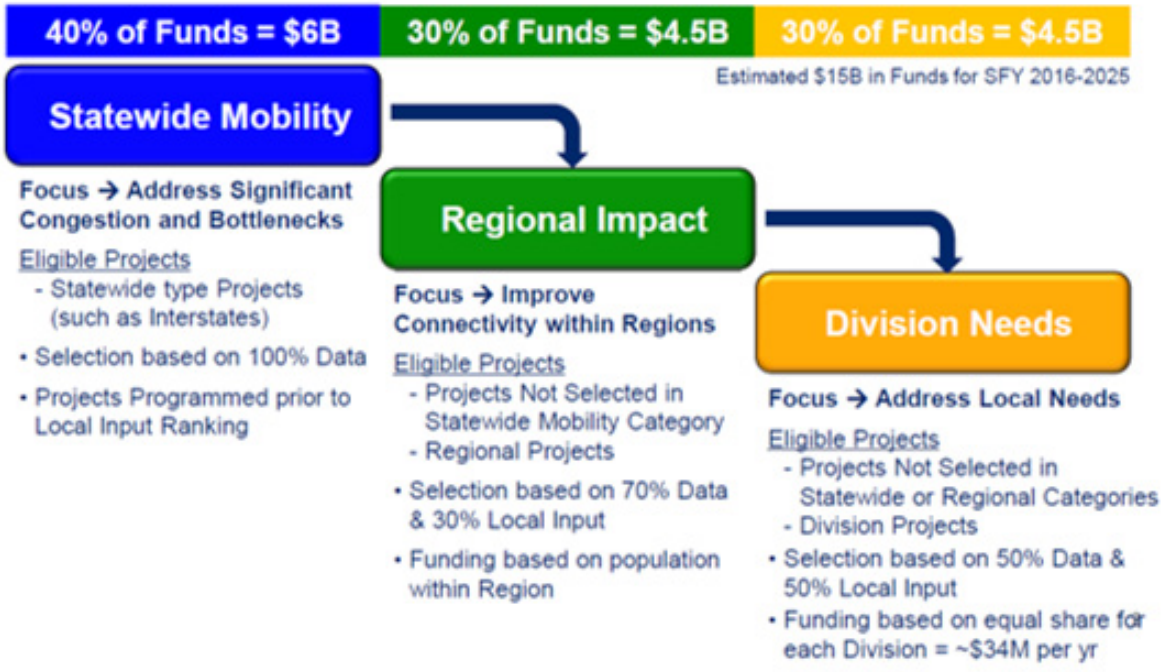
The NCDOT's State Transportation Improvement Program is based on the Strategic Transportation Investments Bill, signed into law in 2013. The Strategic Transportation Investments (STI) Initiative introduces the Strategic Mobility Formula, a new way to fund and prioritize transportation projects.

The new Strategic Transportation Investments Initiative is scheduled to be fully implemented by July 1, 2015. Projects slated for construction after that time will be ranked and programed according to the new formula. The new Strategic mobility formula assigns projects for all modes into one of three categories: 1) Statewide Mobility, 2) Regional Impact, and 3) Division Needs.

All independent bicycle and pedestrian projects are placed in the "Division Needs" category, and are currently ranked based on 50% data (safety, access, demand, connectivity, and cost effectiveness) and 50% local input, with a breakdown as follows:

Safety 15%

- Definition: Projects or improvements where bicycle or pedestrian accommodations are non-existent or inadequate for safety of users
- How it's measured: Crash history, posted speed limits, and estimated safety benefit
- Calculation:
  - Bicycle/pedestrian crashes along the corridor within last five years: 40% weight
  - Posted speed limits, with higher points for higher limits: 40% weight



- Project safety benefit, measured by each specific improvement: 20% weight

Access 10%

- Definition: Destinations that draw or generate high volumes of bikes/pedestrians
- How it's measured: Type of and distance to destination

Demand 10%

- Definition: Projects serving large resident or employee user groups
- How its measured: # of households and employees per square mile within 1 ½ mile bicycle or ½ mile pedestrian facility + factor for unoccupied housing units (second homes)

Connectivity 10%

- Definition: Measure impact of project on reliability and quality of network
- How it's measured: Creates score per each SIT based on degree of bike/ped separation from roadway and connectivity to similar or better project type

Cost Effectiveness 5%

- Definition: Ratio of calculated user benefit divided by NCDOT project cost
- How it's measured: Safety + Demand + Access + Connectivity)/Estimated Project Cost to NCDOT

Local Input 50%

- Definition: Input from MPO/RPOs and NCDOT Divisions, which comes in the form points assigned to projects.
- How it is measured: Base points + points for population size. A given project is more likely to get funded if it is assigned base points from both the MPO/RPO and the Division, making the need for communicating the importance of projects to these groups critical. Further, projects that have a local match will score higher.

