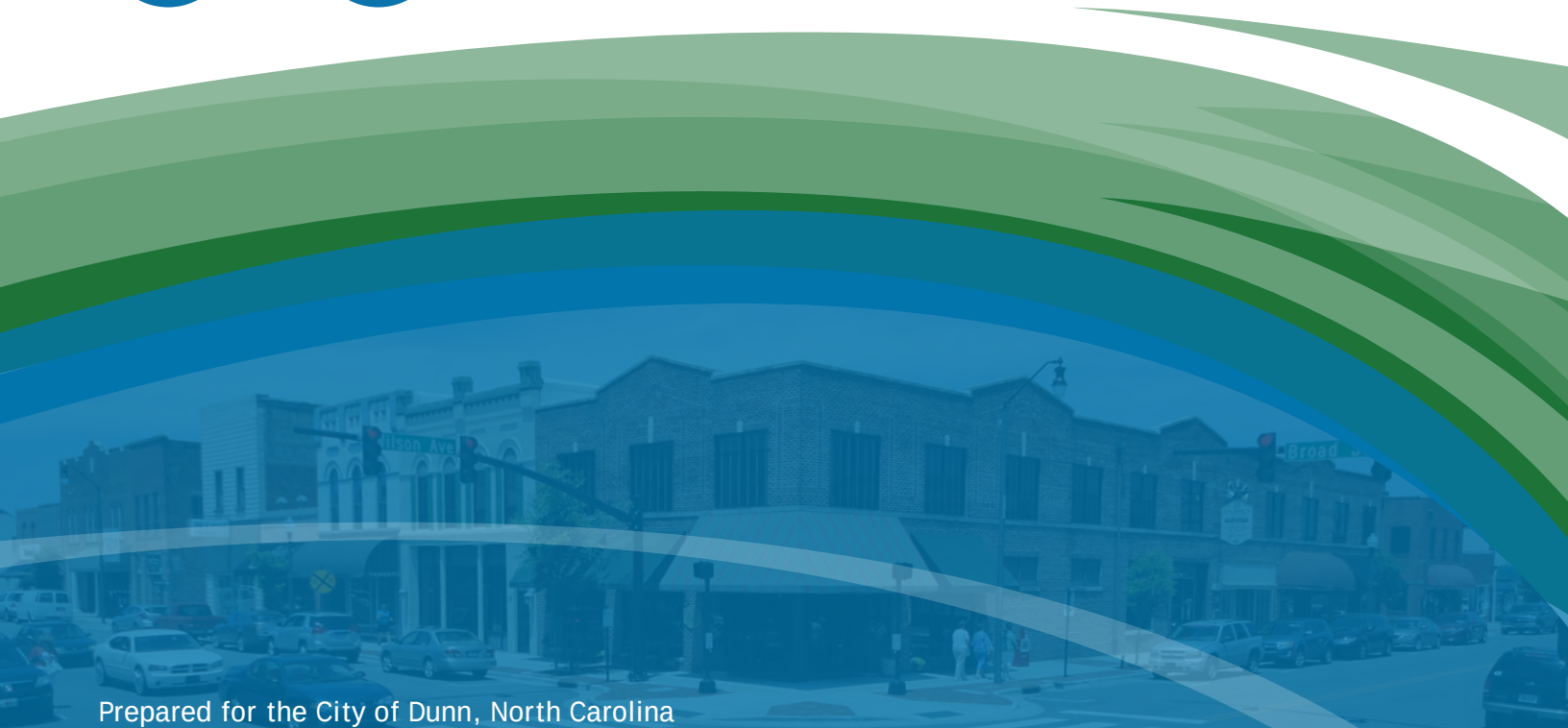
CITY *of* DUNN

Comprehensive Bicycle Plan

Final Plan 2014



Prepared for the City of Dunn, North Carolina
Prepared by Alta Planning + Design

alta PLANNING + DESIGN

ACKNOWLEDGEMENTS

Thanks to the local residents, business leaders, community leaders, and government staff that participated in the development of this plan through meetings, comment forms, and plan review. Special thanks to those who participated as steering committee members, listed below.

PROJECT STEERING COMMITTEE

The Steering Committee is made up of local residents, municipal and county staff, and other local community and business representatives.

Billy Addison, Dunn Public Works
Russell Galvan, DSC, Inc
Ockidde Harris, Cumberland County/ Community Transformation Grants
Zada McLamb, Harnett Health
Brian McNeill, Dunn Parks and Recreation
Mason Poe, The HP Group
Chief Jimmy Pope, Dunn Police Department
Belinda Rayner, Harnett County Health Department
Sharon Stevens, Dunn Area Tourism Authority
Joel Strickland, Mid-Carolina Council of Governments
Lauren White, Wellons Realty
Tammy Williams, Dunn Area Chamber of Commerce
Samantha L. Wullenwaber, Dunn Planning Department

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VISION STATEMENT

The City of Dunn will be a vibrant, economically stimulated, and connected community where bicycling is safe and convenient for individuals and families, with a network of bikeways and trails that provide opportunities for utilitarian trips, physical activity and fitness, healthy lifestyles, community interaction, and access to local businesses, services, and schools.

Chapter 1: Introduction

Chapter Contents:

PROJECT BACKGROUND

The City of Dunn's Comprehensive Bicycle Plan was made possible by funding from the Center for Disease Control and Prevention's Community Transformation Grant Project for Region 6. In 2014, the City of Dunn commissioned this comprehensive planning study to identify a complete, up-to-date framework for moving forward with tangible bicycle improvements, complimented by a series of programmatic recommendations to educate and encourage bicyclists and motorists in Dunn. This plan combines past planning efforts with new research and analysis, and includes public input.

PLANNING PROCESS & PUBLIC INVOLVEMENT

The planning process started in the spring of 2014 with the initial steering committee meetings and concluded with plan adoption in October 2014. The plan's steering committee included a combination of local residents, City staff, and regional representatives from different points of view and interests related to bicycling issues in Dunn. The steering committee included representatives from the City of Dunn planning staff, City of Dunn Police, Dunn Area Chamber of Commerce, Dunn Area Tourism Authority, Harnett County Health Department, CTG Program (Region 6), Mid-Carolina Rural Planning Organization (RPO), and enthusiastic resident volunteers.

Key tasks of the steering committee included guiding the overall vision of the plan, identifying existing opportunities and constraints for bicycling in Dunn, and providing feedback on plan recommendations.

In addition to steering committee input, the planning process included several other important methods of public outreach and involvement. The project website, public comment form, public workshops, and press releases were all used to inform and gather input from the public for plan development. Aspects of the plan and planning process were also communicated through social media, such as the City's website and steering committee member's Facebook pages. Key outreach events in the process included:

- Project Kick-Off Meeting – April 2, 2014
- Public Workshop #1 – July 15, 2014
- Draft Bicycle Plan (released online) – September 5, 2014
- Public Workshop #2 - September 2, 2014
- Final Plan Public Hearing Presentation - October 14, 2014

So, what will Dunn be like for cyclists in the future? This plan seeks to answer that question and is guided by a vision statement and set of measurable goals. The vision statement and goals were developed during the steering committee kick-off meeting and were supported by residents of Dunn during public outreach and engagement activities. The statement below describes Dunn's vision for a bicycle-friendly future and the goals describe how Dunn will achieve their vision.

VISION STATEMENT & GOALS

Vision Statement:

The City of Dunn will be a vibrant, economically stimulated, and connected community where bicycling is safe and convenient for individuals and families, with a network of bikeways and trails that provide opportunities for utilitarian trips, physical activity and fitness, healthy lifestyles, community interaction, and access to local businesses, services, and schools.

Goals of the Bicycle Plan:

- Create recurring annual community events that use city streets and trails to promote cycling, such as an "Open Streets" festival, and use social media as well as traditional media to promote events.
- Start a bicycling education program in all elementary and middle schools for children in grades K-8.
- Raise awareness and educate decision-makers, stakeholders, interest groups, and the public on the benefits of bikeways, greenway trails, and active, healthy lifestyles.
- Increase bicyclist safety by reducing the number of bicycle-related accidents each year.
- Build high priority bicycle and shared-use trail facility network to better connect neighborhoods to the downtown, public spaces, and other important destinations.

The steering committee first convened for the kick off meeting in April 2014 and developed the vision statement and goals presented in this chapter.

WHY THIS PLAN IS IMPORTANT

When considering the level of dedication in time and valuable resources that it takes to create a bicycle-friendly community, it is also important to assess the immense value of bicycle transportation. Better bicycling facilities improve safety and encourage more people to ride, which in turn improves health, provides a boost to the local economy, creates a cleaner environment, reduces congestion and fuel costs, and contributes to a better quality of life and sense of community.

Communities across the country are experiencing the benefits of providing a supportive environment for bicycling. With a better bicycle network, Dunn can create a stronger, more vibrant community and take advantage of the many types of benefits described below.

Health and Physical Activity Benefits

A growing number of studies show that the design of our communities—including neighborhoods, towns, transportation systems, parks, trails and other public recreational facilities—affects our level of physical activity. Regular physical activity is recognized as an important contributor to good health; the Centers for Disease Control and Prevention (CDC) recommend 30 minutes of moderate physical activity each day for adults and 60 minutes each day for children.[1] Unfortunately, many people do not meet these recommendations because they lack environments where they can be physically active. The CDC reports that "physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic."[2] These conditions also increase families' medical expenses; each year North Carolinians spend over $24 billion on health care costs associated with a lack of physical activity, excess weight, type II diabetes, and poor nutrition.[3]

- Having accessible bicycle facilities available, such as bike lanes and paths, can help people more easily incorporate physical activity into their daily lives. Sixty percent of North Carolinians say they would increase their level of physical activity if they had better access to walking and bicycling facilities, such as sidewalks and trails.[4] Regular physical activity, such as bicycling, is shown to have numerous health benefits:[5]
- Reduces the risk and severity of heart disease and diabetes
- Reduces the risk of some types of cancer
- Improves mood
- Controls weight
- Reduces the risk of premature death

The American Public Health Association also recognizes the health benefits of walk- and bike-friendly communities. According to its 2010 report, "Investments in transit, walking and bicycling facilities support transit use, walking and bicycling directly; they also support the formation of compact, walkable, transit-oriented neighborhoods that in turn support more walking, bicycling and transit and less driving. These built environments have repeatedly been associated with more walking, bicycling and transit use, more overall physical activity, and lower body weights; lower rates of traffic injuries and fatalities, particularly for pedestrians; lower rates of air pollution and greenhouse gas emissions; and better mobility for non-driving populations."[6]

The CDC determined that creating and improving places to be active could result in a 25 percent increase in the number of people who exercise at least three times a week.[7] This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits. The establishment of a safe and reliable network of bikeways and trails can have a positive impact on the health of nearby residents. The Rails-to-Trails Conservancy puts it simply: "Individuals must choose to exercise, but communities can make that choice easier."[8]

Economic Benefits

Transportation Savings

When it comes to transportation costs, bicycling is one of the most affordable forms of transportation available, second only to walking. According to the American Automobile Association, the cost of owning and operating a medium-sized sedan for one year, assuming one drives 10,000 miles per year, is approximately $7,804.[9] Owning and operating a bicycle costs just $120 per year, according to the League of American Bicyclists.[10] The Pedestrian and Bicycle Information Center explains how these lower costs help individuals and communities as a whole: "When safe facilities are provided for pedestrians and bicyclists, more people are able to be productive, active members of society. Car ownership is expensive, and consumes a major portion of many Americans' income."

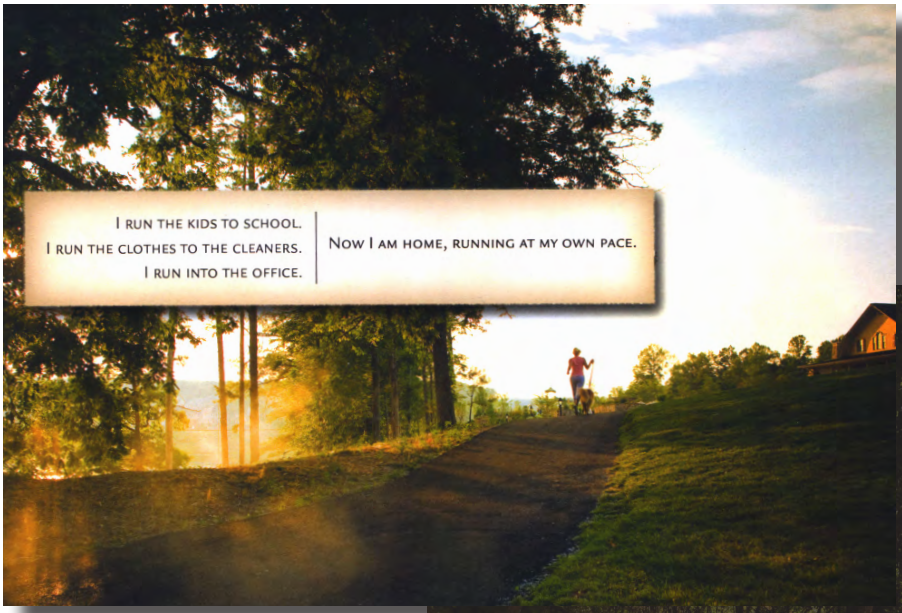
Bicycling becomes even more attractive from an economic standpoint when the unstable price of gasoline is factored into the equation. Oil prices more than quadrupled between 2000 and 2008, when gasoline prices topped $4 a gallon.[11] The unreliable cost of fuel reinforces the idea that local communities should be built to accommodate people-powered transportation, such as walking and biking. Many older North Carolina communities already have traditional mixed-use and generally compact land development patterns; when combined with new strategies for improving bicycle transportation, many such communities could foster local reductions in auto- and oil-dependency.

To determine your driving costs accurately, keep personal records on all the costs listed below. Use this worksheet to figure your total cost to drive.

Annual Cost Per Mile

costs		yearly totals
operating costs		
gas per mile		
total miles driven	×	
total gas	=	
maintenance	+	
tires	+	
total operating costs	+ =	
ownership costs		
depreciation		
insurance	+	
taxes	+	
license and registration	+	
finance charges	+	
total ownership costs	+ =	
other costs (washing, accessories, etc.)	+	
total driving costs	=	
total miles driven	÷	
cost per mile	=	

Driving Costs Worksheet. AmericanAutomobile Association, Your Driving Costs Report: 2013 Edition.



Developers are taking advantage of the positive impact of trails on property values by marketing their greenways; left and below are examples of two magazine advertisements from developers that focus their marketing on greenways. These images are from adds in North Carolina and Florida.

At the award-winning Fishhawk Ranch (right), nearly 30 miles of trails weave throughout the community, connecting the many parks, amenities, villages and neighbors.

Property Values

Bicycle facilities such as bike lanes, paths, and greenway trails are popular community amenities that add value to properties nearby. According to a 2002 survey by the National Association of Realtors and the National Association of Homebuilders, homebuyers rank trails as the second-most important community amenity out of 18 choices, above golf courses, ball fields, parks, security, and others.[12] This preference for trails is reflected in property values around the country. In the Shepard's Vineyard residential development in Apex, North Carolina, homes along the regional greenway were priced $5,000 higher than other residences in the development – and these homes were still the first to sell.[13] A study of home values along the Little Miami Scenic Trail in Ohio found that single-family home values increased by $7.05 for every foot closer a home is to the trail.[13] These higher prices reflect how trails and greenways add to the desirability of a community, attracting homebuyers and visitors alike.

Environmental Benefits

Air Quality

Providing the option of bicycling as an alternative to driving can reduce the volume of gasoline consumed and resulting car-related emissions, which in turn improves air quality. Cleaner air reduces the risk and complications of asthma, particularly for children, the elderly, and people with heart conditions or respiratory illnesses.[14] Lower automobile traffic volumes also help to reduce neighborhood noise levels and improve local water quality by reducing automobile-related discharges that are washed into local rivers, streams, and lakes. Furthermore, every car trip replaced with a bicycle trip reduces U.S. dependency on fossil fuels, which is a national goal. According to a survey by the National Association of Realtors and Transportation for America, 89 percent of Americans agree that transportation investments should support the goal of reducing energy use.[15]

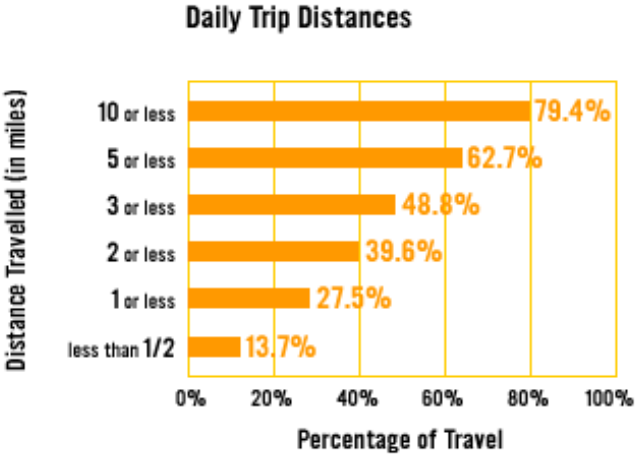
Environmental Services of Greenways

Greenways and trails are a key component of any bicycle network and carry environmental benefits as well. Greenways protect and link fragmented habitat and provide opportunities for protecting plant and animal species. By conserving plant cover, greenways also preserve the natural air filtration processes provided by plants, filtering out harmful pollutants, such as ozone, sulfur dioxide, carbon monoxide, and airborne heavy metal particles. Finally, greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff. Greenways also act as a line of defense against natural hazards, such as flooding.

Transportation Benefits

Many North Carolinians do not have access to a vehicle or are unable to drive. According to the 2001 National Household Travel Survey, 12 percent of persons age 15 or older do not drive, and 8 percent of U.S. households do not own an automobile. Providing a well-connected bicycle network provides those who are unable or unwilling to drive with a safe transportation option. Bicycle improvements can increase access to important destinations for the young, the elderly, low-income families, and others who may be unable to drive or do not have a motor vehicle.

Investing in bicycle facilities can also help to reduce congestion and the pollution, gas costs, wasted time, and stress that comes with it. Each person who makes a trip by bicycle is one less car on the road or in the parking lot. A network of wide shoulders, bike lanes, and paths gives people the option of making a trip by bike, which helps to alleviate congestion for everyone. Bicycle facilities can also help to substantially reduce transportation costs by providing a way of getting around without a car for some trips. About half of all trips taken by car are three miles or less, equivalent to a 15-minute bike ride.[16] With a safe,



Almost 50 percent of all trips are 3 miles or less, or less than a 15-minute bike ride. Source: Pedestrian and Bicycle Information Center, www.pedbikeinfo.org

convenient bicycle network, some of these shorter trips could be comfortably made by bike, saving money on gas, parking costs, and vehicle wear and tear over time.

Quality of Life

Many factors go into determining quality of life for the citizens of a community: the local education system, prevalence of quality employment opportunities, and affordability of housing are all items that are commonly cited. Increasingly though, citizens are demanding a cleaner, safer, more enjoyable community that provides amenities for adults and children alike. Communities with quality greenways, trails, and bicycle routes attract new residents as well as new businesses and industries. Getting outdoors and being physically active also helps to relieve stress, improve mood, and foster social connections between residents.

Bicyclist in Dunn, at the corner of Magnolia and Vance.

Transportation and recreation options will be especially important for older Americans in the coming years. According to the Brookings Institution, the number of older Americans is expected to double between 2000 and 2025.[17] Seniors who find themselves unable to drive or who become uncomfortable with driving will find that their mobility is severely limited if another transportation option isn't available. Trails and paths will provide seniors with a place to take a low-intensity bike ride or a stroll around the neighborhood, or a way to get to nearby shops and services. Paths and trails are also valuable transportation connections for the elderly because they accommodate motorized wheelchairs, which can provide many seniors with the independent mobility that they would not have otherwise.

Children under 16 are another important subset of our society who deserve access to safe mobility and a higher quality of life. In recent years, increased traffic and a lack of pedestrian and bicycle facilities have made it less safe for children to travel to school or to a friend's house. In 1969, 48 percent of students walked or biked to school, but by 2001, less than 16 percent of students walked or biked to or from school.

In a 2004 Centers for Disease Control and Prevention survey, 1,588 adults answered questions about barriers to walking to school for their youngest child aged 5 to 18 years.[18] The main reasons cited by parents included distance to school, at 62%, and traffic-related danger, at 30%. Strategic additions to the bicycle and pedestrian network could shorten the distance from homes to schools, and overall pedestrian and bicycle improvements can improve the safety of our roadways so that children within Dunn could once again safely bike in their communities. According to the National Center for Safe Routes to School, "Walking or biking to school gives children time for physical activity and a sense of responsibility and independence; allows them to enjoy being outside; and provides them with time to socialize with their parents and friends and to get to know their neighborhoods."[19] Ensuring that children have safe connections to their schools and throughout their neighborhoods can encourage them to spend time outdoors, get the physical activity they need for good health, and enjoy a higher quality of life.

Endnotes

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19. *National Center for Safe Routes to School. (2006). National Center for Safe Routes to School Talking Points.*

The steering committee first convened for the kick off meeting in April 2014 and reviewed existing conditions base maps and demographic data.

Chapter 2: Existing Conditions

Chapter Contents:

LOCAL CONTEXT

The City of Dunn is a historically significant city situated near the eastern edge of Harnett County, North Carolina. Located along the I-95 corridor, six miles south of the intersection with I-40 and 40 miles south of the capital city Raleigh, Dunn is characterized by dense pine forests, large tracts of agriculturally developed lands, and sandy soils of the Sand Hills and Inner Coastal Plains region of North Carolina.

According to the 2010 Census, the population of Dunn reached 9,263 people, maintaining its status as the most populous city in Harnett County. The Cape Fear River snakes its way west of the city limits, providing residents and visitors with an expansive natural recreational opportunity.

Incorporated in 1887 as a logging and turpentine distilling center, Dunn is the site for two historically preserved Civil War Battlefields, numerous National Register Historic properties and a small gridded, downtown business core featuring locally owned businesses and restaurants.

CURRENT CONDITIONS

Trip Attractors

People currently drive, walk, or bike to a variety of destinations across Dunn for various purposes. These potential destinations and points of origin for residents and visitors are referred to in this document as 'trip attractors'. Many, but not all, of the trip attractors in Dunn are labeled on Map 2.1 on page 2-2. Trip attractors in and around Dunn include the following:

- Cape Fear River
- Averasboro Civil War Battlefield and Museum
- Downtown Dunn Commercial District
- Chicora Civil War Cemetery
- Campbell University
- Lebanon Plantation House
- Clarence Lee Tart Memorial Park
- CB Codrington Park
- Coats Cotton Museum
- Central Carolina Community College
- General William C. Lee Airborne Museum
- Dunn-Erwin Rail Trail
- Raven Rock State Park

Lebanon Plantation House

Dunn-Erwin Rail Trail

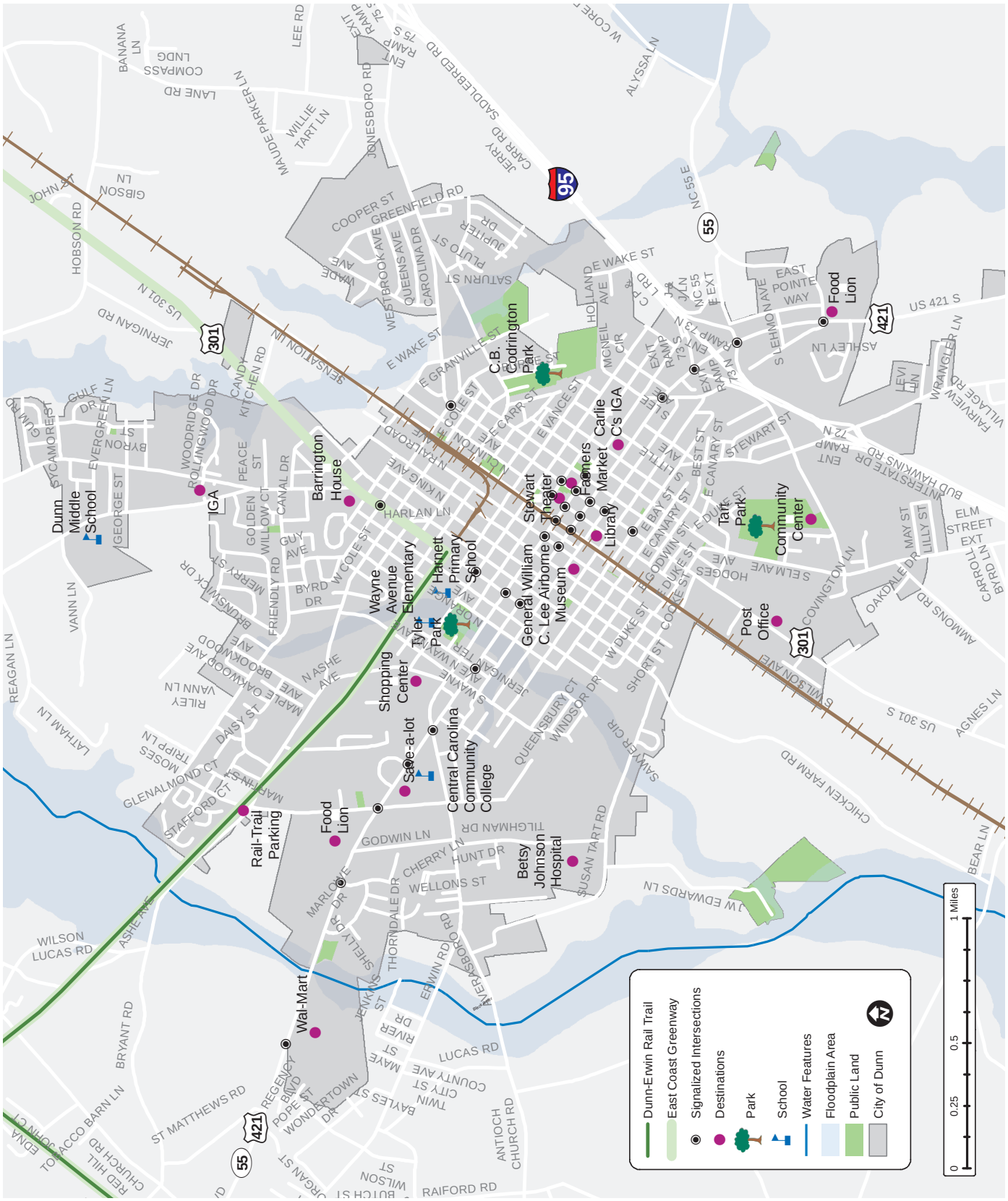
These trip attractors were considered when determining locations for recommended bicycle network improvements. They represent important starting and ending points for travel and provide a good basis for planning ideal routes. While several of the listed trip attractors are not located within Dunn's city limits, the Dunn-Erwin Rail Trail currently provides a significant travel corridor to many of the destinations.

The primarily historic two-story storefront downtown features a compact gridded street network featuring 330' square blocks of development rather than the more common rectangular grids of development. This same network of street development extends from beyond the downtown core into the nearby surrounding residential communities. These surrounding residential zones, all within walking distance of Dunn's downtown core, feature both Wayne Avenue Elementary School, Harnett Primary School and several municipally owned and operated parks providing both residents and visitors with year-round recreational and athletic programming opportunities.

As mentioned above, the Dunn-Erwin Rail Trail provides a safe, efficient and naturally scenic walking and bicycle connection between downtown Dunn and downtown Erwin. The trail crosses the Black River and several other diverse habitats. Informative markers are placed along the trail relaying the historic properties and development of the area and the trail has become one of the most popular recreational sites in the region. Safer and easier connections to this trail will be examined within this plan.

Downtown Dunn features many locally owned shops, safe intersections, and is a lively hub of activity.

MAP 2.1 EXISTING CONDITIONS



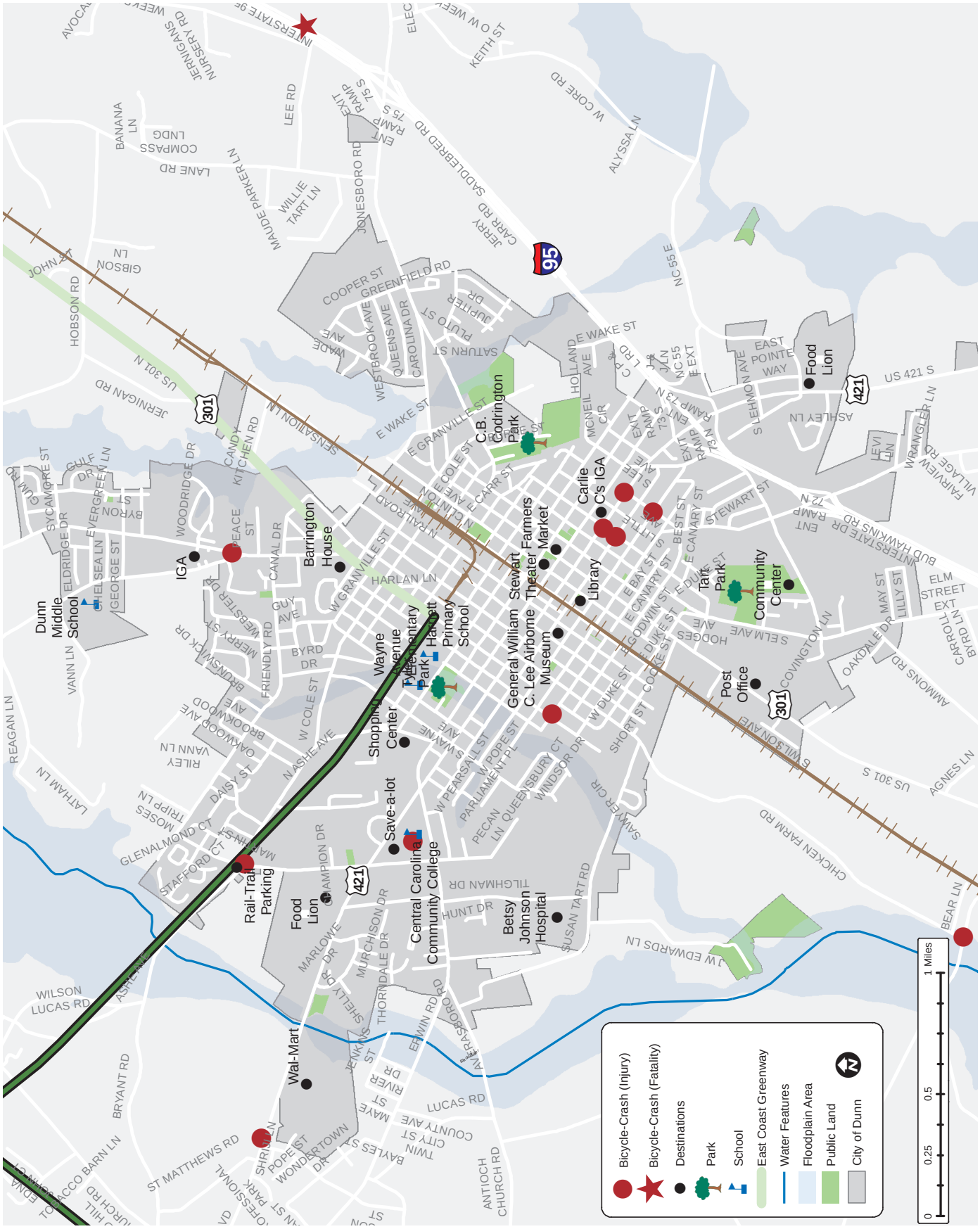
Downtown Dunn has key destinations such as shops, restaurants, and municipal services.

Harnett Primary School, located on Harnett Street, is adjacent to Tyler Park and Wayne Avenue Elementary School.

The Dunn-Erwin Rail-Trail is an important destination and regional facility that attracts residents and visitors year-round.

The Nathan Harris Athletic Complex makes many youth athletic programs possible year-round.

MAP 2.2 BICYCLE-RELATED CRASHES



NCDOT-REPORTED BICYCLE-RELATED CRASHES

Data for bicycle crashes involving motor vehicles from 2007-2011 was provided by NCDOT early in the planning process. It is important to note that not all bicycle-related crashes are reported to the police, and only reported crashes are included in this evaluation. The 13 crashes in Dunn during this time period are mapped on page 2-6.

The locations of the 13 crashes were assessed during field work investigations. Existing intersection crossing conditions and the bicycling environment were noted, as well as any barriers to bicycle or motorist safety. Examples of existing barriers to bicyclist travel in Dunn are presented on page 2-16. The recommendations presented in Chapter 3 take into account the locations of the 13 crashes and the results of the field work assessment of each crash location.

Table 2.1 Bicycle-Auto Crashes in Dunn, 2007-2011 (NCDOT)

Bicycle Crash Location	Number of Crashes
US 421 / W. Cumberland Street	3
E. Cumberland Street	2
N. Powell Avenue	1
E. Divine Street	1
E. Pearsall Street	1
S. Orange Avenue	1
All other locations	4

The S. Washington Avenue & E. Divine Street intersection is a crash location.

The N. Powell Avenue and N. Ashe Avenue intersection is a crash location. The road has been improved to a traffic circle since the crash occurred.

The S. Washington Avenue & E. Cumberland Street intersection is a crash location.

DEMOGRAPHIC ANALYSIS

The bicycling needs and demands of different populations in Dunn can be better understood through an analysis of demographic information. 2010 U.S. Census Bureau data and 2007-2011 U.S. Census Bureau, American Community Survey (ACS) data were obtained and analyzed during the current conditions evaluation of this plan. Data sets such as population density, minority populations, households without access to a vehicle, people who bike to work, and median household income were mapped by Census Block or Block Group. A summary of U.S. Census information is included in the table below. It is important to know that an average of 11.3 percent of households in Dunn do not have access to a vehicle and 27.4 percent of the population in Dunn is living below the poverty line. The areas of Dunn that have many residents without access to a vehicle or are living below the poverty line were carefully examined during this bicycle master planning process.

Population Characteristics

As of the 2010 U.S. Census estimate, Dunn has a total population of 9,263. Females represent 54.7 percent of the population and males 45.3 percent. Over half of the population (57 percent) falls between the ages of 18 and 65 years old. Youth under the age of 18 make up 24 percent of the population and adults over the age of 65 account for about 19 percent.

Population Density

Map 2.3 on page 2-10, titled "Population Density," shows population density by U.S. Census Block in Dunn. The most densely populated areas are located at Parrish Nursing Center on N. Ellis Avenue and W. Edgerton Street and Dunn Village Apartments on Sawyer Circle, each with a density of over 20 persons per acre. Other places with greater than 15 persons per acre are located along Strauss Road off of Pope Road and between West Duke Street and South Ellis Avenue on the west side of the city. Providing safe access between highly populated areas and destinations such as commercial centers, employment areas, and the downtown should be considered high priorities for Dunn.

Racial Minority Populations

According to the 2010 U.S. Census, 49.8 percent of the total population in Dunn is considered to be minority. Map 2.5 on page 2-12, titled "Minority Populations," is a map of the minority populations within Dunn. Higher density clusters of minority populations exist in the north and east portions of the city, particularly in neighborhoods north of E. Harnett Street, north of E. Washington Avenue, and north of W. Carr Street. Residential areas surrounding C.B. Codrington Park on the east side of the city also have greater than 50 percent minority populations. It is important to consider these areas when planning for bicycle infrastructure projects to ensure that the City provides equitable access to the bicycle network.

Hispanic or Latino Ethnicity/Origin Populations

According to the 2010 U.S. Census, approximately 5.3 percent of Dunn's total population are considered to be of Hispanic or Latino ethnicity/origin. Map 2.4 on page 2-11, titled "Hispanic/Latino Ethnicity," illustrates the concentrations of the Latino population in Dunn. Higher density clusters of Latino populations exist in the eastern portions of Dunn along E. Edgerton Street, near Tyler Park on N.

The median household income is $18,299 for the areas surrounding and adjacent to Edgerton Street and Lee Street.

Harnett Primary School is located in an area of Dunn with reported Bike to Work populations.

Wayne Avenue, and along E. Godwin Street south of downtown. Considering these areas is also important when planning for bicycle infrastructure projects to ensure equitable access to the bicycle network.

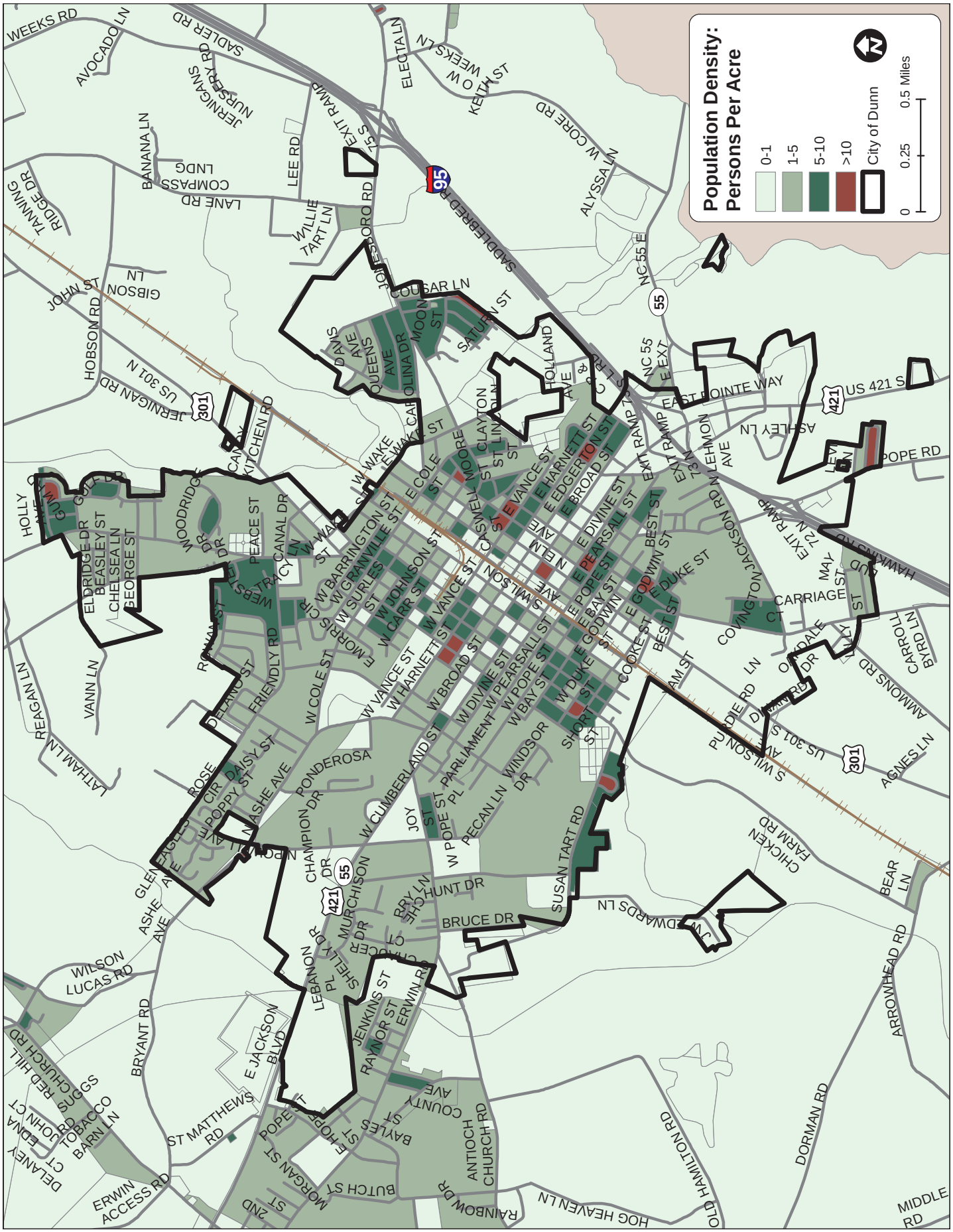
Median Household Income Levels

Median household income is mapped by U.S. Census Block Group, as data are not available at the Census Block level. According to 2007-2011 U.S. Census ACS data, the median household income for Dunn is $28,196. Median household income levels for Dunn Census Block Groups are illustrated in Map 2.6 on page 2-13. The block group with the lowest median income, $18,229, is in the east central portion of the city, bounded by E. Johnston Street to the north, I-95 to the east, and E. Cumberland Street to the south. The southeast portion of the city also has a median income lower than the city average, at $20,064. The block group with the highest median income is located just northwest of downtown Dunn, with a median of $51,150. To ensure convenient bicycling opportunities for transportation and recreation, a strong bicycle network should be in place to safely connect residents of all income levels to important destinations in Dunn.

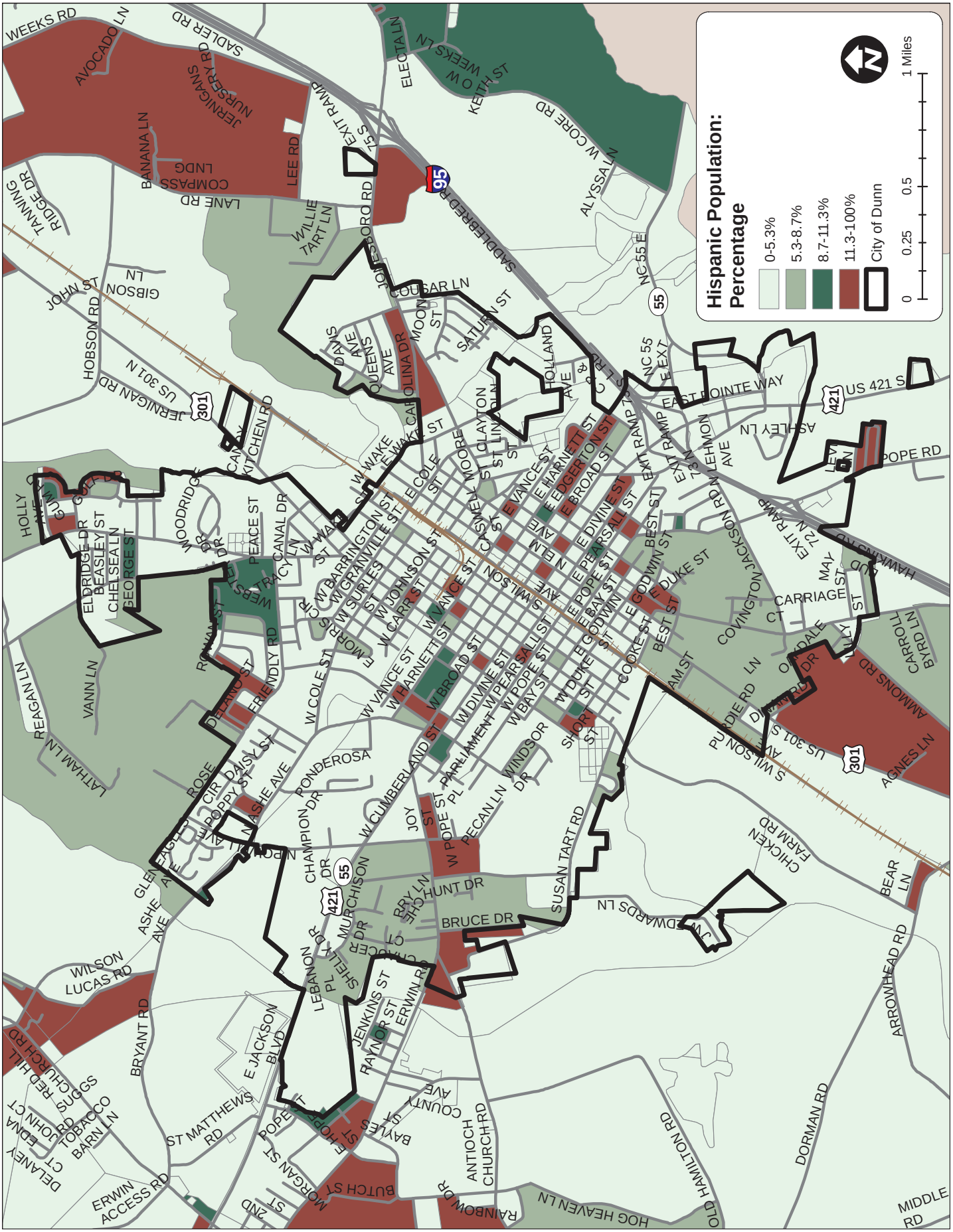
Bike to Work Populations

The overall commute by bicycling average for the City of Dunn as reported by the 2007-2011 ACS is 0.1 percent, which is very similar to the State of North Carolina average of 0.2 percent. Map 2.8 on page 2-15, titled "Bicycle Commuters," illustrates ACS Census Block Group data for the populations in Dunn that commute to work by bicycle. The ACS Census Block Group with the highest percentage (0.7 percent) of bicycle commuters exists in the northwestern portion of the city, south of Friendly Road, north of W. Cumberland Street and west of N. Orange Street. Areas with a high proportion of people cycling to work have an immediate need for safe, connected cycling facilities. Areas with a low proportion of cycling commuters may have many potential cycling commuters who would choose to bike to work with better infrastructure, combined with education, and encouragement programs. Improved facilities and access would enable residents to consider biking to their place of employment or other high priority destinations.