Additional bicycle and pedestrian project requirements:

- Federal funding typically requires a 20% non-federal match
- State law prohibits state match for bicycle and pedestrian projects (except for Powell Bill)
- Limited number of project submittals per MPO/RPO/Division
- Minimum project cost requirement is $100,000
- Bike/Ped projects typically include: bicycle lanes, multi-use path/greenway, paved shoulders, sidewalks, pedestrian signals, SRTS infrastructure projects, and other streetscape/multi-site improvements (such as median refuge, signage, etc.)

These rankings largely determine which projects will be included in NCDOT's State Transportation Improvement Program (STIP). The STIP is a federally mandated transportation planning document that details transportation planning improvements prioritized by the stakeholders for inclusion in NCDOT's Work Program over the next 10 years. "More than 900 non-highway construction projects were prioritized for years 2015-2020, totaling an estimated $9 billion. NCDOT will only have an estimated $1.5 billion to spend during this time period." The STIP is updated every 2 years. The STIP contains funding information for various transportation divisions of NCDOT, including, highways, rail, bicycle and pedestrian, public transportation and aviation. A project does not have to be fully funded to be in the STIP.

For more information on STIP: **www.ncdot.gov/strategictransportationinvestments/**

To access the STIP: **https://connect.ncdot.gov/projects/planning/Pages/State-Transportation-Improvement-Program.aspx**

For more about the STI process: **http://www.ncdot.gov/download/performance/performance_TheProcess.pdf**

Incidental Projects

Bicycle and Pedestrian accommodations such as; bike lanes, wide paved shoulders, sidewalks, intersection improvements, bicycle and pedestrian safe bridge design, etc. are frequently included as "incidental" features of larger highway/roadway projects. This is increasingly common with the adoption of NCDOT's "Complete Streets" Policy.

In addition, bicycle safe drainage grates and handicapped accessible sidewalk ramps are now a standard feature of all NCDOT highway construction. Most pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of federal and state roadway construction funds, and usually with a local match. On-road bicycle accommodations, if warranted, typically do not require a local match.

"Incidental Projects" are often constructed as part of a larger transportation project, when they are justified by local plans that show these improvements as part of a larger, multi-modal transportation system. Having a local bicycle or pedestrian plan is important, because it allows NCDOT to identify where bike and pedestrian improvements are needed, and can be included as part of highway or street improvement project. It also helps local government identify what their priorities are and how they might be able to pay for these projects. Under "Complete Streets" local governments may be responsible for a portion of the costs for bicycle and pedestrian projects. The cost share breakdown is based on population size as follows:

- >100,000 = 50% local match
- 50,000 - 100,000 = 40% local match
- 10,000 - 50,000 = 30% local match
- <10,000 = 20% local match

For more information: **https://connect.ncdot.gov/projects/planning/RNAProjDocs/2014-06FinalReport.pdf**

SPOT Safety Program

The Spot Safety Program is a state-funded public safety investment and improvement program that provides highly effective low-cost safety improvements for intersections and sections of North Carolina's 79,000 miles of state maintained roads in all 100 counties of North Carolina. The Spot Safety Program is used to develop smaller improvement projects to address safety, potential safety, and operational issues. The program is funded with state funds and currently receives approximately $9 million per state fiscal year. Other monetary sources (such as Small Construction or Contingency funds) can assist in funding Spot Safety projects, however, the maximum allowable contribution of Spot Safety funds per project is $250,000.