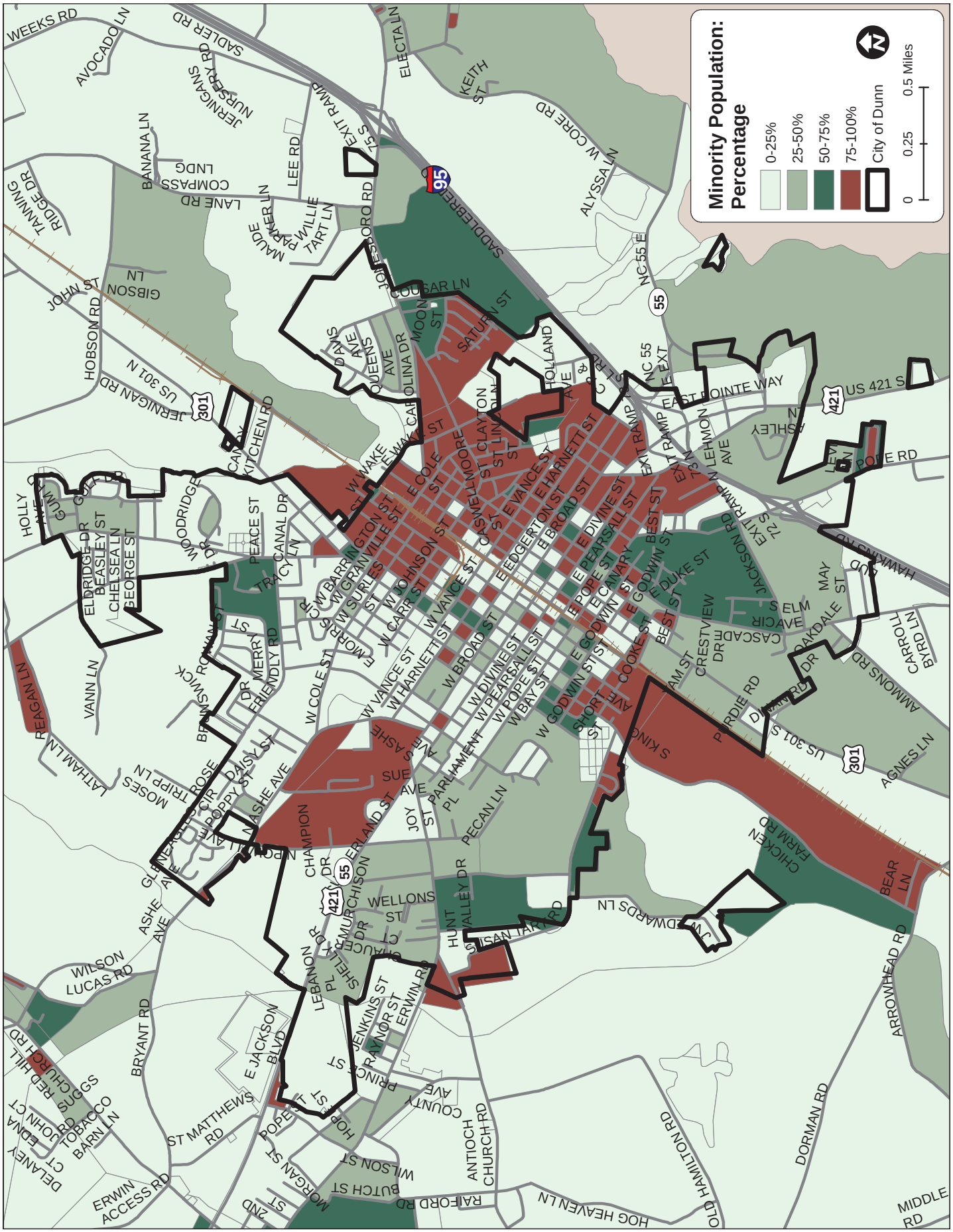
MAP 2.3 POPULATION DENSITY



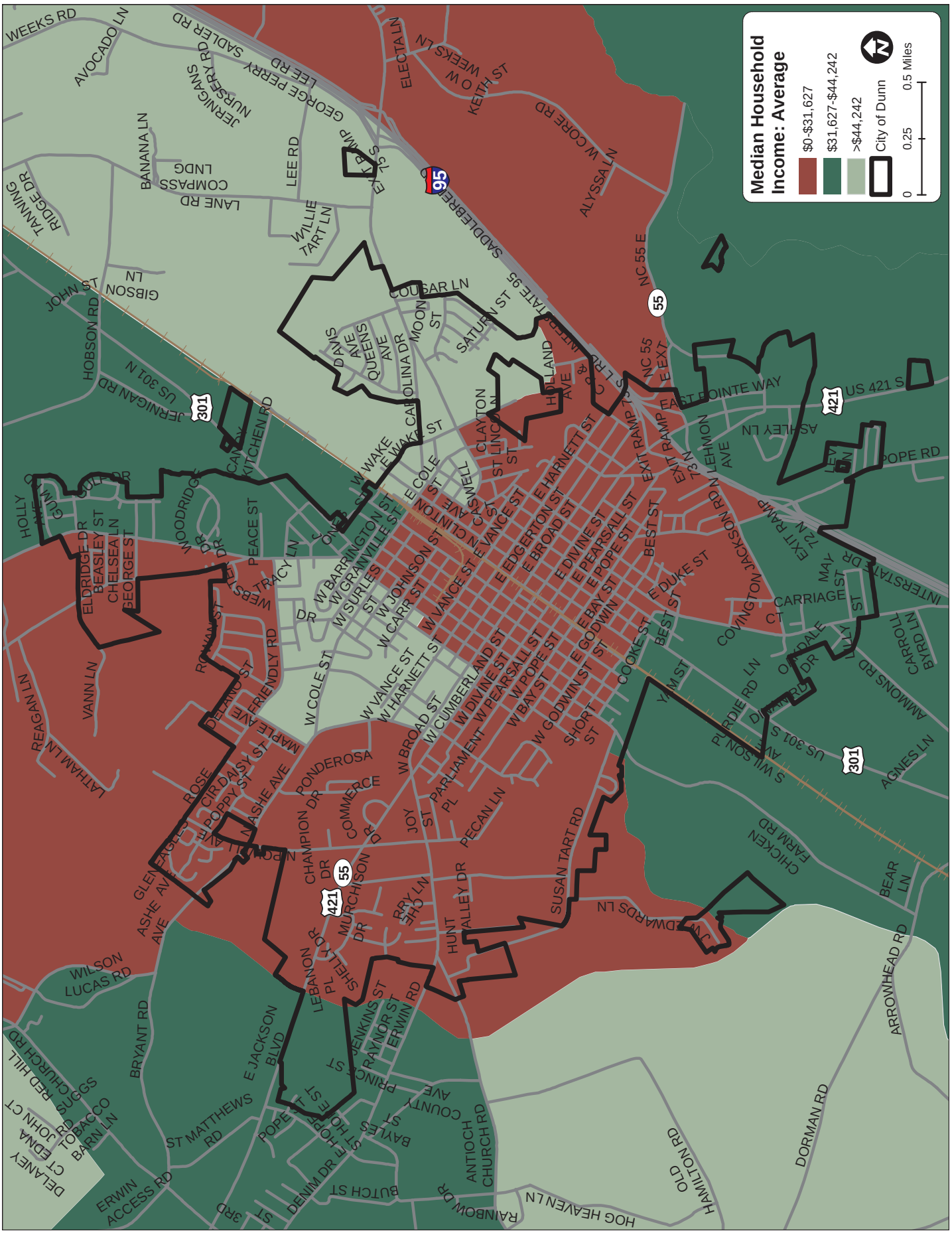
MAP 2.4 HISPANIC/LATINO ETHNICITY

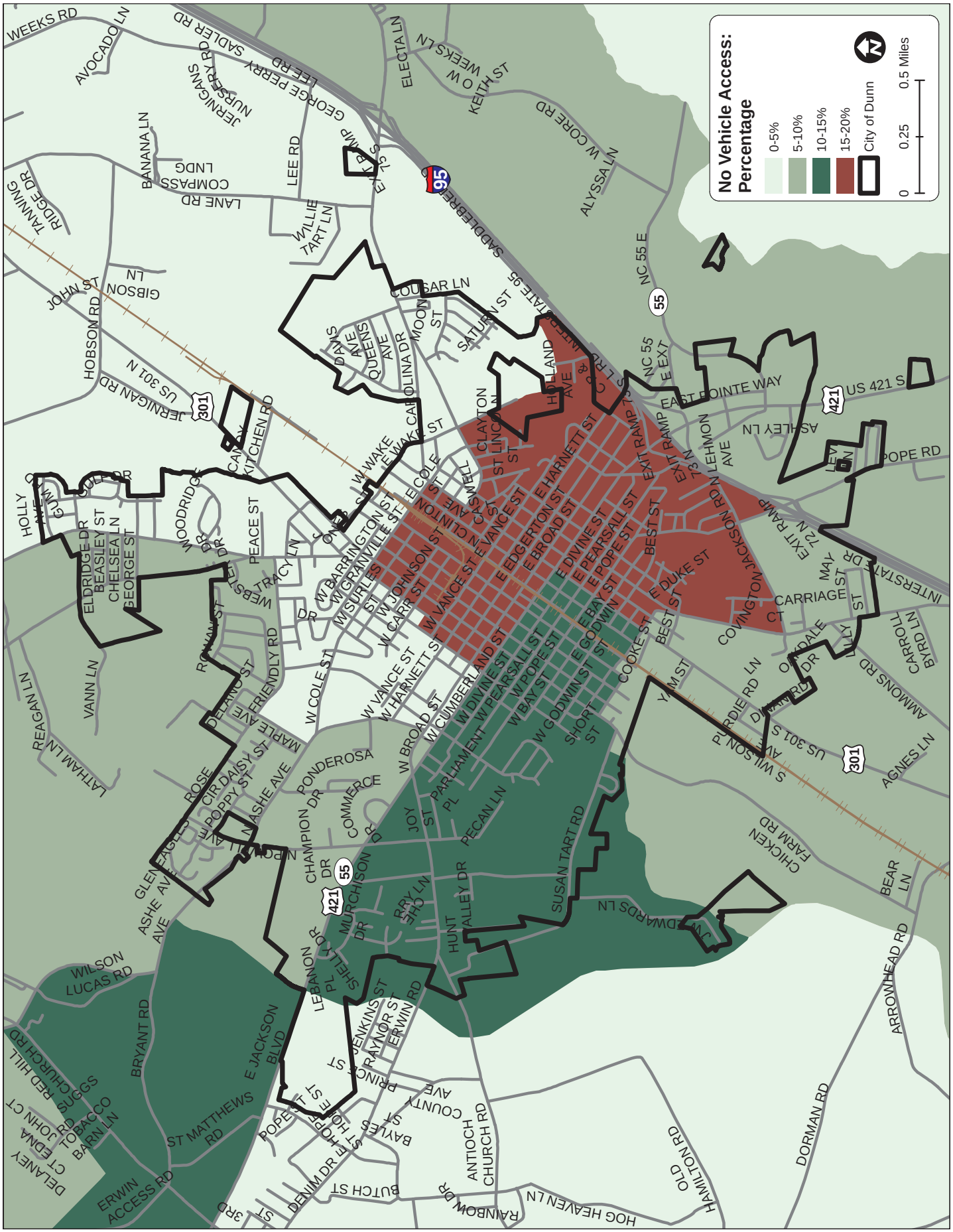


MAP 2.5 MINORITY POPULATIONS

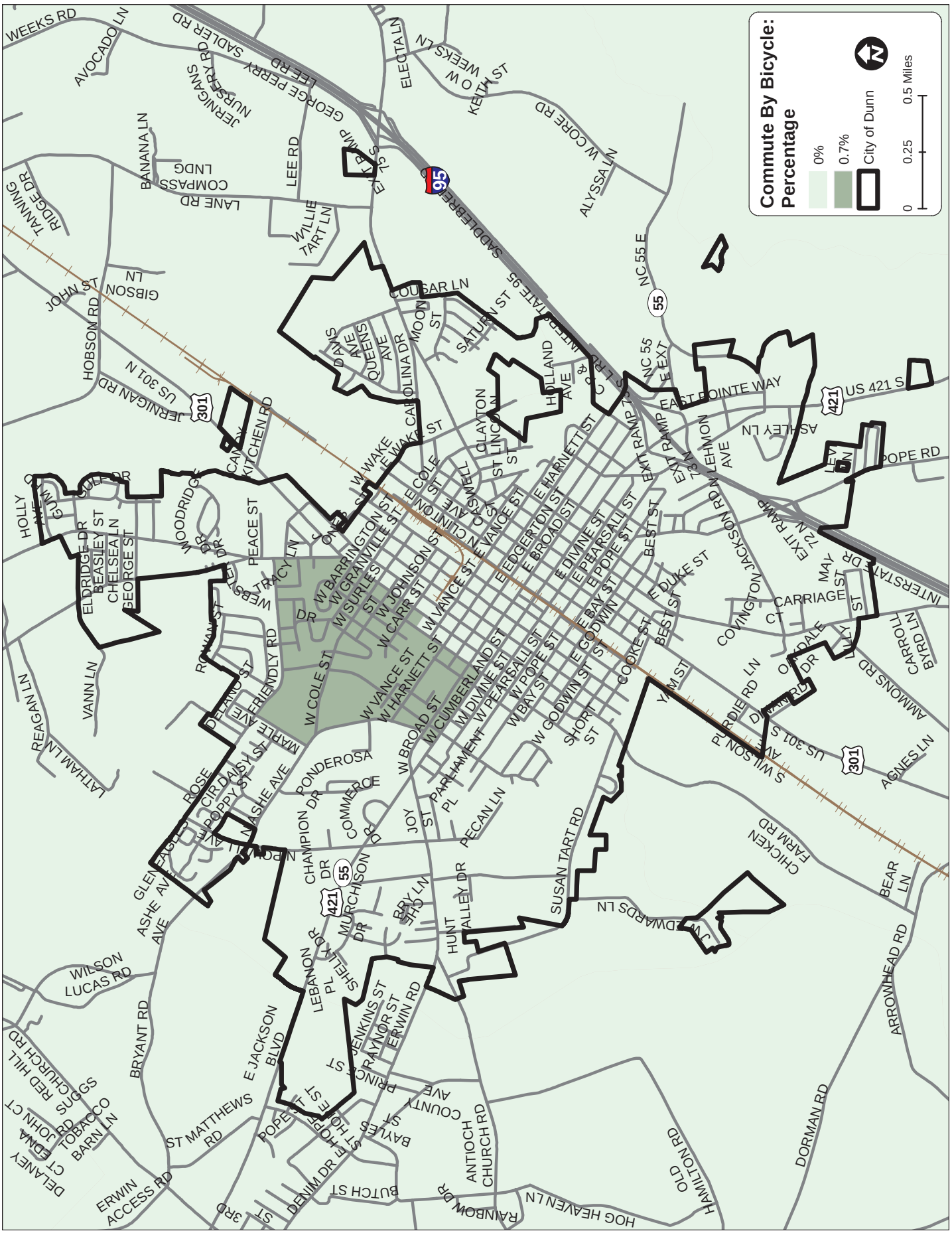


MAP 2.6 MEDIAN HOUSEHOLD INCOME





MAP 2.7 ZERO CAR HOUSEHOLDS



MAP 2.8 BICYCLE COMMUTERS

OPPORTUNITIES & CHALLENGES

An analysis of Dunn's existing bicycling environment identified a number of elements that are considered opportunities and challenges for creating a bikeable and active community. An opportunity represents a situation or condition that is favorable to bicycle travel, either today or in the future. A challenge represents a situation or condition that is a potential limitation or restriction to bicycle access. This section identifies the opportunities and challenges associated with the existing environment in Dunn, as noted by the consultant team's field review and input from the public, City staff, the steering committee, and key stakeholders.

Key Opportunities

1. Grid street network extending out from downtown core with lower automobile traffic volumes
2. Multi-use trail opportunities along existing sewer and utility corridors
3. Existing Dunn-Erwin Rail-Trail
4. Key destinations clustered in and adjacent to downtown Dunn

Neighborhood streets are part of the grid network, have low automobile traffic volumes, and provide safe opportunities for bicycle travel.

An existing sewer easement near Susan Tart Road is a great opportunity for a multi-use trail corridor.

The Dunn-Erwin Rail-Trail is an important destination and regional facility that attracts residents and visitors year-round.

Downtown Dunn features key destinations such as shops, restaurants, and municipal services.

Key Challenges

1. Lack of existing bicycle facilities
2. High-volume, high-speed arterial roadways
3. Lack of wayfinding signage for key destinations
4. Narrow roadway and right-of-way widths for arterial roadways

Currently there are no on-street bicycle facilities in Dunn and roads such as King Avenue and Broad Street would be safer for bicycle travel if they offered bicycle facilities.

Multi-lane arterial roadways such as Pope Road are unsafe for bicyclists because of high automobile speeds and traffic volumes.

Downtown Dunn is a bustling hub of activity with key destinations located close together, however, there is no signage that provides direction or destination information.

Many arterial roadways such as McKay Avenue do not have adequate width to add bicycle lanes and right-of-way widths also appear to be very narrow.

EXISTING & PAST PROGRAMS

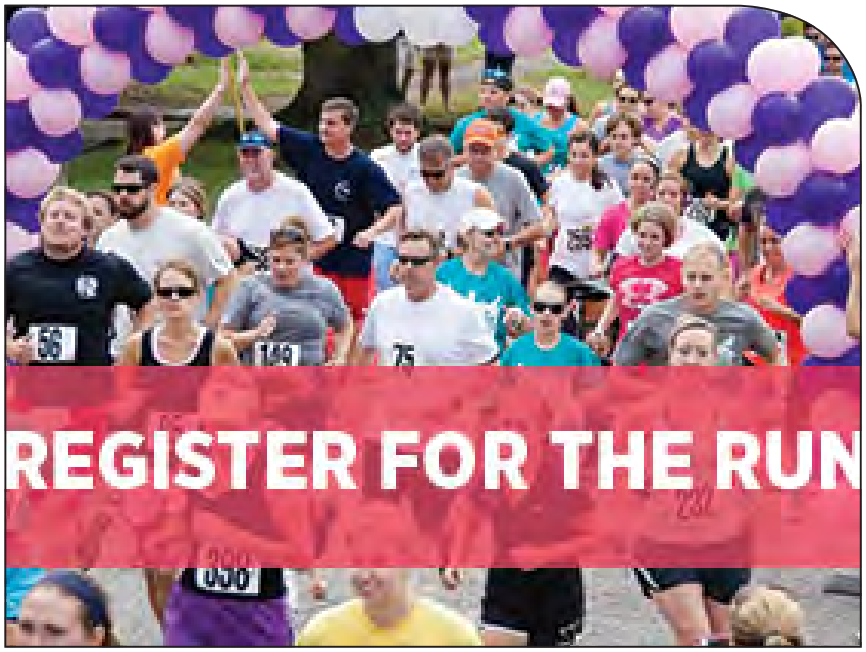
The City of Dunn does not currently facilitate programs directly related to bicycle education, encouragement, or enforcement. However, the City, through the Parks and Recreation Department and the Dunn Area Tourism Authority, does promote and facilitate several other programs and events that residents and visitors of Dunn participate in every year.

As mentioned above, the Dunn Area Tourism Authority sponsors two separate 5k runs/walks that utilize the current road and trail system in the Dunn area. Those runs are-

- Railtrail Run for CareNet- A 5k run/walk held annually in April. This benefit race takes runners/walkers through scenic countryside from downtown Dunn into downtown Erwin.

- ACCRF Run- Held annually the last Saturday in August. A benefit 5k run and 1 mile fun run through downtown Dunn, with all proceeds going to Adenoid Cystic Carcinoma Research.

In addition to the 5k races, a triathalon is held on the first Saturday in June. The bicycle section of the race takes place along the rural back roads around Dunn, kayaking down the Cape Fear River, and a three-mile run to the finish line in downtown Erwin.



The ACCRF Run is held in downtown Dunn every August.

The RailTrail 5K run/walk.

RELATED PLANS & INITIATIVES

The following local and regional plans are relevant to bicycle and pedestrian planning in Dunn. Links to more information and online versions of these plans are provided below.

Dunn 2005 Land Use Plan- The development plan is offered to protect Dunn's sensitive natural areas and to guide its projected residential, commercial, industrial growth for the next twenty years. Within the 2005 Land Use Plan, a set of goals is established to direct future development projects. Goal 3 of that plan is to maintain, enhance, and expand Dunn's system of parks and recreational areas to better serve the needs of its diverse and growing population. This goal would be met by creating a bicycle and pedestrian plan that integrates new trail development with the network of existing trails. Included in this strategy is the construction of additional bike, nature and greenway trails within Dunn that would be interconnected with the Dunn-Erwin Rail Trail and other parks in the city.

2008 City of Dunn Pedestrian Plan- The intent of the Dunn Comprehensive Pedestrian Plan is to provide guidance for developing the City of Dunn into a more pedestrian-friendly community. The Pedestrian Plan offers guidance for future pedestrian-related projects and improvements in the City, as well as recommended programs and policies that will improve local walking conditions, such as a Safe Routes to School Program and Pedestrian Safety Campaign. This plan also establishes Design Guidelines to provide a set of standards for the design of pedestrian facilities, such as sidewalks, crossings and greenway designs.

2011 Harnett County Comprehensive Transportation Plan- This long range multi-modal transportation plan covers the transportation needs of Harnett County through 2035. This plan identified corridor improvement projects in Dunn that would benefit from the incorporation of bike lanes and sidewalks. This plan directly referenced the 2008 City of Dunn Pedestrian Plan recommending the development of a network of Multi-Use Paths in Dunn.

2008 City of Dunn Pedestrian Plan.

The City of Dunn 2005 Land Use Plan.

PUBLIC INPUT ON EXISTING CONDITIONS

Public input for this plan was collected through the project website, public comment form (see below), public workshops, and social media. Generally, the feedback from residents, visitors, and property owners is that they feel the current bicycling conditions are poor or fair and that improving them is very important. Safety and connectivity were the driving factors identified by the steering committee, and that was reflected in the public comments received about the need to better connect to the exiting Dunn-Erwin Rail Trail.

City of Dunn Comprehensive Bicycle Plan PUBLIC COMMENT FORM 2014

1 How **OFTEN** do you ride your bike? (Select one)

- _ It is part of my daily routine
- _ A few times a week
- _ A few times a month
- _ A few times a year
- _ Planning to purchase a bike soon

2 What would make biking more **USEFUL**? (Select two)

- _ Many of my destinations are close to each other
- _ My route choices are direct; I don't have to go out of my way
- _ I have multiple route options
- _ Biking is a convenient choice
- _ Bike parking is available

3 What would make biking more **SAFE**? (Select two)

- _ Better lighting
- _ Better intersection features, such as crosswalks
- _ More protection or separation between cars and myself
- _ Slower vehicle speeds
- _ More police enforcement
- _ More education for drivers and cyclists

4 What would make biking more **COMFORTABLE**? (Select two)

- _ Better lighting
- _ More street trees
- _ More space between cars and myself
- _ Slower vehicle speeds
- _ Road conditions

5 What would make biking more **INTERESTING**? (Select two)

- _ Seeing people I know while I am out
- _ Being more social/group-oriented
- _ Hearing and seeing nature
- _ Having several places to shop or visit on one bike ride
- _ Public art

6 Why do you bike? (Select all that apply)

- _ I don't bike
- _ Recreation/fitness/health
- _ To get to school/work
- _ To get to nearby destinations
- _ Charitable causes

7 If you had 10 dollars to spend on improving biking conditions in Dunn, what would you spend it on and how much would you spend on each item?

- _ New bike lanes
- _ New trails
- _ Infrastructure enhancements in downtown & around schools
- _ Maintain and repair what we already have

8 How should bike facilities be funded?

- _ Local funds
- _ State funds
- _ Federal funds
- _ Public grants
- _ Private funds
- _ Public & private partnerships

9 Which roadway in Dunn do you think would benefit the most from bicycling improvements?

_____

_____

10 What is your sex?

- _ Male
- _ Female

11 What is your age?

- _ < 20
- _ 20s
- _ 30s
- _ 40s
- _ 50s
- _ 60s
- _ 70+

12 What are the top reasons to get more people biking? (Select two)

- _ Quality of life
- _ Transportation
- _ Economic development
- _ Health
- _ Environmental Stewardship
- _ Recreation

13 Would you bike more if safe and comfortable facilities were created for you?

- _ Yes
- _ No

14 Would you be interested in participating in a bicycling education event or activity?

- _ Yes
- _ No

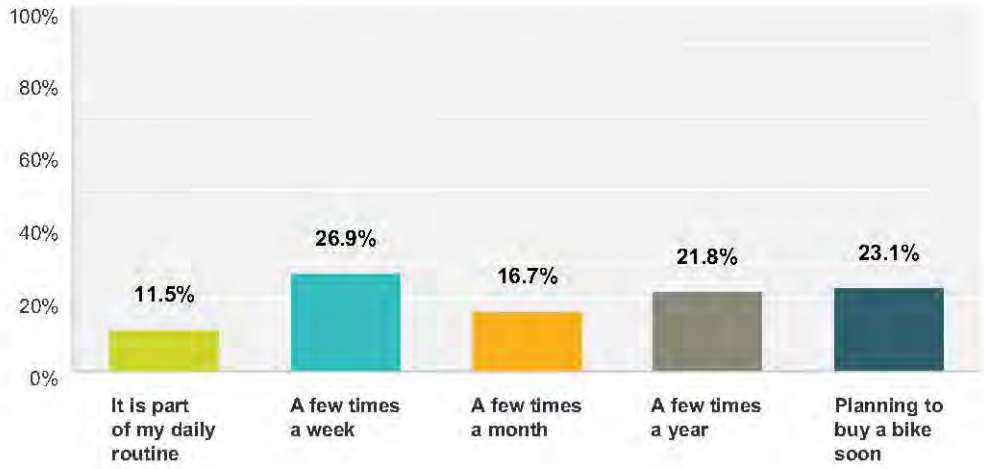
Return Completed Form To: Ms. Samantha Wullenwaber, Planning Director, 102 N. Powell Avenue, Dunn, NC

Public Comment Form Results

The charts below summarize public input collected during this planning process in Spring and Summer 2014.

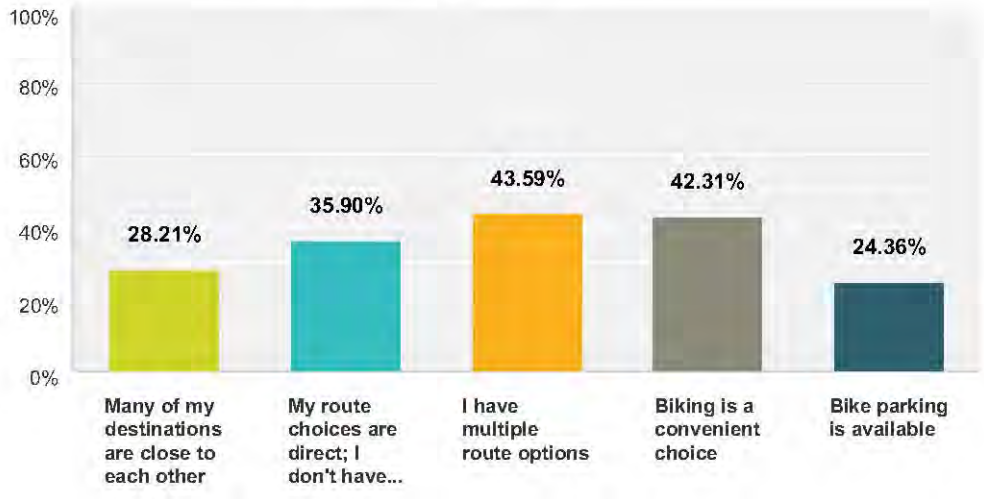
Q1 How OFTEN do you ride your bike?

Answered: 78 Skipped: 0

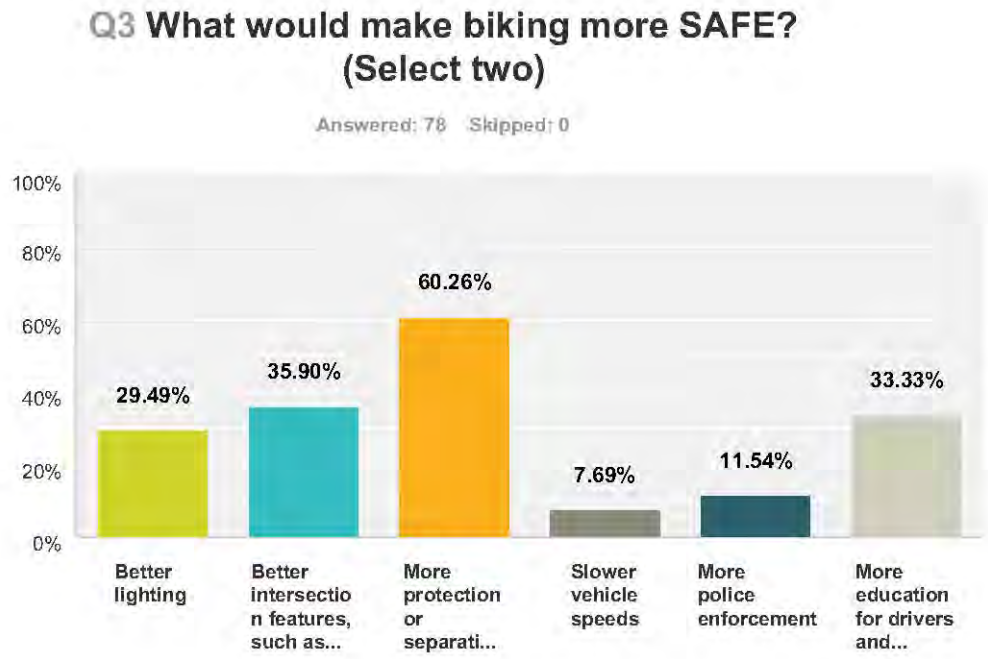


Q2 What would make biking more USEFUL? (Select two)

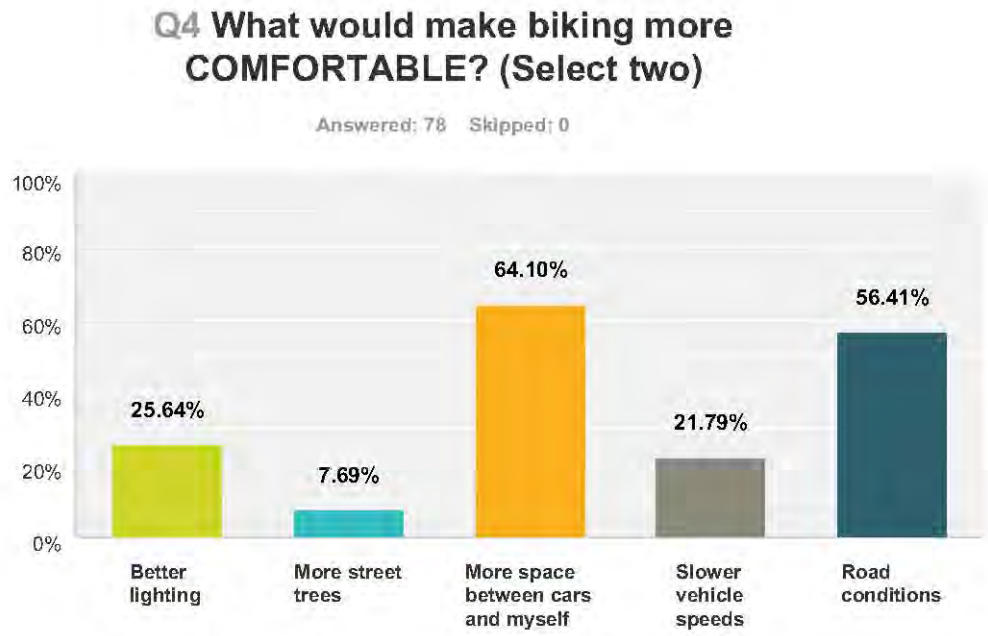
Answered: 78 Skipped: 0



See Question 2 in the Comment Form on page 2-20 for the above answer that is not completely visible here

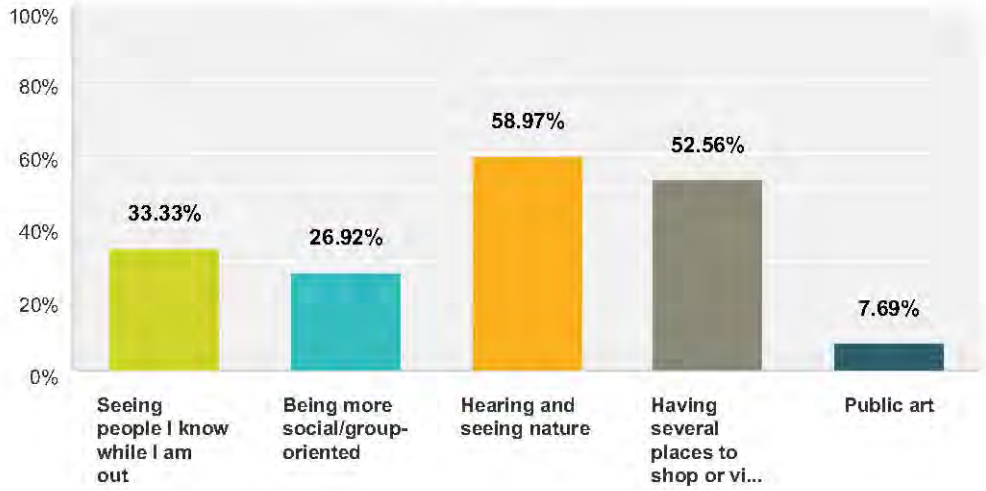


See Question 3 in the Comment Form on page 2-20 for the above answers that are not completely visible here



Q5 What would make biking more INTERESTING? (Select two)

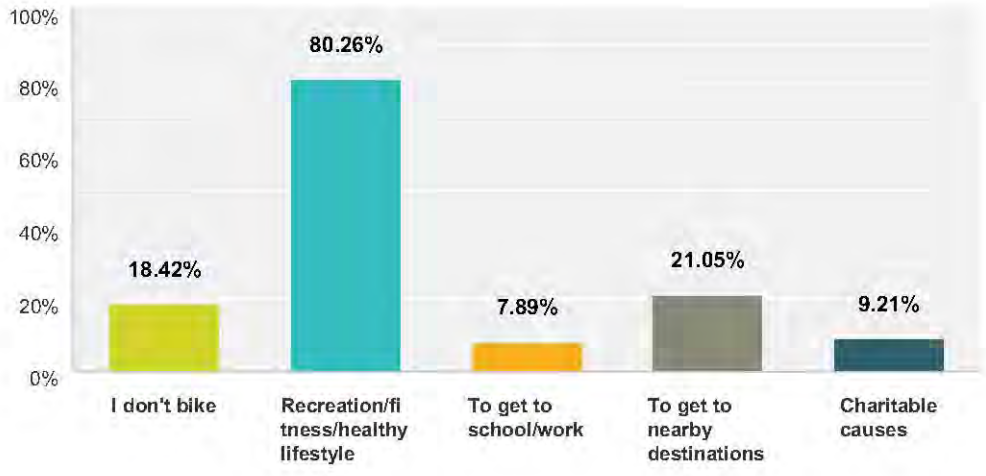
Answered: 78 Skipped: 0



See Question 5 in the Comment Form on page 2-20 for the above answer that is not completely visible here

Q6 Why do you bike?

Answered: 76 Skipped: 2



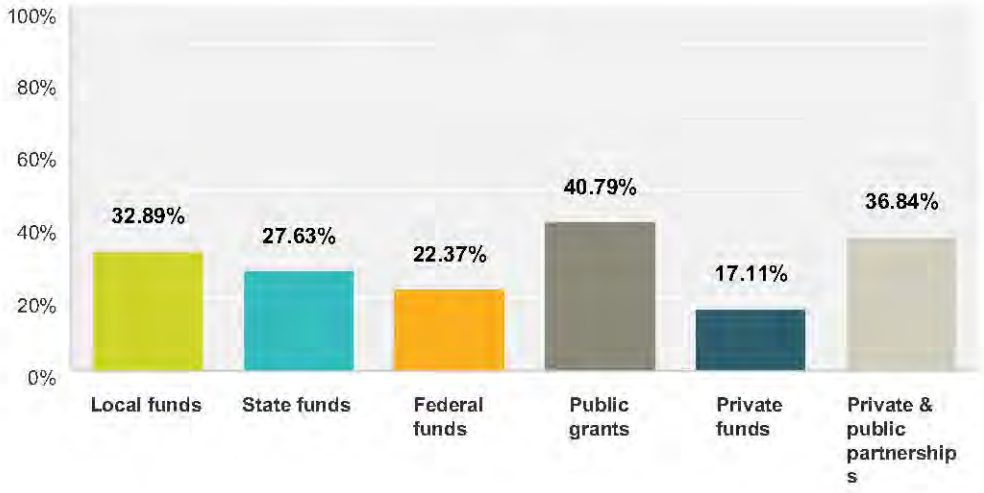
Q7 If you had $10 dollars to spend on improving biking conditions in Dunn, what would you spend it on and how much would you spend on each item?

Answered: 75 Skipped: 3

Answer Choices	Responses	
New bike lanes	56.00%	42
New trails	61.33%	46
New sidewalks	8.00%	6
Intersection improvements	20.00%	15
Infrastructure enhancements in downtown & around schools and parks	20.00%	15
Infrastructure enhancements around schools	6.67%	5
Infrastructure enhancements in my neighborhood	8.00%	6
Maintain and repair what we already have	32.00%	24

Q8 How should bike facilities be funded?

Answered: 76 Skipped: 2



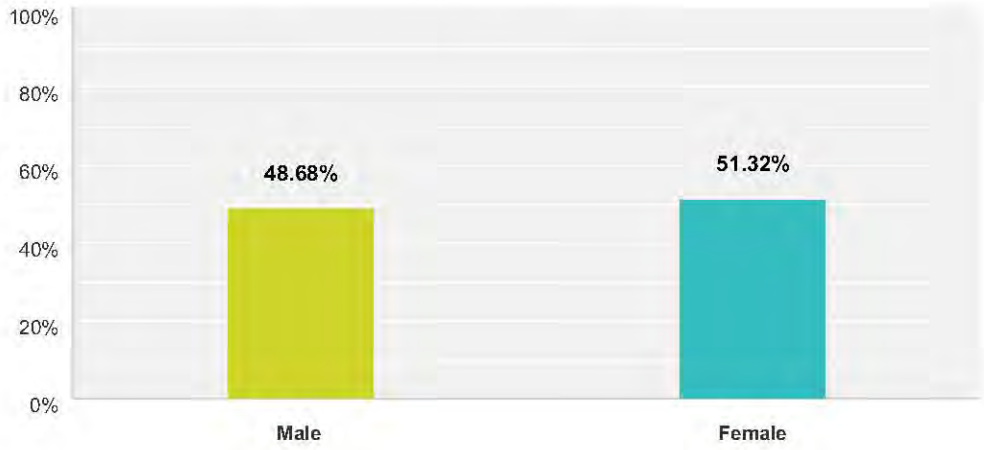
Q9 Which roadway in Dunn do you think would benefit the most from bicycling improvements?

Answered: 65 Skipped: 13

Larger text proportionally represents street names that were frequently cited

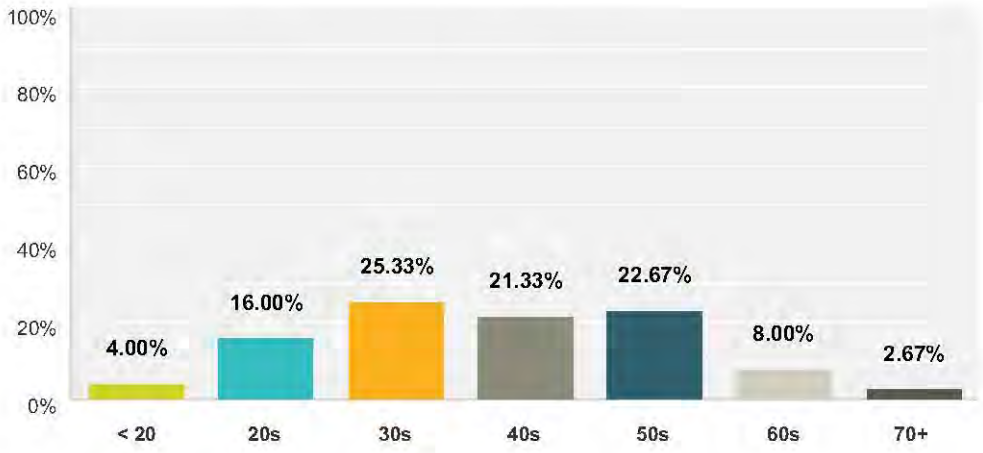
Q10 What is your sex?

Answered: 76 Skipped: 2



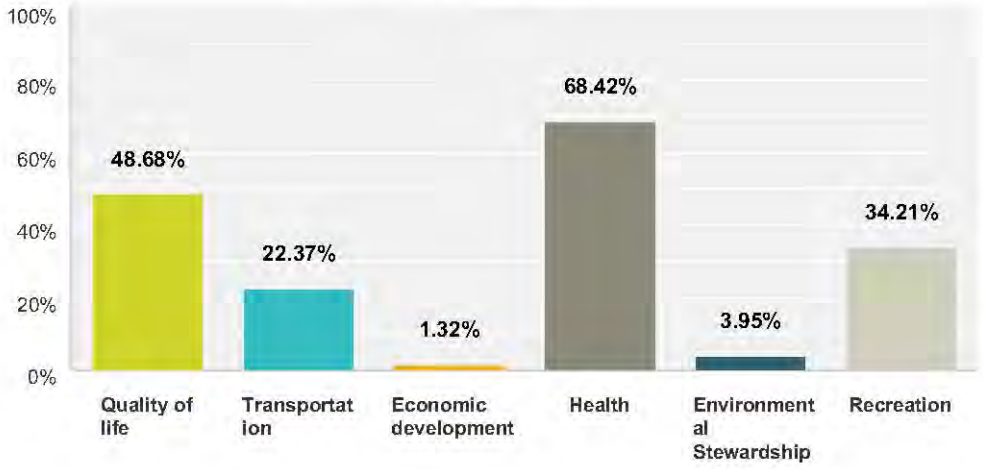
Q11 What is your age?

Answered: 75 Skipped: 3



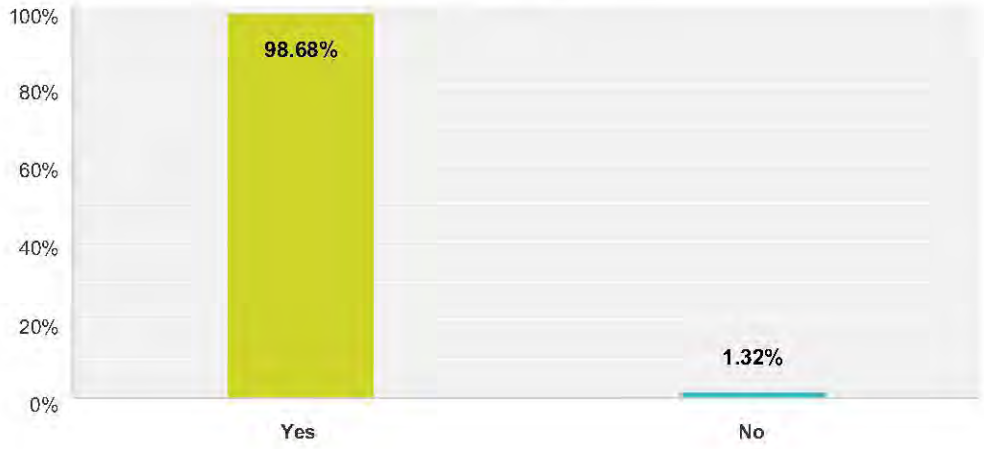
Q12 What are the top reasons to get more people biking? (Select two)

Answered: 76 Skipped: 2



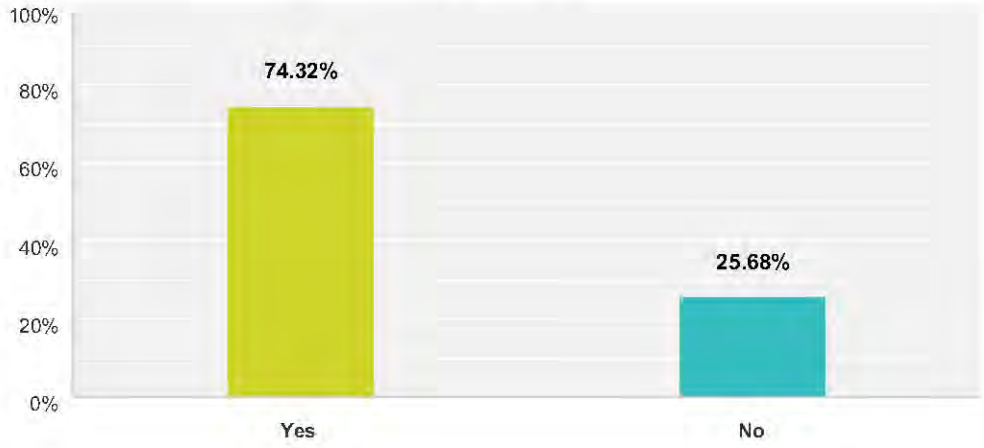
Q13 Would you bike more if safe and comfortable facilities were created for you?

Answered: 76 Skipped: 2



Q14 Would you be interested in participating in a bicycling education event or activity?

Answered: 74 Skipped: 4



Rail-Trail near Powell Street

Chapter 3: Recommendations

Chapter Contents:

OVERVIEW

This chapter features recommendations for bicycle facilities in the City of Dunn, followed by recommendations for related programs and policies. The recommended bicycle network consists of existing and proposed facilities such as bicycle lanes, signed routes, and greenways. Conceptually, these bicycle facilities and the destinations they connect form a network of 'hubs and spokes'. Downtown Dunn, shopping centers, parks, neighborhoods, schools, and other places where people bicycle to and from are the 'hubs', whereas bicycle lanes, trails, and other bicycle facilities are the 'spokes' that connect them (see diagram below).

Methodology for Bicycle Network Design

The recommended bicycle network was developed by assembling and analyzing information from several sources: input from the staff and steering committee, public input from comment forms and workshops, previous plans and studies, locations of existing facilities and destinations, and the consultant's field analysis. Field work examined the potential and need for bicycle facilities along key corridors in Dunn, with a focus on potential connections between key destinations.

TYPES OF BICYCLISTS

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. Each of these groups has different bicycle facility needs, so it is important to consider how a bicycle network will accommodate each type of cyclist when creating a non-motorized plan or project. The 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.

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

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.

The images and descriptions on the following pages are provided for a quick reference when viewing the bicycle network maps included in this chapter. For more information on facility design, please see Appendix A: Design Guidelines.

BICYCLE FACILITY TYPES

The descriptions on pages 3-5 through 3-9 offer a brief overview of the primary facility types recommended in this plan. The facility types recommended for the City of Dunn accommodate the types of cyclists described on page 3-2 as well as the range of roadway environments present in the community. Many facility types are appropriate in multiple settlement types, such as signed roadways and multi-use trails, while others are most appropriate in specific areas.

Bicycle Boulevard (Neighborhood Greenways)

Bicycle boulevards are streets with low motorized traffic volumes and speeds, designated and designed to give bicycle travel priority. Bicycle Boulevards use signs, pavement markings and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.

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

A bike boulevard in Portland, Oregon, featuring a neighborhood traffic circle. See Appendix A, page A-11 for bike boulevard design guidelines.

Example bicycle boulevard recommendation: King Avenue (shown near W. Edgerton Street).