The Spot Safety Program targets hazardous locations for expedited low cost safety improvements such as traffic signals, turn lanes, improved shoulders, intersection upgrades, positive guidance enhancements (rumble strips, improved

channelization, raised pavement markers, long life highly visible pavement markings), improved warning and regulatory signing, roadside safety improvements, school safety improvements, and safety appurtenances (like guardrail and crash attenuators).

A Safety Oversight Committee (SOC) reviews and recommends Spot Safety projects to the Board of Transportation (BOT) for approval and funding. Criteria used by the SOC to select projects for recommendation to the BOT include, but are not limited to, the frequency of correctable crashes, severity of crashes, delay, congestion, number of signal warrants met, effect on pedestrians and schools, division and region priorities, and public interest.

For more information: **https://connect.ncdot.gov/resources/safety/Pages/NC-Highway-Safety-Program-and-Projects.aspx**

Highway Hazard Elimination Program

The Hazard Elimination Program is used to develop larger improvement projects to address safety and potential safety issues. The program is funded with 90 percent federal funds and 10 percent state funds. The cost of Hazard Elimination Program projects typically ranges between $400,000 and $1 million. A Safety Oversight Committee (SOC) reviews and recommends Hazard Elimination projects to the Board of Transportation (BOT) for approval and funding. These projects are prioritized for funding according to a safety benefit to cost (B/C) ratio, with the safety benefit being based on crash reduction. Once approved and funded by the BOT, these projects become part of the department's State Transportation Improvement Program (STIP).

For more information: **https://connect.ncdot.gov/resources/safety/Pages/NC-Highway-Safety-Program-and-Projects.aspx**

Governor's Highway Safety Program

The Governor's Highway Safety Program (GHSP) funds safety improvement projects on state highways throughout North Carolina. All funding is performance-based. Substantial progress in reducing crashes, injuries, and fatalities is required as a condition of continued funding. Permitted safety projects include checking station equipment, traffic safety equipment, and BikeSafe NC equipment. However, funding is not allowed for speed display signs. This funding source is considered to be "seed money" to get programs started. The grantee is expected to provide a portion of the project costs and is expected to continue the program after GHSP funding ends. Applications must include county level crash data. Local governments, including county governments and municipal governments, are eligible to apply.

For more information: **http://www.ncdot.org/programs/ghsp/**

Safe Routes to School (SRTS)

SRTS is managed by NCDOT, but is federally funded; See Federal Funding Sources above for more information.

Community Development Block Grant Funds

Community Development Block Grant (CDBG) funds are available to local municipal or county governments that qualify for community development projects that provide decent housing and suitable living environments and by expanding economic opportunities, principally for persons of low and moderate income. State CDBG funds are provided by the U.S. Department of Housing and Urban Development (HUD) to the state of North Carolina. Some urban counties and cities in North Carolina receive CDBG funding directly from HUD. Each year, CDBG provides funding to local governments for hundreds of critically-needed community improvement projects throughout the state. These community improvement projects are administered by the Division of Community Assistance and the Commerce Finance Center under eight grant categories. CDBG funds may be used for activities which include, but are not limited to: acquisition of real property, construction of public facilities and improvements, such as streets, neighborhood centers, and conversion of school buildings for eligible purposes, and activities related to energy conservation.

For more information: **https://www.hudexchange.info/programs/cdbg-entitlement/cdbg-entitlement-program-eligibility-requirements/**

The North Carolina Division of Parks and Recreation – Recreational Trails and Adopt-a-Trail Grants

The Adopt-a-Trail Grant Program (AAT) awards $108,000 annually to government agencies, nonprofit organizations and private trail groups for trail projects. Funding from the federal Recreational Trails Program (RTP), which is used for renovating or constructing trails and greenways, is allocated to states. The North Carolina Division of Parks and Recreation and the State Trails Program manages these funds with a goal of helping citizens, organizations and agencies plan, develop and manage all types of trails ranging from greenways and trails for hiking, biking, and horseback riding to river trails and off-highway vehicle trails. Grants are available to governmental agencies and nonprofit organizations. The maximum grant amount is $100,000 and requires a 25% match of RTP funds received. Permissible uses include:

- New trail or greenway construction
- Trail or greenway renovation
- Approved trail or greenway facilities
- Trail head/ trail markers
- Purchase of tools to construct and/or renovate trails/greenways
- Land acquisition for trail purposes
- Planning, legal, environmental, and permitting costs - up to 10% of grant amount
- Combination of the above

Grant applications are typically due in May.