Marked Shared Roadways (sharrows)

Marked shared roadways (also known as "shared lane markings" or "sharrows") have become more popular as a pavement marking treatment to help align cyclists properly within more urban landscapes that may feature on-street parking, a variety of lane widths, and other factors.

Sharrows in Raleigh, NC. See Appendix A, page A-10 for sharrow design guidelines.

Sharrows on N. Front Street in Downtown Wilmington, NC. See Appendix A, page A-10 for sharrow design guidelines.

Example sharrow recommendation: Divine Street in Dunn (shown near S. Elm Avenue).

Example sharrow recommendation: Wayne Avenue to connect to Wayne Avenue School.

Bicycle Lanes

A bicycle lane is defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists.

Bicycle lane on Harding Drive in Goldsboro. See Appendix A, page A-14 for bicycle lane design guidelines.

Bicycle lane in Durham, NC. See Appendix A, page A-14 for bicycle lane design guidelines.

Example bicycle lane recommendation: Granville Street in Dunn (shown near N. Fayetteville Avenue).

Example bicycle lane recommendation: Broad Street in Dunn (shown near N. McKay Avenue).

Paved Shoulders

In many rural areas on roadways with speed limits equal to or less than 45 MPH, four-foot wide paved shoulders (or 'shoulder bikeways') are the typical treatment for accommodating bicyclists. Four-foot-wide paved shoulders allow bicyclists to travel on a paved surface adjacent to through traffic, if desired. Five-foot wide paved shoulders are appropriate for roadways with speed limits greater than 45 MPH.

Paved shoulder in Durham, NC. See Appendix A, page A-13 for paved shoulder design guidelines.

Paved shoulder, location unknown. See Appendix A, page A-13 for paved shoulder design guidelines.

Example paved shoulder recommendation for Fairground Road in Dunn (shown near N. Ellis Avenue).

Example paved shoulder recommendation for Tilghman Drive to connect to the proposed facilities along Susan Tart Road.

Multi-Use Trails

The term "multi-use trails" refers to trails built in open space, along utility corridors such as sewer or power line easements, stream corridors, or along a roadway within the existing right-of-way. Such trails are closed to motorized traffic and designed for two-way travel by bicyclists and pedestrians. As described in Appendix A: Design Guidelines, a multi-use trail should be an all-weather surface and accessible within urban, suburban, and rural areas.

Trails can be constructed of many different materials, however, for trails that serve the purpose of bicycle transportation, hard surfaces such as asphalt or concrete are recommended. Each trail project will also require close coordination with nearby property owners. Design features such as landscaped screening, fencing, and other treatments should be considered to help ensure privacy where desired.

The City of Dunn should work closely with Harnett County to develop multi-use trails, trail spurs, and side paths that connect to neighborhoods, commercial areas, downtown, schools, park, and the recommended on-road bicycle network. Multi-use trails in Dunn should be integrated with and serve as an off-road extension of the on-road bicycle facility network.

The Tar River Greenway in Greenville, NC is a hard surface/paved trail. See Appendix A, page A-37 for multi-use path design guidelines.

The Dunn-Erwin Rail-Trail is a natural surface trail.

The Virginia Creeper Trail in Damascus, VA, is a natural surface trail. See Appendix A, page A-40 for natural surface greenway design guidelines.

Multi-Use Side Paths

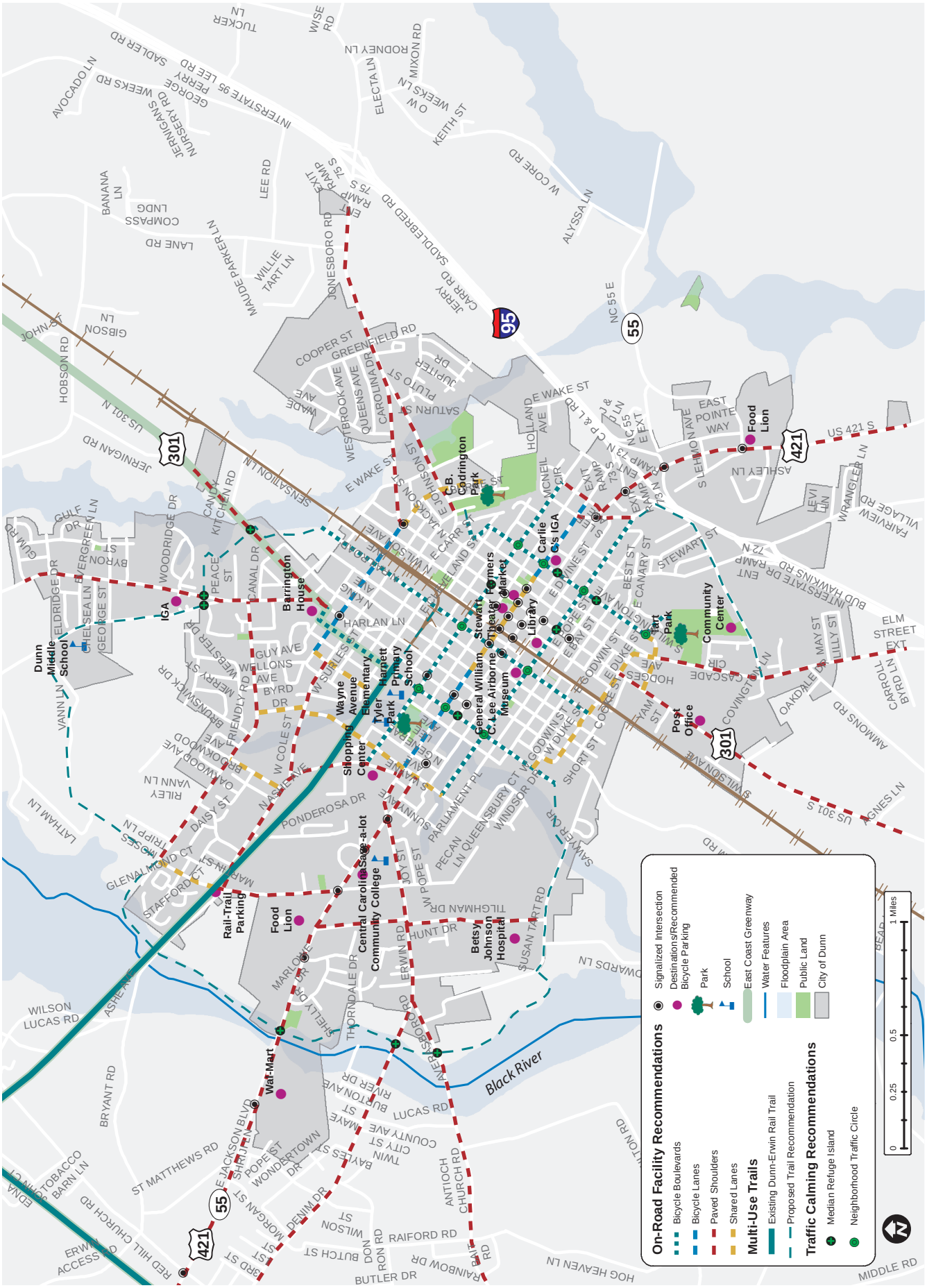
A multi-use side path is a type of multi-use trail that follows a road corridor but is separated from on-road traffic. Side paths are more transportation-oriented in character and used by bicyclists and pedestrians. They are typically only appropriate for bicyclists if there are a limited number of driveways and intersections. Where side paths are proposed in Dunn, factors such as the distance between destinations, adjacent land use, and population density were considered.

Families and novice bicyclists are most comfortable on multi-use trails. Therefore, a comprehensive network of multi-use trails, that includes trails built in open space as well as side paths is an integral part of the overall bicycle facility network, and its development should be a priority of the City of Dunn.

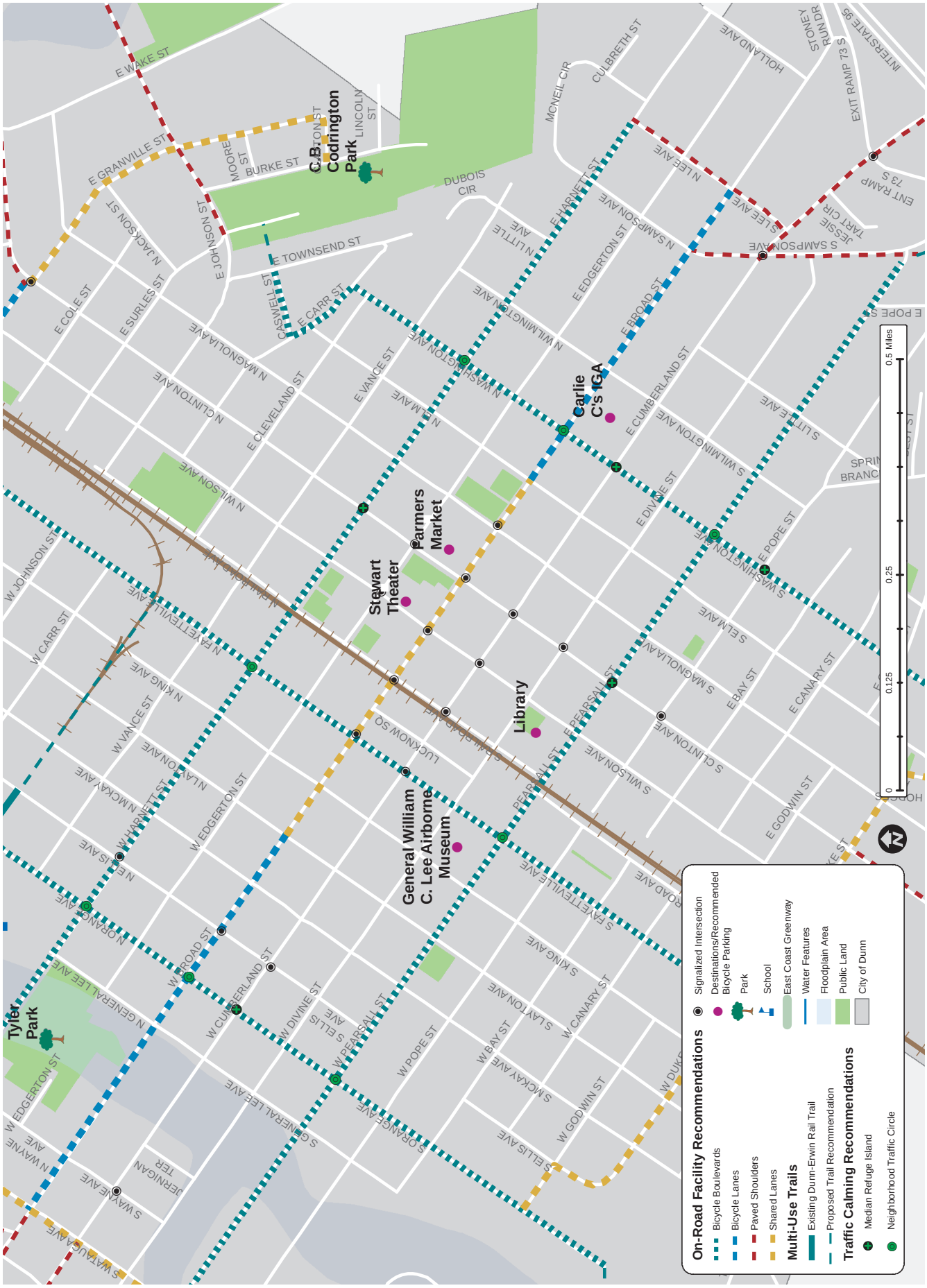
Side path example from Conover, NC. See Appendix A, page A-40 for design guidelines for multi-use paths along roadways.

Side path example from Raleigh, NC. See Appendix A, page A-40 for design guidelines for multi-use paths along roadways.

MAP 3.1 OVERALL BICYCLE NETWORK RECOMMENDATIONS

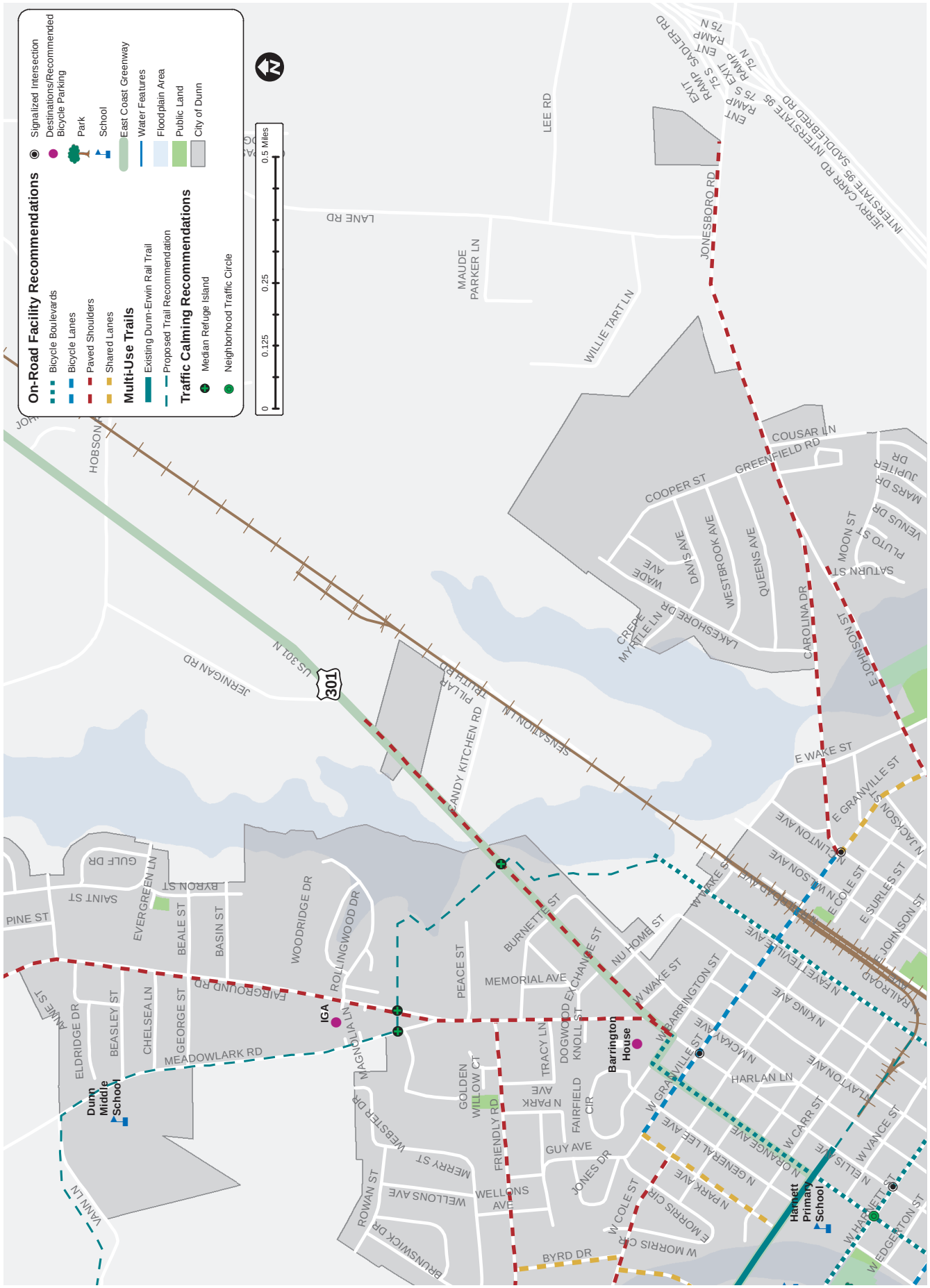


MAP 3.2 DOWNTOWN RECOMMENDATIONS

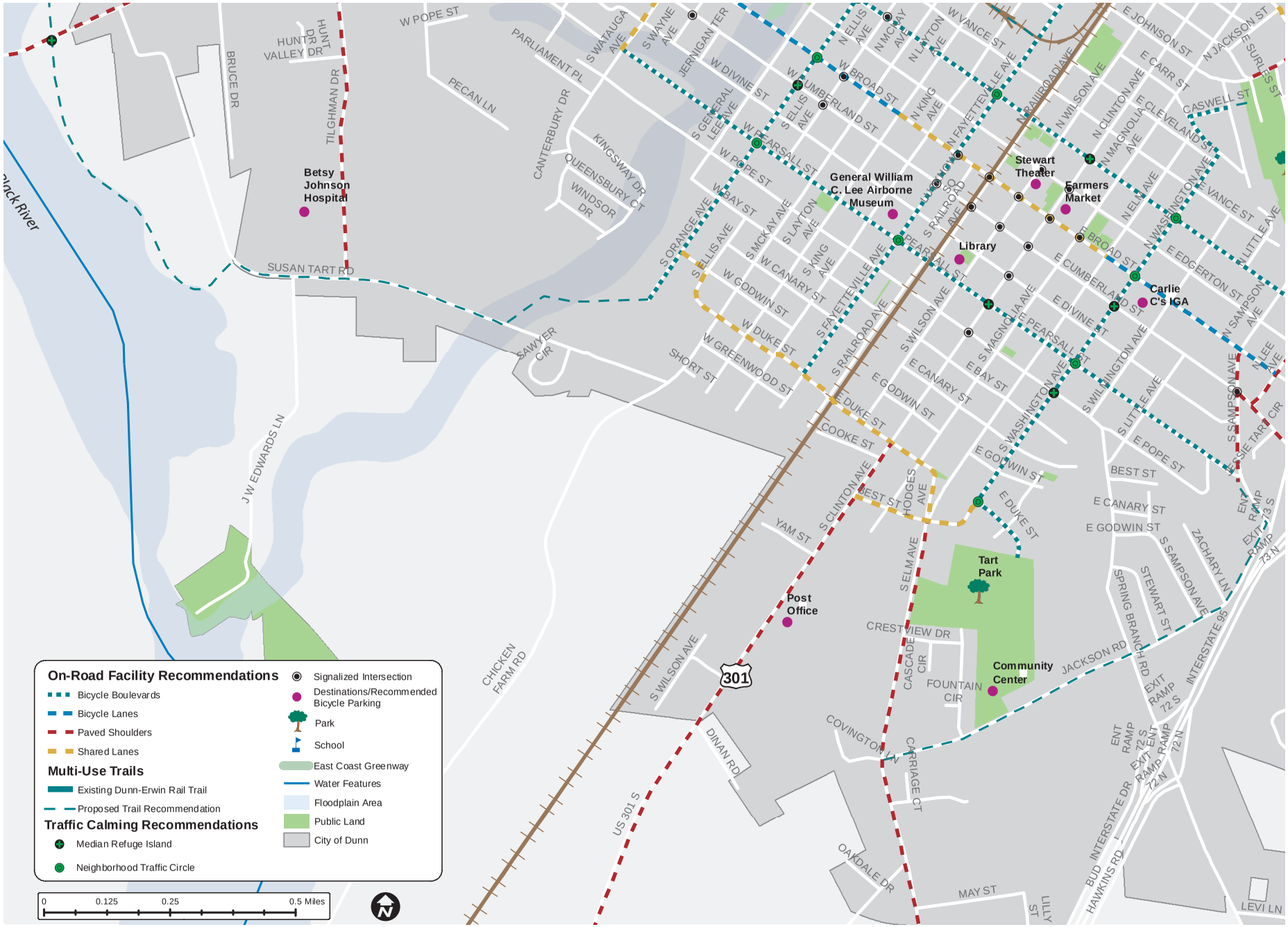


MAP 3.3 NORTHWESTERN DUNN RECOMMENDATIONS

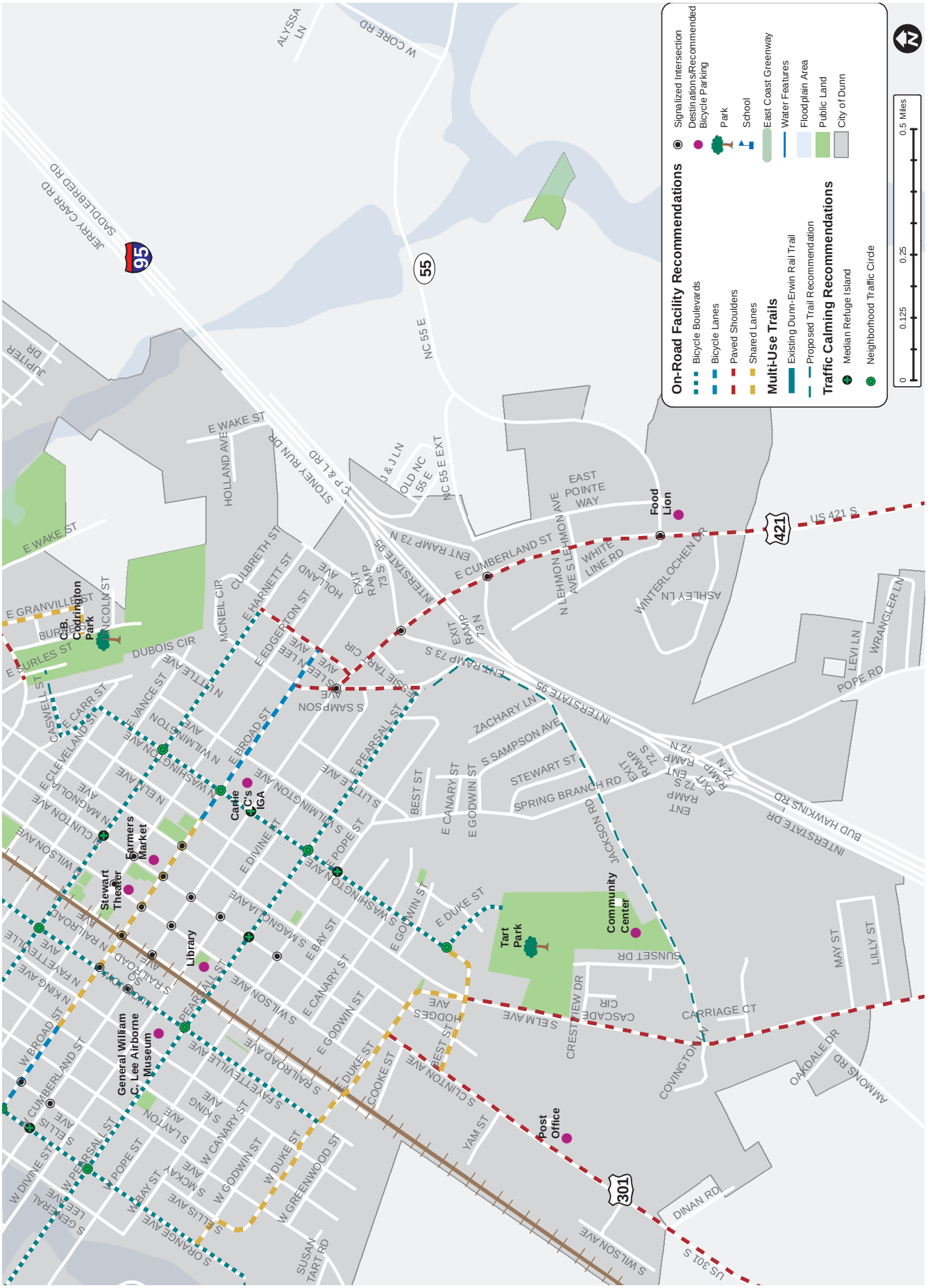
MAP 3.4 NORTHEASTERN DUNN RECOMMENDATIONS



MAP 3.5 SOUTHWESTERN DUNN RECOMMENDATIONS



MAP 3.6 SOUTHEASTERN DUNN RECOMMENDATIONS



PROJECT PRIORITIZATION

The prioritization process began with input from City staff and steering committee members on high priority areas and corridors during the project kick-off meeting. The consultant team then reviewed previous planning documents for Dunn and extracted information on project priorities. During fieldwork investigations, the consultant team evaluated and ground-truthed the high priority areas and corridors to identify the most appropriate facility type for each corridor.

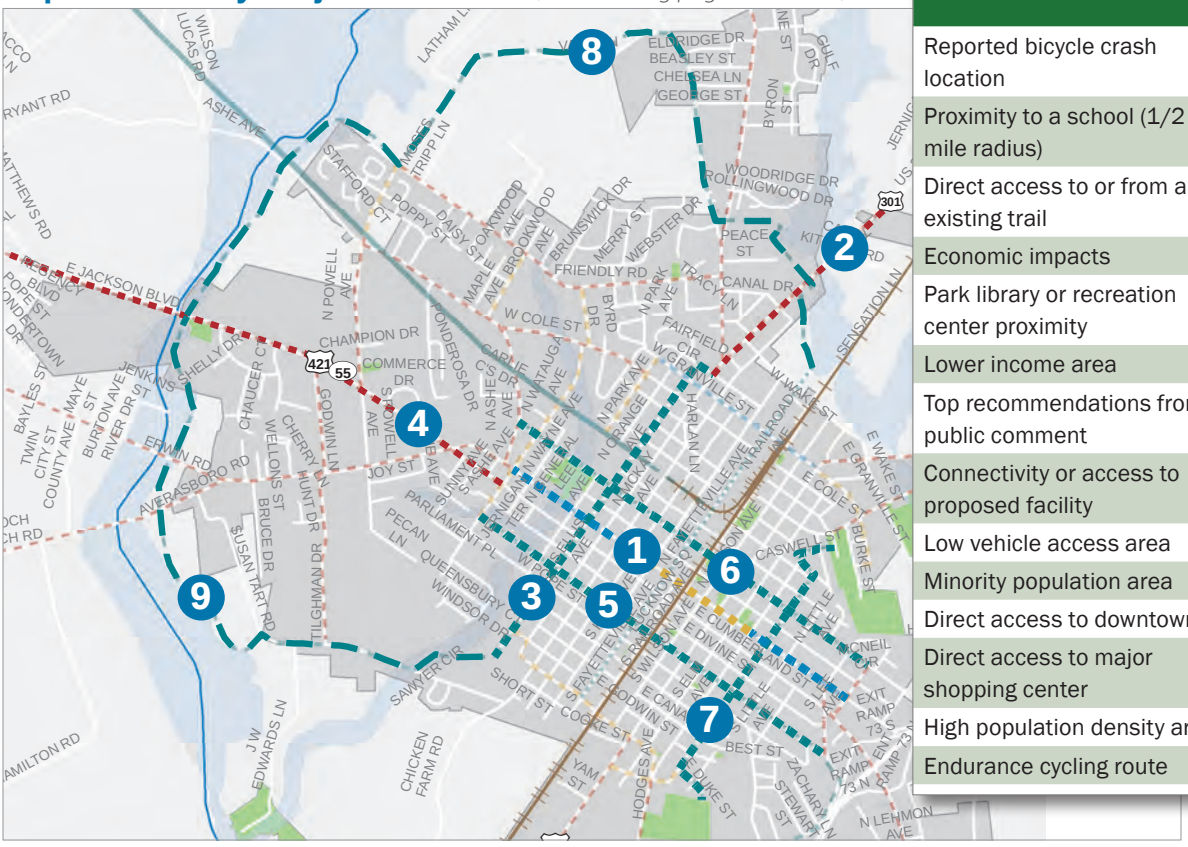
During a committee meeting, project prioritization criteria were discussed and selected by the steering committee members. Committee members were then asked to assign a score to each prioritization criterion. All of the scores were averaged and a final weighted score for each criterion was determined. The table below presents the results of the criteria scoring process.

Network recommendations were evaluated against the prioritization criteria and the top nine projects were identified. Priority projects were then reviewed and discussed with the steering committee, public, City staff, and NCDOT staff. The nine priority project segments are presented beginning on the following pages.

Table 3.1 Prioritization Criteria Scoring

Prioritization Criteria	Weighted Score
Reported bicycle crash location	4.83
Proximity to a school (1/2 mile radius)	4.66
Direct access to or from an existing trail	4.33
Economic impacts	4.16
Park library or recreation center proximity	4.0
Lower income area	3.83
Top recommendations from public comment	3.66
Connectivity or access to proposed facility	3.66
Low vehicle access area	3.33
Minority population area	3.33
Direct access to downtown	3.1
Direct access to major shopping center	3.1
High population density area	2.5
Endurance cycling route	1.83

Map 3.7 Priority Project Locations *(see following pages for details)*



1) Broad Street, 2) US 301/Ellis Avenue, 3) Orange Avenue / Bay Street, 4) US 421/Cumberland Street, 5) Pearsall Street, 6) Harnett Street, 7) Washington Avenue, 8) Dunn Middle School Trail, and 9) Betsy Johnson Hospital Trail

Priority Project #1: Broad Street Bicycle Lanes and Sharrows from Watauga Avenue to Lee Avenue

Broad Street is one of the critical corridors that connect eastern and western areas of Dunn with downtown. Broad Street also provides direct access to Tyler Park and several options for groceries and recreation. Both Wayne Avenue Elementary and Harnett Primary School are within 1/2 mile of the proposed Broad Street bicycle lanes. The Broad Street bicycle lanes would run 0.94 miles, interrupted by 0.5 miles of sharrows from Layton Avenue to Elm Avenue due to downtown roadway configuration. The bicycle lane portion will require automobile travel lane width reduction and the limitation of on-street parking.

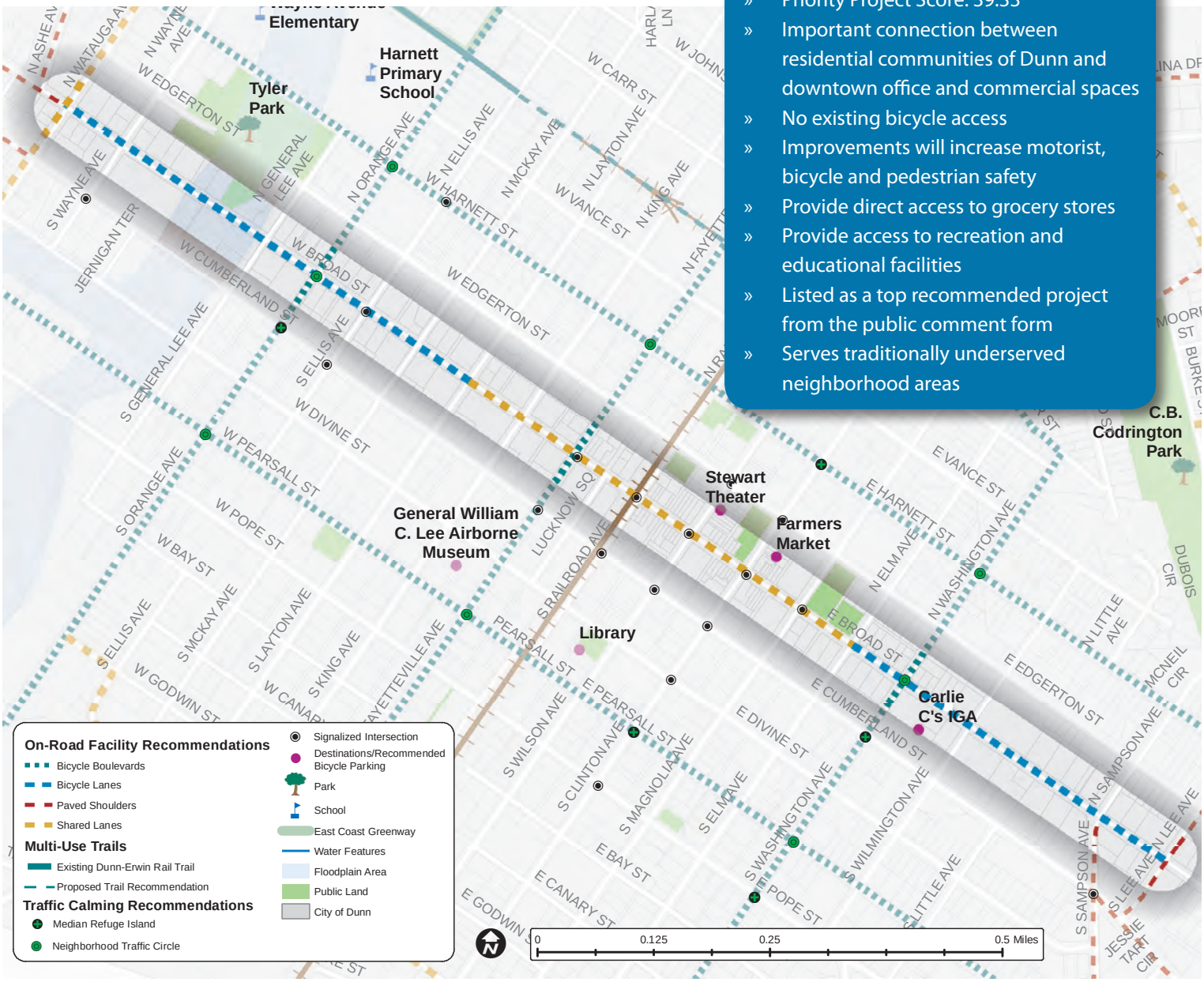
Planning-level Cost Estimate: $110,563.01

Broad Street

Why It's important:

- Priority Project Score: 39.33
- Important connection between residential communities of Dunn and downtown office and commercial spaces
- No existing bicycle access
- Improvements will increase motorist, bicycle and pedestrian safety
- Provide direct access to grocery stores
- Provide access to recreation and educational facilities
- Listed as a top recommended project from the public comment form
- Serves traditionally underserved neighborhood areas

Priority Map #1: Broad Street Bicycle Lanes & Sharrows



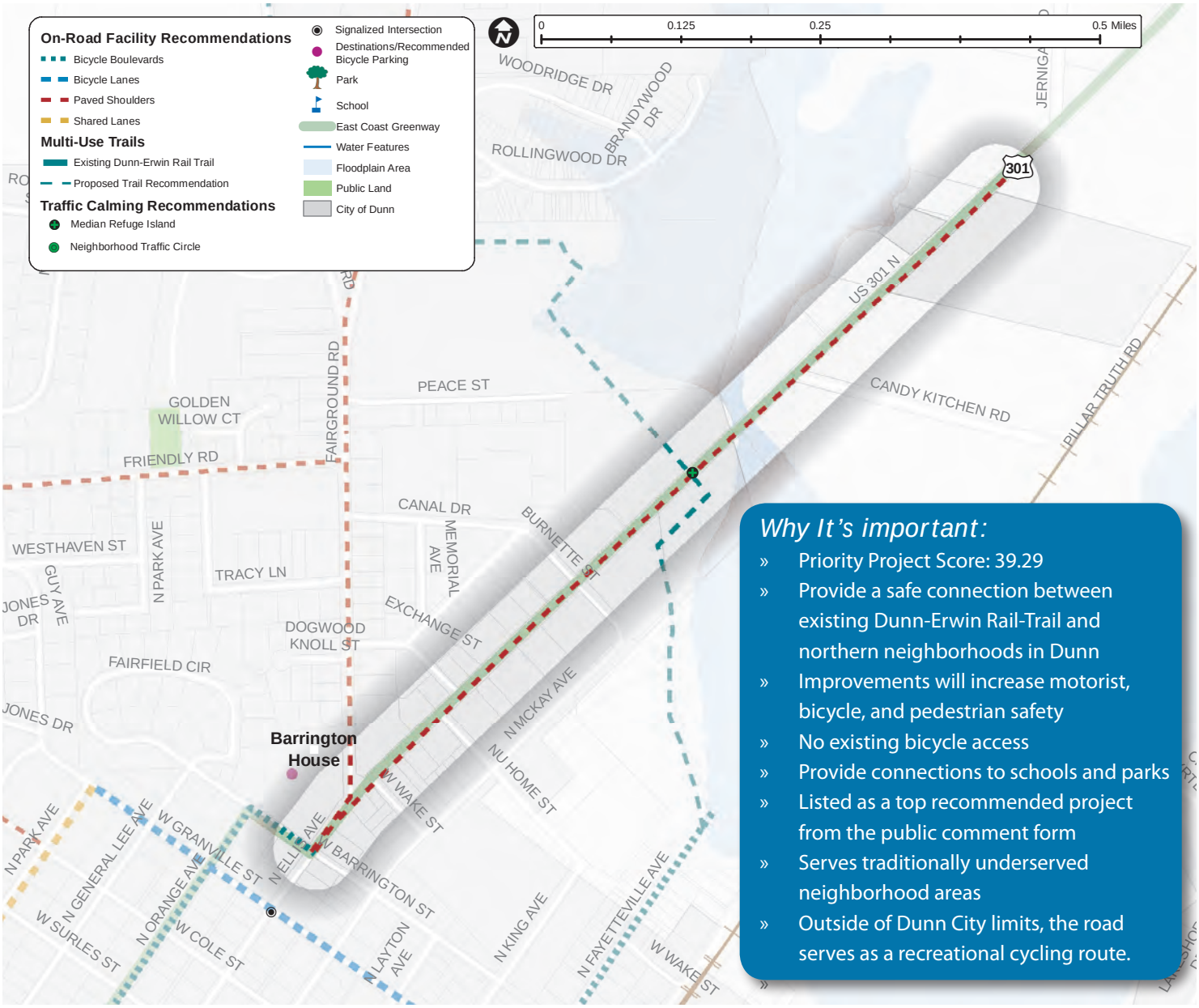
Priority Project #2: US 301/Ellis Avenue Paved Shoulders from Jernigan Road to Barrington Street

Ellis Avenue is an important corridor of connectivity in Dunn, especially as part of the East Coast Greenway. The two-lane road connects from north of Dunn, south towards the Barrington House. From Barrington Street, this plan recommends shifting the East Coast Greenway to the proposed bicycle boulevard on N Orange Avenue, connecting south to the Dunn-Erwin Rail Trail and Harnett Primary School. This 0.9 mile stretch of roadway would benefit from the construction of 4' wide asphalt paved shoulders in both directions of traffic. The construction of the paved shoulders would include pavement markings and intersection treatments.

Ellis Avenue

Planning-level Cost Estimate: $56,111.48

Priority Map #2: US 301/Ellis Avenue Paved Shoulders



Why It's important:

- Priority Project Score: 39.29
- Provide a safe connection between existing Dunn-Erwin Rail-Trail and northern neighborhoods in Dunn
- Improvements will increase motorist, bicycle, and pedestrian safety
- No existing bicycle access
- Provide connections to schools and parks
- Listed as a top recommended project from the public comment form
- Serves traditionally underserved neighborhood areas
- Outside of Dunn City limits, the road serves as a recreational cycling route.

Priority Project #3: Orange Avenue Bicycle Boulevard from Barrington Street to the southern terminus of Orange Avenue

This 1.26 mile project area includes Orange Avenue and is a vital bicycling connection for residents of Dunn. Orange Avenue has several key destinations and residential communities along the roadway. Wayne Avenue Elementary School, Harnett Primary School and Tyler Park are all within a 1/4 mile of the proposed bike boulevard. Orange Avenue also provides direct access to the Barrington House and the existing Dunn-Erwin Rail Trail. Three neighborhood traffic circles and a vegetative median refuge island will be placed along Orange Avenue for traffic calming. Bicycle boulevard street markings will be placed every 250 feet along both roadway corridors.

Planning-level Cost Estimate: $68,307.85

Priority Map #3: Orange Avenue Bicycle Boulevard

Why It's important:

- Priority Project Score: 38.63
- Recent reported bicycle crash location
- Provides direct access to local schools and existing Dunn-Erwin Rail-Trail
- No existing bicycle access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to businesses and residences along Orange Avenue
- Serves traditionally underserved neighborhood areas

Priority Project #4: US 421/Cumberland Street Paved Shoulders from Watauga Avenue to the Dunn-Erwin Rail Trail

From Watauga Avenue, US 421/Cumberland Street feels like a commercial corridor with large businesses, wide lanes of separated traffic and large intersections. To improve bicycling conditions along this scenic and economic corridor, a 5' wide paved asphalt shoulder is recommended for both directions of traffic. This 2.55 mile shoulder widening project will improve biking conditions for a corridor that has experienced a recent crash, ensure local residents access to grocery stores and provide a stronger connection to the regional transportation network.

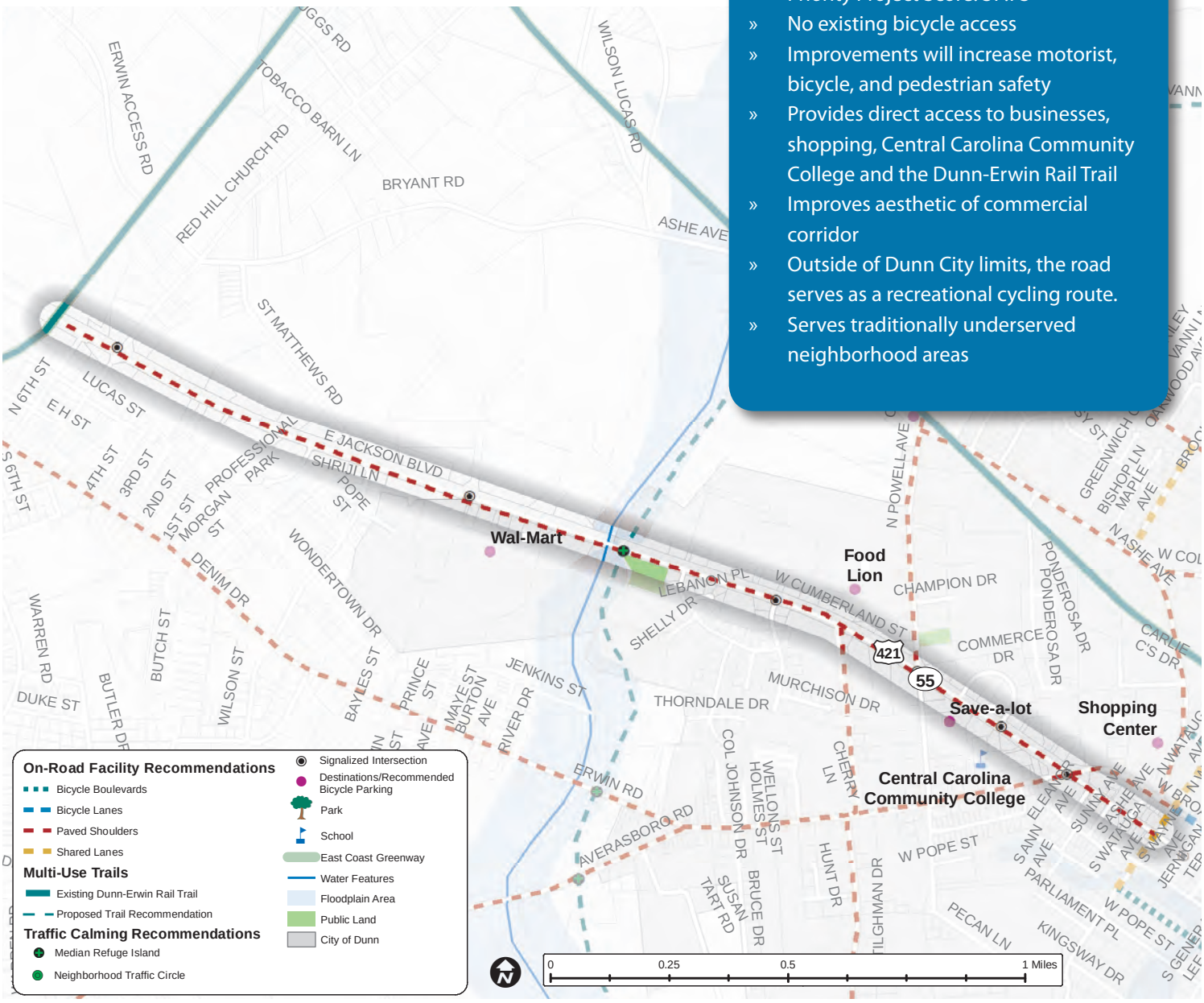
Planning-level Cost Estimate: $198,406

Cumberland Street

Why It's important:

- Priority Project Score: 37.73
- No existing bicycle access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to businesses, shopping, Central Carolina Community College and the Dunn-Erwin Rail Trail
- Improves aesthetic of commercial corridor
- Outside of Dunn City limits, the road serves as a recreational cycling route.
- Serves traditionally underserved neighborhood areas

Priority Map #4: US 421/Cumberland Street Paved Shoulders



Priority Project #5: Pearsall Street Bicycle Boulevard from Watauga Avenue to Sampson Avenue

A bicycle boulevard is planned for the 7,795-foot corridor of Pearsall Street running from S. Watauga Avenue to S. Sampson Avenue. This stretch of road will include the development of three neighborhood traffic circles and one median refuge island to calm traffic, and bike boulevard markings placed every 250 feet along the corridor. Pearsall Street did have a recent bicycle crash located on it and this project will help improve biking conditions on this section of roadway. This corridor provides access to cultural destinations, and is within 1/2 mile of Tart Park, Tyler Park and both Wayne Avenue and Harnett Primary School. A diverse group of residential communities are found along Pearsall Street and would access this bicycle boulevard.