For more information: **http://www.ncparks.gov/more-about-us/grants/trail-grants/recreational-trails-program**

NC Parks and Recreation Trust Fund (PARTF)

The Parks and Recreation Trust Fund (PARTF) provides dollar-for-dollar matching grants to local governments for parks and recreational projects to serve the general public. Counties, incorporated

municipalities, and public authorities, as defined by G.S. 159-7, are eligible applicants. A local government can request a maximum of $500,000 with each application. An applicant must match the grant dollar-for-dollar, 50 percent of the total cost of the project, and may contribute more than 50 percent. The appraised value of land to be donated to the applicant can be used as part of the match. The value of in-kind services, such as volunteer work, cannot be used as part of the match. Property acquired with PARTF funds must be dedicated for public recreational use.

For more information: **http://www.ncparks.gov/more-about-us/parks-recreation-trust-fund/eligibility**

Clean Water Management Trust Fund

The Clean Water Management Trust Fund (CWMTF) is available to any state agency, local government, or non-profit organization whose primary purpose is the conservation, preservation, and restoration of North Carolina's environmental and natural resources. Grant assistance is provided to conservation projects that:

- enhance or restore degraded waters;
- protect unpolluted waters, and/or
- contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits;
- provide buffers around military bases to protect the military mission;
- acquire land that represents the ecological diversity of North Carolina; and
- acquire land that contributes to the development of a balanced State program of historic properties.

For 2017, CWMTF expects to award over $25 million to projects that protect natural and cultural resources.

For more information: **http://www.cwmtf.net/#appmain.htm**

Duke Energy Water Resources Fund

Duke Energy is investing $10 million in a fund for projects that benefit waterways in the Carolinas. The fund supports science-based, research-supported projects and programs that provide direct benefit to at least one of the following focus areas:

- Improve water quality, quantity and conservation;
- Enhance fish and wildlife habitats;
- Expand public use and access to waterways; and
- Increase citizens' awareness about their roles in protecting these resources.

Applications are open to nonprofit organizations and local government agencies. Funding decisions are made twice a year. Local and regional government agencies could consider this resource for proposed greenways across the region such as the Browns Creek section of proposed greenway as part of Priority Project D in Elizabethtown.

For more information: **http://www.nccommunityfoundation.org/page/other-grant-opportunities/duke-energy-water-resource-fund-grants/applying-to-the-duke-energy-water-resources-fund**

Urban and Community Forestry Grant

The North Carolina Division of Forest Resources Urban and Community Forestry grant can provide funding for a variety of projects that will help plan and establish street trees as well as trees for urban open space. The goal is to improve public understanding of the benefits of preserving existing tree cover in communities and assist local governments with projects which will lead to more effective and efficient management of urban and community forests. Grant requests should range between $1,000 and $15,000 and must be matched equally with non-federal funds. Grant funds may be awarded to any unit of local or state government, public educational institutions, approved non-profit 501(c)(3) organizations, and other tax-exempt organizations. First time municipal applicant and municipalities seeking Tree City USA status are given priority for funding. Grant applications are due by March 31st of each year and recipients are notified by mid-July.

For more about Tree City USA status, including application instructions, visit: **http://ncforestservice.gov/Urban/urban_grant_overview.htm**

LOCAL GOVERNMENT FUNDING SOURCES

Municipalities often plan for the funding of pedestrian and bicycle facilities or improvements through development of Capital Improvement Projects (CIP) or occasionally, through their annual Operating Budgets. In Raleigh, for example, the greenway system has been developed over many years through an annual dedicated source of funding that has ranged from $100,000 to $500,000 and 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 capital reserve fund, capital protection ordinances, municipal service district, tax increment financing, taxes, fees, and bonds. Each category is described below. A variety of possible funding options available to North Carolina jurisdictions for implementing pedestrian and bicycle projects are also described below. However, many will require specific local action as a means of establishing a program if it's not already in place.