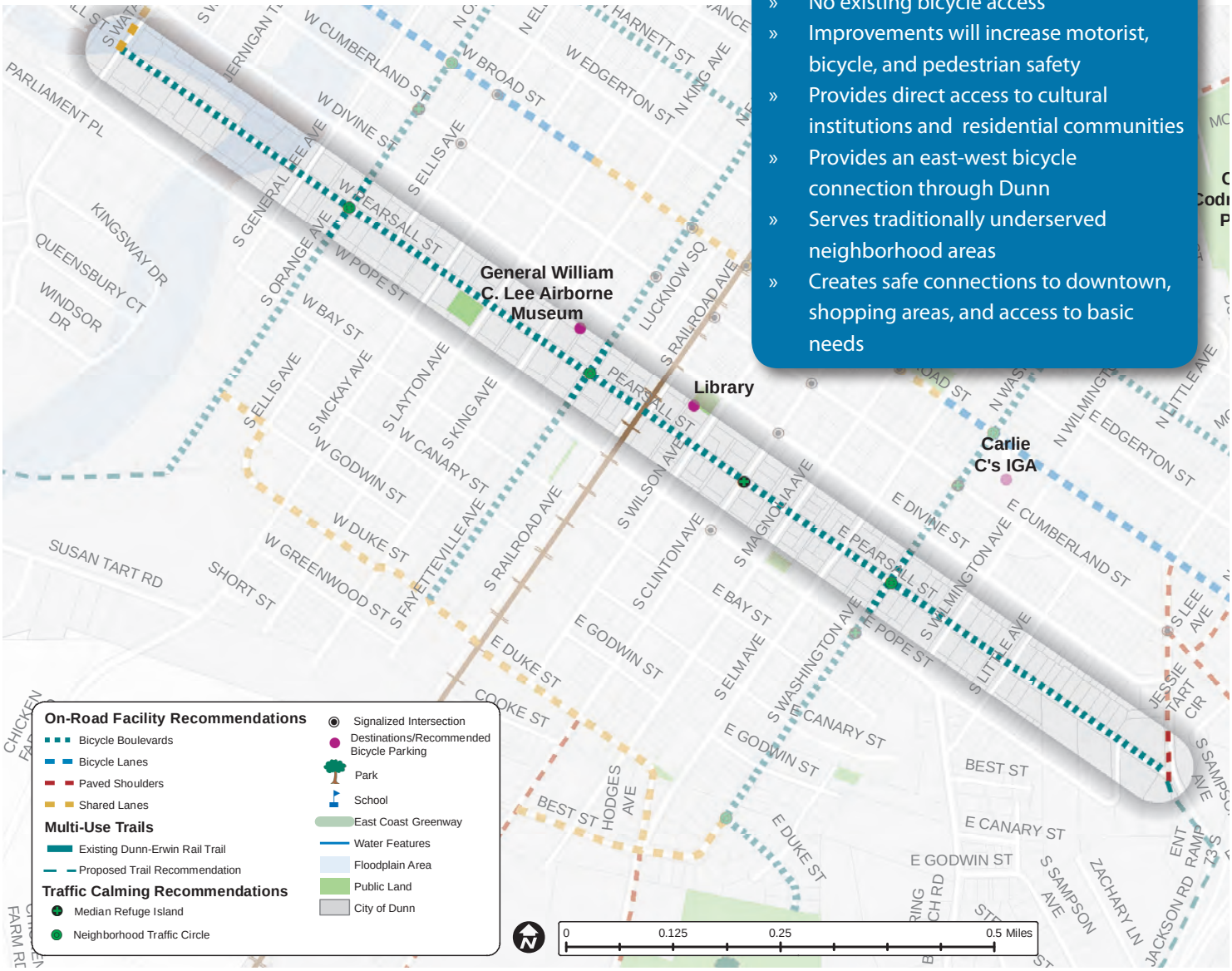
Pearsall Street

Planning-level Cost Estimate: $70,928.26

Why It's important:

- Priority Project Score: 37.4
- No existing bicycle access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to cultural institutions and residential communities
- Provides an east-west bicycle connection through Dunn
- Serves traditionally underserved neighborhood areas
- Creates safe connections to downtown, shopping areas, and access to basic needs

Priority Map #5: Pearsall Street Bicycle Boulevard



Priority Project #6: Harnett Street Bicycle Boulevard from Ashe Avenue to Lee Avenue

This 1.51 mile bicycle boulevard provides an important east/west connection from Tyler Park and Harnett Primary School through downtown to eastern Dunn. The bicycle boulevard will include three neighborhood traffic circles and two median refuge islands to calm traffic. Additionally, the proposed bicycle boulevard will include appropriate wayfinding signage and pavement markings along the entire stretch of roadway. Harnett Street has several regional recreational and educational destinations, a diverse group of residential populations and some of the most populous blocks in the city.

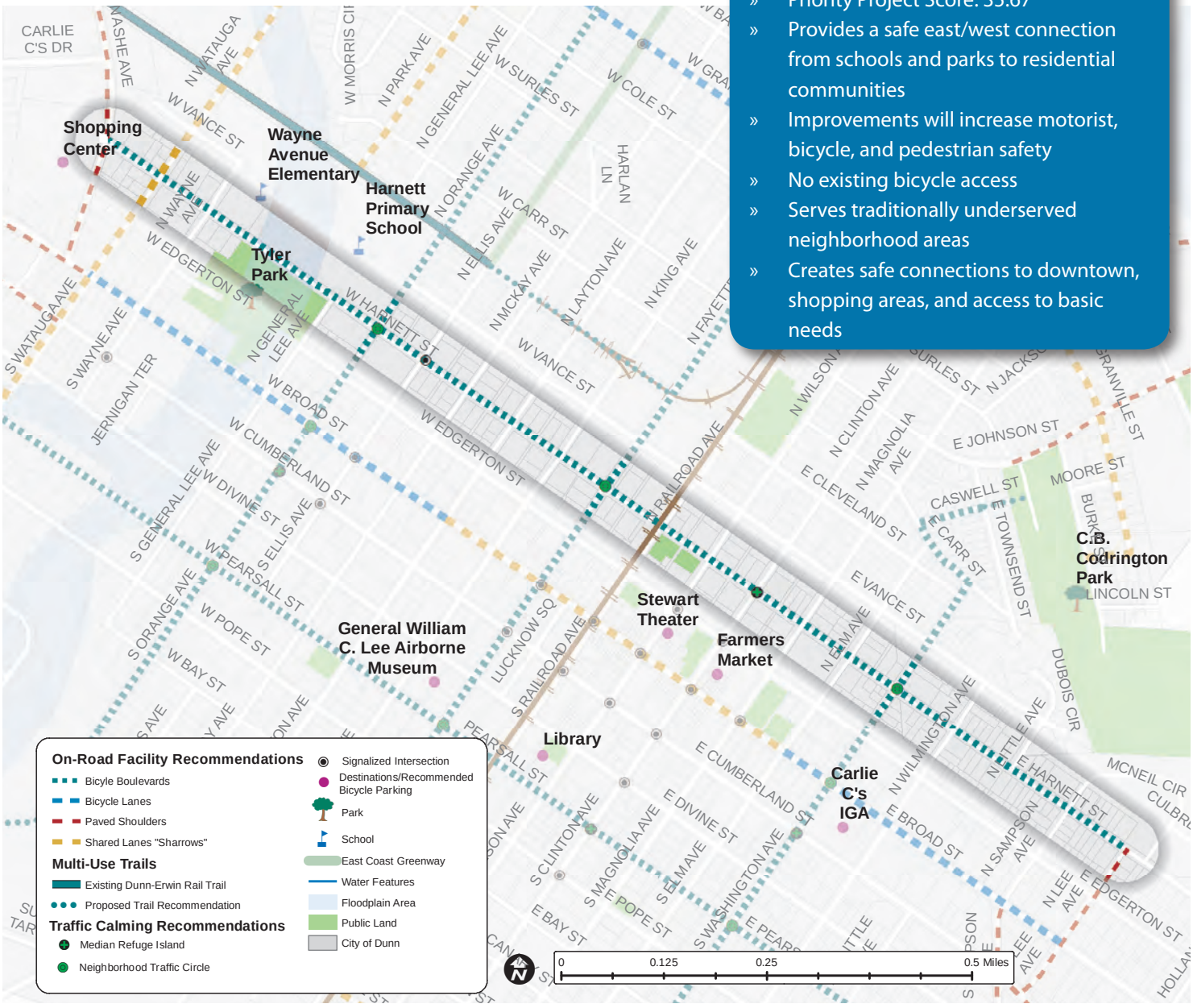
Planning-level Cost Estimate: $71,455.43

Harnett Street

Why It's important:

- Priority Project Score: 35.67
- Provides a safe east/west connection from schools and parks to residential communities
- Improvements will increase motorist, bicycle, and pedestrian safety
- No existing bicycle access
- Serves traditionally underserved neighborhood areas
- Creates safe connections to downtown, shopping areas, and access to basic needs

Priority Map #6: Harnett Street Bicycle Boulevard



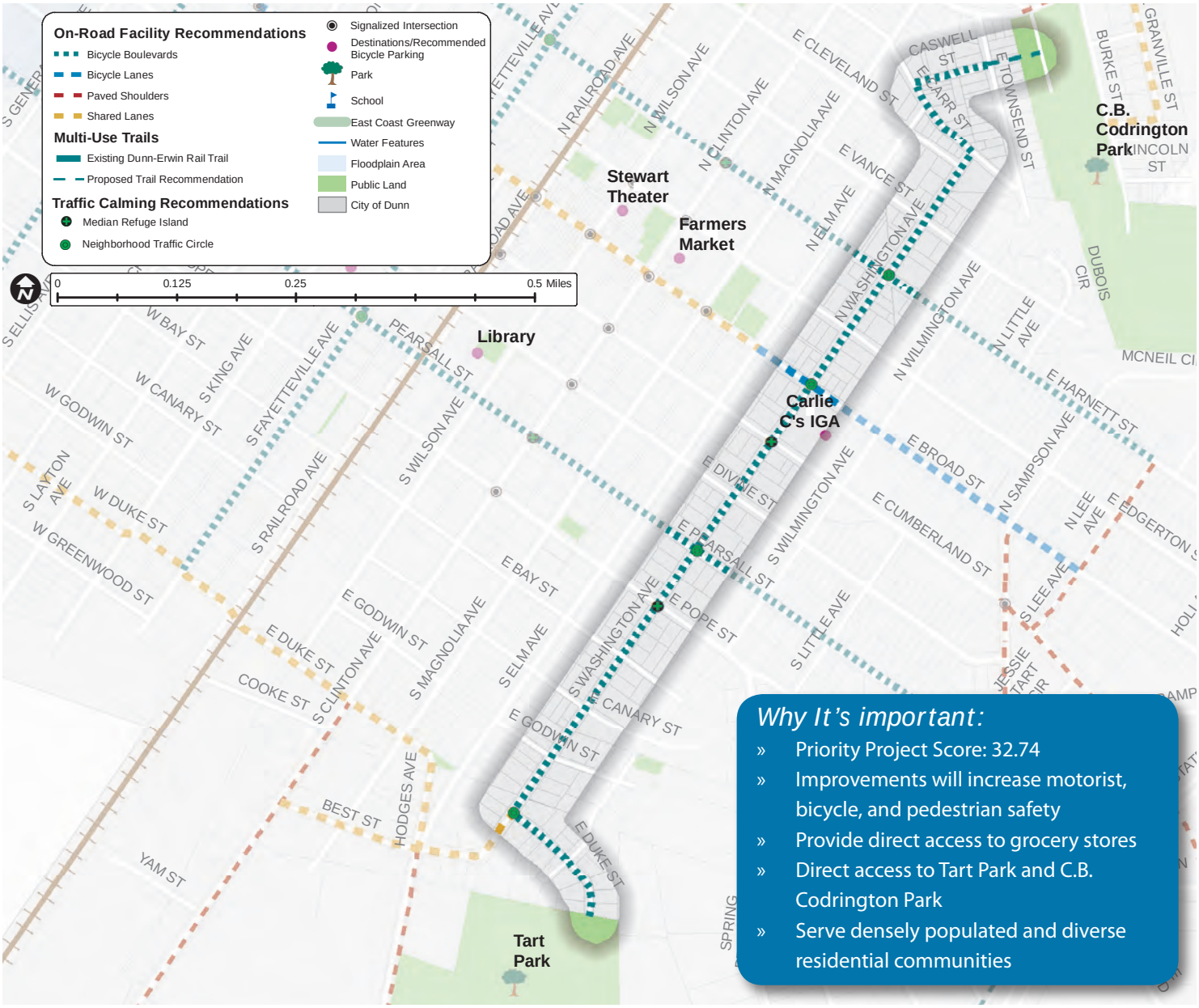
Priority Project #7: Washington Avenue Bicycle Boulevard from C.B. Codrington Park to Tart Park

The Washington Avenue corridor runs north-south through the east side of Dunn. This stretch of road is a priority section of roadway in part because of the multiple bicycle crashes that have occurred on this stretch in recent years. This 1.16 mile section of proposed bicycle boulevard provides direct access to the IGA grocery store and connects via two short proposed trails (0.05 miles combined). The bicycle boulevard improvements will include four neighborhood traffic circles and two median refuge islands as traffic calming devices, wayfinding signage, intersection treatments and pavement markers.

Planning-level Cost Estimate: $90,131.42

Washington Avenue

Priority Map #7: Washington Avenue Bicycle Boulevard



Why It's important:

- Priority Project Score: 32.74
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provide direct access to grocery stores
- Direct access to Tart Park and C.B. Codrington Park
- Serve densely populated and diverse residential communities

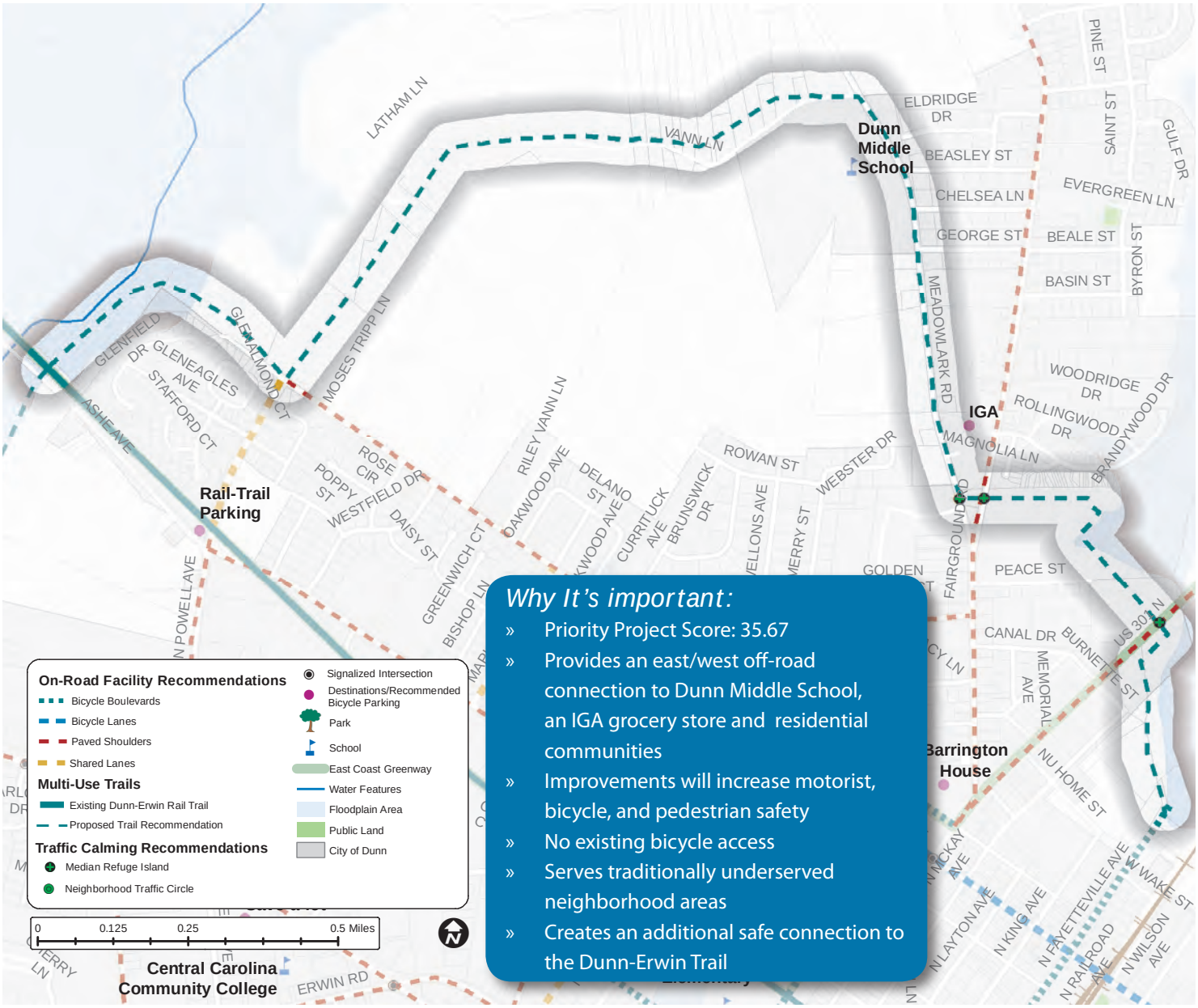
Priority Project #8: Dunn Middle School Trail from the Dunn-Erwin Trail to Fayetteville Avenue

This 3.22 mile multi-use trail provides important connections to Dunn Middle School from the east and west sides of town, utilizing a combination of the sewer outfall corridor and side paths. Three median refuge islands will be needed to calm traffic and facilitate crossings. Additionally, the proposed trail will include appropriate wayfinding signage throughout the corridor. In addition to Dunn Middle School, this trail links near the IGA grocery store, connects directly to the Dunn-Erwin Trail, and connects to trail possibilities that would form a loop around Dunn.

Planning-level Cost Estimate: $229,238.13

Meadowlark Avenue

Priority Map #8: Dunn Middle School Trail



Why It's important:

- Priority Project Score: 35.67
- Provides an east/west off-road connection to Dunn Middle School, an IGA grocery store and residential communities
- Improvements will increase motorist, bicycle, and pedestrian safety
- No existing bicycle access
- Serves traditionally underserved neighborhood areas
- Creates an additional safe connection to the Dunn-Erwin Trail

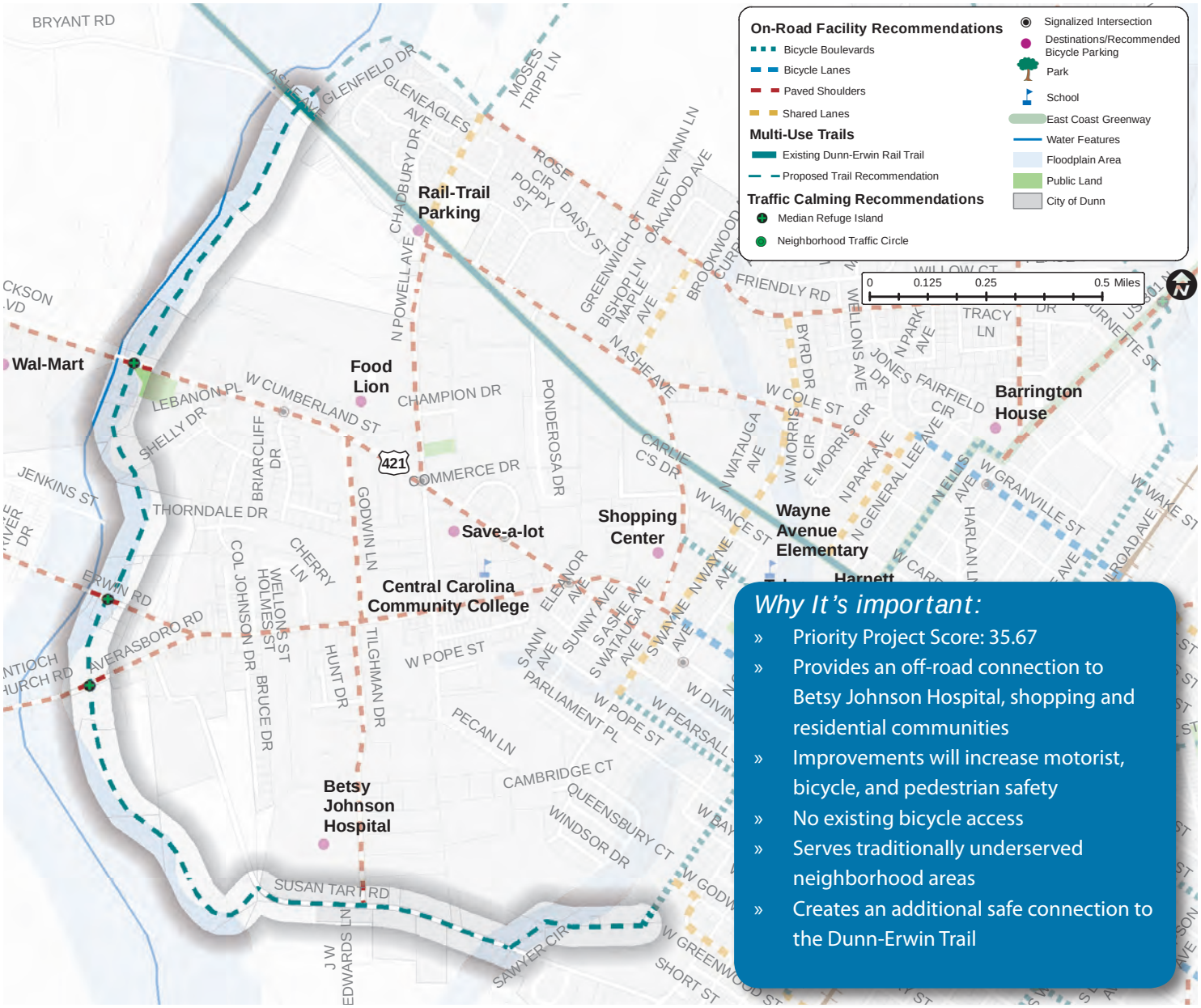
Priority Project #9: Betsy Johnson Hospital Trail from the Dunn-Erwin Trail to Orange Avenue

This 2.98 mile multi-use trail provides important connections to Betsy Johnson Hospital from the south and west sides of town, primarily utilizing the sewer outfall corridor. Three median refuge islands will be needed to calm traffic and facilitate crossings. Additionally, the proposed trail will include appropriate wayfinding signage throughout the corridor. In addition to Betsy Johnson Hospital, this trail links near shopping destinations, connects directly to the Dunn-Erwin Trail, and connects to trail possibilities that would form a loop around Dunn.

Planning-level Cost Estimate: $213,079.07

Sewer Easement near Susan Tart Road

Priority Map #9: Betsy Johnson Hospital Trail



Why It's important:

- Priority Project Score: 35.67
- Provides an off-road connection to Betsy Johnson Hospital, shopping and residential communities
- Improvements will increase motorist, bicycle, and pedestrian safety
- No existing bicycle access
- Serves traditionally underserved neighborhood areas
- Creates an additional safe connection to the Dunn-Erwin Trail

Table 3.2 Priority Project Cost Estimate Summary

Project #	Project Name	From	To	Facility Type(s)	Length (miles)	Planning-level Cost Estimate*
1	Broad Street	Watauga Avenue	Lee Avenue	Bike Lanes and Sharrows	1.44	$110,563.01
2	US 301/Ellis Avenue	Annexed city parcel	Barrington Street	Paved Shoulders	0.9	$56,111.48
3	Orange Avenue	Southern End of Orange Ave (dead end)	Barrington Street	Bicycle Boulevard	1.26	$68,307.85
4	US 421 / Cumberland Street	Exsiting Dunn-Erwin Rail Trail	Watauga Avenue	Paved Shoulders	2.56	$198,406.00
5	Pearsall Street	Watagua Avenue	Sampson Avenue	Bicycle Boulevard	1.48	$70,928.26
6	Harnett Street	Ashe Avenue	Lee Avenue	Bicycle Boulevard	1.51	$71,455.43
7	Washington Avenue	C.B. Codrington Park	Tart Park	Bicycle Boulevard/Trail	1.2	$90,131.42
8	Dunn Middle School Trail	Existing Dunn-Erwin Rail Trail	Fayetteville Avenue	Multi-Use Trail	3.22	$229,238.13
9	Betsy Johnson Hospital Trail	Existing Dunn-Erwin Rail Trail	Orange Avenue	Multi-Use Trail	2.98	$213,079.07

**Planning-level cost estimate includes 15% mobility/contingency factor.*

Table 3.3 Per Unit Cost Estimate Summary

Per Unit Cost Estimates
STRIPING ESTIMATES (per Linear Foot (LF))
$/LF per single line removal $2.00
$/LF per single dashed line removal $0.25
$/LF per single line stripe (Thermo) $1.85
$/LF per single line stripe $0.46
ASPHALT AND AGGREGATE BASE COURSE (ABC) ESTIMATES
$/TON OF ASPHALT $33.00*
$/TON OF ABC $20.00**
PAVEMENT MARKINGS, REFLECTOR, SIGNAGE ESTIMATES
SHARROW thermoplastic symbol $220.00
$/reflective marker (stick-on) $7.00
$/reflective marker (embedded) $25 .00
$/wayfinding sign $200.00
BIKE BOULEVARD TRAFFIC CALMING TECHNIQUE ESTIMATES
Neighborhood Traffic Circle $12,000.00 per vegetative traffic circle
Median Refuge Island $5,000.00 per vegetative median refuge island

**Asphalt SF9.5A: at 10' wide, 1" thick - 325 TON/mi*

***Aggregate Base Course: at 11'wide, 6"thick - 2,150 TON/mi*

PROGRAM RECOMMENDATIONS

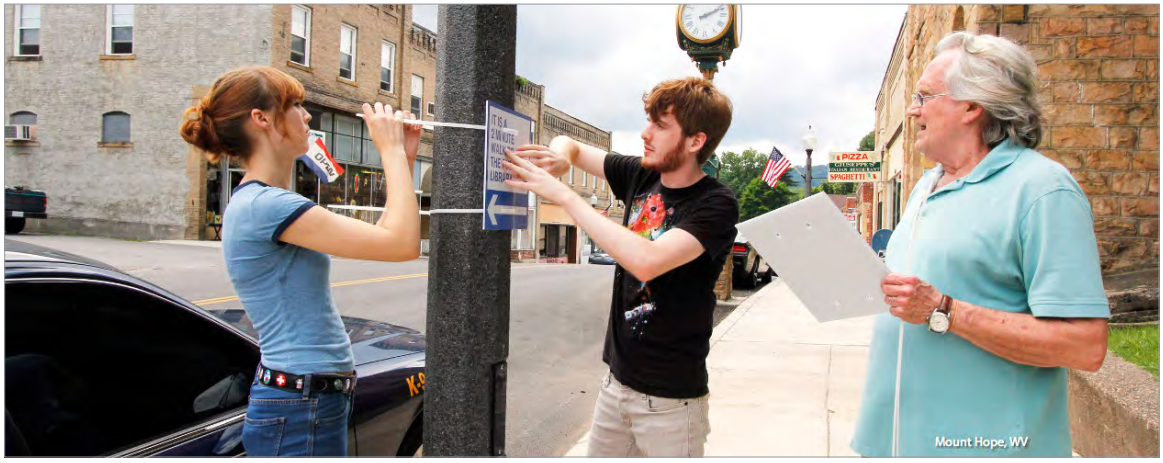
Below are some key program recommendations that were identified by the steering committee and City staff during the planning process and supported by the residents of Dunn during public outreach. See Chapter 4: Implementation for program implementation guidance.

Wayfinding Signage Program

Wayfinding signage enhances resident and visitor orientation by directing pedestrians, bicyclists, and motorists to popular destinations around town. Dunn should develop a customized wayfinding program that provides effective orientation and direction to key destinations (see example at right). A wayfinding program can include directional signage, on-road markings, and kiosks with town maps. The Dunn Area Chamber of Commerce and Dunn Area Tourism Authority are examples of potential partners to develop such a program, based on the nexus with tourism and economic development. A cost-effective signage program can be implemented quickly and easily through the "Walk [Your City]" program (see below). Signs can be customized for bicycling. One of the first wayfinding signage projects in Dunn should connect the end of the Dunn-Erwin Rail-Trail to downtown Dunn. Visit http://walkyourcity.org/for more information.

Above: A customized wayfinding signage design could be used to include walking- and bicycling-oriented travel times, local town logos, and sponsorship branding.

Below: Walk [Your City] is an online tool for making directional signage for walking and biking (all images below used with permission from walkyourcity.org).



Road signage has traditionally been expensive and car-centered, leaving walkers and bikers by the wayside. Walk [Your City] lets anyone from citizens to corporations quickly and affordably promote healthy lifestyles, public safety, and human-centered transit.

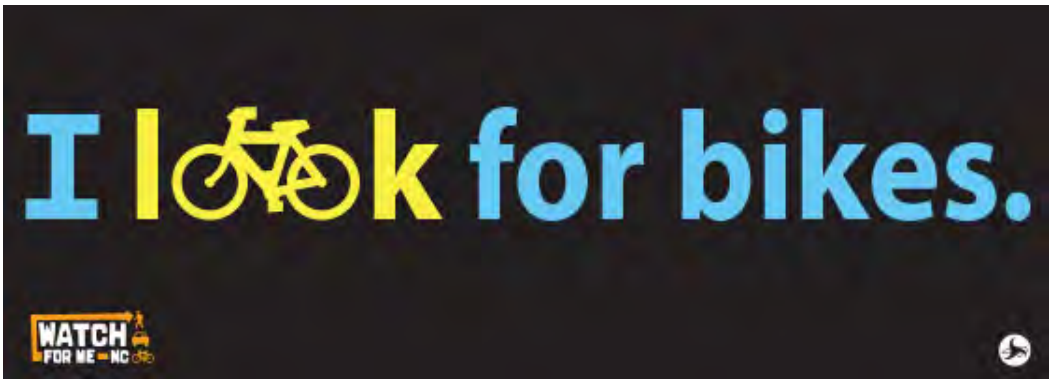
Open Street Events

Car-free, open street events have many names-Sunday Parkways, Ciclovias, Summer Streets, and Sunday Streets-and involve periodic street "openings" that create a temporary park that is open to the public for walking, bicycling, dancing, and other physical activity. The purpose of the event is to encourage physical activity by providing a fun, welcoming environment for activity. Car-free street events have been very successful internationally and are rapidly becoming popular in the US. Local businesses open doors and set up tables along sidewalks to support the event and generate foot and bike traffic for their businesses. See http://openstreetsproject.org/ for more information.

Examples of Open Street events in Durham and Boone, NC

Media Campaign to Educate Motorists, Cyclists, and Pedestrians

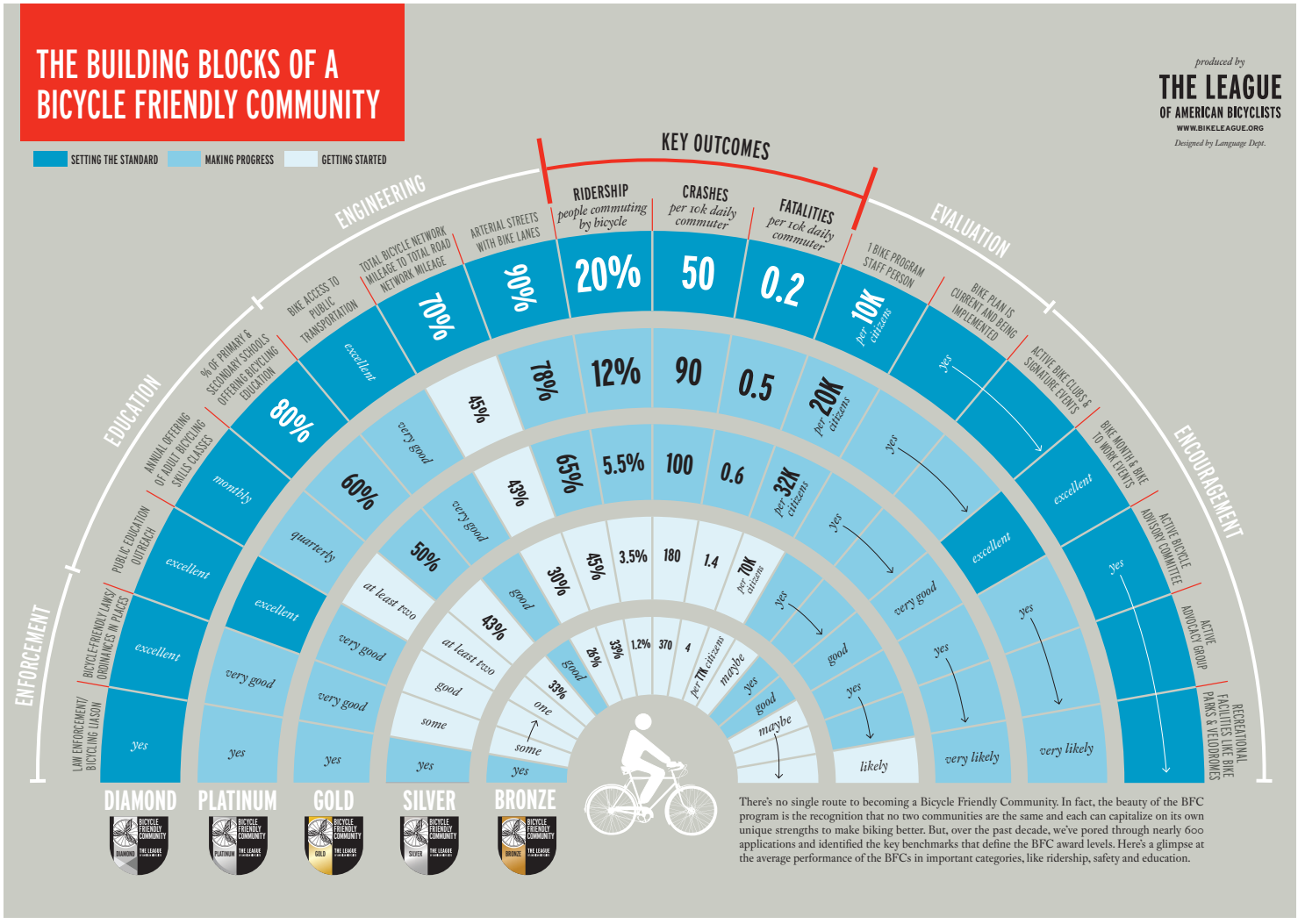
A media campaign could be used to educate all road users about their rights and responsibilities to increase awareness and improve traffic safety. Watch for Me NC is a comprehensive campaign aimed at reducing the number of pedestrians and bicyclists hit and injured in crashes with vehicles. The campaign consists of safety messages directed toward drivers and pedestrians; educational messages to better inform drivers, cyclists, and pedestrians about safety laws; and an enforcement effort by area police in several Triangle communities: Raleigh, Durham, Chapel Hill, and Carrboro. The campaign is programmed to expand statewide and include bicycling laws. The City could use the educational materials made available by NCDOT to distribute at local festivals and other events. Visit http://www.watchformenc.org for more information.



Images targeting motorists from the 'Watch for Me NC' campaign, including bumper stickers, messaging at the pump, and ad space on a bus.

Bike-Friendly Community (BFC) Designation

The BFC program (administered by the League of American Bicyclists) is a national recognition program developed to encourage towns and cities across the U.S. to create more bikeable environments. Even just by applying for the BFC program, the City of Dunn would receive valuable feedback from the League of American Bicyclists on how to improve conditions for bicycling as compared to peer communities in NC and nationwide. Visit http://bikeleague.org/content/communities for more information.

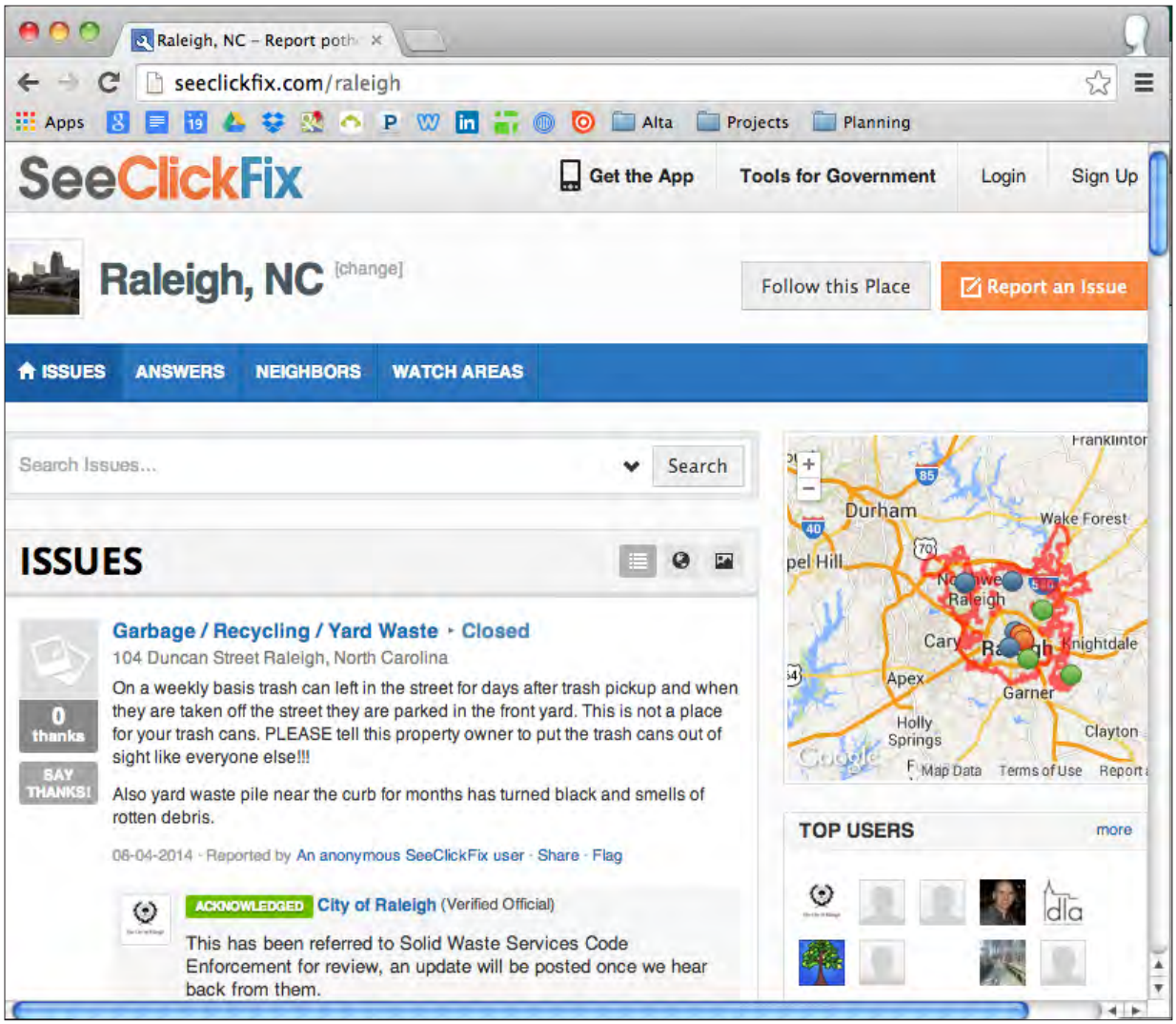


BFC Infographic. Download the full version here: http://bikeleague.org/sites/default/files/BFC%20infographic.pdf

Maintenance Hotline/Website

The City of Dunn can work together with residents to identify bicycling safety issues by creating web forms and/or hotlines that residents can use to request maintenance or enhancements. This benefits the public by helping them route their concerns to the correct party. It benefits the City by making sure they hear about potential safety and liability issues early so they can take action. Many jurisdictions also find that this approach is beneficial because their scheduled maintenance and complaint-based inspection approach cannot identify every legitimate issue, so hotlines and web forms can essentially distribute the job of inspecting facilities to all residents.

The highest priority should be creating a mechanism for residents to report bicycling safety issues such as cracked pavement, blocked drains, malfunctioning crossing signals, encroaching vegetation, debris in bike lanes, etc.. If desired, additional input may be invited such as allowing residents to request bicycling and walking maps by mail, allowing residents to request parking enforcement that impacts walking and bicycling (e.g. parked cars blocking ADA ramps or bike lanes), and/or allowing residents to request traffic safety enforcement.



Example program: Raleigh's 'SeeClickFix': http://seeclickfix.com/raleigh

Bike to School Day

School systems can offer incentives to students who participate in Bicycle to School Day activities and events to promote initiative and reward their participation. For example, the City should encourage schools to partner with parents to organize bike trains for the children who will participate in Bike to School Day. Each group of students should be led safely to school by a parent or teacher volunteer. See http://www.walkbiketoschool.org/ for more information.

Active Routes to School

The North Carolina Division of Public Health (Community and Clinical Connections for Prevention and Health Branch) and the North Carolina Department of Transportation are partnering to offer a new project: Active Routes to School. The goal of the project is to increase the number of North Carolinians that meet the physical activity recommendations by increasing the number of elementary and middle school students who safely walk and bike to school.

The Active Routes to School project is federally funded and will span across 3 years. The project will focus on providing a safe, appealing environment for walking and biking, improving the quality of children's lives by increasing physical activity and reducing traffic, fuel consumption, and air pollution in the vicinity of schools. Specifically, the goals of the program are to work with partners in communities such as Dunn, to increase:

1. Awareness about the importance of Safe Routes to School,
2. The number of programs that encourage safely walking and biking to or at school (i.e., walk to school day, walking school bus, Walk Across America, etc.),
3. The number of trainings on how to implement Safe Routes to School (i.e., bike rodeo),
4. The number of policies that support safe walking and biking,
5. The number of safety features near schools, such as sidewalks, cross walks, and bike lanes,
6. Opportunities for shared use of facilities and complete street policies to improve access to physical activity.

Bicycle Helmet Initiative, Locks, Lights, and Reflectors

The North Carolina Division of Bicycle and Pedestrian Transportation has undertaken a series of helmet promotions in collaboration with other organizations and agencies across North Carolina. Today, communities conducting bicycle safety events for underprivileged children can request helmets through the DBPT's Bicycle Helmet Initiative. A maximum of 24 helmets is available per year to each agency that requests helmets. Helmet availability is determined on a "first come first serve" basis.

The City of Dunn should also consider acquiring bicycle locks, lights, and reflectors for give-aways to be carried out by the City of Dunn Police Department. Bicycle Safety information should be included.

POLICY RECOMMENDATIONS

Bicycle Policy and Regulatory Review

One of the most cost effective implementation strategies for the City of Dunn is to establish land development regulations and street design policies that promote bikeable new development and capital projects. As part of a comprehensive approach to developing recommendations for a more bikeable community, the City of Dunn ordinances, development standards and policies were reviewed to identify general issues and opportunities impacting the bicycling environment. The recommendations in this section generally fall under the six E's category of "Evaluation and Planning." Regulatory standards and policies were analyzed through the lens of the project visions and goals, specifically, the vision of making the Dunn community "an attractive regional destination where a convenient network of sidewalks, bikeways, and multi-use trails brings people of all ages and abilities together; safely connects them to where they want to go."

Model regulatory and policy language from around North Carolina and the U.S. was identified for elements including land use/transportation integration, connectivity, Complete Streets, and bicycle parking, enabling the City to maximize on-road bicycle and mulit-use trail improvements in conjunction with new development, redevelopment, and corridor improvement projects. In addition, recommended policy language additions to enhance multi-use trail development are included.

Table 3.4 Policy Review

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
Complete Streets and Greenways				
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. Dunn has one of the best complete street policy statements of any community in NC in section 22-352 of the Zoning Ordinance. The opportunity for Dunn is to integrate the implementation details, guidance, and standards of such policy in the Subdivision ordinance and the Engineering and Design Standards.	**EXCELLENT Complete Streets Statement. Probably one of the best in NC.** ***Sec. 22-352. Circulation and connectivity.*** ***(a) Purpose and intent.*** *The purpose of this section is to support the creation of a* ***highly connected transportation system with the city in order to provide choices for drivers, bicyclists, and pedestrians; promote walking and bicycling; connect neighborhoods to each other and to local destinations such as schools, parks, and shopping centers; reduce vehicle miles of travel and travel times; increase effectiveness of municipal service delivery, and free up arterial capacity to better serve regional long distance travel needs.*** *It is the intent of this Code to* ***build streets that are integral components of community design****. Streets shall be detailed to compliment neighborhoods and commercial centers and shall be* ***pedestrian in scale****. In addition to these standards, streets shall conform to the provisions of chapter 20. In certain situations, streets are encouraged to be designed with on-street parking.*	**Needs Improvement.** Zoning Ordinance Complete Streets purpose and intent is not adequately reflected in the current standards. See notes and recommendations in the sections that follow.	**Needs Improvement.** ***Sec. 3.02 Design:*** *Street design is based primarily on criteria dictated by the street classification, design speed, surrounding terrain, and traffic volumes. The following factors shall also be considered in determining street and right-of-way widths: urban-type development, on-street parking, alley-loaded units, zoning, depth of lots (length of driveways), garages, street trees, street network, setbacks, street classification, speed limit, and sidewalks.* The intent is not consistent with the Complete Streets policy intent of the Zoning Ordinance. It does also not mention bicycle use or operation as a design factor. Consider adding as acceptable references for street design: - *NCDOT Complete Streets Guidelines* - *NACTO Urban Street Design Guide* - *NACTO Urban Bikeway Design Guide*	In addition to the very thorough NCDOT Complete Streets Guidelines, 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/).