Powell Bill Funds

Annually, State street-aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as outlined by G.S. 136-41.1 through 136-41.4. Powell Bill funds shall be expended only for the purposes of maintaining, repairing, constructing, reconstructing or widening of local streets that are the responsibility of the municipalities. It may also be used for planning, construction, and maintenance of bikeways or sidewalks within municipal limits or within the

area of a metropolitan planning organization or rural planning organization. Beginning July 1, 2015, under the Strategic Transportation Investments initiative, Powell Bill funds may no longer be used to provide a match for federal transportation funds such as Transportation Alternatives. Certified Statement, street listing, add/delete sheet and certified map from all municipalities are due between July 1st and July 21st of each year. Additional documentation is due shortly afterwards.

For more information: **https://connect.ncdot.gov/municipalities/State-Street-Aid/Pages/default.aspx**

Capital Reserve Fund

Municipalities have statutory authority to create capital reserve funds for any capital purpose, including pedestrian 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.

Local Improvement District (LID)

Local Improvement Districts (LIDs) are most often used by cities to construct localized projects such as streets, sidewalks, or bikeways. Through the LID process, the costs of local improvements are generally spread out among a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as traffic trip generation.

Municipal Service District

Municipalities have statutory authority to establish municipal service districts, to levy a property tax in the district additional to the town-wide 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, and can include projects such as street, sidewalk, or bikeway improvements within the downtown taxing district.

Tax Increment Financing

Project Development Financing bonds, also known as Tax Increment Financing (TIF) is a relatively new tool in North Carolina, allowing localities to use future gains in taxes to finance the current improvements that will create those gains. When a public project (e.g., sidewalk improvements) is constructed, surrounding property values generally increase and encourage surrounding development or redevelopment. The increased tax revenues are then dedicated to finance the debt created by the original public improvement project. Streets, streetscapes, and sidewalk improvements are specifically authorized for TIF funding in North Carolina. Tax Increment Financing typically occurs within designated development financing districts that meet certain economic criteria that are approved by a local governing body. TIF funds are generally spent inside the boundaries of the TIF district, but they can also be spent outside the district if necessary to encourage development within it. Although larger cities use this type of financing more often, Woodfin, NC is an example of a small town that has used this type of financing.

Municipal Vehicle Tax

NCGS 20-97 allows municipalities to establish a vehicle fee/tax and a percentage of funding can be used for maintaining, repairing, constructing, reconstructing, widening, or improving public streets in the city or town that do not form a part of the State highway system.

Other Local Funding Options

- Bonds/Loans
- Taxes
- Impact fees
- Exactions
- Installment purchase financing
- In-lieu-of fees
- Partnerships

PRIVATE AND NONPROFIT FUNDING SOURCES

Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are examples of private funding opportunities.

FUNDING FOR TRAIL DEVELOPMENT

Rails-to-Trails Conservancy

RTC launched a new grant program in 2015 to support organizations and local governments that are implementing projects to build and improve rail-trails. Under the Doppelt Family Trail Development Fund, RTC will award a total of $85,000 per year through a competitive process, which is then distributed among several qualifying projects. Eligible applicants include nonprofit organizations and state, regional, and local government agencies. Two types of grants are available - community support grants and project transformation grants. Around three to four community support grants are awarded each year, ranging from $5,000-$10,000 each. Community Support Grants support nonprofit organizations or "Friends of the Trail" groups that need funding to get trail development or trail improvement efforts off the ground. Each year, 1-2 Project Transformation Grants area awarded that range from $15,000-$50,000. The intention of these grants is to enable an organization to complete a significant trail development or improvement project. For both types of grants, applications for projects on rail-trails and rails-with-trails are given preference, but rail-trail designation is not a requirement. The trail must serve multiple user types, such as bicycling, walking, and hiking, and must be considered a trail, greenway, or shared-use path.

The fund was established with a $80,000 grant from Jeff Doppelt of Great Neck, New York, a long-time supporter of RTC and development of rail-trails in the United States, and an additional $20,000 donation from an anonymous donor. Applications are due January 31st of each year but applicants should check the website for grant application announcements.