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
1.2 Develop Complete Street Design Guidelines for a variety of contexts and all street/roadway user groups The subsections 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 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.		**Needs Improvement.** While the City has an outstanding Complete Street Purpose statement, the design requirements for building complete streets need expansion and improvement. ***Sec. 20-6. Definitions.*** *Street means a dedicated and accepted public right-of-way for vehicular traffic.* **Sec. 20-73. Streets** Provides a number of minimum widths for streets and street ROWs. The minimum widths for highways and major streets may not be sufficient for bike lanes (see note at right). The minimum widths for residential streets are too wide to promote low speed motor vehicle traffic movements. In general, the menu of street alternatives needs to be more refined to provide better complete street options that meet local goals for connectivity, safety, and comfort. *(g)Pavement widths. Pavement widths face to face of curb shall be not less than the following:* *Feet* *(1) Highway and major streets .....48* *(2) Collector streets .....40* *(3)Subcollector streets .....34* *(4) Residential streets .....30* *(5) Minor streets 25*	**Needs Improvement.** **3.02 A. Street Classifications for City Specifications** Design standards and specifications do not include consideration of cyclists or dedicated space or design details for bikeway treatments for collectors or major streets. The minimum widths for major streets would not accommodate bicycle lanes or separated bikeways when more than 2 lanes of motor vehicle travel are anticipated in each direction. However, collector street widths could accommodate dedicated bikeways if no more than 1 lane of vehicular travel is required in each direction. ***3.02 M. Shoulder Sections*** It is not clear if shoulders are intended to be paved, in which case they would be useable by cyclists on rural roadways. *Shoulders shall be sufficient to permit the adequate installation and maintenance of sidewalks and utilities, as well as provide sufficient clear zone distance as defined by NCDOT.* *Shoulder sections without sidewalk shall be 12 feet wide on all streets with a cross section of 35 feet and greater.* *Shoulder sections without curb and gutter must be a minimum of 6 feet wide.*	Dunn could adopt and endorse the NCDOT guidelines and other national guidelines, Including the NACTO Urban Bikeway Design Guide: http://nacto.org/cities-for-cycling/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

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
1.3. Require bike accommodations by roadway type		**Needs Improvement.** None required or specified.	**Needs Improvement.** None required or specified.	See Chapter 4 of the NCDOT *Complete Streets Planning and Design Guidelines* for recommendations of bikeway type by roadway type. Also: The design guidelines recommended as part of the Dunn Bicycle Plan could be incorporated or included by reference in the City's Engineering and Design Standards and Subdivision Ordinance. NACTO Urban Bikeway Design Guide provides additional design details for various on-street bikeway treatments and could be adopted by reference in the ordinance and/or the 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	Not required. **Needs Improvement.**	Not required. Street design guidelines do not address bicycle facilities and do not require that they be included with new roadway construction. **Needs Improvement.**	Not required. Street design guidelines do not address bicycle facilities and do not require that they be included with new roadway construction. **Needs Improvement.**	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* 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 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
1.5. Require dedication, reservation or development of greenways		**Needs Improvement.** Not required for greenways or trails, however, pedestrian easements through interior blocks may be required by the City. Expand the pedestrian easement requirement to include bicycles. Needs to also reference greenway requirements as noted in the Engineering Standards. ***Sec. 20-77. Easements.*** *Easements shall be provided as follows:* *(3) Pedestrian easements or walkways. Pedestrian rights-of-way shall be dedicated through the interior of blocks where the city determines that rights-of-way are needed. Pedestrian rights-of-way shall be at least eight (8) feet wide.*	**Needs Improvement.** Subdivision ordinance requirements don't seem to be consistent with the requirements in the Engineering manual. And the requirements don't seem to indicate whether greenways are required to be constructed by developers in all cases. ***3.12 GREENWAY SPECIFICATIONS*** *Greenway locations and alignments shall be as directed and approved by the Director of Parks and Recreation and shall be in accordance with the* City of Dunn Pedestrian Plan. *Greenways alignment shall be finalized with the Director of Parks and Recreation prior to preliminary plan approval, with full construction plans and all permits provided prior to construction drawings approval for any project on which greenways are required.* This section provides design guidelines for greenways, which need to be updated to have a minimum width of 10 feet, per the current AASHTO *Guide for the Development of Bicycle Facilities*, 2012, Fourth Edition (Section 5.2.1)	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. 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
1.6. Require new bike lanes, greenways, etc., to connect to existing facilities	Not required. **Inadequate**	Not required. **Inadequate**	Not required. **Inadequate**	Connectivity of facilities is critical for walking and biking conditions. New development should be required to connect to or extend existing facilities 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

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
1.7. Consider bicycle concerns and Level of Service (LOS) in Traffic Impact Analyses and other engineering studies .	No specific guidelines **Inadequate**	No specific guidelines **Inadequate**	***Sec 3.02 Design:*** *Note that a Transportation Impact Analysis may be required to accompany plans submitted to the City for consideration of traffic impacts due to development according to the City of Dunn Code of Ordinances.* **Needs Improvement.**	Dunn 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 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 livablility.	***Sec. 22-353. Vehicular connectivity.*** *Traffic calming devices* ***may*** *be installed to help facilitate safer pedestrian crossings. . . Allowable treatments may include, but are not limited to, roundabouts, raised pedestrian crosswalks, multi-way stops, bulb-outs, alternative pavement treatments, and signals at cross walks when warranted.*		**3.08 TRAFFIC CALMING DEVICES** Permits some traffic calming devices, but only with approval of City Council. **Needs Improvement.** Expand to include other traffic calming tools and measures that can be used without City Council approval. These 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/).

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
1.9. Develop an access management program or policy Requiring cross-access between adjacent parcels of land is a great tool for reducing the amount of traffic on major roads while increasing connectivity for pedestrians, bicycles, and cars.	**Very Good.** **Sec. 22-345. Design of parking facilities and access management**. Includes good requirements for spacing of driveways for commercial and higher density development. Interconnections of parking areas are also included. Should be also reflected in the subdivision and Engineering Standards requirements.			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 municipal codes: http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf
Bicycle-oriented Urban Design Elements				
2.1. Adopt bicycle parking requirements	None. **Inadequate**	None. **Inadequate**	No specifications for acceptable bicycle parking devices included. **Inadequate**	Bicycles should receive equal consideration when calculating parking needs with specific calculations provided for determining the amount of bicycle parking provided by district 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)
Connectivity Requirements				
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)		**Needs Improvement.** **Sec. 20-75. Blocks.** *(b) Length. Block lengths shall not exceed fifteen hundred (1,500) feet nor be less than four hundred (400) feet*		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.

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
3.2. Require connectivity/cross-Access between adjacent land parcels (See background paragraph above)	**EXCELLENT Connectivity purpose language and standards.** Needs to be referenced in subdivision standards as well. ***Sec. 22-353. Vehicular connectivity.*** *(a) Street arrangement. Streets should be designed and located so that they relate to the topography, preserve natural feature such as streams and tree growth and* ***provide for adequate public safety and convenience****. Vehicular* ***connections from adjacent property (street stub-outs) must be utilized*** *unless the planning board deems the connection impractical due to topographic conditions, environmental constraints, property shape or property accessibility.* *(b) Cross access. Traffic studies have shown that highly connected street networks provide much greater traffic throughout and mobility for a community, at less cost. A high degree of connectivity should occur not only at the level of the arterials, but also on collector, local and other secondary roads. Such connectivity vastly improves a street network's performance. The street pattern should not force short trips of one (1) or two (2) miles onto arterials; it should be possible to make trips of this sort by using collector or other secondary streets. With a highly connected street network, cross-city trips should be possible using fairly direct secondary roads.* *. . . When cross access is deemed impractical by the planning director on the basis of sever topography, environmental constraints, or vehicular safety factors,* ***the requirement may be waived provided that appropriate bicycle and pedestrian connections are provided between adjacent developments or land uses.*** *. .*	**Needs Improvement.** ***Sec. 20-73. Streets*** *(a) Coordination and continuation of streets. The proposed street layout shall be coordinated with the street system of the surrounding area. Where possible, existing principal streets shall be extended. The proposed streets shall be in conformity with official plans and maps of the city.* **Connectivity to adjacent properties suggested, but not required:** *(b) Access to adjacent properties. Where, in the opinion of the planning board, it is desirable to provide for street access to an adjoining property, the streets shall be extended by dedication to the boundary of such property and a temporary turnaround shall be provided.*	**EXCELLENT Connectivity Standards.** Needs to be referenced in subdivision standards as well. ***3.02 N. Roadway Connectivity*** *A Connectivity Index shall be calculated for each subdivision, and shall be required to exceed 1.2 unless otherwise approved by the Director of Public Works due to unusual topographical restraints. This index shall be calculated by dividing the total number of street lengths (street sections between intersections including cul-de-sacs) by the number of street nodes (intersections plus cul-de-sacs). Calculations should not include adjacent streets. In addition, intersections shall be spaced no more than 1200 feet to 1500 feet in each direction.* *Developments shall provide at least one vehicular access to each abutting property*	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.
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 pedestrian and bicycle connectivity and over all neighborhood accessibility, including for emergency access and other services.		**Needs Improvement.** **Cul-de-sacs or permanent dead end streets are allowed and permitted to be longer than is appropriate for pedestrian- friendly development.** No quantifiable standards are provided for when application of the connectivity provision should be used. ***Sec. 20-73. Streets. (o) Culs-de-sac.*** *Permanent dead-end streets shall not exceed eight hundred (800) feet in length and shall have a turnaround with a forty-foot radius and a right-of-way radius of not less than fifty (50) feet. Temporary dead-end streets shall have a radius of not less than forty (40) feet.*		· Provide quantifiable connectivity standards (see above) based on land use context and other guidelines · 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

Table 3.4 Policy Review (continued)

Topics/Strategies	Comments/Recommendations			
	Zoning Ordinance	Subdivision Ordinance	Engineering and Design Standards	General Recommendations
3.4 Bicycles in Parks **COO Sec. 15-96. Vehicles. (No Bicycle Riding Allowed in Parks)** ***It shall be unlawful for any person to drive or propel any motor vehicle or other vehicle in, over, or through any park, except along and upon regularly-established roadways and parking lots.*** *It shall be unlawful for any person to park or permit to be parked any vehicle anywhere except upon designated parking areas authorized by the city manager. The term "motor vehicle" is hereby defined to include but is not limited to automobiles, trucks, minibikes, go-carts, motorbikes, motorcycles, or any other self-propelled, motorized vehicle.* ***The term "other vehicle" is defined to include but is not limited to bicycles.***				Suggest that bicycle prohibition in parks be limited to specific parks depending on the size and nature of the park.
Resources				
The following documents were referenced for this policy and regulatory review. *City of Dunn Code of Ordinances:* https://library.municode.com/index.aspx?clientId=14084 City of Dunn Pedestrian Plan: http://www.dunn-nc.org/planning/pedestrian-plan--736.asp Other references for best practices are listed in the column on the far right.	City of Dunn Code of Ordinances, Section 22: https://library.municode.com/index.aspx?clientId=14084	City of Dunn Code of Ordinances, Section 20: https://library.municode.com/index.aspx?clientId=14084	Engineering and Construction Standards, City of Dunn http://www.dunn-nc.org/works/downloads/Dunn_Standard_Specs_Final.pdf	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: http://www.wilsonnc.org/attachments/pages/545/CH%206-Infrastructure%20Standards.pdf 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) And other documents noted in this column in the rows above.

Chapter 4: Implementation

Chapter Contents:

OVERVIEW

This chapter defines a structure for managing the implementation of the City of Dunn's Comprehensive Bicycle Plan. Implementing the recommendations within this plan will require leadership and dedication to bicycle facility development on the part of a variety of agencies. Equally critical, and perhaps more challenging, will be meeting the need for a recurring source of revenue. Even small amounts of local funding could be very useful and beneficial when matched with outside sources. Most importantly, the local governments within the region need not accomplish the recommendations of this plan by acting alone; success will be realized through collaboration with state and federal agencies, the private sector, and non-profit organizations. Funding resources that may be available to Dunn are presented in Appendix B of this plan.

Given the present day economic challenges faced by local governments (as well as their state, federal, and private sector partners), it is difficult to know what financial resources will be available at different time frames during the implementation of this plan. However, there are still important actions to take in advance of major investments, including key organizational steps, the initiation of education and safety programs, and the development of strategic, lower-cost on-road bicycle facilities. Following through on these priorities will allow the key stakeholders to prepare for the development of the regional network over time while taking advantage of strategic opportunities, as they arise. Key action steps fall into three categories: policies, programs, and infrastructure. Each of the recommendations that constitute these categories have been presented in the previous chapters of this plan. Table 4.1 on page 4-13 summarizes these action steps, along with all other recommendations made throughout the plan, and defines recommended actions, responsible agencies, and phasing. Finally, this plan's appendices provide a variety of in-depth resources for assisting in carrying out these tasks.

ORGANIZATIONAL FRAMEWORK FOR IMPLEMENTATION

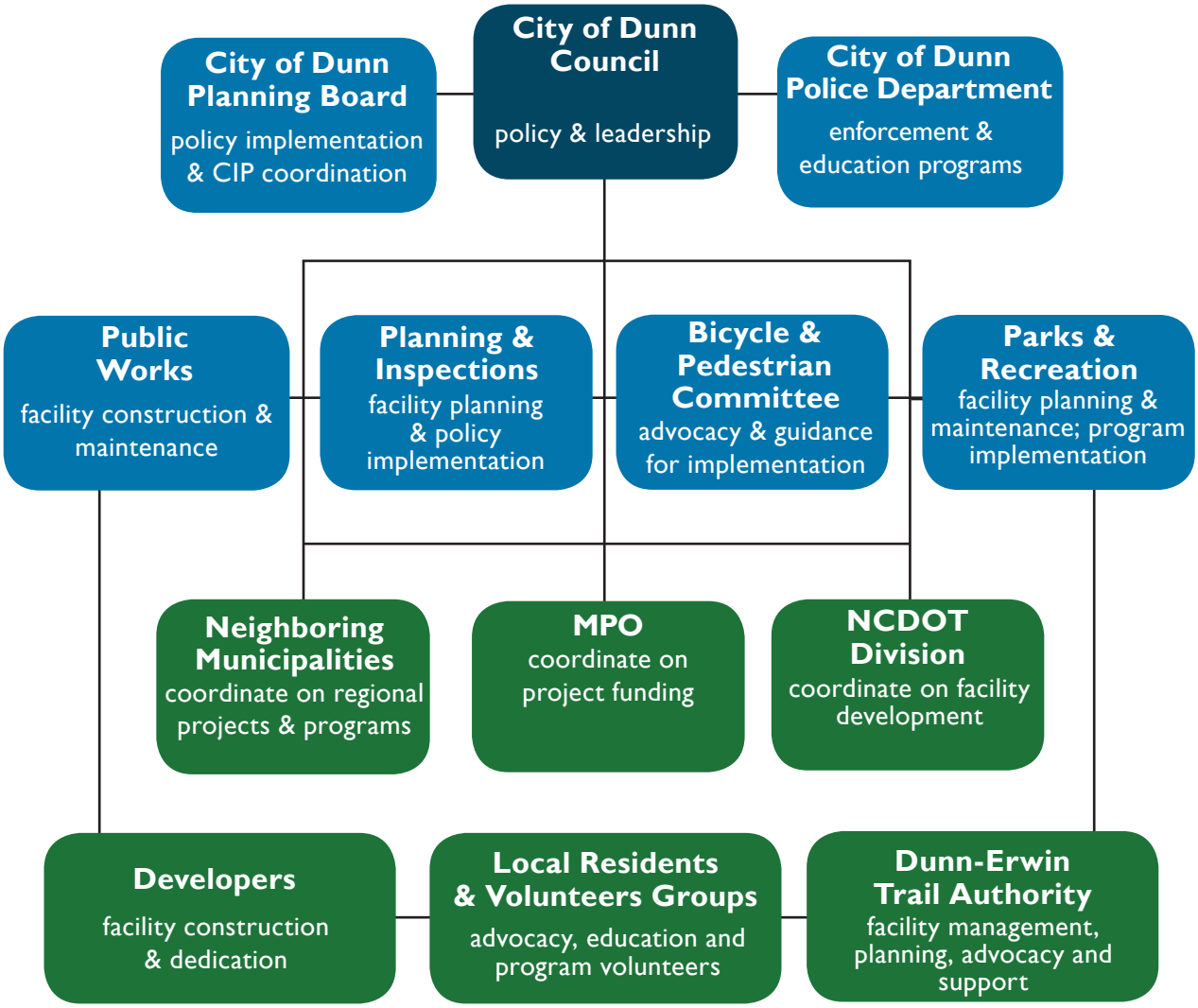


Table 4.1 Implementation Action Steps

Task	Lead Agency	Support	Details	Phase
Present Plan to City	Project Consultants	Planning Staff	Presentation to City Council in Fall 2014	Short Term
Adopt this plan	City Council	Planning Staff, Project Consultants	Through adoption, the Plan becomes an official planning document of the City. Adoption shows that the City of Dunn has undergone a successful, supported planning process.	Short Term
Designate Staff	City Council & City Manager	Leadership of City/ County Departments	Designate staff to oversee the implementation of this plan and the proper maintenance of the facilities that are developed. It is recommended that a combination of existing Planning and Engineering Staff oversee the day-to-day implementation of this plan.	Short Term
Create a Bicycle and Pedestrian Advisory Committee (BPAC)	City/County	Planning Staff	The committee should help coordinate the implementation of this plan, develop programs, listen to community needs, promote the bicycle network, and keep positive momentum going.	Short Term
Present this Plan to other local and regional bodies and agencies.	Planning Staff	BPAC	This plan should be presented to other local and regional bodies and agencies. Possible groups to receive a presentation might include the regional transportation and greenway planners, health clubs and fitness facilities, schools and youth organizations, environmental clubs, civic organizations, chambers of commerce, and large neighborhood groups.	Short Term
Present this Plan's recommendations to NCDOT Division and District Offices, as well as other Departments.	Planning Staff	NCDOT Bike/Ped Division	This Plan should be presented to other NCDOT Divisions, Districts and Departments to integrate this Plan's recommendations into an update to the Comprehensive Transportation Plan (CTP).	Short Term
Adopt the Recommendations for Amendments to the City Code of Ordinances & UDO	City Council	Planning Staff, City Engineering, City Legal, NCDOT Bike/ Ped Division	Changing current policy has the greatest long-term implication of any action that a government can take to alter its future conditions. By doing so, it implies that the community is committed to providing an efficient multi-modal transportation network such that access, mobility, and safety needs of motorists, pedestrians, and bicyclists are accommodated.	Short Term
Design Orientation	Public Works and NCDOT Division 6	NCDOT Bike/Ped Division	Become familiar with the guidelines featured in Appendix A of this Plan, as well as state and national standards for bicycle facility design.	Short Term
Launch Programs as New Projects are Built	BPAC	Planning Staff	Assist in the coordination of education and encouragement programs, such as Bicycle Month Activities.	Short Term/ Ongoing
Begin Semi-annual Meeting With Key Project Partners	Planning Staff	City Departments, NCDOT, BPAC, and local & regional stakeholders	Key project partners should meet on an semi-annual basis to evaluate the implementation of this Plan. Meetings could also occasionally include on-site tours of locations where facilities are recommended. COG meetings could also serve as an opportunity to coordinate.	Short Term/ Ongoing
Seek Multiple Funding Sources and Begin Facility Development	Planning Staff	Finance Director, BPAC	Chapter 3 contains recommended projects. See Appendix B for potential funding opportunities.	Short Term/ Ongoing

Table 4.1 Implementation Action Steps (continued)

Task	Lead Agency	Support	Details	Phase
Provide police officers with educational material to hand out with warnings	Police Department	NCDOT Bike/Ped Division	Provide officers with an informational handout to be used during bicycle and pedestrian-related citations and warnings.	Mid Term
Develop Bicycle Facility and Multi-Use Trail Specifications	Engineering Staff	Planning Staff	City staff could prepare these using the design guidelines in Appendix A.	Ongoing/ Beginning Fall 2014
Notify City Planning staff of all upcoming roadway reconstruction or resurfacing/restriping projects, no later than the design phase.	Public Works Director, and NCDOT Division 8	Planning Staff, NCDOT Bike/Ped Division, & NCDOT Harnett County Maintenance Engineer	Provide sufficient time for comments. Incorporate pedestrian recommendations from this Plan. If a compromise to the original recommendation is needed, then contact NCDOT Division of Bicycle and Pedestrian Transportation for guidance on appropriate alternatives. Also, coordinate with the NCDOT Harnett County Maintenance Engineer, on the Annual Resurfacing Plan's 3-year project list.	Ongoing/ Beginning Winter 2015
Develop a long term funding strategy	City Manager & Finance Director	Planning Staff & City Council	To allow continued development of the overall system, capital and Powell Bill funds for bicycle facility construction should be set aside every year, even if only a small amount (small amounts of local funding can be matched to outside funding sources). Funding for an ongoing maintenance program should also be included in the City's operating budget.	Mid Term
Ensure planning efforts are being integrated regionally	Planning Staff	Regional planning organizations, neighboring municipalities, BPAC	Combining resources and efforts with surrounding municipalities, regional entities, and stakeholders is mutually beneficial, especially with trail development. Communicate and coordinate with the regional partners on regional trails and bicycle facilities and partner on joint-funding opportunities. After adoption by the City, this document should also be recognized in regional transportation plans.	Mid Term
Apply for further Safe Routes to School Grants and Infrastructure Funding	Planning Staff	NCDOT Division 6 & BPAC	Establish 'bike-to-school' groups, 'walking school buses' or other similar activities for children through the Safe Routes to School Program. Inquire about pedestrian infrastructure funding for projects within 1.5 miles of schools through NCDOT Division 6.	Mid Term
Explore possibility of a regional multi-modal coordinator	City Manager	Planning Staff, BPAC, regional planning organizations, and neighboring municipalities	Explore the possibility of partnership with neighboring municipalities or the RPO in hiring a regional Multi-Modal Transportation Coordinator	Long Term
Become familiar with the bicycle facility recommendations for NCDOT roadways in this Plan (Chapter 3); take initiative in incorporating this Plan's recommendations into the Division's schedule of improvements.	NCDOT Division 6	Planning Staff, NCDOT Bike/Ped Division	Construct and maintain all bicycle and pedestrian facilities using the highest standards allowed by the State (including the possibility of using innovative treatments on a trial-basis). Seek guidance and direction from the NCDOT Division of Bicycle and Pedestrian Transportation on issues related to this Plan and its implementation.	Ongoing

POLICY ACTION STEPS

Several policy steps are crucial to the success of future facility development. These steps will legitimize the recommendations found in this plan and enable the right-of-way acquisition necessary to carry out those recommendations.

Adopt This Plan

Before any other action takes place, the City of Dunn should adopt this plan. This should be considered the first step in implementation. Through adoption of this plan and its accompanying maps as the City of Dunn's official bicycle transportation plan, Dunn will be better able to shape transportation and development decisions so that they fit with the goals of this plan. Most importantly, having an adopted plan is extremely helpful in securing funding from state, federal, and private agencies. Adopting this plan does not commit the City of Dunn to dedicate or allocate funds, but rather indicates intent to implement this plan over time, starting with these action steps.

Adoption procedures vary from community to community depending on existing plans and policies. In each jurisdiction, the planning board (as applicable) should review and recommend the plan to its governing body, which in turn must consider and officially incorporate the recommended infrastructure improvements of this plan into its land-use plans.

Adoption of this plan also signifies that the design guidelines provided in Appendix A are established as bicycle facility standards for the community. This will establish consistency in design, ensuring that future facilities will be developed with consistency and will accommodate a variety of user types.

This plan and its recommended on- and off-road facilities should be approved by the NCDOT, and they should be included in the future planning of each agency. This plan's recommendations should be integrated into an update to the Comprehensive Transportation Plan for Harnett County. NCDOT should refer to this document when assessing the impact for future projects and plans. Likewise, NCDENR's Division of Parks and Recreation should refer to this plan in any projects relating to any state parks in the Dunn region.

Establish Land Right-of-Way Acquisition Mechanisms

It is recommended that each local zoning and subdivision ordinance be amended to ensure that, as developments are planned and reviewed, the bicycle facilities and greenway corridors identified in this plan are protected. This would entail amending development regulations to have developers set aside land for trails whenever a development proposal overlaps with the proposed routes, as adopted. City of Dunn staff should ensure that an effective review of all bicycle and pedestrian elements of proposed developments takes place.

In addition, local policies should be revised to reflect the recommendations presented in Chapter 3 of this plan. For example, revising policy language to allow for public access for trail users, as a matter of right, on all new sewer and utility easements, or to mandate the improvement of identified five foot

sidewalks to eight-foot side paths along roadways designated as corridor overlay districts, during future redevelopment projects. The implementation of these policies would have a significant impact on the bicycling environment in Dunn.

Coordinate Development Plans

The City of Dunn should ensure that adopted bicycle and multi-use trail recommendations from this plan are included in future residential and commercial developments that connect with such proposed facilities.

PROGRAM ACTION STEPS

While policies provide a legal basis for on- and off-road facility development, the program recommendations included in Chapter 3 of this plan will build community support for the creation of new facilities and establish a strong bicycling and walking culture.

Designate Staff

Designate staff to oversee the implementation of this plan and the proper maintenance of the facilities that are developed. It is recommended that a combination of existing planning staff and public works staff oversee the day-to-day implementation of this plan. In many municipalities, this task is covered by a full-time bicycle and pedestrian coordinator, but in smaller cities, such as Dunn, it makes more sense to fold these responsibilities into current staff responsibilities.

Form a Bicycle and Pedestrian Advisory Commission

The City of Dunn should establish a Bicycle and Pedestrian Advisory Commission (BPAC) to assist in the implementation of this Plan. The City's Planning Department would oversee this group. The BPAC would be comprised of both commuting and recreational cyclists and bicycle advocates, and it should champion the recommendations of this Plan. Formation of the BPAC will also represent a significant step toward becoming a Bicycle Friendly Community through the League of American Bicyclists. The BPAC would provide a communications link between the citizens of the community and the government. The BPAC should meet periodically to assist City and County staff in community outreach, marketing, and educational activities recommended by this Plan.

Become Designated as a Bicycle Friendly Community

A long term goal for Dunn may be for the City to seek a "BicycleFriendly Community" (BFC) designation. The Bicycle Friendly Community campaign is an award program that recognizes municipalities that actively support bicycling activities and safety. A Bicycle Friendly Community provides safe accommodation for bicycling and encourages its residents to bicycle for transportation and recreation. The program is administered through the League of American Bicyclists and many North Carolina communities have become designated as Bicycle Friendly Communities or are seeking designations as such. The development and implementation of this Plan is an essential first step toward becoming a Bicycle Friendly Community. With ongoing efforts and the

short- term work program recommended here, the City should be in a position to apply for and receive BFC status within a few short years.

Communication and Outreach

A subgroup of the BPAC should be created to establish a communication campaign to celebrate successes as facilities are developed and otherwise raise awareness of the overall bicycle network and its benefits. A key first task of this group is to design and implement a bicycle and pedestrian wayfinding system. Please refer to Appendix A: Design Guidelines for more information about signage and wayfinding.

One-Stop Website

Many current and potential bicyclists do not know where to turn to find out about bicycling laws, events, maps, tips, and groups. Developing a "Bike Central" website provides information to a wide audience and encourages people to bicycle. A one-stop bike website is not usually difficult to set up, but it will only be successful if the site is both easy to use and updated frequently. All website content should be reviewed regularly for accuracy. The bicycling community can assist in keeping the site up to date.

Establish a Monitoring Program

From the beginning, and continuously through the life of a pedestrian or bicycle facility project, the BPAC should brainstorm specific benchmarks to track through a monitoring program and honor the completion of projects with public events and media coverage. Monitoring should be supported by the programmatic recommendations included in Chapter 3, such as a bicycle and pedestrian needs checklist and a facility inspection and maintenance program. Benchmarks should be revisited and revised periodically as the bicycle facility network evolves.

Begin Semi-Annual Meeting With Key Project Partners

Coordination between key project partners will establish a system of checks and balances, provide a level of accountability, and ensure that recommendations are implemented. This meeting should be organized by the designated City staff, and should include representatives from all different departments within the City. The purpose of the meeting should be to ensure that this plan's recommendations are integrated with other transportation planning efforts in the region, as well as long-range and current land use planning, economic development planning, and environmental planning. Attendees should work together to identify and secure funding necessary to immediately begin the first year's work, and start working on a funding strategy that will allow the City to incrementally complete each of the suggested physical improvements, policy changes and programs over a 5-10 year period. A brief progress benchmark report should be a product of these meetings, and goals for the year should be reconfirmed by participants. The meetings could also occasionally feature special training sessions on bicycle, pedestrian, and trail issues.

Seek Multiple Funding Sources and Facility Development Options

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. A priority action is to immediately evaluate the recommendations against transportation projects that are currently programmed in the Transportation Improvement Program (TIP) to see where projects overlap, compliment, or conflict with each other. The City should also evaluate which of the proposed projects could be added to future TIP updates. Capital and local funds for bicycle and pedestrian facilities and trail construction 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 or could be used to enhance NCDOT projects with bicycle or pedestrian features that may otherwise not be budgeted for by the state. A variety of local, state, and federal options and sources exist and should be pursued. These funding options are described in Appendix B: Funding Resources.

Develop Bicycle and Pedestrian Facility Designs and Specifications for Proposed Projects

City of Dunn staff could prepare these in-house to save resources, using the design guidelines of this plan and the project cut-sheets as starting points. The public should have an opportunity to comment on the design of new facilities.

Improve Existing Programs and Launch New Programs

Chapter 3: Recommendations provides a set of programmatic resources for outreach, education, enforcement, and evaluation/policy that will support the goals of this plan The City should reference the recommendations in the chapter to expand and improve upon existing programs, as well as to develop new programs that promote bicycling.

Through cooperation with the City of Dunn, the BPAC, and groups such as walking and bicycling clubs, strong education, encouragement, and enforcement campaigns could also occur as new facilities are built. When an improvement has been made, the roadway environment has changed and proper interaction between motorists and bicyclists is critical for the safety of all users. A campaign through local television, on-site enforcement, education events, and other methods will bring attention to the new facility, and educate, encourage, and enforce proper use and behavior. Chapter 3: Recommendations, provides program ideas to choose from, many of which are also included in this section.

Provide Enforcement and Education Training for Police Officers

Law enforcement officers have many important responsibilities, yet pedestrians and bicyclists remain the most vulnerable forms of traffic. The Dunn Police Department has been aware of this planning process, and should be involved in implementation. In many cases, citizens (and even sometimes officers) are not fully aware of state and local laws related to bicyclists and pedestrians. Training on this topic can lead to additional education and enforcement programs that

promote safety. Training for Dunn's officers could be done through free online resources available from the National Highway Traffic Safety Administration (NHTSA) (see links at www.bicyclinginfo.org/enforcement/training.cfm) and through webinars available through the Association of Pedestrian and Bicycle Professionals (APBP).

INFRASTRUCTURE ACTION STEPS

While establishing the policies and programs described, Dunn should move forward with the design and construction of priority projects. They should also work to identify funding for long-term, higher-cost projects.

Identify Funding

Achieving the vision defined within this plan will require, among other things, a stable and recurring source of funding. Communities across the country that have successfully engaged in bicycle programs have relied on multiple funding sources to achieve their goals. No single source of funding will meet the recommendations identified in this plan. Instead, stakeholders will need to work cooperatively with municipality, state, and federal partners to generate funds sufficient to implement the program.

A stable and recurring source of revenue is needed that can then be used to leverage grant dollars from state, federal, and private sources. The ability of local agencies to generate a source of funding for bicycle facilities depends on a variety of factors, such as taxing capacity, budgetary resources, voter preferences, and political will. It is very important that these local agencies explore the ability to establish a stable and recurring source of revenue for facilities.

Donations from individuals or companies are another potential source of funding. The BPAC should establish an Adopt-A-Greenway program as a mechanism to collect these donations for the development of the multi-use trail recommendations discussed in Chapter 3. In addition to a formalized program, a website should be set up as an easy way for individuals to donate smaller amounts. The need for a donation mechanism was identified during the stakeholder interviews that took place at the beginning of the planning process. Federal and state grants should be pursued along with local funds to pay for necessary ROW acquisition and project design, construction, and maintenance expenses. "Shovel-ready" designed projects should be prepared in the event that future federal stimulus funds become available. Additional recommended funding sources may be found in Appendix B: Funding Resources.

Complete Short-Term Priority Projects

By quickly moving forward on priority projects, Dunn will demonstrate its commitment to carrying out this plan and will better sustain the enthusiasm generated during the public outreach stages of the planning process. Refer to Chapter 3: Recommendations for priority project ranking and the prioritization methodology.

KEY PARTNERS IN IMPLEMENTATION

Role of the Dunn City Council

The City Council will be responsible for adopting this plan. Through adoption, the City of Dunn's leadership is further recognizing the value of bicycle and pedestrian transportation and is putting forth a well-thought out set of recommendations for improving public safety and overall quality of life (see the 'Benefits of a Bikeable Community' section in Chapter 1). By adopting this plan, the City Council is also signifying that they are prepared to support the efforts of other key partners in the plan's implementation, including the work of City departments and the local NCDOT Division 6.

Role of the City of Dunn Planning Board

The City of Dunn Planning Board serves as an advisory board to the Council on matters of planning and zoning. The Planning Board should be prepared to:

- Become familiar with the recommendations of this plan, and support its implementation.
- Learn about pedestrian-related policies as detailed in Chapter 3 of this plan.

Role of the City of Dunn Public Works Department

The Public Works Department handles the responsibility for the construction and maintenance of bicycle facilities on locally owned and maintained roadways, as well as on NCDOT roadways, where encroachment agreements are secured. The Department also maintains City parks and greenways. The department should be prepared to:

- Communicate and coordinate with other city departments and the BPAC on priority bicycle and pedestrian projects.
- Become familiar with the standards set forth in Appendix A of this plan, as well as state and national standards for bicycle and pedestrian facility design.
- Secure encroachment agreements for work on NCDOT-owned and maintained roadways.
- Design, construct, and maintain pedestrian and bicycle facilities.
- Communicate and coordinate with Harnett County, Mid-Carolina COG, and neighboring municipalities on regional trails; partner for joint-funding opportunities, such as SRTS.
- Communicate and coordinate with NCDOT Division 6 on this plan's recommendations for NCDOT-owned and maintained roadways. Provide comment and reminders about this plan's recommendations no later than the design phase.
- Work with Division 6 to ensure that when NCDOT-owned and maintained roadways in Dunn are resurfaced or reconstructed, that this plan's adopted recommendations for bicycle and pedestrian facilities are included on those streets. If a compromise to the original recommendation is needed, then contact NCDOT Division of Bicycle and Pedestrian Transportation for guidance on appropriate alternatives.

Role of the City of Dunn Planning & Inspections

Planning & Inspections' planning staff will take primary responsibility for the contact with new development to implement the plan (with support from the Public Works Department). For example, the staff should be prepared to:

- Communicate and coordinate with local developers on adopted recommendations for bicycle and pedestrian facilities, including paved multi-use trails.
- Assist the Public Works Department in communicating with NCDOT and regional partners.
- Refer often to Appendix C: Policy Resources for information that may apply to bicycle and pedestrian facility development in Dunn.

Role of the Local NCDOT Division 6

Division 6 of the NCDOT is responsible for the construction and maintenance of pedestrian and bicycle facilities on NCDOT-owned and maintained roadways in the City of Dunn, OR is expected to allow for the Town to do so with encroachment agreements. Division 6 should be prepared to:

- Recognize this plan as not only as an adopted plan of the City of Dunn, but also as an approved plan of the NCDOT.
- Become familiar with the bicycle and pedestrian facility recommendations for NCDOT roadways in this Plan (Chapter 3); take initiative in incorporating this plan's recommendations into the Division's schedule of improvements whenever possible.
- Become familiar with the standards set forth in Appendix A of this plan, as well as state and national standards for facility design; construct and maintain recommended facilities using the highest standards allowed by the State (including the use of innovative treatments on a trial-basis).
- Notify the City of Dunn Public Works Department of all upcoming roadway reconstruction or resurfacing/restriping projects in Dunn, no later than the design phase. Provide sufficient time for comments from the planning staff.
- If needed, seek guidance and direction from the NCDOT Division of Bicycle and Pedestrian Transportation on issues related to this plan and its implementation.

Role of the City of Dunn Police Department

The City of Dunn Police Department is responsible for providing the community the highest quality law enforcement service and protection to ensure the safety of the citizens and visitors to the City of Dunn. The Police Department should be prepared to:

- Become experts on bicycle and pedestrian-related laws in North Carolina. (see: www.ncdot.gov/bikeped/lawspolicies/laws/)
- Continue to enforce not only bicycle and pedestrian-related laws, but also motorist laws that affect walking and bicycling, such as speeding, running red lights, aggressive driving, etc.
- Participate in bicycle and pedestrian-related education programs.
- Review safety considerations with the Public Works Department as projects are implemented.

Role of Developers

Developers in Dunn can play an important role in facility development whenever a project requires the enhancement of transportation facilities or the dedication and development of on-road bicycle facilities, sidewalks, trails or crossing facilities. Developers should be prepared to:

- Become familiar with the benefits, both financial and otherwise, of providing amenities for walking and biking (including trails) in residential and commercial developments.
- Become familiar with the standards set forth in Appendix A of this plan, as well as state and national standards for facility design.
- Be prepared to account for bicycle and pedestrian circulation and connectivity in future developments.

Role of Local & Regional Stakeholders

Stakeholders for bicycle facility development and related programs, such as Harnett County, the Mid-Carolina COG, and local economic development organizations play important roles in the implementation of this plan. Local and regional stakeholders should be prepared to:

- Become familiar with the recommendations of this plan, and communicate & coordinate with the City for implementation, specifically in relation to funding opportunities, such as grant writing and developing local matches for facility construction.
- The RPO operates as part of the COG and provides transportation planning-related services. The RPO should work with the City of Dunn on populating the Transportation Improvement Program (TIP) with pedestrian and bicycle infrastructure projects.
- Harnett County should coordinate with the City on trail development and SRTS grants.
- Local economic development groups, such as downtown organizations and chambers, should look for opportunities to partner on specific projects, such as signage and wayfinding projects.

The City of Dunn and the RPO should coordinate bike/ped access through I-95 intersection re-design to ensure bike/ped accessibility across I-95

Role of Local Residents, Clubs and Advocacy Groups

Local residents, clubs and advocacy groups play a critical role in the success of this plan. They should be prepared to:

- Continue offering input regarding pedestrian and bicycling issues in Dunn.
- Assist City of Dunn staff and the BPAC by volunteering for bicycle and pedestrian-related events and educational activities and/or participate in such activities.
- Assist City of Dunn staff and the BPAC by speaking at City Council meetings and advocating for local pedestrian and bicycle project and program funding.

Role of Volunteers

Services from volunteers, student labor, and seniors, or donations of material and equipment may be provided in-kind, to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail/greenway or adopt-a-highway can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as needed with senior class projects, scout projects, interested organizations, clubs or a neighborhood's community service to provide for many of the program ideas outlined in Chapter 3 of this plan. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and personal connections to the town's greenway, bicycle, and pedestrian networks.

PERFORMANCE MEASURES

The City of Dunn should establish performance measures to benchmark progress towards fulfilling the recommendations of this plan. These performance measures should be stated in an official report within two years after the plan is adopted. Performance measures could address the following aspects of bicycle transportation and recreation in Dunn:

- **Safety.** Measures of bicycle-related crashes and injuries.
- **Facilities.** Measures of how many bicycle facilities have been funded and constructed since the plan's adoption.
- **Maintenance.** Measures of existing sidewalk/crosswalk or bicycle facility deficiency or maintenance needs.
- **Counts.** Measures of bicycle traffic at specific locations.
- **Education, Encouragement and Enforcement.** Measures of the number of people who have participated in part of a bicycle-related program since the plan's adoption.

FACILITY DEVELOPMENT METHODS

This section describes different construction methods for the proposed pedestrian and bicycle facilities outlined in Chapter 3. Note that many types of transportation facility construction and maintenance projects can be used to create new bicycle facilities. It is much more cost-effective to provide bicycle facilities during roadway construction and re-construction projects than to initiate the improvements later as "retrofits".

To take advantage of upcoming opportunities and to incorporate bicycle facilities into routine transportation and utility projects, the City of Dunn should keep track of NCDOT's projects and any other local transportation improvements. While doing this, City staff should be aware of the different procedures for state and local roads and interstates.

NCDOT Transportation Improvement Program

The Transportation Improvement Program (TIP) is an ongoing program at NCDOT which includes a process asking localities to present their transportation needs to state government. Bicycle facility and safety needs are an important part of this process. Every other year, a series of TIP meetings are scheduled around the state. Following the conclusion of these meetings, all requests are evaluated. Bicycle improvement requests, which meet project selection criteria, are then scheduled into a four-year program as part of the state's long-term transportation program.

There are two types of projects in the TIP: incidental and independent. Incidental projects are those that can be incorporated into a scheduled roadway improvement project. Independent are those that can standalone such as a greenway, not related to a particular roadway.

The City of Dunn, guided by the priority projects within this plan, should present bicycle projects along State roads to the COG and State. Local requests for small pedestrian projects, such as crosswalks and smaller segments of sidewalk, can be directed to the COG or the local NCDOT Division 6 office. Further information, including the criteria evaluated can be found at: http://www.ncdot.org/transit/bicycle/funding/funding_TIP.html

Local Roadway Construction or Reconstruction

Pedestrians and cyclists should be accommodated any time a new road is constructed or an existing road is reconstructed. In the longer-term, all new roads with moderate to heavy motor vehicle traffic should have sidewalks, bicycle facilities, and safe intersections. However, multi-use side paths can be an acceptable solution when a road has few driveways and high-speed, high-volume traffic.

Also, case law surrounding the ADA has found that roadway resurfacing constitutes an alteration, which requires the addition of curb ramps at intersections where they do not yet exist. The Department of Justice and the Federal Highway Administration recently released guidance on the Title II of the Americans with Disabilities Act requirement to provide curb ramps when streets, roads, or highways are altered through resurfacing. More information is available on the following website: http://www.ada.gov/doj-fhwa-ta.htm.

Residential and Commercial Development

The construction of sidewalks, bicycle facilities, trails, and safe crosswalks should be required during development. Construction of facilities that corresponds with site construction is more cost-effective than retro-fitting. In commercial development, emphasis should also be focused on safe pedestrian and bicyclist access into, within, and through large parking lots. This ensures the future growth of the pedestrian and bicycle networks and the development of safe communities.

Removing Parking

Some neighborhood collector roadways are wide enough to stripe with bike lanes, but they are used by residents for on-street parking, especially in the evening. In locations like this, removing parking is likely to create considerable controversy and is not recommended unless there is no other solution (unless the parking is never used). In the rare case that removing parking is being considered, the parking should not be removed unless there is a great deal of public support for the bike lanes on that particular roadway and a full public involvement process with adjacent residents and businesses is undertaken prior to removing parking.

If it is not practical to add a bike lane, edgelines and shared lane markings may be considered. On roads where the outside lane and parking area combined are more than 17-feet-wide, 10-foot-wide travel lanes can be striped with an edgeline, leaving the rest of the space on either side for parking. The stripe would help slow motor vehicles and provide extra comfort for bicyclists, especially during the daytime when fewer cars would be parked along the curb. On roads with outside lane and parking areas that are narrower than 17-feet-wide, shared lane markings can be provided every 100 to 200 meters on the right side of the motor vehicle travel lane to increase the visibility of the bike route.

Repaving

Repaving projects provide a clean slate for revising pavement markings. When a road is repaved, the roadway should be restriped to create narrower lanes and provide space for bicycle lanes and shoulders, where feasible.
In addition, if the spaces on the sides of non-curb and gutter streets have relatively level grades and few obstructions, the total pavement width can be widened to include paved shoulders.

Installing Shared Lane Markings

The City of Dunn should adopt the use of shared lane markings, or "sharrows," as one of its bicycle facility types. Shared lane markings have been newly incorporated into the Manual on Uniform Traffic Control Devices (MUTCD). They take the place of traditional bicycle lanes where travel lanes cannot be narrowed, where speeds do not exceed 35 mph, and/or where there is on-street parking. The intent of the shared lane marking is threefold:

- They draw attention to the fact that the roadway is accommodating bicycle use and traffic;
- They clearly define the direction of travel for both bicyclists and motorists; and
- With proper placement, they remind bicyclists to bike further from parked cars to prevent "dooring" collisions.

While shared-lane markings are not typically recommended or needed on local, residential streets, they are sometimes used along such streets when part of a signed route or bicycle boulevard. It should be noted that sharrows are not a replacement for bicycle lanes in their effectiveness or use.

The City of Dunn should partner with NCDOT Division 6 through a Memorandum of Agreement regarding the installation and future maintenance of "sharrows" along NCDOT roadway corridors in Dunn.

Retrofit Roadways with New Bicycle and Pedestrian Facilities

There may be critical locations in the bicycle network that have bicycle safety issues or are essential links to destinations. In these locations, it may be justifiable to add new bicycle facilities before a roadway is scheduled to be repaved or reconstructed. In some other locations, it may be relatively easy to add sidewalk or to add extra pavement for shoulders, but other segments may require removing trees, relocating landscaping or fences, re-grading ditches or cut and fill sections. Retrofitting roadways with side paths creates similar challenges. Improvements in these locations are typically recommended in the long-term.

Some roads may require a "road diet" solution in order to accommodate bicycle facilities. Road diets involve reallocating motor vehicle travel lanes for the benefit of increasing roadway safety and efficiency for all users, and in some cases increasing space for other uses such as parking, on-street bicycle facilities, sidewalks, and/or side paths. These are generally recommended only in situations where the vehicular traffic count can be safely and efficiently accommodated with a reduced number of travel lanes. When considering how a road diet might affect road capacity, however, it is important to keep in mind that bicycle facilities may increase roadway capacity by allowing a greater number of total vehicles - including bicycles - to move along the roadway in a given time period. Further study may be necessary for recommended road diets to ensure that the needs of all road users are being met.

Bridge Construction or Replacement

Provisions should always be made to include a walking and bicycling facility as a part of vehicular bridges, underpasses, or tunnels. All new or replacement bridges should accommodate two-way travel for all users. Even though bridge construction and replacement does not occur regularly, it is important to consider these policies for long-term bicycle and pedestrian planning. NCDOT bridge policy states that sidewalks shall be included on new NCDOT road bridges with curb and gutter approach roadways. A determination of providing sidewalks on one or both sides is made during the planning process. Facility design standards such as widths of facilities and heights of handrails are presented in Appendix A: Design Guidelines.

Signage and Wayfinding Projects

A relatively low-cost, short-term action that the City of Dunn can pursue immediately is to develop and adopt a signage style policy and procedure, to be applied throughout the entire community, to make it easier for people to find destinations. Signage programs that include informational, warning, and regulatory signage along specific routes or in an entire community can be updated to include wayfinding signage to make it easier for people to find destinations. Bicycle route signs are one example of these wayfinding signs, and should be installed along routes independently of other signage projects

or as a part of a more comprehensive wayfinding improvement project. Posting signage that includes bicycle travel times to major destinations can help to increase awareness of the ease and efficiency of bicycle travel. One of the first wayfinding signage projects in Dunn should connect the end of the Dunn-Erwin Rail-Trail to downtown Dunn. See Appendix A: Design Guidelines for more detailed guidance on signage and wayfinding improvements.

For a step-by-step guide to help non-professionals participate in the process of developing and designing a signage system, as well as information on the range of signage types, visit the Project for Public Places website: www.pps.org/info/amenities_bb/signage_guide

Bicycle Parking

Bicycle Parking is recommended at each destination identified in this plan and as needed. This is another relatively low-cost, short-term action that the City of Dunn can pursue immediately. Refer to Appendix A for guidance.

City Easements

The City of Dunn should explore opportunities to revise existing easements to accommodate public access greenway facilities or multi-use trail facilities. Similarly, as new easements are acquired in the future, the possibility of public access should be considered. Sewer easements are very commonly used for this purpose, offering cleared and graded corridors that easily accommodate trails. This approach avoids the difficulties associated with acquiring land, and it better utilizes the City's resources. See the following pages for an example of an easement for sanitary sewer greenway purposes.

Instrument Prepared By: City Attorney's Office
Brief Description for Index: Sewer/Greenway Easement
Parcel Identifier: _____
Mail After Recording To: City Clerk's Office
P. O. Box 590
Raleigh, N.C. 27602

STATE OF NORTH CAROLINA

COUNTY OF WAKE

GENERAL WARRANTY DEED
EASEMENT FOR SANITARY SEWER AND GREENWAY PURPOSES

THIS DEED OF EASEMENT, made and executed this _____ day of _____, 19_____, by _____, hereinafter referred to as the "Grantors", to the City of Raleigh, a municipal corporation of the State of North Carolina, hereinafter referred to as the "City";

W I T N E S S E T H:

WHEREAS, the Grantors are the Owners of the land hereinafter described and have agreed to convey to the City, according to the terms set forth below, the easement hereinafter described;

The designation "Grantors" as used herein shall include the singular and plural, as required, and the masculine, feminine and neuter gender as appropriate.

NOW, THEREFORE, in consideration of Ten Dollars ($10.00) and other valuable consideration paid to the Grantors, receipt of which is hereby acknowledged, the Grantors, do hereby grant unto the City, its successors and assigns, the right, privilege and easement in perpetuity to: establish upon and maintain the land, hereinafter described, specifically as a greenway with facilities or improvements which may include trails, litter receptacles, boat launches, gates, trail markers, trail bridges, shelters, and other facilities necessary or convenient thereto and including the right of ingress and egress to the City and members of the general public for greenway maintenance and use; to construct, install, improve, remove, replace, inspect, repair, maintain, and use a system of pipelines or mains for sanitary sewer purposes, together with all the appurtenant facilities and equipment necessary or convenient thereto; subject to the laws and ordinances of the city, in, upon, and across the property of the Grantors described in a deed recorded in Deed Book _____, Page _____, Wake County Registry, which said easement is more particularly described in Exhibit A attached hereto and incorporated herein.

TO HAVE AND TO HOLD the aforesaid easement interest and all privileges and rights thereunto belonging to the City of Raleigh, its successors and assigns forever.

THE FURTHER TERMS AND CONDITIONS of the easement interest herein conveyed are as follows:

1. The City is authorized hereunder to remove and keep removed from the easement all trees, shrubs, underbrush, and part thereof, or other obstructions as necessary to maintain, repair or protect said greenway and sanitary sewer lines and appurtenances or as necessary for the prevention or treatment of disease and for other good husbandry practices. Except as hereinabove allowed there shall be no other removal, destruction or cutting of trees, shrubs or other vegetation from the easement interest herein described and conveyed by any person or entity.

2. Nothing herein shall be construed to grant to the City of Raleigh or the general public any right of access through or over any property of the Grantors except that lying within the easement interest herein described and conveyed.

3. Following the installation of a sanitary sewer main and appurtenant facilities within the permanent easement hereinabove referenced and described, any and all temporary construction easement interest conveyed herein to the City shall terminate; and further, the City shall regrade, mulch, and reseed all damaged lands lying with the permanent and temporary easements, to the end that the same shall be restored to a condition as good as or better than that before construction.

4. Except as herein authorized, no building, fence, sign, or other structure nor any vehicular surface area shall be erected within the easement interest herein described and conveyed.

5. There shall be no dumping of ashes, garbage, waste, or other unsightly or offensive material on the easement interest herein described and conveyed.

6. There shall be no excavation, dredging, removal of loam, rock, sand, gravel or other material, nor any building of roads or other change in the natural topography of the easement interest herein described and conveyed, excepting for the construction and maintenance of the greenway and the sanitary sewer system undertaken by the City of Raleigh or its agents.

7. The City of Raleigh shall have the right and duty to maintain this Greenway Easement in a clean, natural, and undisturbed state, consistent with the City's master Greenway Plan.

8. The City agrees to hold Grantors harmless from liability for personal injury or property damage arising out of the use of the easement for greenway purposes; provided Grantors shall not be held harmless from liability caused by the active conduct or instrumentalities of the Grantors, their agents, invitees, or contractors; or by acts of Grantors, their agents, invitees or contractors which violate the terms and conditions of this Deed of Easement.

The City does not waive or forfeit the right to take action to insure compliance with the terms, conditions and purposes of this easement by a prior failure to act.

The City reserves the right to enter the subject property at reasonable times in order to monitor compliance with the terms, conditions, restrictions, and purposes of this easement.

The Grantors expressly reserve the right to continue the use of the property for all purposes not inconsistent with this easement.

The Grantors agree that the terms, conditions and restrictions of this easement will be inserted by them in any subsequent deed or other legal instrument by which they divest themselves of either the fee simple title to, or of their possessory interest in, the subject property.

TO HAVE AND TO HOLD the said right, privilege and easement herein granted to the City of Raleigh, its successors and assigns forever. The covenants agreed to and the terms, conditions and restrictions imposed herein shall be binding upon the said Grantors and their agents, personal representatives, heirs and assigns, and all other successors to them in interest and shall continue as a servitude running in perpetuity with the above described land.

AND the said Grantors covenant that they are vested of the premises in fee and have the right to convey the same in fee simple; that the same are free from encumbrances except as hereinafter stated; and that they will warrant and defend title to the same against the claims of all persons whomsoever, subject only to the following exceptions:

IN WITNESS WHEREOF, the said Grantors have hereunto set their hand and seals the day and year first above written.

WITNESS:

_____ _____ (SEAL)

_____ (SEAL)

Approved as to Form: _____ (SEAL)

_____ _____ (SEAL)

(Deputy) City Attorney

STATE OF NORTH CAROLINA

INDIVIDUAL

COUNTY OF _____

I, _____, a Notary Public do hereby certify that _____, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

This the _____day of _____, 19_____.

(SEAL)

_____
Notary Public

My Commission Expires:

STATE OF NORTH CAROLINA

PARTNERSHIP
(INDIVIDUAL)

COUNTY OF _____

I, _____, a Notary Public do hereby certify that _____, general partner of_____, personally appeared before me this day and acknowledged the execution, with proper authorization, of the foregoing instrument, all in accordance with partnership instruments recorded in Book _____ Page _____ in the _____ County Registry and that the instrument is the act and deed of the partnership.

This the _____day of _____19____.

(SEAL)

_____
Notary Public

My Commission Expires:

NORTH CAROLINA

CORPORATE

COUNTY OF _____

This is to certify that on the _____day of _____, 19_____, before me personally came _____, with whom I am personally acquainted, who, being by me duly sworn, says that (s)he is the (assistant) secretary, and _____ is the (vice) president of _____, the corporation described in and which executed the foregoing instrument; that (s)he knows the common seal of said corporation; that the seal affixed to the foregoing instrument is said common seal, and the name of the corporation was subscribed thereto by the said (assistant) secretary, and that the said (assistant) secretary and (vice) president subscribed their names thereto, and said common seal was affixed, all by order of the Board of Directors of said corporation, and that the said instrument is the act and deed of said corporation.

WITNESS my hand and official seal this the _____day of _____19_____.

(SEAL)

_____
Notary Public

My Commission Expires:

Downtown Dunn, NC

Appendix A: Design Guidelines

Appendix Contents:

OVERVIEW

The sections that follow serve as an inventory of bicycle design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating a bicycle-friendly, 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. Some improvements may also require cooperation with the NCDOT for specific design solutions. The following standards and guidelines are referred to in this guide.

- The Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (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*, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities.
- The National Association of City Transportation Officials' (NACTO) 2012 *Urban Bikeway Design Guide* is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US. The FHWA endorsed the NACTO Guide in 2013.
- The North Carolina Department of Transportation *Complete Streets Planning and Design Guidelines,* released in 2012, provide NCDOT and municipality staff with a guide to planning and designing streets that meet the needs of all users, including pedestrians, bicyclists, and motor vehicles. The guidelines include detailed information on the processes, street types, and recommendations for creating complete streets in North Carolina.

Should these standards be revised in the future and result in discrepancies with this appendix, the standards should prevail for all design decisions. A qualified engineer or landscape architect should be consulted for the most up to date and accurate cost estimates.

DESIGN NEEDS OF BICYCLISTS

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.

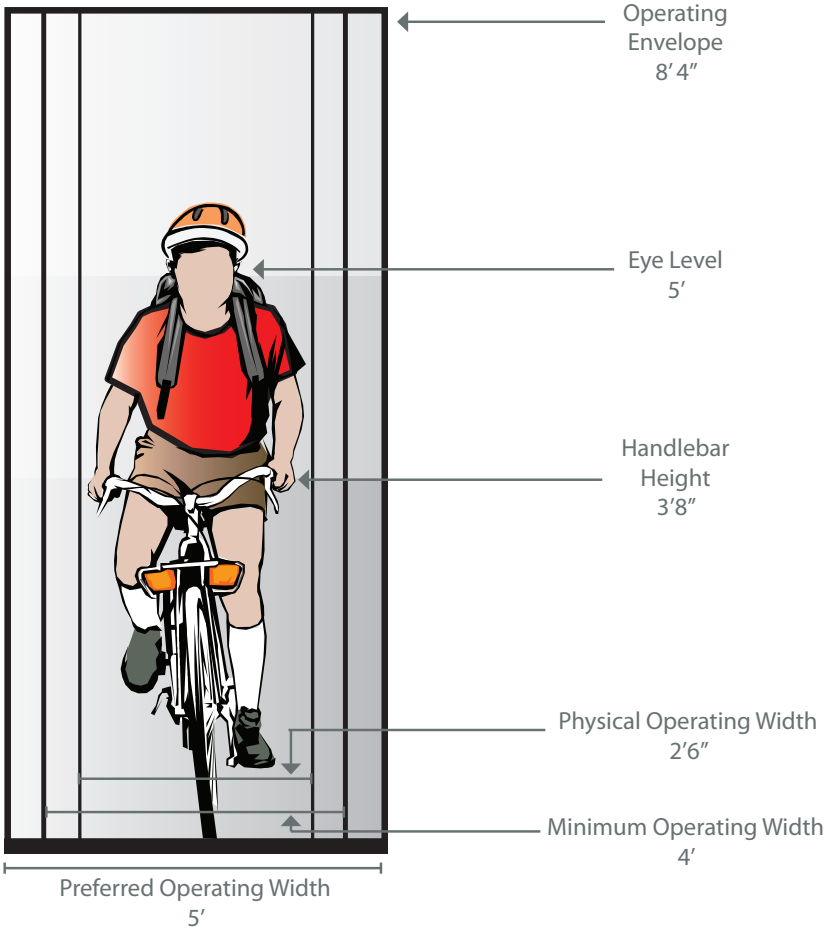
Bicycle as a Design Vehicle

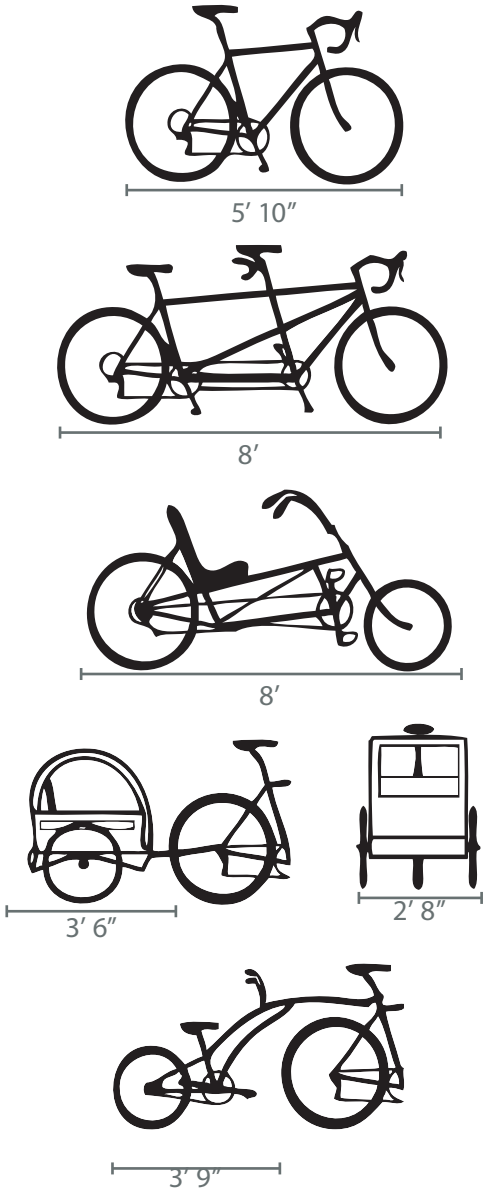
Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The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

The figure below 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 feet or more operating width, although four feet 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 and table below summarize the typical dimensions for bicycle types.

Standard Bicycle Rider Dimensions
Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition





Bicycle as Design Vehicle - Typical Dimensions
Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition *AASHTO does not provide typical dimensions for tricycles.

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

Bicycle as Design Vehicle - Typical Dimensions

Bicycle Type	Feature	Typical Dimensions
Upright Adult Bicyclist	Physical width	2 ft 6 in
	Operating width (Minimum)	4 ft
	Operating width (Preferred)	5 ft
	Physical length	5 ft 10 in
	Physical height of handlebars	3 ft 8 in
	Operating height	8 ft 4 in
	Eye height	5 ft
	Vertical clearance to obstructions (tunnel height, lighting, etc)	10 ft
	Approximate center of gravity	2 ft 9 in - 3 ft 4 in
Recumbent Bicyclist	Physical length	8 ft
	Eye height	3 ft 10 in
Tandem Bicyclist	Physical length	8 ft
Bicyclist with child trailer	Physical length	10 ft
	Physical width	2 ft 8 in

Bicycle as Design Vehicle - Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	15 mph
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

*Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.

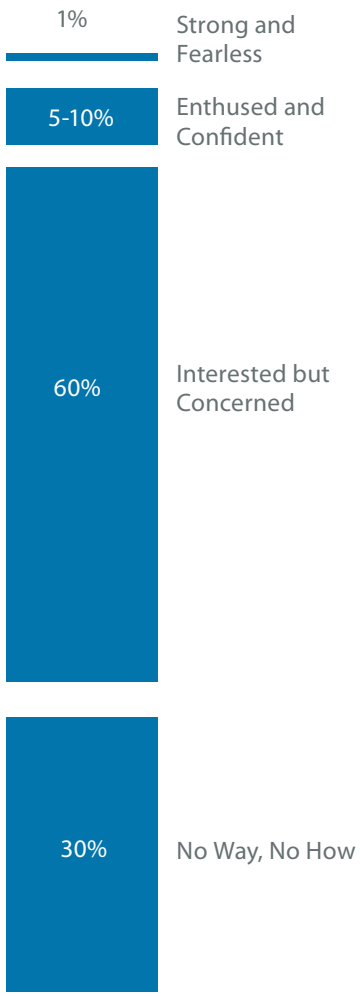
TYPES OF BICYCLISTS

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences 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.

The bicycle planning and engineering professions currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the "design cyclist" as Advanced, Basic, or Child[1]. A more detailed understanding of the US population as a whole is illustrated in the figure below. Developed by planners in Portland, OR[2] and supported by data collected nationally since 2005, this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- Strong and Fearless (approximately 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 multi-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 (approximately 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, No How (approximately 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 never ride a bicycle other than on rare occasions or under special circumstances (e.g., in a park, with a child).

Typical Distribution of Bicyclist Types



1 Selecting Roadway Design Treatments to Accommodate Bicycles. (1994). Publication No. FHWA-RD-92-073

2 Four Types of Cyclists. (2009). Roger Geller, City of Portland Bureau of Transportation.

http://www.portlandonline.com/transportation/index.cfm?&a=237507

BICYCLE FACILITY SELECTION GUIDELINES

The specific facility type that should be provided depends on the surrounding environment (e.g. auto speed and volume, topography, and adjacent land use) and expected bicyclist needs (e.g. bicyclists commuting on a highway versus students riding to school on residential streets).


Facility Classification


Facility Continua

Facility Selection Guidelines

There are no 'hard and fast' rules for determining the most appropriate type of bicycle facility for a particular location – roadway speeds, volumes, right-of-way width, presence of parking, adjacent land uses, and expected bicycle user types are all critical elements of this decision. Studies find that the most significant factors influencing bicycle use are motor vehicle traffic volumes and speeds. Additionally, most bicyclists prefer facilities separated from motor vehicle traffic or located on local roads with low motor vehicle traffic speeds and volumes. Because off-street pathways are physically separated from the roadway, they are perceived as safe and attractive routes for bicyclists who prefer to avoid motor vehicle traffic. Consistent use of treatments and application of bikeway facilities allow users to anticipate whether they would feel comfortable riding on a particular facility, and plan their trips accordingly. This section provides guidance on various factors that affect the type of facilities that should be provided.

This section includes:

- Facility Classification
- Facility Continua

FACILITY CLASSIFICATION

Description

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared Roadways are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.

Shared Roadways may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Shared-lane markings are included in this class of treatments.

Separated Bikeways, such as bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists. Paved Shoulders are also included in this classification.

Cycle Tracks are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.

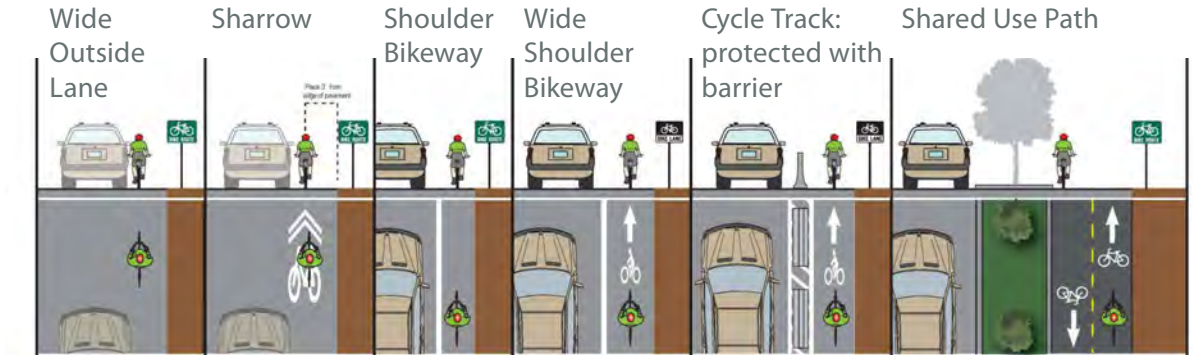
Multi-use Paths are facilities separated from roadways for use by bicyclists and pedestrians. Greenways and side paths are included in this classification.

FACILITY CONTINUA

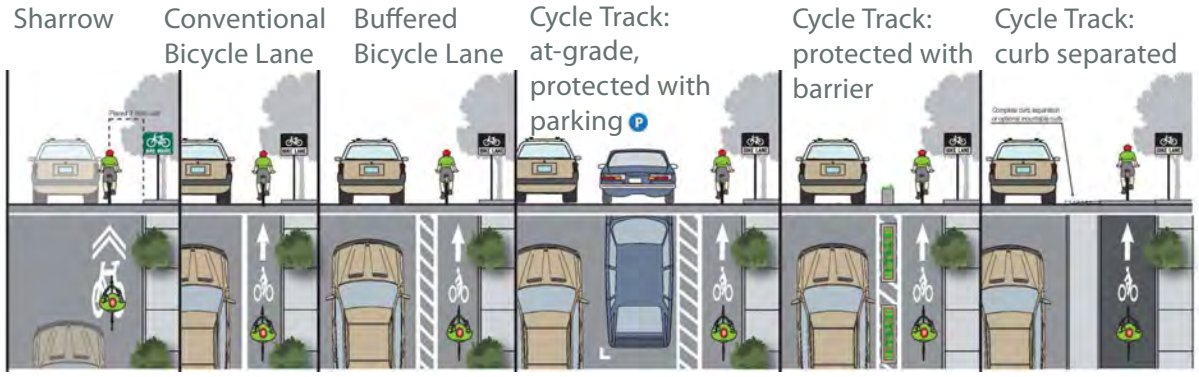
The following continua illustrate the range of bicycle facilities applicable to various roadway environments, based on the roadway type and desired degree of separation. Engineering judgment, traffic studies, previous municipal planning efforts, community input, and local context should be used to refine criteria when developing bicycle facility recommendations for a particular street. In some corridors, it may be desirable to construct facilities to a higher level of treatment than those recommended in relevant planning documents in order to enhance user safety and comfort. In other cases, existing and/or future motor vehicle speeds and volumes may not justify the recommended level of separation, and a less intensive treatment may be acceptable.

Least Protected → Most Protected

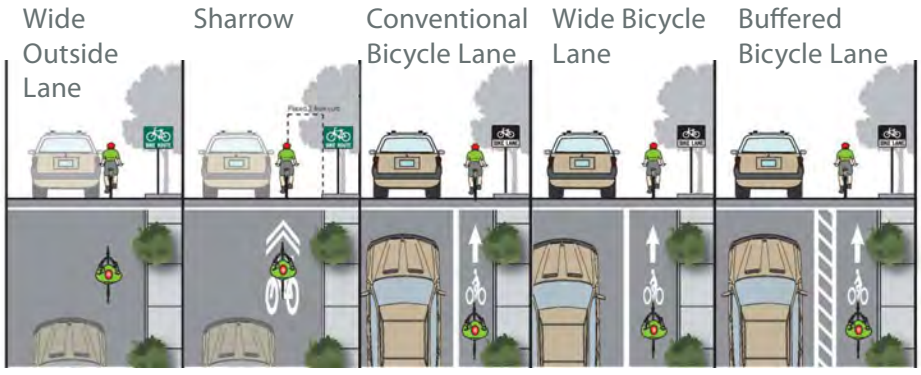
Arterial/Highway Bikeway Continuum (without curb and gutter)



Arterial/Highway Bikeway Continuum (with curb and gutter)



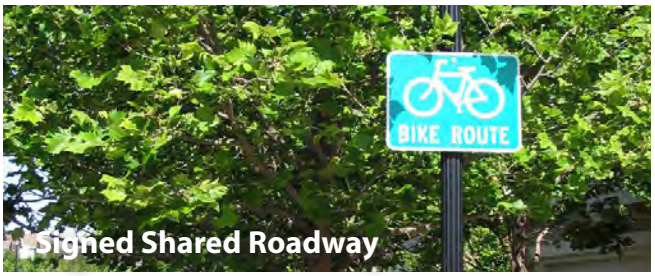
Collector Bikeway Continuum



Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they 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.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.



Signed Shared Roadway


Marked Shared Roadway


Bicycle Boulevard

This section includes:

- Signed Shared Roadway
- Marked Shared Roadway
- Bicycle Boulevard

Signed Shared Roadways

Description

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.

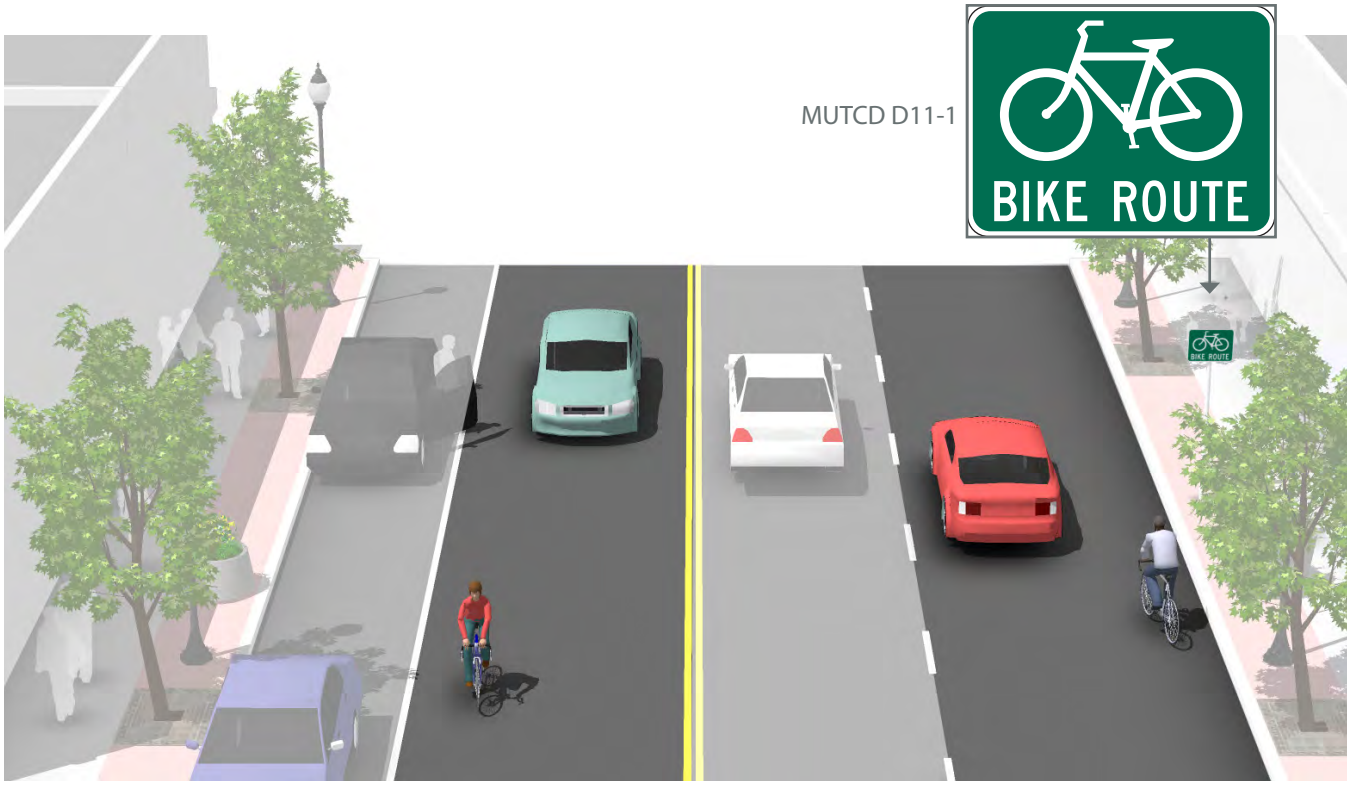
Guidance

Lane width varies depending on roadway configuration.

Bicycle 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.

MUTCD D11-1



Discussion

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 **Bicycle 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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

Marked Shared Roadway

Description

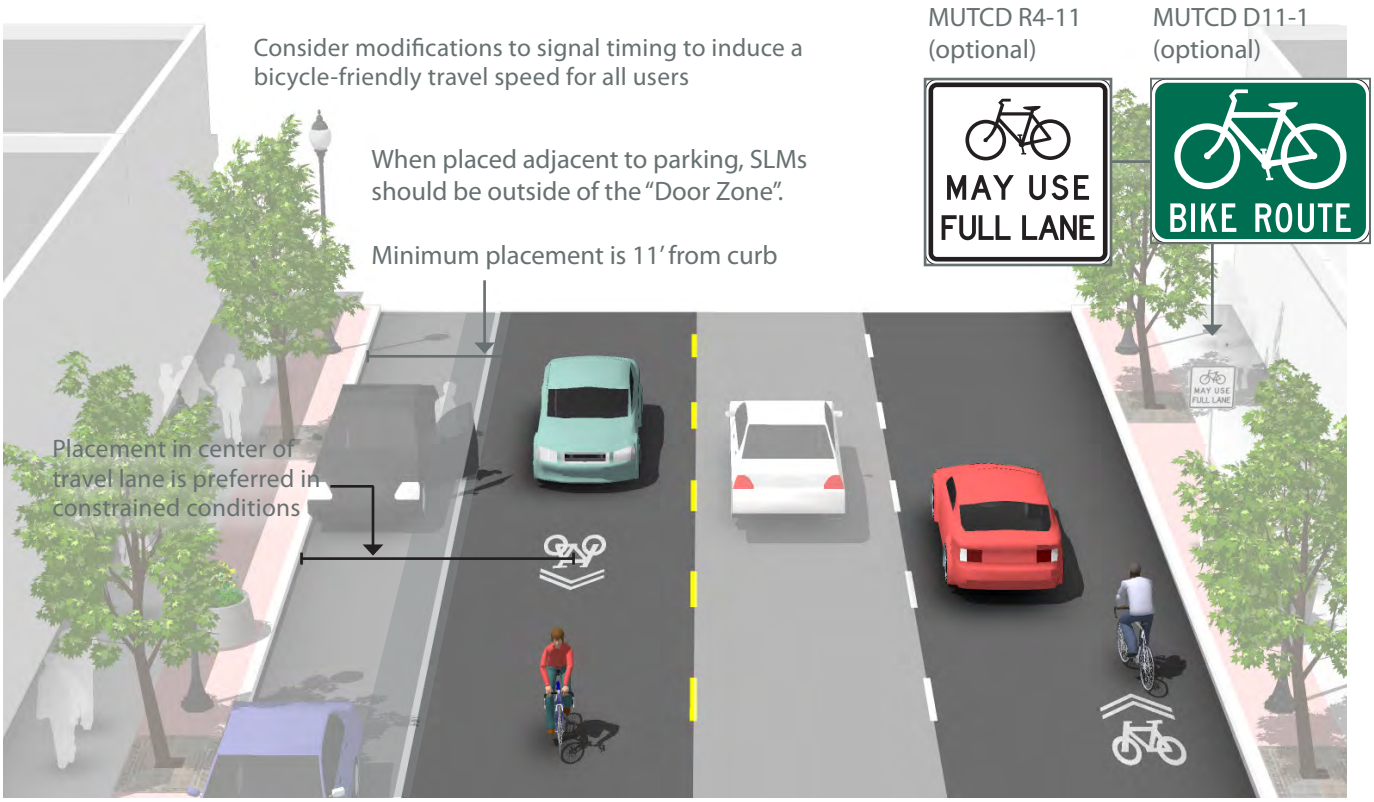
A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.

In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. 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.

Guidance

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



Discussion

Bike Lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated Bike Lanes, or to designate Bicycle Detection at signalized intersections. (MUTCD 9C.07)

This configuration differs from a Bicycle Boulevard due to a lack of traffic calming, wayfinding, and other enhancements designed to provide a higher level of comfort for a broad spectrum of users.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide. NCDOT. (2000). Traditional Neighborhood Development (TND) Guidelines.

Materials and Maintenance

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

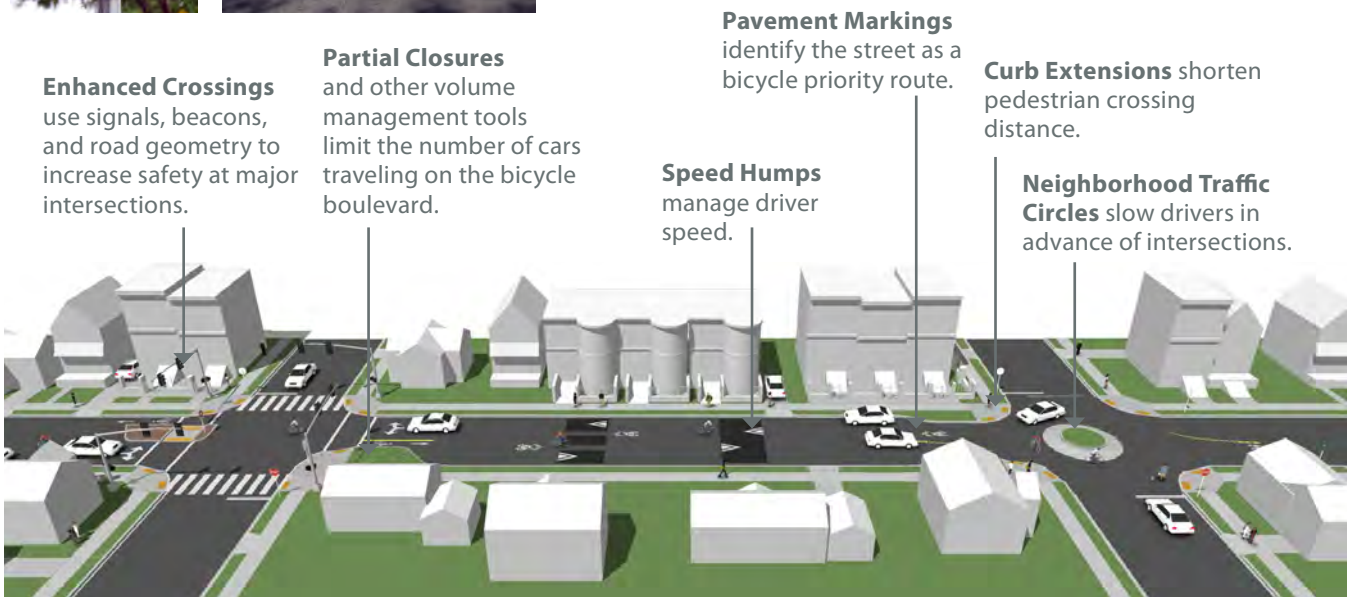
Bicycle Boulevard

Description

Bicycle boulevards are a special class of shared roadways designed for a broad spectrum of bicyclists. They are low-volume, low-speed local 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.

Guidance

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- 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.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.



Discussion

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.

Additional References and Guidelines

Alta Planning + Design and IBPI. (2009). Bicycle Boulevard Planning and Design Handbook. BikeSafe. (No Date). Bicycle countermeasure selection system. Ewing, Reid. (1999). Traffic Calming: State of the Practice. Ewing, Reid and Brown, Steven. (2009). U.S. Traffic Calming Manual.

Materials and Maintenance

Vegetation should be regularly trimmed to maintain visibility and attractiveness.

SEPARATED BIKEWAYS

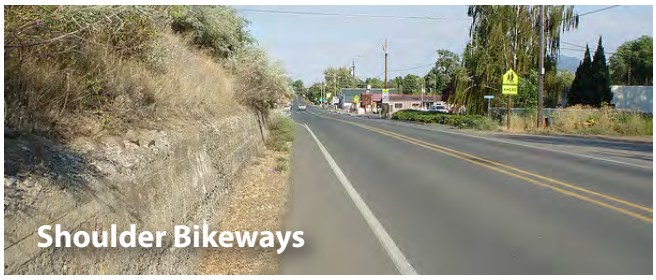
Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.

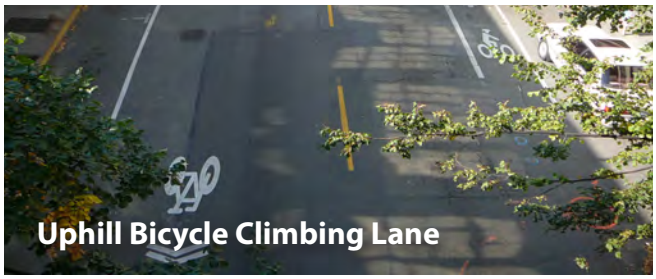
This section includes:

- Shoulder Bikeways
- Bicycle Lanes
- Buffered Bike Lanes
- Uphill Bicycle Climbing Lane
- Cycle Tracks


Shoulder Bikeways


Bicycle Lanes


Buffered Bike Lanes


Uphill Bicycle Climbing Lane


Cycle Tracks

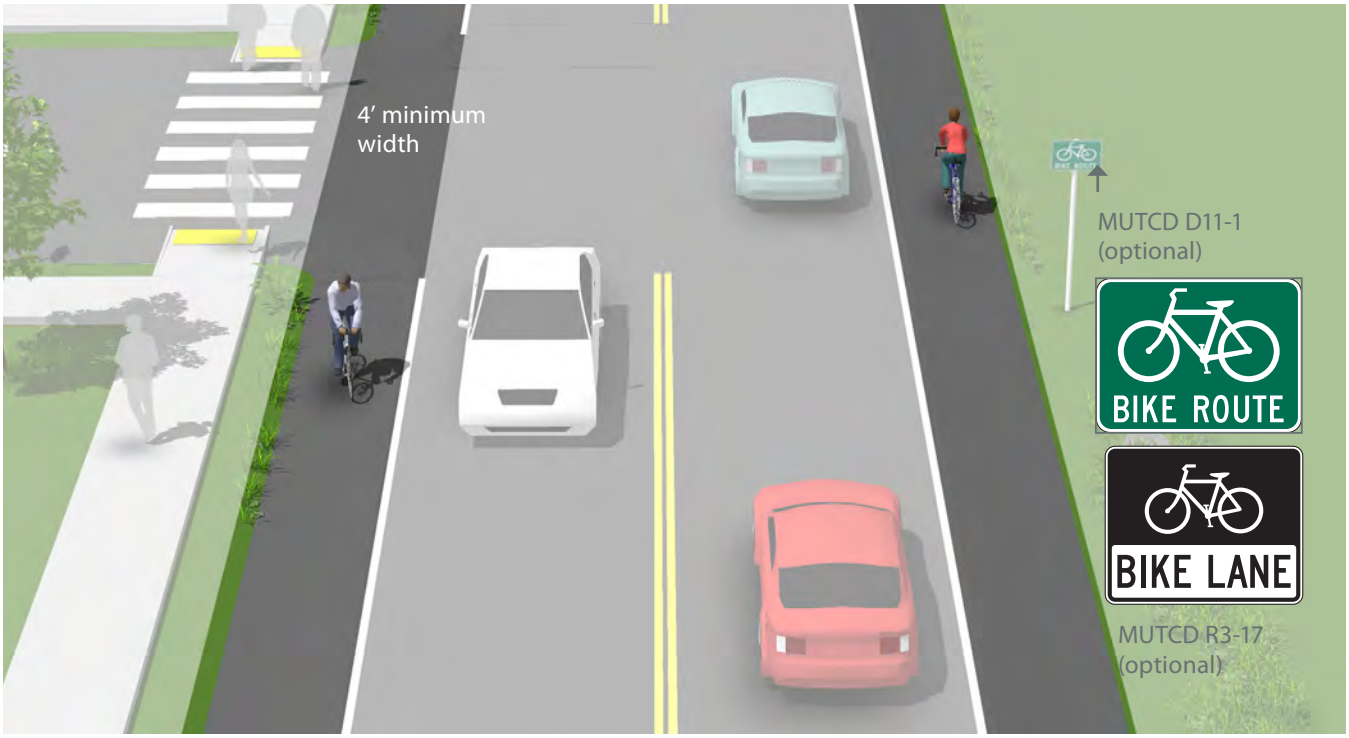
Shoulder Bikeways

Description

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. 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. This type of treatment is not typical in urban areas and should only be used where constraints exist.

Guidance

- 4 foot minimum width. Greater widths preferred.
- 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.



Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a marked shared roadway in these locations.

Where feasible, roadway widening should be performed with pavement resurfacing jobs.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. NCDOT. (1994). Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

Bicycle Lanes

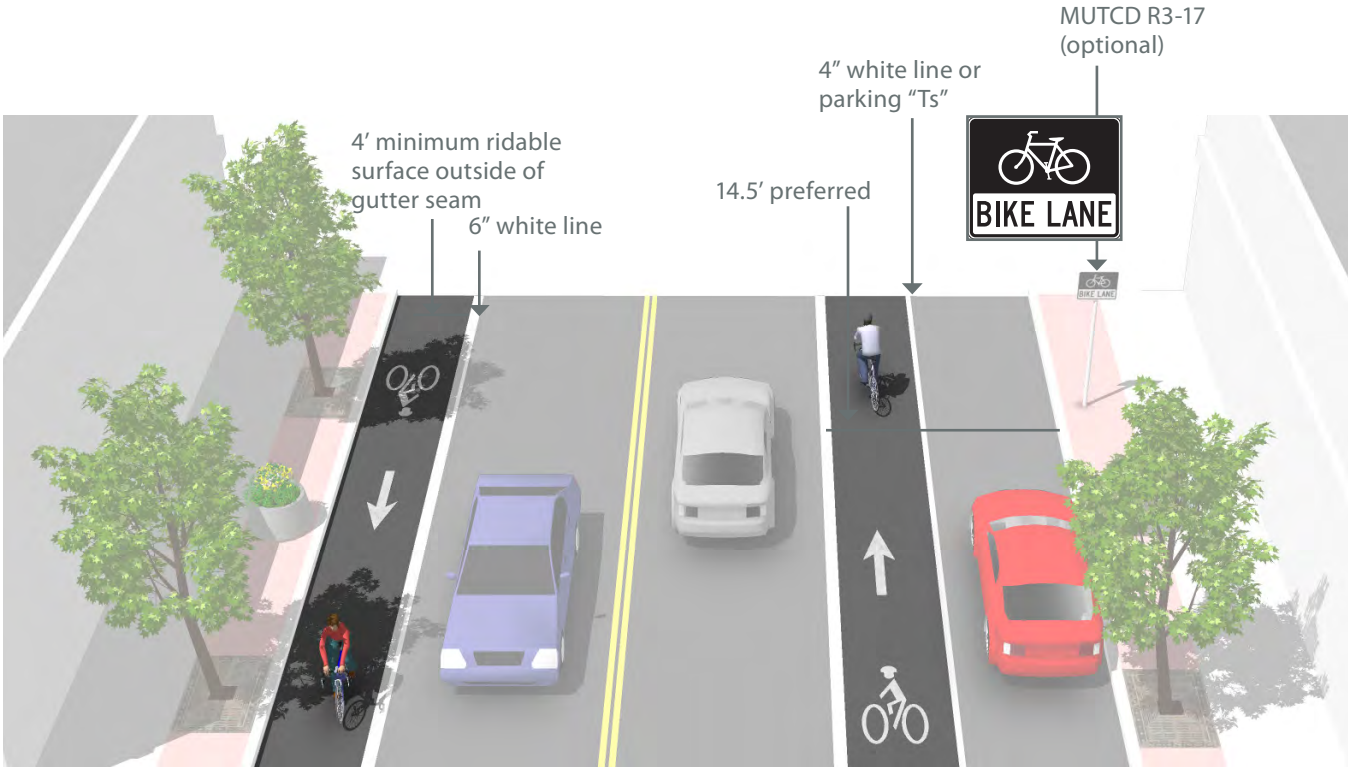
Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located 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.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum).
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider Buffered Bicycle Lanes when further separation is desired.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. NACTO. (2012). Urban Bikeway Design Guide. NCDOT. (2000). Traditional Neighborhood Development (TND) Guidelines. NCDOT. (1994). Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Buffered Bike Lanes

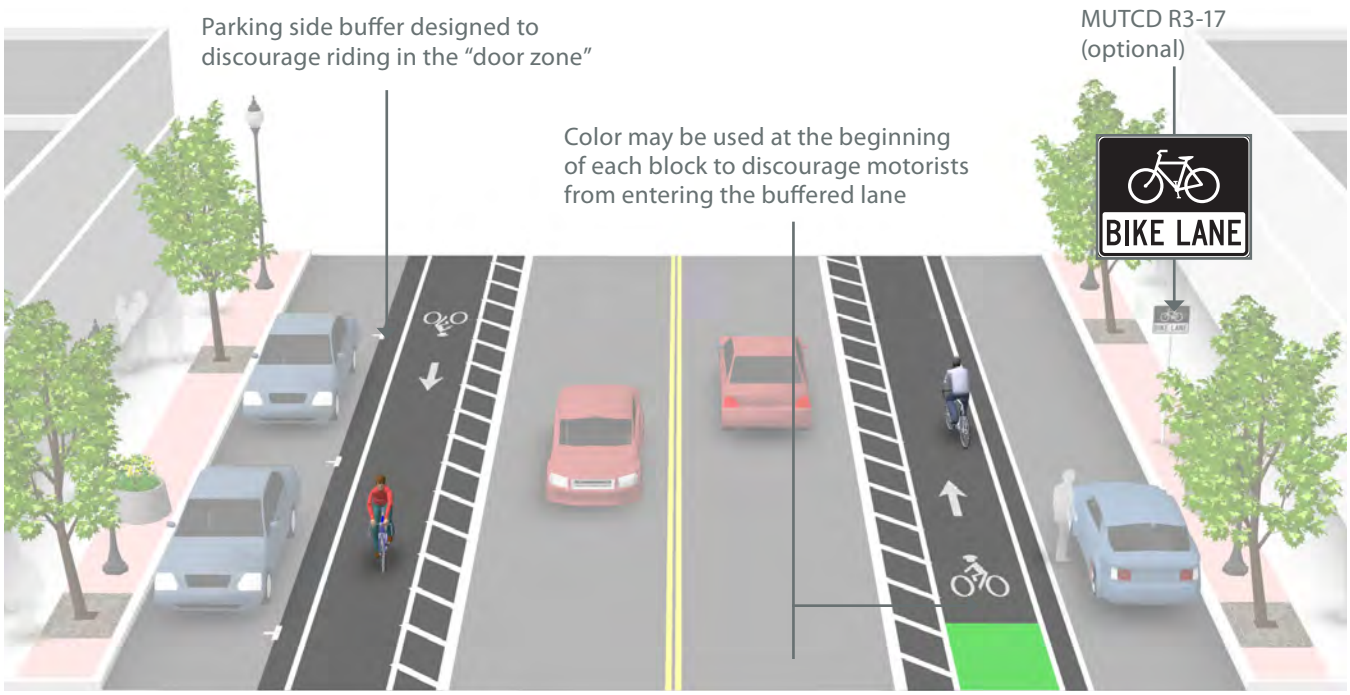
Description

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. Buffered bike lanes are allowed as per MUTCD guidelines for buffered preferential lanes (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

Guidance

- Where bicyclist volumes are high or where bicyclist speed differentials are significant, the desired bicycle travel area width is 7 feet.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line or colored pavement for the inside buffer boundary where cars are expected to cross.



Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. (3D-01) NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

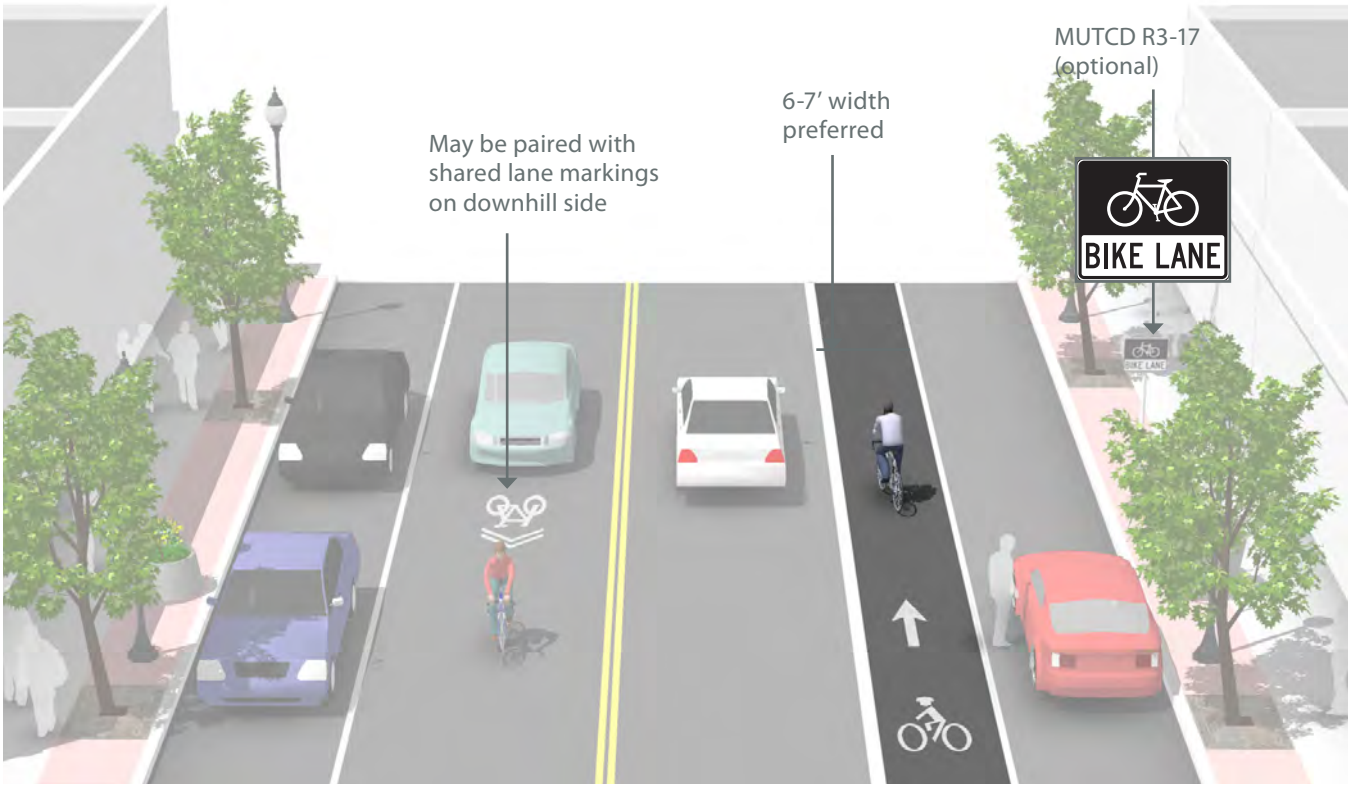
Uphill Bicycle Climbing Lane

Description

Uphill bike lanes (also known as "climbing lanes") enable motorists to safely pass slower-speed bicyclists, thereby improving conditions for both travel modes.