For more information: **http://www.railstotrails.org/our-work/doppelt-family-trail-development-fund/**

National Trails Fund

American Hiking Society created the National Trails Fund in 1998, which is the only privately supported national grants program that provides funding to grassroots organizations working toward establishing, protecting, and maintaining foot trails in America. National Trails Fund grants help give local organizations the resources they need to secure access, volunteers, tools and materials to protect America's cherished public trails. To date, American Hiking has granted more than $588,000 to 192 different trail projects across the U.S. for land acquisition, constituency building campaigns, and traditional trail work projects. Awards range from $500 to $3,000 per project. Only 501(c)3 nonprofit organizations are eligible to apply. Applicants must be current members of American Hiking Society's Alliance of Hiking Organizations. Except for land acquisition projects, funded projects must be completed in a year. Multi-year projects may be considered if they are exceptional cases. Projects the American Hiking Society will consider include:

- 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.

For more information: **https://americanhiking.org/national-trails-fund/**

American Greenways Eastman Kodak Awards

The Conservation Fund's American Greenways Program has teamed with the Eastman Kodak Corporation and the National Geographic Society to award small grants ($500 to $2,500) to stimulate the planning, design, and development of greenways. These grants can be used for activities such as mapping, conducting ecological assessments, surveying land, holding conferences, developing brochures, producing interpretive displays, incorporating land trusts, planning bike paths, and building trails. Grants are primarily awarded to local, regional, or statewide nonprofit organizations. Public agencies may apply but preference is given to community organizations. Grants are awarded based on the importance of the project to local greenway development efforts, demonstrated community support, extent to which the grant will result in matching funds, likelihood of tangible results, and the capacity of the organization to complete the project. Applications can be submitted from March 1st through June 1st of each calendar year.

For more information: **http://www.rlch.org/funding/kodak-american-greenways-grants**

FUNDING FOR CONSERVATION EFFORTS

National Fish and Wildlife Foundation (NFWF)

The National Fish and Wildlife Foundation (NFWF) is a private, nonprofit, tax-exempt organization chartered by Congress in 1984. The National Fish and Wildlife Foundation sustains, restores, and enhances the Nation's fish, wildlife, plants, and habitats. Through leadership conservation investments with public and private partners, the Foundation is dedicated to achieving maximum conservation impact by developing and applying best practices and innovative methods for measurable outcomes.

The Foundation provides grants through more than 70 diverse conservation grant programs. One of the most relevant programs for bicycle and pedestrian projects is Acres for America. Funding priorities include conservation of bird, fish, plants and wildlife habitats, providing access for people to enjoy outdoors, and connecting existing protected lands. Federal, state, and local governement agencies, educational institutions, Native Amerian tribes, and nonprofit organizations may apply twice annually for matching grants. Due to the competitive nature of grant funding for Acres for America, all awarded grants require a minimum 1:1 match.

For more information: **http://www.nfwf.org/whatwedo/grants/Pages/home.aspx**

The Trust for Public Land

Land conservation is central to the mission of the Trust for Public Land (TPL). Founded in 1972, the TPL is the only national non-profit working exclusively to protect land for human enjoyment and well-being. TPL helps acquire land and transfer it to public agencies, land trusts, or other groups that intend to conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities.

For more information: **http://www.tpl.org**

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 was successful in 2013 in asking the North Carolina General Assembly to continue to support conservation efforts in the state. The state budget bill includes about $50 million in funds for key conservation efforts in North Carolina. Land for Tomorrow works to 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, and historic downtowns and neighborhoods will be there to enhance the quality of life for generations to come.

For more information: **http://www.land4tomorrow.org/**

The Conservation Alliance

The Conservation Alliance is a nonprofit organization of outdoor businesses whose collective annual membership dues support grassroots citizen-action groups and their efforts to protect wild and natural areas. Grants are typically about $35,000 each. Since its inception in 1989, The Conservation Alliance has contributed $4,775,059

to environmental groups across the nation, saving over 34 million acres of wild lands.

The Conservation Alliance Funding Criteria:

- The Project should be focused primarily on direct citizen action to protect and enhance our natural resources for recreation.
- The Alliance does not look for mainstream education or scientific research projects, but rather for active campaigns.
- All projects should be quantifiable, with specific goals, objectives, and action plans and should include a measure for evaluating success.
- The project should have a good chance for closure or significant measurable results over a fairly short term (within four years).