Guidance

- Uphill bike lanes should be 6-7 feet wide (wider lanes are preferred because extra maneuvering room on steep grades can benefit bicyclists).
- Can be combined with Shared Lane Markings for downhill bicyclists who can more closely match prevailing traffic speeds.



Discussion

This treatment is typically found on retrofit projects as newly constructed roads should provide adequate space for bicycle lanes in both directions of travel. Accommodating an uphill bicycle lane often includes delineating on-street parking (if provided), narrowing travel lanes and/or shifting the centerline if necessary.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.
AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Cycle Tracks

Description

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic and distinct from the sidewalk. Cycle tracks have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks.

Raised cycle tracks may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the cycle track from the pedestrian area.

Guidance

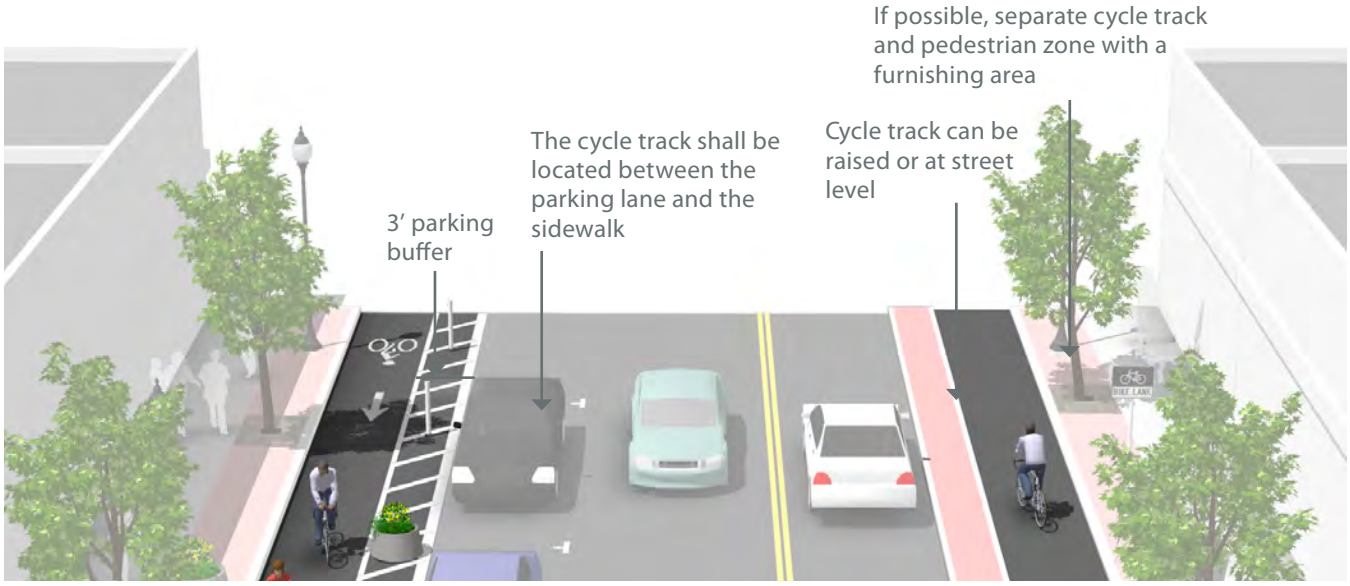
Cycle tracks should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

One-Way Cycle Tracks

- 7 foot recommended minimum to allow passing. 5 foot minimum width in constrained locations.

Two-Way Cycle Tracks

- Cycle tracks located on one-way streets have fewer potential conflict areas than those on two-way streets.
- 12 foot recommended minimum for two-way facility. 8 foot minimum in constrained locations



Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to cycle track design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic. If configured as a raised cycle track, the crossing should be raised so that the sidewalk and cycle track maintain their elevation through the crossing.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

In cities with winter climates, barrier separated and raised cycle tracks may require special equipment for snow removal.

SEPARATED BIKEWAYS AT INTERSECTIONS

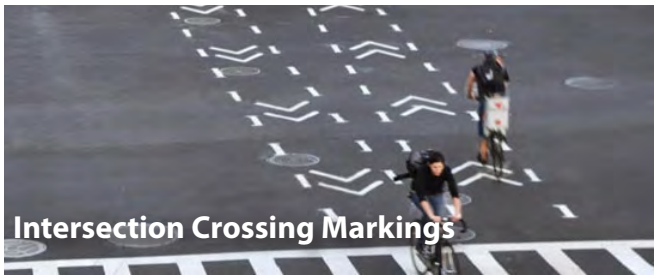
Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

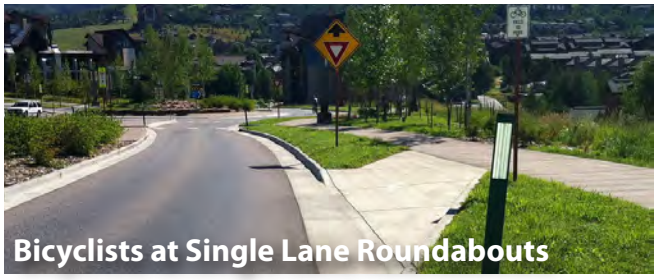
The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

Bike Lanes at Right Turn Only Lanes


Colored Bike Lanes in Conflict Areas

Combined Bike Lane/Turn Lane


Intersection Crossing Markings


Bicyclists at Single Lane Roundabouts

This section includes:

- Bike Lanes at Right Turn Only Lanes
- Colored Bike Lanes in Conflict Areas
- Combined Bike Lane/Turn Lane
- Intersection Crossing Markings
- Bicycles at Single Lane Roundabouts

Bike Lanes at Right Turn Only Lanes

Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane/turn lane.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.

Guidance

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dotted line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.

Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see shared bike lane/turn lane, bicycle signals, and colored bike facilities.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. NACTO. (2012). Urban Bikeway Design Guide.

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

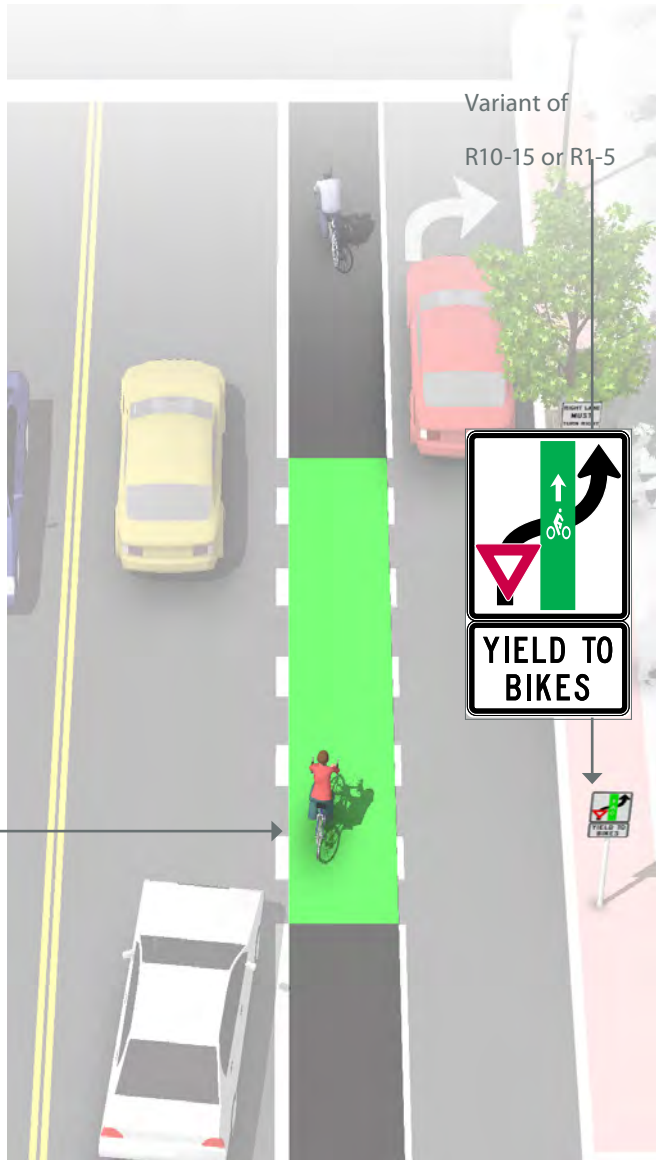
Colored Bike Lanes in Conflict Areas

Description

Colored pavement within a bicycle lane increases the visibility of the facility and reinforces priority of bicyclists in conflict areas.

Guidance

- Green colored pavement was given interim approval by the Federal Highways Administration in March 2011. See interim approval for specific color standards.
- The colored surface should be skid resistant and retro-reflective.
- A "Yield to Bikes" sign should be used at intersections or driveway crossings to reinforce that bicyclists have the right-of-way in colored bike lane areas.



Discussion

Evaluations performed in Portland, OR, St. Petersburg, FL and Austin, TX found that significantly more motorists yielded to bicyclists and slowed or stopped before entering the conflict area after the application of the colored pavement when compared with an uncolored treatment.

Additional References and Guidelines

FHWA. (2011). Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

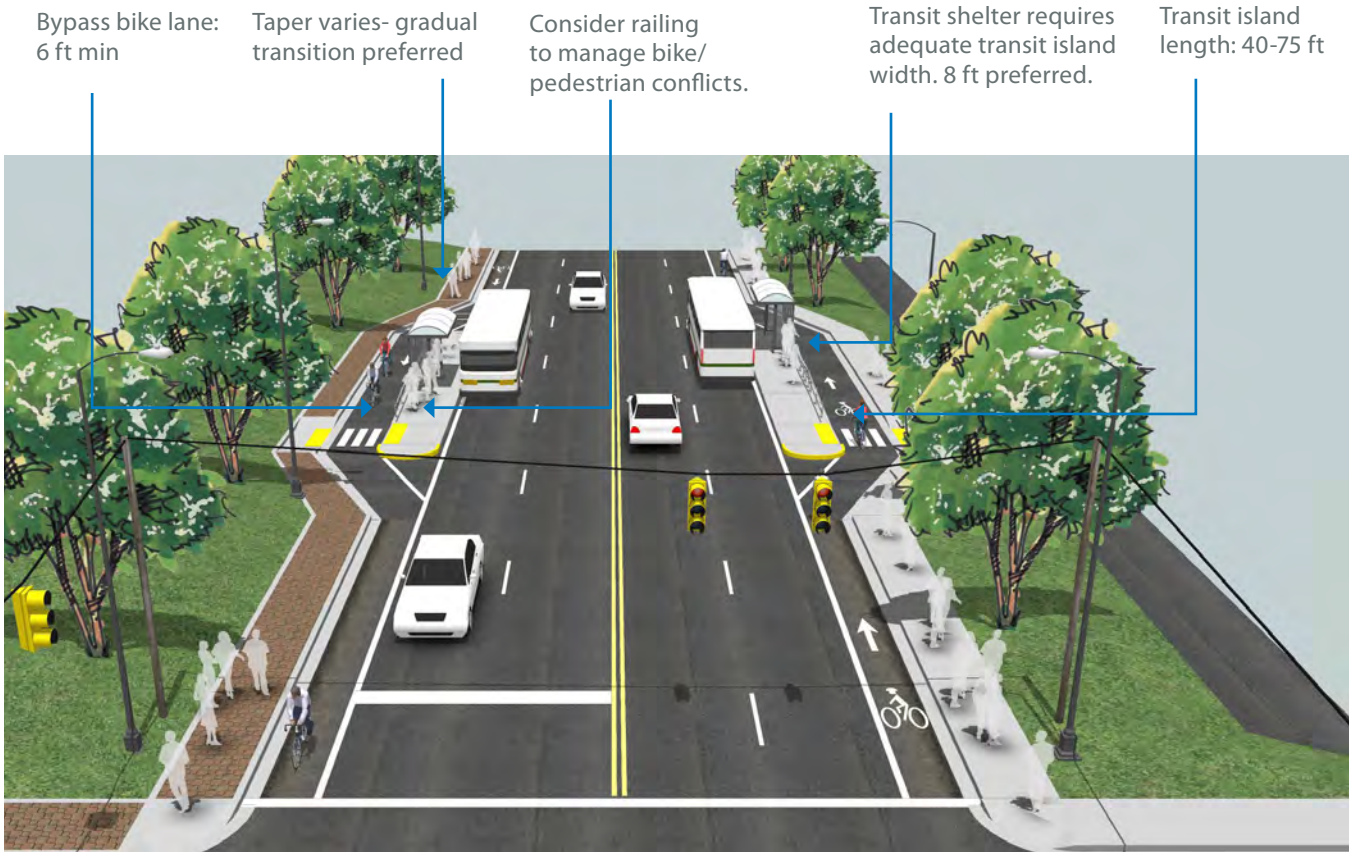
Bicycle Lane Transit Bypass

Description

Transit bypass bike lane is a channelized lane for bicycles designed to allow bicyclists to pass stopped busses, and prevent conflicts with busses pulling to the curb. This is particularly helpful on corridors with high volumes of transit vehicles and bicyclists, where "leapfrogging" may occur.

Guidance

- Appropriate in areas with high volumes of busses and bicyclists.
- 6 foot minimum width bypass lane.
- Transit island should be wide enough to hold all waiting transit riders.



Discussion

Ensure an adequate width bicycle lane where the bypass lane rejoins the roadway so that bicyclists do not encroach into adjacent lanes.

Conflicts with pedestrians may be increased over conventional bus stop designs. Consider railings to direct pedestrians to a single location where they may cross to the sidewalk.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

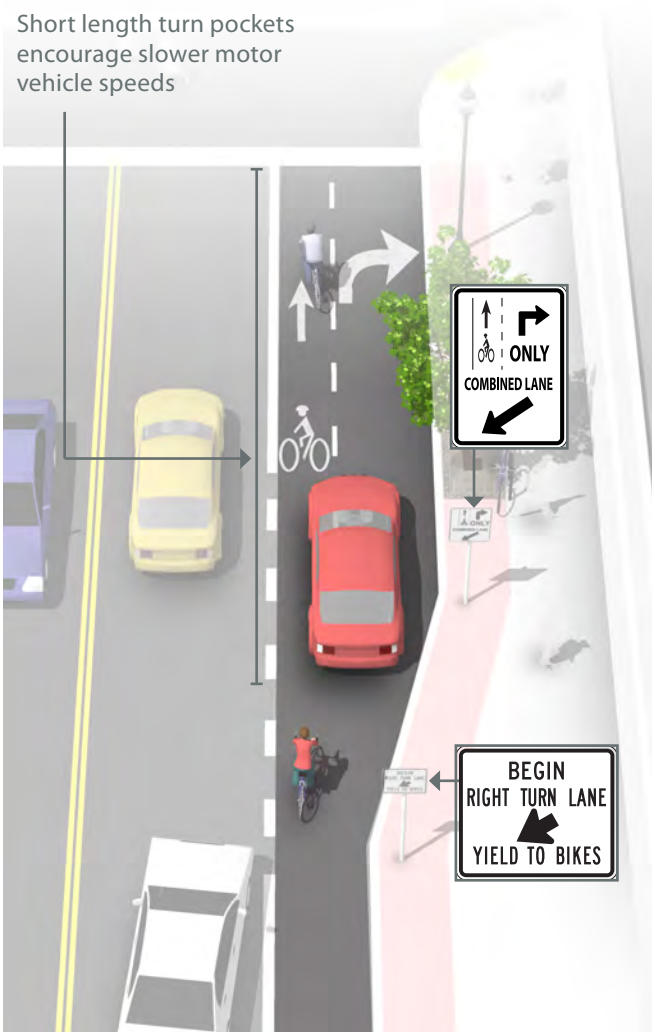
The channelized bicycle lane may require additional sweeping to maintain free of debris.

Combined Bike Lane / Turn Lane

Description

The combined bicycle/right turn lane places a standard-width bike lane on the left side of a dedicated right turn lane. A dotted line delineates the space for bicyclists and motorists within the shared lane. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane.

This treatment is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.



Guidance

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Bike Lane pocket should have a minimum width of 4 feet with 5 feet preferred.
- A dotted 4 inch line and bicycle lane marking should be used to clarify bicyclist positioning within the combined lane, without excluding cars from the suggested bicycle area.
- A "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.

Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets 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.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.
This treatment is currently slated for inclusion in the next edition of the AASHTO Guide for the Development of Bicycle Facilities

Materials and Maintenance

Locate markings out of tire tread to minimize wear. Because the effectiveness of markings depends on their visibility, maintaining markings should be a high priority.

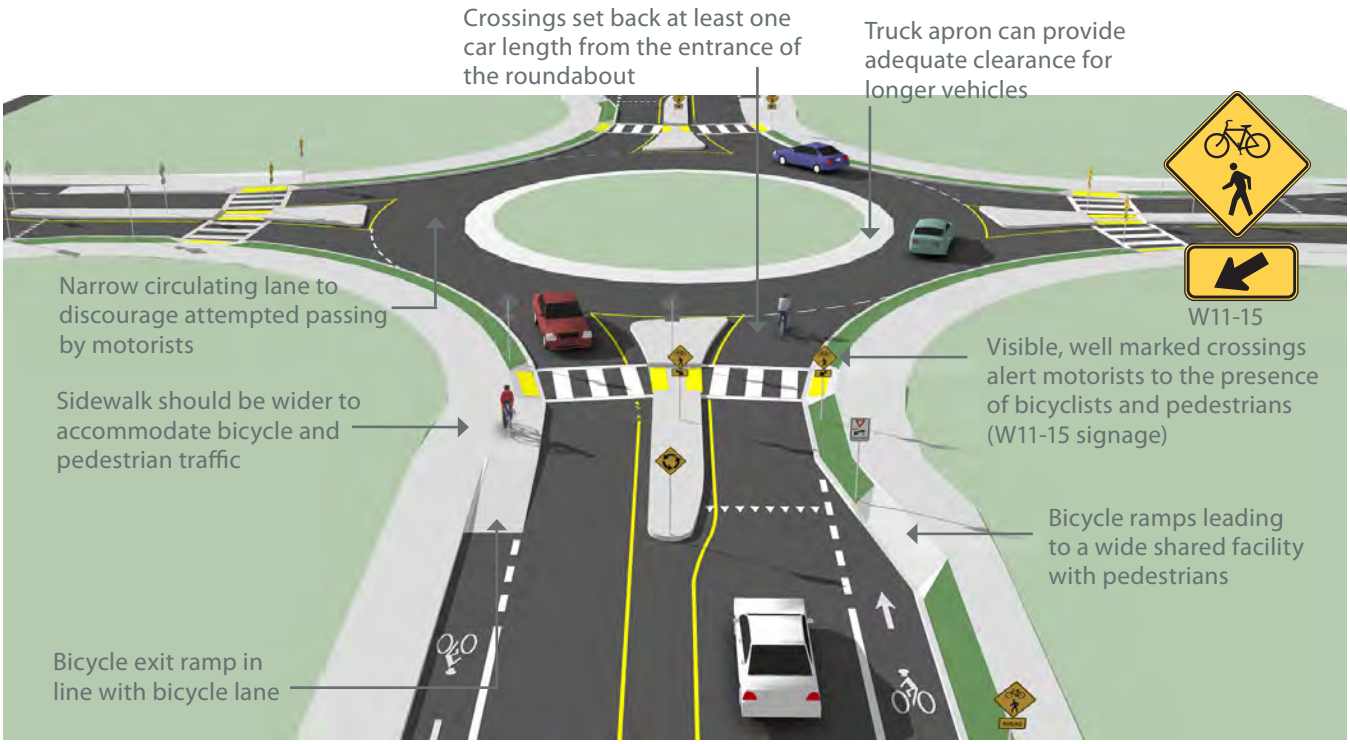
Bicyclists at Single Lane Roundabouts

Description

In single lane roundabouts 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.

Guidelines

- 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.



Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2000). Roundabouts: An Informational Guide. FHWA. (2010). Roundabouts: An Informational Guide, Second Edition. NCHRP 672

Materials and Maintenance

Signage and striping require routine maintenance.

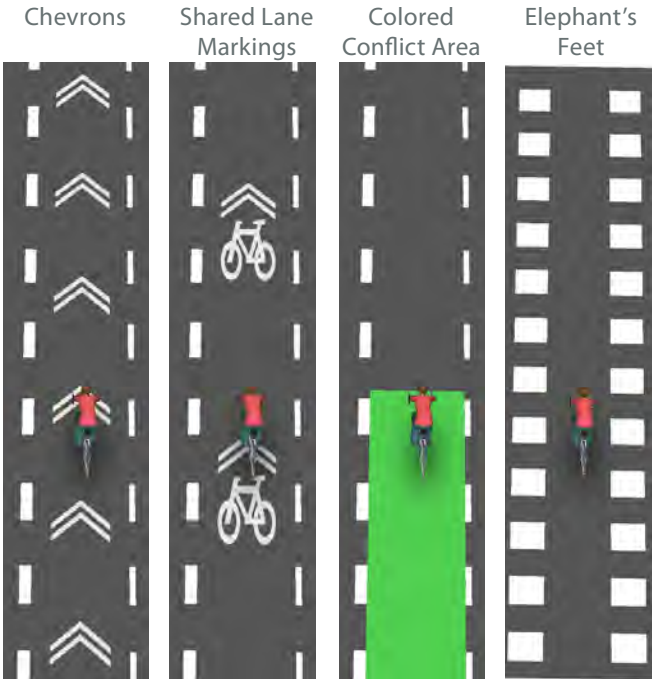
Intersection Crossing Markings

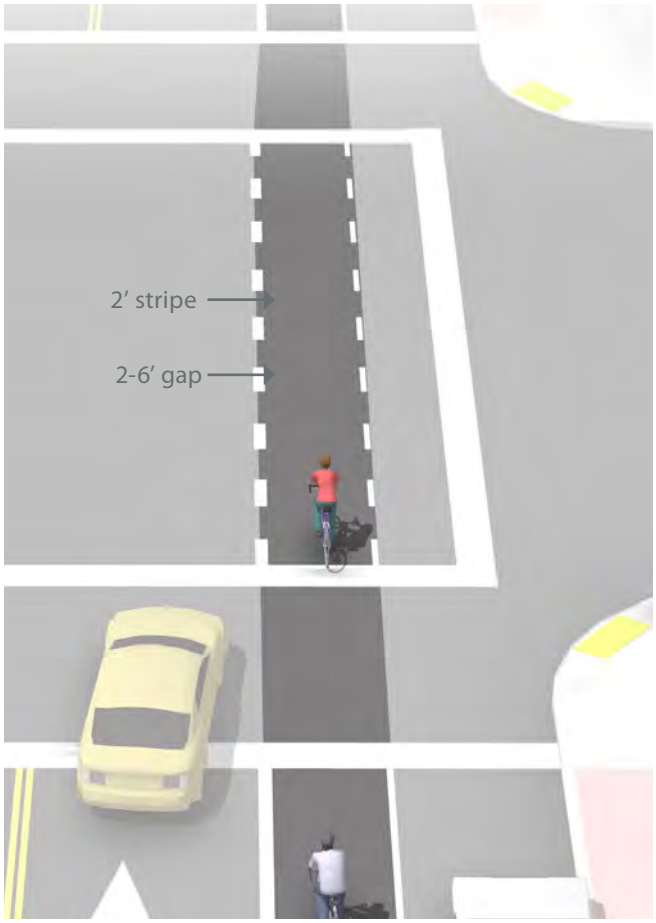
Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dotted lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, or colored bike lanes in conflict areas may be used to increase visibility within conflict areas or across entire intersections. Elephant's Feet markings are common in Canada, and in use in Chicago, IL.





Discussion

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. (3A.06). NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

SIGNAGE PROGRAMS

A comprehensive system of signage ensures that information is provided regarding the safe and appropriate use of all facilities, both on-road and on multi-use paths. The bicycle network should be signed seamlessly with other alternative transportation routes, such as bicycle routes from neighboring jurisdictions, trails, historic and/or cultural walking tours, and wherever possible, local transit systems.

Signage includes post- or pole-mounted signs and pavement striping. Signage is further divided into information signs, directional/wayfinding signs, regulatory signs and warning signs. Trail signage should conform to the Manual on Uniform Traffic Control Devices and the American Association of State Highway Transportation Official Guide for the Development of Bicycle Facilities. Bicycle signage should also be coordinated with local colleges and universities.

Share the Road signs remind motorists that bicyclists have the right to ride on the roadway.

The "Bikes Allowed Use of Full Lane" sign is currently used on an experimental basis in several cities.

Directional Signs

Implementing a well-planned and attractive system of signing can greatly enhance bikeway facilities by signaling their presence and location to both motorists and existing or potential bicycle users. Effective signage can encourage more bicycling by leading people to bikeways, and by creating a safe and efficient transportation option for local residents and visitors.

The signage examples to on page B-27 show a number of different signs and markings, both on poles and on the roadway. Wayfinding signs such as these improve the clarity of travel direction while illustrating that destinations are only a short ride away.

Regulatory/Warning Signs

Regulatory and warning bicycle signage like the examples shown on page B-25 should conform to the Manual on Uniform Traffic Control Devices (MUTCD). The signage on page B-25 are examples of regulatory signs for bicycle (their labels are sign reference numbers for the MUTCD).

Special Purpose Signage

The "Share the Road" sign (to the left), is designed to advise motorists that bicyclists are allowed to share and have the right to cycle on narrow roadways with motor vehicles. For more on the "Share the Road Initiative" go to: http://ncdot.org/transit/bicycle/safety/programs_initiatives/share.html

Innovative signage is often developed to increase bicycle awareness and improve visibility (such as 'Bikes Allowed Use of Full Lane', bottom left). Special purpose signs to be installed on public roadways in North Carolina must be approved by NCDOT's Traffic Control Devices Committee and/or the local jurisdiction. New designs can be utilized on an experimental basis with NCDOT approval.

R1-1

R1-2

R3-17

R3-17a

R3-17b

R4-1

R4-2

R4-3

R4-4


R4-7

R5-1b

R9-3c

R5-3


R5-6

R7-9

R7-9a


R9-3a

R9-5

R9-6

R9-7

R10-3

R10-22

R15-1

Bikeway Signing

The ability to navigate through a town is informed by landmarks, natural features and other visual cues. Signs throughout the town should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

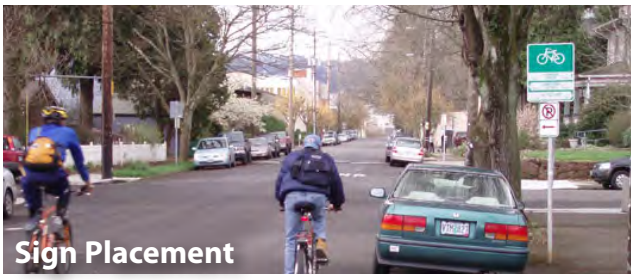
- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

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

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.

Sign Types


Sign Placement

This section includes:

- Sign Types
- Sign Placement

Sign Types

Description
A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs
Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route. This signage can include destinations and distance/time, but does not include arrows.

Turn Signs
Indicate where a bikeway turns from one street onto another street. This signage can be used with pavement markings, and does include destinations and arrows.

Decisions Signs
Mark the junction of two bikeways and informs bicyclists of the designated bike route to access key destinations. Destinations and arrows, distances and travel times are optional but recommended.

Alternative Designs
A customized alternative design could be used to include walking- and bicycling-oriented travel times, local town logos, and sponsorship branding.

Discussion
There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. 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.

Sign Placement

Guidance

Signs are typically 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.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

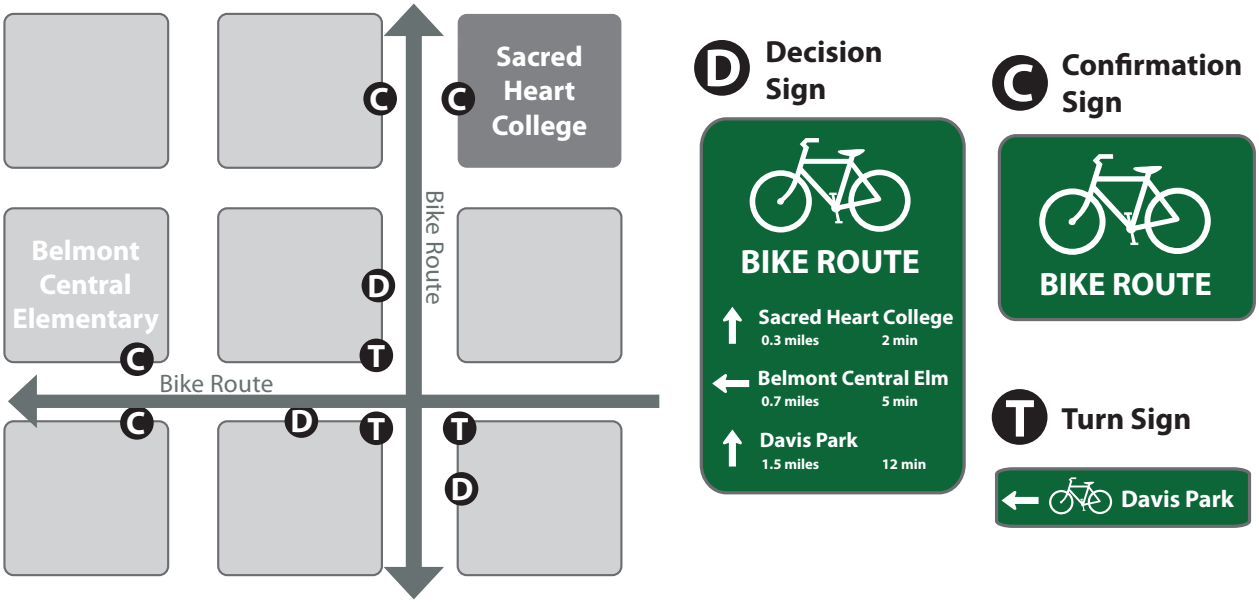
Along a route to indicate a nearby destination.

Confirmation Signs

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.



Discussion

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 five 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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

RETROFITTING EXISTING STREETS TO ADD BIKEWAYS

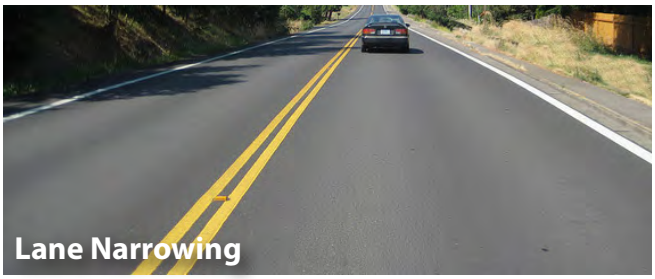
Most major streets are characterized by conditions (e.g., high vehicle speeds and/or volumes) for which dedicated bike lanes are the most appropriate facility to accommodate safe and comfortable riding. Although opportunities to add bike lanes through roadway widening may exist in some locations, many major streets have physical and other constraints that would require street retrofit measures within existing curb-to-curb widths. As a result, much of the guidance provided in this section focuses on effectively reallocating existing street width through striping modifications to accommodate dedicated bike lanes.

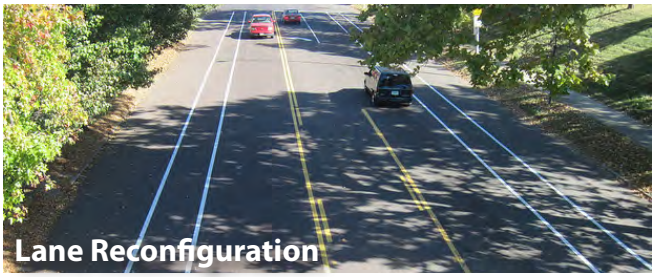
Although largely intended for major streets, these measures may be appropriate for any roadway where bike lanes would be the best accommodation for bicyclists.

This section includes:

- Roadway Widening
- Lane Narrowing
- Lane Reconfiguration
- Parking Reduction


Roadway Widening


Lane Narrowing


Lane Reconfiguration


Parking Reduction

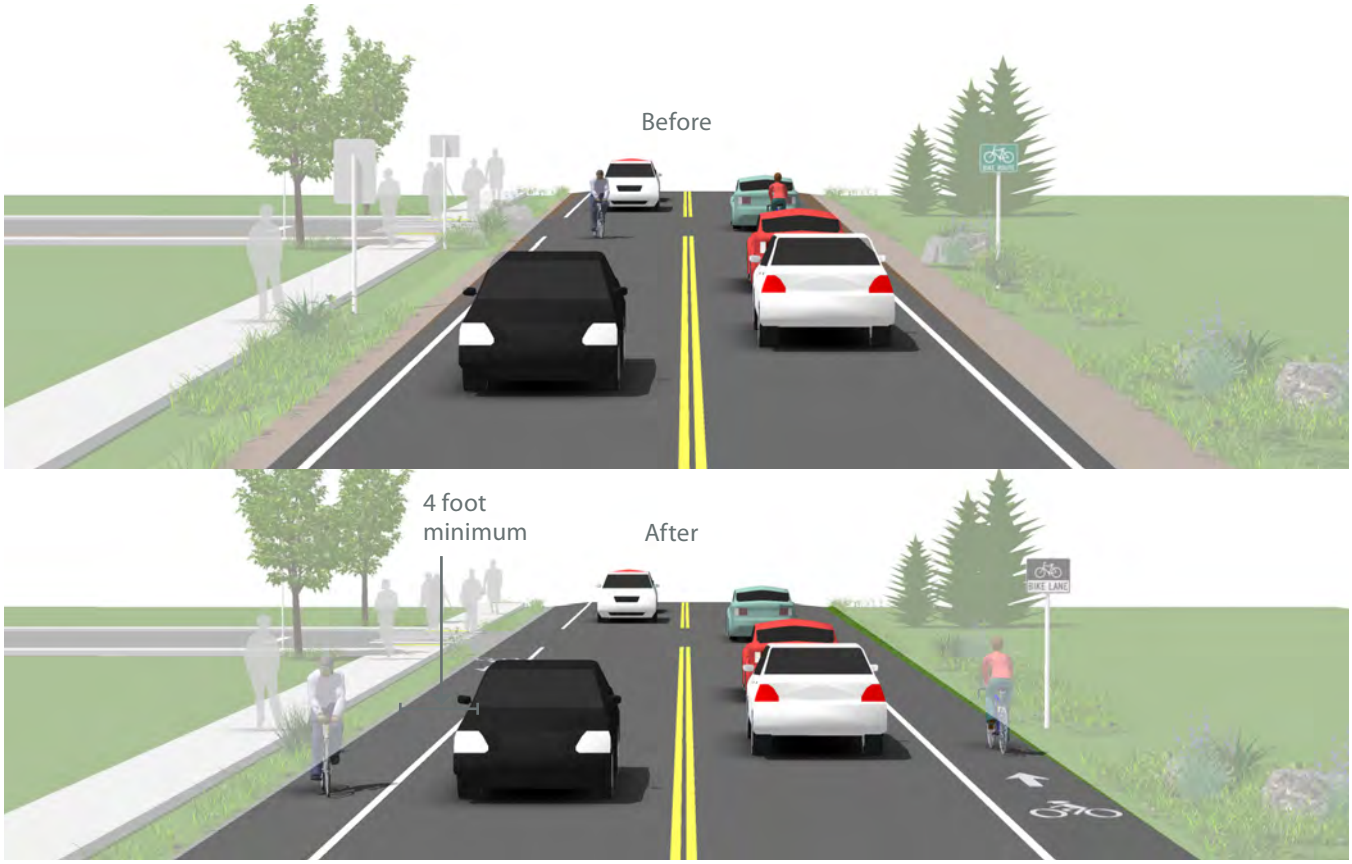
Roadway Widening

Description

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.

Guidance

- Guidance on bicycle lanes applies to this treatment.
- 4 foot minimum width when no curb and gutter is present.
- 6 foot width preferred.



Discussion

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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

Materials and Maintenance

The extended bicycle area should not contain any rough joints where bicyclists ride. Saw or grind a clean cut at the edge of the travel lane, or feather with a fine mix in a non-ridable area of the roadway.

Lane Narrowing

Description

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. Most standards allow for the use of 11 foot and sometimes 10 foot wide travel lanes to create space for bike lanes.

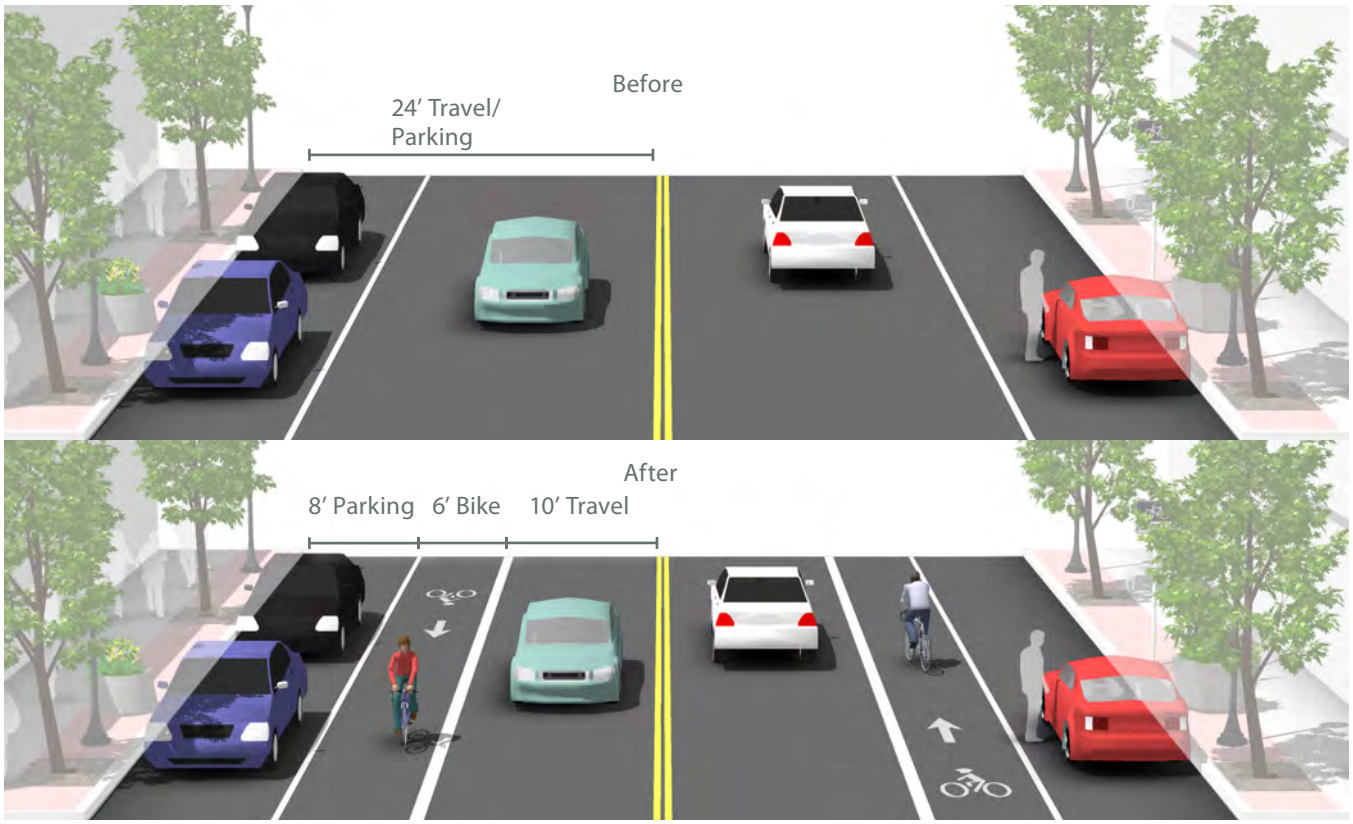
Guidance

Vehicle lane width:

- Before: 10-15 feet
- After: 10-11 feet

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment.



Discussion

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.

AASHTO supports reduced width lanes in A Policy on Geometric Design of Highways and Streets: "On interrupted-flow operation conditions at low speeds (45 mph or less), narrow lane widths are normally adequate and have some advantages."

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

Lane Reconfiguration

Description

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.

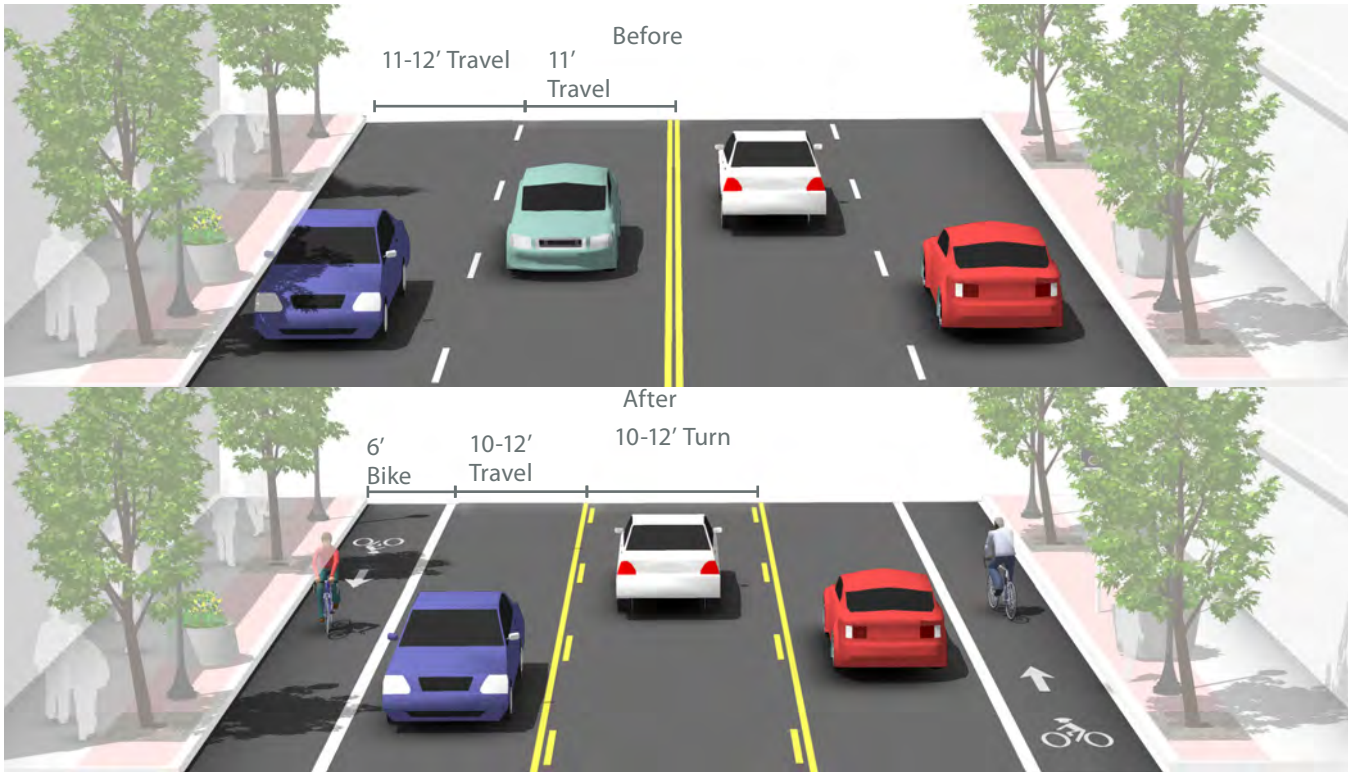
Guidance

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.



Discussion

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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2010). Evaluation of Lane Reduction "Road Diet" Measures on Crashes. Publication Number: FHWA-HRT-10-053

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

Parking Reduction

Description

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.