For more information: **http://www.conservationalliance.com/grants/?yearly=2016**

FUNDING FOR ENVIRONMENTAL INITIATIVES

Blue Cross Blue Shield of North Carolina Foundation (BCBS)

Blue Cross Blue Shield (BCBS) focuses on programs that use an outcome-based approach to improve the health and well-being of residents. The Healthy Places grant concentrates on increased physical activity and active play through support of improved built environments such as sidewalks and safe places to bike. Nonprofit organizations and government entities are eligible to apply. Eligible grant applicants must be located in North Carolina, be able to provide recent tax forms, and depending on the size of the non-profit, provide an audit. BCBS does not have a traditional grant cycle and announces grant opportunities on a periodic basis. Grants can range from small-dollar equipment grants to large, multi-year partnerships.

For more information: **http://www.bcbsncfoundation.org/faqs**

Duke Energy Foundation

Funded by Duke Energy shareholders, this foundation makes charitable grants to nonprofit organizations and government agencies. Grant applicants must serve communities that are also served by Duke Energy. The grant program has several investment priorities, one of which is environment, and this is the most applicable to bicycle and pedestrian projects. Duke Energy supports initiatives that help protect and restore wildlife and natural resources, with a special focus on water and air. The application period is typically from July 1st to August 31st.

For more information: **https://www.duke-energy.com/community/duke-energy-foundation**

FUNDING FOR COMMUNITY DEVELOPMENT INITIATIVES

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 non-profit organizations and institutions throughout the state. Based in Raleigh, 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. The foundation also manages various scholarship programs statewide. Nonprofit organizations and local government units, such as public schools, are eligible to apply. The foundation will only give consideration to applicants that serve counties within its affiliate network.

For more information: **http://www.nccommunityfoundation.org/grants-scholarships**

Z. Smith Reynolds Foundation

This Winston-Salem-based foundation has been assisting environmental projects in North Carolina for many years. Grant recipients include nonprofit organizations, colleges and universities, religious entities, and government agencies that have projects or programs that serve North Carolinians. The Foundation focuses its grant making on five focus areas: Community Economic Development; Environment; Public Education; Social Justice and Equity; and Strengthening Democracy. The "environment" focus area is the most applicable for bicycle and pedestrian projects. This focus area seeks to protect and restore ecosystems in the state's mountains and coastal areas. The Z. Smith Reynolds Foundation is committed to accommodating the increasing growth demands in the state in environmentally sustainable ways, including through enhanced transportation options. Deadline to apply is typically in August.

For more information: **http://www.zsr.org/grants-programs**

Bank of America Charitable Foundation

The Bank of America Charitable Foundation is one of the largest in the nation. Its grantmaking activities are focused on 3 focus areas: workforce development and education, community development, and basic needs. The area of focus most relevant to increased recreational opportunities and trails is community development, which provides funding for projects that foster green communities and for transit oriented development projects. Only nonprofit organizations are eligible to apply for funding.

For more information: **www.bankofamerica.com/foundation**

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.

CORPORATE DONATIONS

Corporate donations are often received in the form of liquid investments (i.e. cash, stock, bonds) and in the form of land. Municipalities typically create funds to facilitate and simplify a transaction from a corporation's donation to the given municipality. Donations are mainly received when a widely supported capital improvement program is implemented.

PRIVATE INDIVIDUAL DONATIONS

Private individual donations can come in the form of liquid investments (i.e. cash, stock, bonds) or land. Municipalities typically create funds to facilitate and simplify a transaction from an individual's donation to the given municipality. Donations are mainly received when a widely supported capital improvement program is implemented.

FUNDRAISING/CAMPAIGN DRIVES

Organizations and individuals can participate in a fundraiser or a campaign drive. It is essential to market the purpose of a fundraiser to rally support and financial backing. Often times fundraising satisfies the need for public awareness, public education, and financial support.

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 form church groups, civic groups, scout troops and environmental groups to work on greenway development on special community workdays. Volunteers can also be used for fund-raising, maintenance, and programming needs.

INNOVATIVE FUNDING OPTIONS

Crowdsourcing "is the process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from an online community, rather than from traditional employees or suppliers."

For some success stories and ideas for innovative fundraising techniques: **http://www.americantrails.org/resources/funding/TipsFund.html**

CAPE FEAR

REGIONAL BICYCLE PLAN

2017