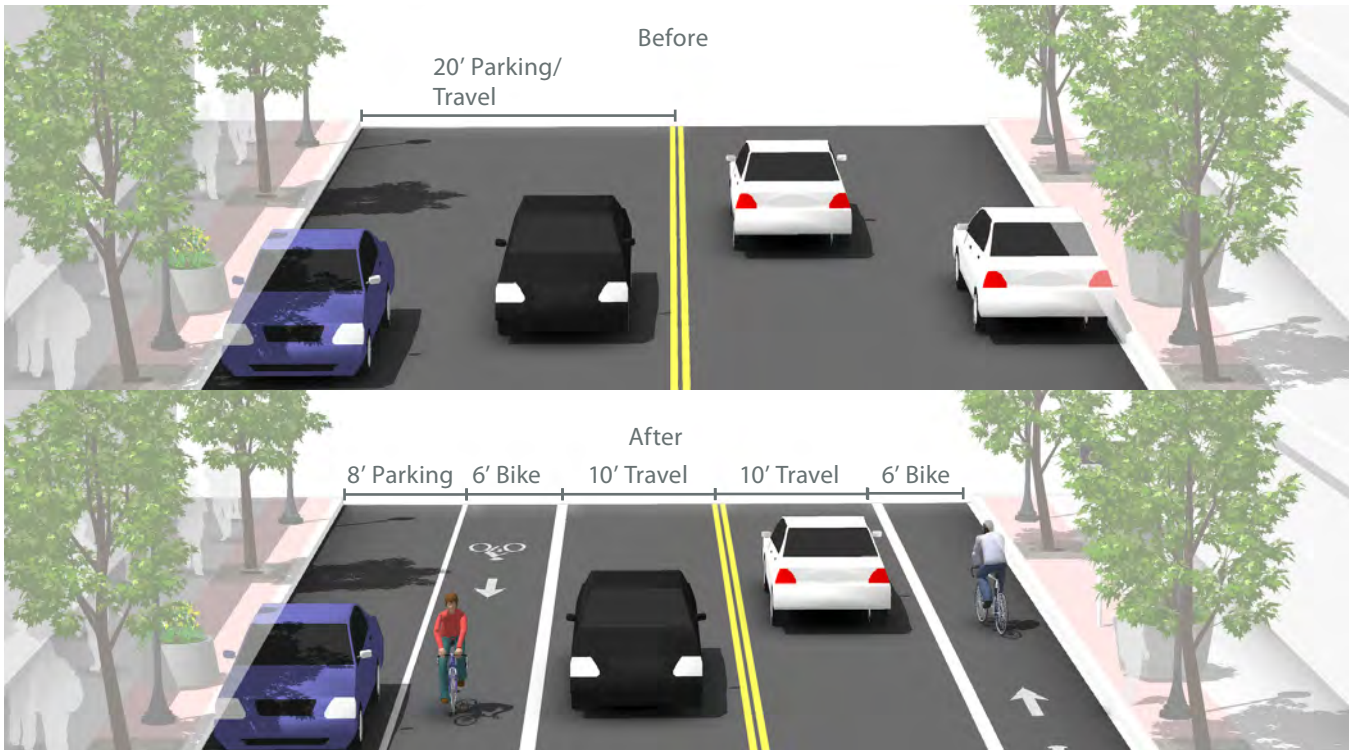
Guidance

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.



Discussion

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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

MULTI-USE PATHS AND OFF-STREET FACILITIES

A multi-use path (also known as a greenway) allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

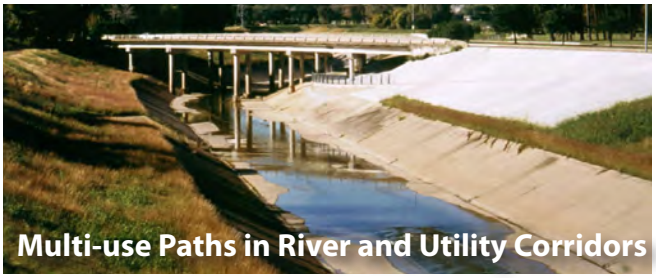
Key features of multi-use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

This Section Includes:

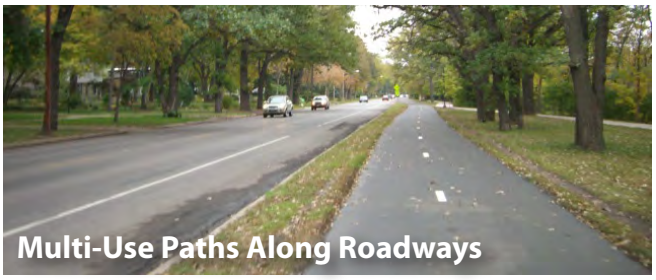
- General Design Practices
- Multi-use Paths in River and Utility Corridors
- Multi-Use Paths in Abandoned Rail Corridors
- Multi-use Paths in Active Rail Corridors
- Neighborhood Greenways
- Local Neighborhood Accessways
- Natural Surface Greenways
- Multi-Use Paths along Roadways


General Design Practices


Multi-use Paths in River and Utility Corridors


Multi-use Paths in Abandoned Rail Corridors


Local Neighborhood Accessways


Multi-Use Paths Along Roadways

General Design Practices

Description

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.

Guidance

Width

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet 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 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.

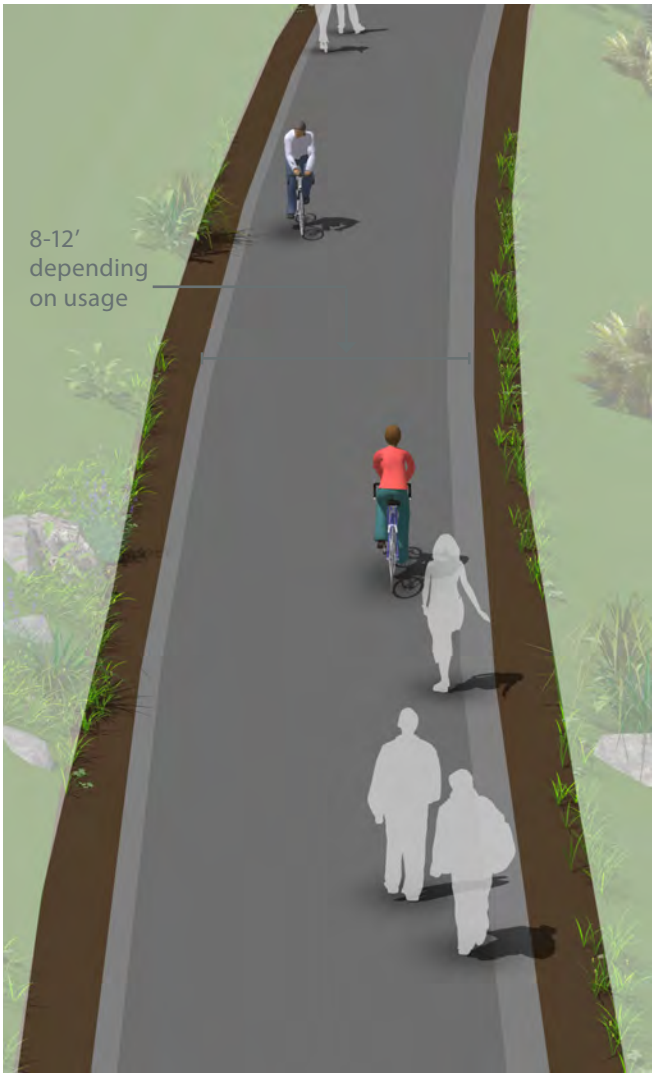
Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet 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.

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.



Discussion

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared use paths along roadways. Also known as "sidepaths", these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding when either entering or exiting the path.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices.
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-use Paths in River and Utility Corridors

Description

Utility and waterway corridors often offer excellent greenway development and bikeway gap closure opportunities. Utility corridors typically include powerline and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.

Guidance

Multi-use paths in utility corridors should meet or exceed general design practices. If additional width allows, wider paths, and landscaping are desirable.

Access Points

Any access point to the path should be well-defined with appropriate signage designating the pathway as a bicycle facility and prohibiting motor vehicles.

Path Closure

Public access to the path may be prohibited during the following events:

- Canal/flood control channel or other utility maintenance activities
- Inclement weather or the prediction of storm conditions

Discussion

Similar to railroads, public access to flood control channels or canals is undesirable by all parties. Hazardous materials, deep water or swift current, steep, slippery slopes, and debris all constitute risks for public access. Appropriate fencing may be required to keep path users within the designated travel way. Creative design of fencing is encouraged to make the path facility feel welcoming to the user.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-use Paths in Abandoned Rail Corridors

Description

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

In some cases, rail owners may rail-bank their corridors as an alternative to a complete abandonment of the line, thus preserving the rail corridor for possible future use.

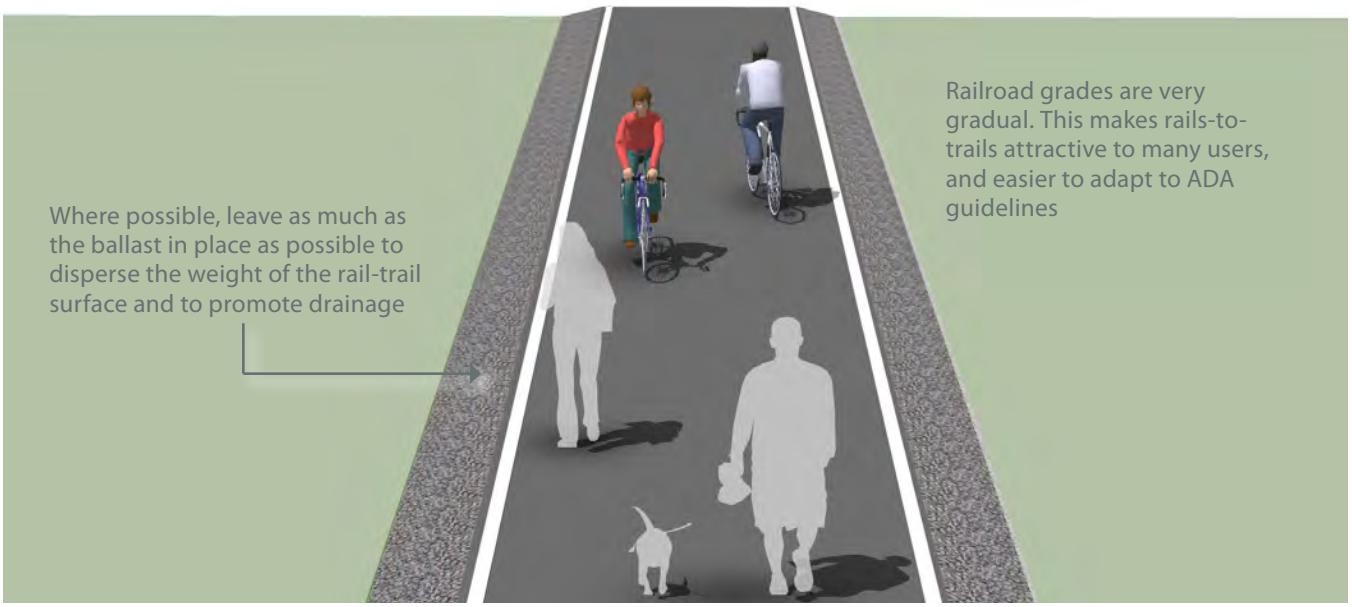
The railroad may form an agreement with any person, public or private, who would like to use the banked rail line as a trail or linear park until it is again needed for rail use. Municipalities should acquire abandoned rail rights-of-way whenever possible to preserve the opportunity for trail development.

Guidance

Multi-use paths in abandoned rail corridors should meet or exceed general design practices. If additional width allows, wider paths, and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

If converting a rail bed adjacent to an active rail line, see Multi-use Paths in Active Rail Corridors.



Discussion

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum path widths, but often lack preferred shoulder and lateral clearance widths.

Rail-to-trails can involve many challenges including the acquisition of the right of way, cleanup and removal of toxic substances, and rehabilitation of tunnels, trestles and culverts. A structural engineer should evaluate existing railroad bridges for structural integrity to ensure they are capable of carrying the appropriate design loads.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Local Neighborhood Accessways

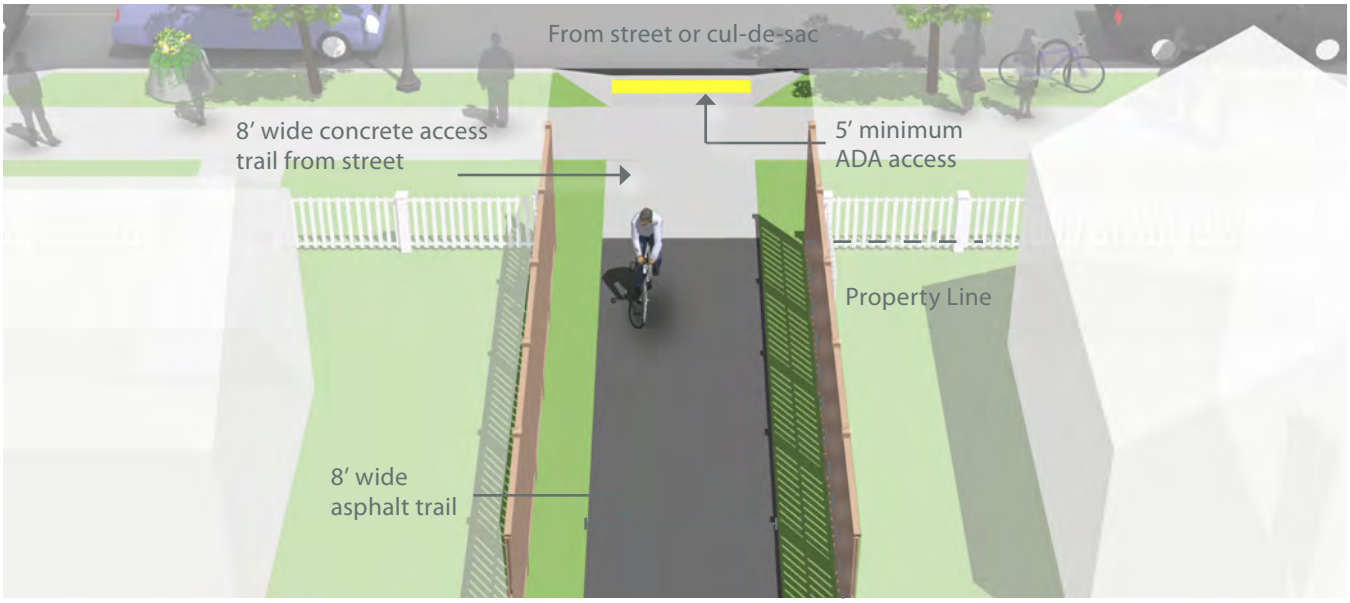
Description

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.

Additionally, these smaller trails can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.

Guidance

- Neighborhood accessways should remain open to the public.
- Trail pavement shall be at least 8′ 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′ 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.



Discussion

Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by town/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.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. FHWA. (2006). Federal Highway Administration University Course on Bicycle and Pedestrian Transportation. Lesson 19: Greenways and Shared Use Paths.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Natural Surface Greenways

Description

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Guidance presented in this section does not include considerations for bicycle users. Natural surface trails designed for bicycle users are typically known as single track trails.

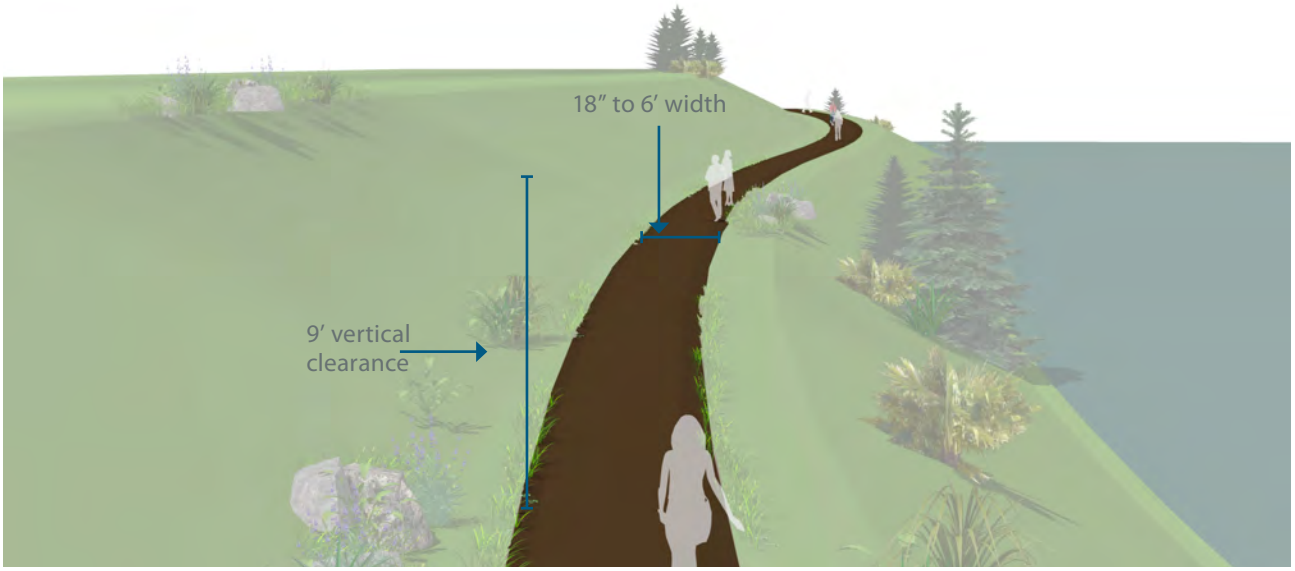
Guidance

Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.

Base preparation varies from machine-worked surfaces to those worn only by usage.

Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.

Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).



Discussion

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.

Additional References and Guidelines

Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Consider implications for accessibility when weighing options for surface treatments.

Multi-Use Paths Along Roadways

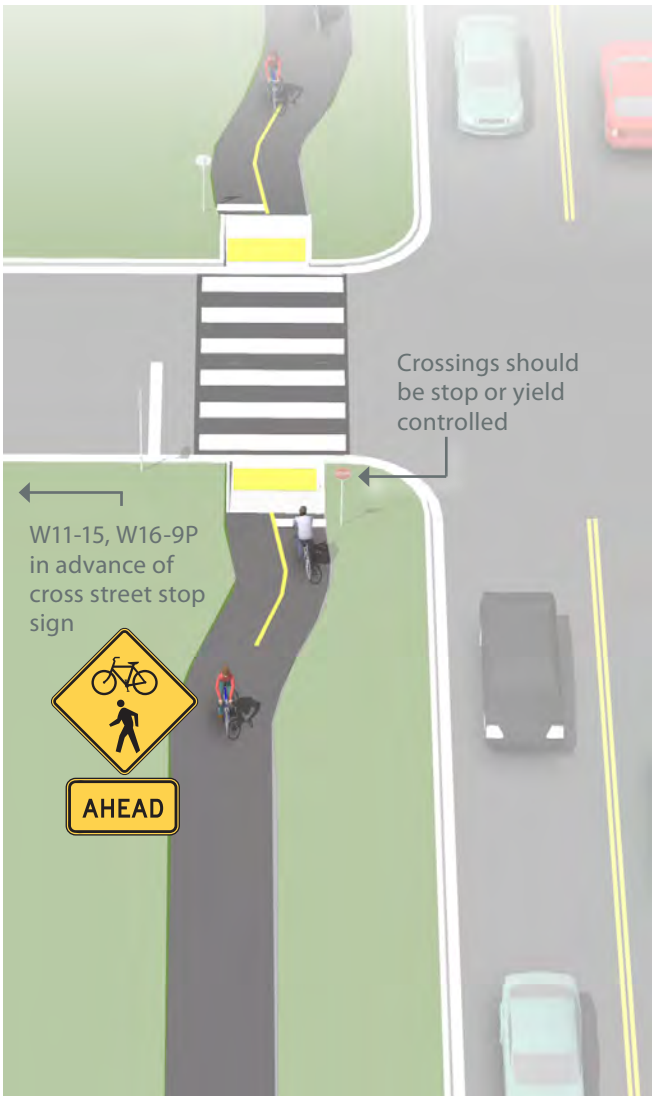
Description

A multi-use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path.

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of multi-use paths directly adjacent to roadways.

Pay special attention to the entrance/exit of the path as bicyclists may continue to travel on the wrong side of the street.



Guidance

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.
- Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.

Discussion

When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are cycling for transportation purposes.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. NACTO. (2012). Urban Bikeway Design Guide. See entry on Raised Cycle Tracks. NCDOT. (1994). Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

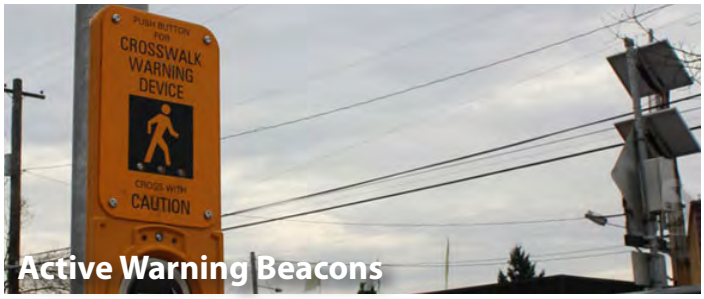
MULTI-USE PATH CROSSINGS

At-grade roadway crossings can create potential conflicts between path users and motorists, however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users. This is evidenced by the thousands of successful facilities around the United States with at-grade crossings. In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture. Signing for path users may include a standard "STOP" or "YIELD" sign and pavement markings, possibly combined with other features such as bollards or a bend in the pathway to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. Crosswalk striping is typically a matter of local and State preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.


Marked/Unsignalized Crossings



Active Warning Beacons


Route Users to Existing Signals

Unsignalized Marked Crossings

Description

An unsignalized marked 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.

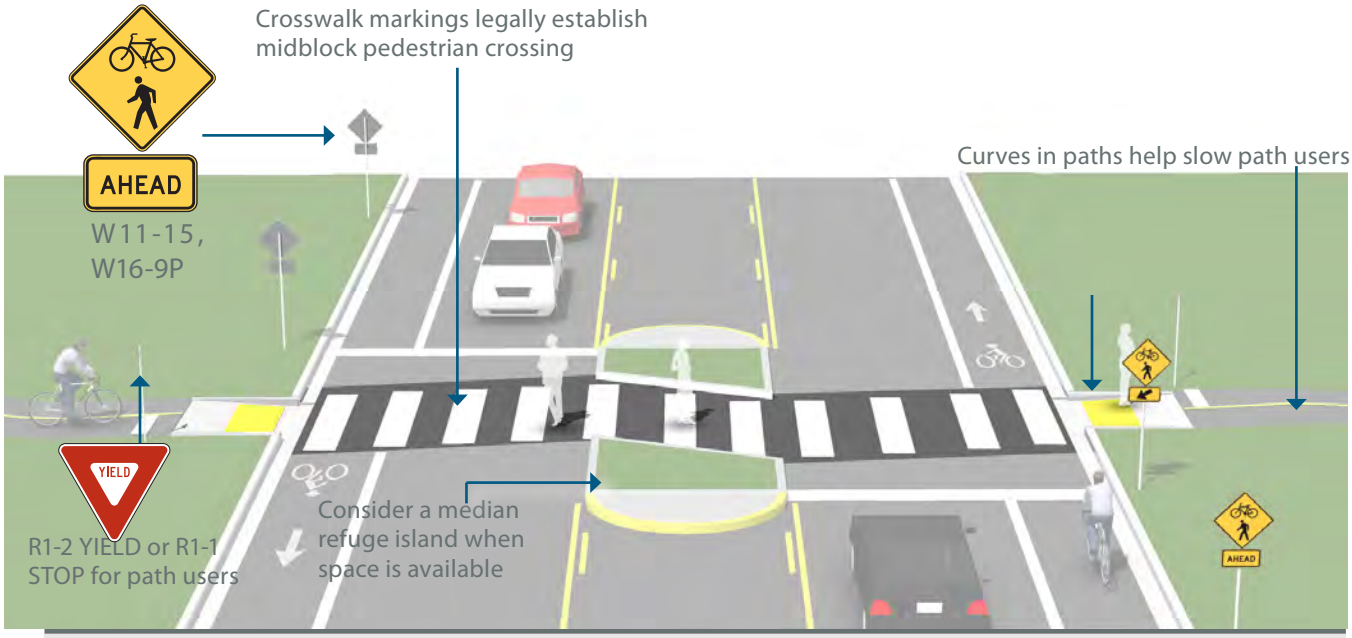
When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

Refer to the FHWA report, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations" for specific volume and speed ranges where a marked crosswalk alone may be sufficient.

Where the speed limit exceeds 40 miles per hour, marked crosswalks alone should not be used at unsignalized locations.

Crosswalks should not be installed at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices.



Discussion

Marked crosswalks alone will not make crossings safer, nor will marked crosswalks necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g. raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions, etc.) as needed to improve the safety of the crossing. These are general recommendations; good engineering judgment should be used in individual cases for deciding which treatment to use.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices. NCDOT. (2012). Complete Streets Planning and Design Guidelines.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

Active Warning Beacons

Description

Enhanced marked crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on multi-lane or high volume roadways.

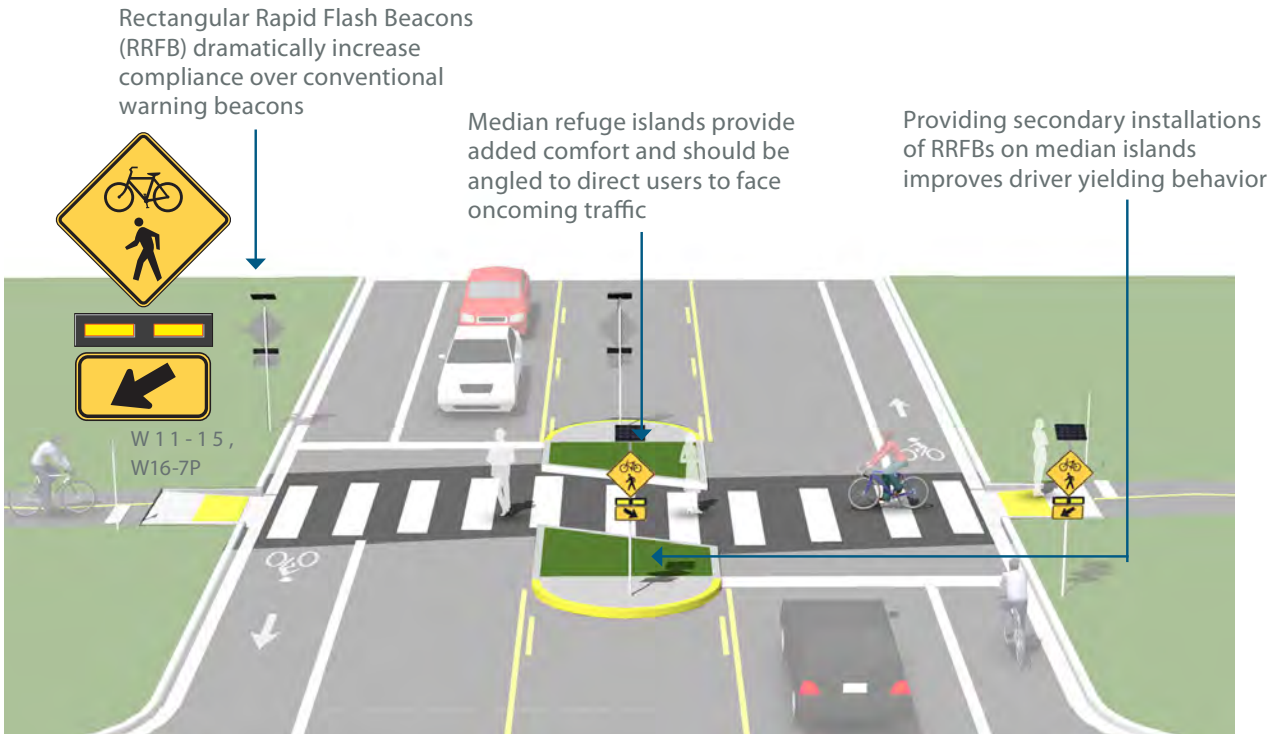
These enhancements include pathway user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB) shown below, or in-roadway warning lights.

Guidance

Guidance for Unsignalized Marked 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.



Discussion

Rectangular rapid flash beacons show the most increased compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88%. Additional studies of long term installations show little to no decrease in yielding behavior over time.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide. FHWA. (2009). Manual on Uniform Traffic Control Devices. FHWA. (2008). MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11) NCDOT. (2012). Complete Streets Planning and Design Guidelines.

Materials and Maintenance

Depending on power supply, maintenance of active warning beacons can be minimal. If solar power is used, signals should run for years without issue.

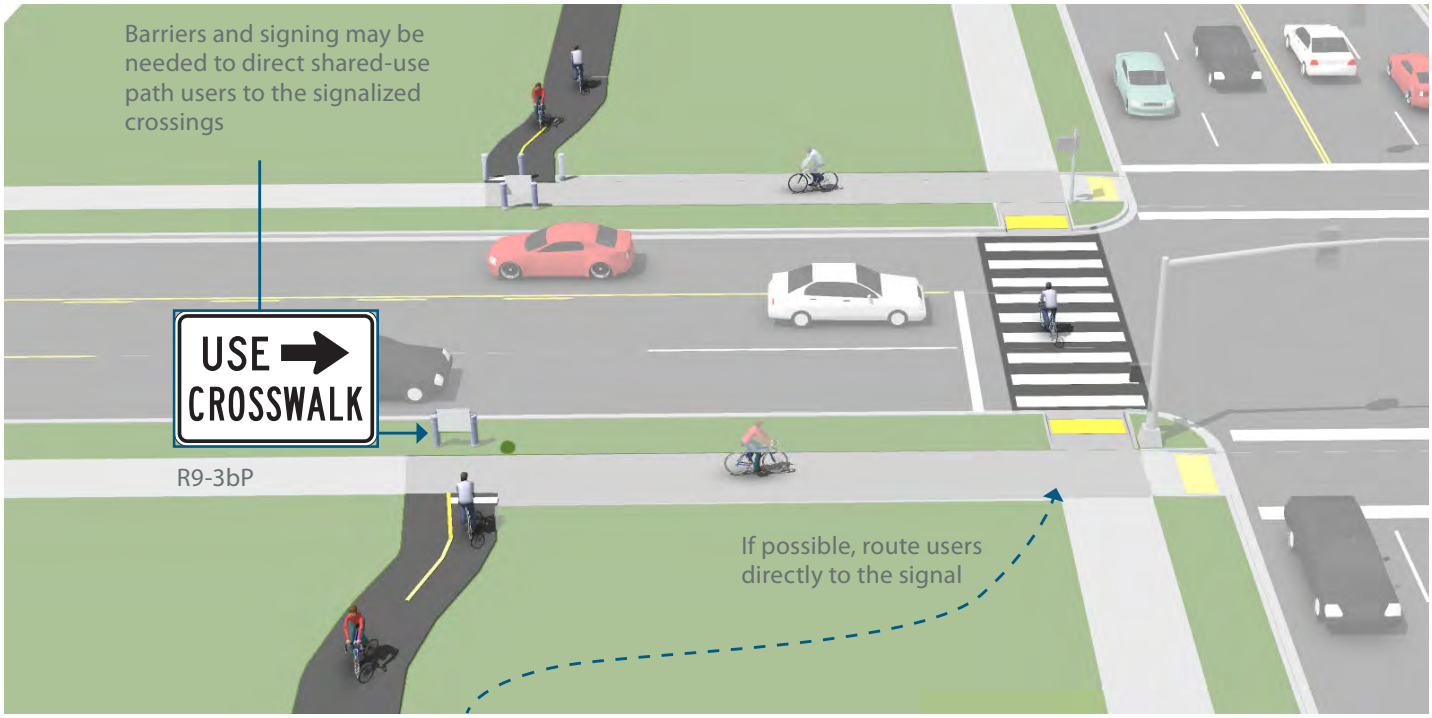
Route Users to Signalized Crossings

Description

Path crossings within approximately 400 feet 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. 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.

Guidance

Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route path directly to the signal.



Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgement 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 jaywalking may become prevalent if the distance is too great.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities. AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities.

Materials and Maintenance

Municipalities should maintain comprehensive inventories of the location and age of bicycle wayfinding signs to allow incorporation of bicycle wayfinding signs into any asset management activities.

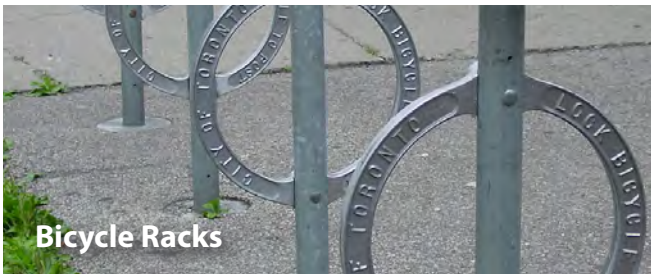
BIKEWAY SUPPORT AND MAINTENANCE

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

Maintenance

Regular bicycle facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flat, and installing bicycle-friendly drainage grates. Pavement overlays are a good opportunity to improve bicycle facilities.



Bicycle Racks


Sweeping

Recommended 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

This Section Includes:

- Bicycle Racks
- Sweeping

Bicycle Racks

Description

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. Racks should:

- Support the bicycle in at least two places, preventing it from falling over.
- Allow locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

Guidance

- 2′ minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50′ maximum distance from main building entrance.
- Minimum clear distance of 6′ should be provided between the bicycle rack and the property line.
- Locate racks in areas that cyclists are most likely to travel.

Sweeping

Description

Bicyclists often avoid shoulders and bike lanes filled with gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, potentially causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.

Guidance

- 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.
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders.
- Perform additional sweeping in the Spring to remove debris from the Winter.
- Perform additional sweeping in the Fall in areas where leaves accumulate.

STANDARDS COMPLIANCE

Some of these treatments covered by these guidelines are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. An "X" marking in the following table identifies the inclusion of a particular treatment within the national and state design guides. A "-" marking indicates a treatment may not be specifically mentioned, but is compliant assuming MUTCD compliant signs and markings are used.

In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

	Manual of Uniform Traffic Control Devices (2009)	Guide for the Development of Bicycle Facilities (2012)	Urban Bikeway Design Guide (2012)	NCDOT Bicycle Facilities & Planning Design Guidelines
Signed Shared Roadway	X	X		X
Marked Shared Roadway	X	X	X	
Bicycle Boulevard		X	X	
Shoulder Bikeway	X	X		X
Bicycle Lane	X	X	X	X
Buffered Bike Lane	-	X	X	
Uphill Bicycle Climbing Lane	-	X	X	
Cycle Tracks	-	Called "one-way sidepath"	X	
Bike Lanes at Right Turn Only Lanes	X	X	X	X
Colored Bike Lanes in Conflict Areas	Interim Approval Granted	X	X	
Combined Bike Lane/Turn Lane	-		X	
Intersection Crossing Markings	X	X	X	
Bicyclists at Single Lane Roundabouts	-	X		
Wayfinding Sign Types	X	X	X	X
Wayfinding Sign Placement	X	X	X	X
Multi-use Paths/Greenways	X	X		X
Shared Use Paths along Roadways	X	Discouraged		Discouraged

Appendix B: Funding Resources

Chapter Contents:

OVERVIEW

When considering possible funding sources for bicycle and pedestrian projects in the City of Dunn, it is important to remember that not all construction activities or programs will be accomplished with a single funding source. It will be necessary to consider several sources of funding that together will support full project completion. Funding sources can be used for a variety of activities, including: programs, planning, design, implementation, and maintenance. This appendix outlines the most likely sources of funding from the federal, state, and local government levels as well as from the private and non-profit sectors. A summary table of funding sources is included on page B-2. Note that this appendix reflects the funding available at the time of writing. Funding amounts, cycles, and the programs themselves may change over time.

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 construction of pedestrian and bicycle improvements.

Moving Ahead for Progress in the Twenty-First Century (MAP-21)

The largest source of federal funding for pedestrian and bicycle projects is the USDOT's Federal-Aid Highway Program, which Congress has reauthorized roughly every six years since the passage of the Federal-Aid Road Act of 1916. The latest act, Moving Ahead for Progress in the Twenty-First Century (MAP-21) was enacted in July 2012 as Public Law 112-141. The Act replaces the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), which was valid from August 2005 – June 2012.

MAP-21 authorizes funding for federal surface transportation programs including highways and transit for the 27-month period between July 2012 and September 2014. It is not possible to guarantee the continued availability of any listed MAP-21 programs, or to predict their future funding levels or policy guidance. Nevertheless, many of these programs have been included in some form since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, and thus may continue to provide capital for active transportation projects and programs.

FUNDING SOURCE	PLANNING	PROGRAMMING	DESIGN/CONSTRUCTION
FEDERAL FUNDING			
Transportation Alternatives	x	x	x
Surface Transportation Program			x
Highway Safety Improvement Program		x	x
Congestion Mitigation/Air Quality		x	x
FTA Metropolitan Planning Program	x		
FTA Enhanced Mobility of Seniors and Individuals with Disabilities		x	x
Partnership for Sustainable Communities	x	x	x
Land and Water Conservation Fund	x		x
Rivers, Trails, and Conservation Assistance Program	x		
National Scenic Byways Discretionary Grant Program			x
Federal Lands Transportation Program	x		x
Energy Efficiency and Conservation Block Grants	x		x
STATE FUNDING			
NCDOT State Transportation Improvement Program			x
Incidental Projects			x
Spot Safety Program			x
High Hazard Elimination Program			x
Governor's Highway Safety Program			x
Bicycle and Pedestrian Planning Grant Initiative	x	x	
Eat Smart, Move More North Carolina Community Grants		x	x
The North Carolina Division of Parks and Recreation			x
The North Carolina Parks and Recreation Trust Fund (PARTF)			x
Adopt-a-Trail Program			x
Powell Bill Funds			x
Community Development Block Grant	x	x	x
Clean Water Management Trust Fund	x	x	x
Safe Routes to School Program	x	x	x
Urban and Community Forestry Grant	x		x

FUNDING SOURCE	PLANNING	PROGRAMMING	DESIGN/CONSTRUCTION
LOCAL FUNDING			
Capital Reserve Fund			x
Capital Project Ordinance			x
Local Improvement District			x
Municipal Service District			x
Tax Increment Financing			x
Bonds and Loans			x
Revenue Bonds			x
General Obligation Bonds (cities, counties, and service districts)			x
Special Assessment Bonds			x
State Revolving Fund Loans			x
Sales Tax	x		x
Property Tax	x		x
Excise Tax			x
Occupancy Tax			x
Stormwater Utility Fees			x
Streetscape Utility Fees			x
Impact Fees			x
Exactions			x
Installment Purchase Financing			x
In-Lieu-of Fees			x
PRIVATE/NON-PROFIT FUNDING			
The Robert Wood Johnson Foundation	x	x	
North Carolina Community Foundation	x	x	
Walmart State Giving Program	x	x	x
The Rite Aid Foundation Grant		x	x
Z. Smith Reynolds Foundation			x
Bank of America Charitable Foundation	x	x	
Duke Energy Foundation		x	
American Greenways Eastman Kodak Awards	x	x	x
National Trails Fund		x	x
The Conservation Alliance	x	x	
National Fish and Wildlife Foundation	x	x	x
The Trust for Public Land	x	x	
Blue Cross Blue Shield of North Carolina Foundation		x	x
Alliance for Biking and Walking Advocacy Advance Grants			x
Local Trail Sponsors			x
Corporate Donations	x	x	x
Private Individual Donations	x	x	x
Fundraising/Campaign Drives	x	x	x
Volunteer Work	x	x	x

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 oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system.

There are a number of programs identified within MAP-21 that are applicable to pedestrian and bicycle projects. These programs are discussed below.

For more information, visit: http://www.fhwa.dot.gov/map21/summaryinfo.cfm

Transportation Alternatives

Transportation Alternatives (TA) is a new funding source under MAP-21 that consolidates three formerly separate programs under SAFETEA-LU: Transportation Enhancements (TE), Safe Routes to School (SRTS), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails. TA funds may also be used for selected education and encouragement programming such as Safe Routes to School, despite the fact that TA does not provide a guaranteed set-aside for this activity as SAFETEA-LU did.

Average annual funds available through TA over the life of MAP-21 equal $814 million nationally, which is based on a two percent set-aside of total MAP-21 allocations. Note that state DOT's may elect to transfer up to 50 percent of TA funds to other highway programs, so the amount listed on the website represents the maximum potential funding. Remaining TA funds (those monies not re-directed to other highway programs) are disbursed through a separate competitive grant program administered by NCDOT. Local governments, school districts, tribal governments, and public lands agencies are permitted to compete for these funds.

Each state governor is given the opportunity to "opt out" of the Recreational Trails Program. However, as of the writing of this plan, only Florida and Kansas have "opted out" of the RTP. For all other states, dedicated funds for recreational trails continue to be provided as a subset of TA. MAP-21 provides $85 million nationally for the RTP.

For the complete list of eligible activities, visit:

http://www.fhwa.dot.gov/environment/transportation_enhancements/legislation/map21.cfm

For funding levels, visit: http://www.fhwa.dot.gov/MAP21/funding.cfm

Surface Transportation Program

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. Unlike most highway projects, STP-funded pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System. 50 percent of each state's STP funds are allocated by population to the MPOs; the remaining 50 percent may be spent in any area of the state.

For more information: http://www.fhwa.dot.gov/map21/stp.cfm

Highway Safety Improvement Program

MAP-21 doubles the amount of funding available through the Highway Safety Improvement Program (HSIP) relative to SAFETEA-LU. HSIP provides $2.4 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. MAP-21 preserves the Railway-Highway Crossings Program within HSIP but discontinues the High-Risk Rural roads set-aside unless safety statistics demonstrate that fatalities are increasing on these roads. Bicycle and pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for non-motorized users in school zones are eligible for these funds.

For more information: http://www.fhwa.dot.gov/map21/hsip.cfm

Congestion Mitigation/Air Quality Program

The Congestion Mitigation/Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality non-attainment and maintenance areas for ozone, carbon monoxide, and particulate matter which reduce transportation related emissions. States with no non-attainment areas may use their CMAQ funds for any CMAQ or STP eligible project. These federal dollars can be used to build bicycle and pedestrian facilities that reduce travel by automobile. Purely recreational facilities generally are not eligible. Communities located in attainment areas who do not receive CMAQ funding apportionments may apply for CMAQ funding to implement projects that will reduce travel by automobile.

For more information: http://www.fhwa.dot.gov/map21/cmaq.cfm

Federal Transit Administration Enhanced Mobility of Seniors and Individuals with Disabilities

This program can be used for capital expenses that support 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.

For more information: http://www.fta.dot.gov/documents/MAP-21_Fact_Sheet_-_Enhanced_Mobility_of_Seniors_and_Individuals_with_Disabilities.pdf

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities 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." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for bicycle and pedestrian infrastructure ("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").

The Partnership 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 Partnership 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 narrowly limited in scope to pedestrian improvement efforts.

For more information: http://www.sustainablecommunities.gov/

http://www.epa.gov/smartgrowth/partnership/

Resource for Rural Communities: http://www.sustainablecommunities.gov/pdf/Supporting_Sustainable_Rural_Communities_FINAL.PDF

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: http://www.ncparks.gov/About/grants/lwcf_main.php

Rivers, Trails, and Conservation Assistance Program

The Rivers, Trails, and Conservation Assistance Program (RTCA) is a National Parks Service (NPS) program providing technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for 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. This program may benefit trail development in North Carolina locales indirectly through technical assistance, particularly for

community organizations, but is not a capital funding source.

For more information: http://www.nps.gov/ncrc/programs/rtca/ or contact the Southeast Region RTCA Program Manager Deirdre "Dee" Hewitt at (404) 507-5691

National Scenic Byways Discretionary Grant Program

The National Scenic Byways Discretionary Grants program provides merit-based funding for byway-related projects each year, utilizing one or more of eight specific activities for roads designated as National Scenic Byways, All-American Roads, State scenic byways, or Indian tribe scenic byways. The activities are described in 23 USC 162(c). This is a discretionary program; all projects are selected by the US Secretary of Transportation.

Eligible projects include construction along a scenic byway of a facility for pedestrians and bicyclists and improvements to a scenic byway that will enhance access to an area for the purpose of recreation. Construction includes the development of the environmental documents, design, engineering, purchase of right-of-way, land, or property, as well as supervising, inspecting, and actual construction.

For more information: http://www.bywaysonline.org/grants/

Federal Lands Transportation Program (FLTP)

The FLTP funds projects that improve access within federal lands (including national forests, national parks, national wildlife refuges, national recreation areas, and other Federal public lands) on federally owned and maintained transportation facilities. $300 million per fiscal year has been allocated to the program for 2013 and 2014.

For more information: http://www.fhwa.dot.gov/map21/fltp.cfm

Energy Efficiency and Conservation Block Grants

The Department of Energy's Energy Efficiency and Conservation Block Grants (EECBG) may be used to reduce energy consumptions and fossil fuel emissions and for improvements in energy efficiency. Section 7 of the funding announcement states that these grants provide opportunities for the development and implementation of transportation programs to conserve energy used in transportation including development of infrastructure such as bike lanes and pathways and pedestrian walkways. Although the current grant period has passed, more opportunities may arise in the future.

For more information: http://www1.eere.energy.gov/wip/eecbg.html

STATE FUNDING SOURCES

The funding sources covered in this section were updated in the Fall of 2013 and reviewed for accuracy by NCDOT staff. However, at the time of development of this plan, the Strategic Transportation Investment initiative was being reviewed by the Joint Legislative Transportation Oversight Committee. Therefore, the status of future funding sources is subject to change. The availability of these funding resources should be confirmed during the implementation of a project.

North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program

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 funded for construction before then will proceed as scheduled under the current Equity Formula; projects slated for after that time will be ranked and programmed according to the new formula. The new Strategic Mobility Formula assigns projects for all modes into one of three categories: Statewide Mobility, Regional Impact, and Division Needs. All independent bicycle and pedestrian projects are placed in the "Division Needs" category, and are ranked using the following five criteria:

- Safety
- Access
- Demand or density
- Constructability
- Benefit/cost ratio

These rankings largely determines which projects will be included in the department's State Transportation Improvement Program (STIP). The STIP is a federally mandated transportation planning document that details transportation improvements prioritized by stakeholders for inclusion in the Work Program over the next ten years. The STIP is updated every two years. The STIP contains funding information for various transportation divisions of NCDOT including highways, aviation, public transportation, rail, bicycle and pedestrian, and the Governor's Highway Safety Program.

Access to federal funds require that projects be incorporated into the STIP. The STIP is the primary method for allocating state and federal transportation funds. Starting in 2015, state funds will not be available to match federally-funded projects. As a result, local governments should plan to use local or Powell Bill funds to secure federal dollars to fund bicycle and pedestrian projects.

For more information on STI:

- www.ncdot.gov/strategictransportationinvestments/
- https://connect.ncdot.gov/projects/planning

Incidental Projects

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 system. Bicycle and pedestrian accommodations such as bike lanes, sidewalks, intersection improvements, widened paved shoulders, and bicycle- and pedestrian-safe bridge design are frequently included as incidental features of highway projects. Most bicycle and pedestrian safety accommodations built by NCDOT are funded with a combination of federal and state roadway construction funds or with a local fund match. The local government may be responsible for a portion of the costs to construct the bike or pedestrian project, even for Complete Streets projects.

For more information: http://www.ncdot.gov/bikeped/funding/process/

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

Powell Bill Funds

Powell Bill Funds are state funding resources that can be used for most bicycle and pedestrian improvements. Each year, State street-aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as provided 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 or for planning, construction, and maintenance of bikeways or sidewalks along public streets and highways. 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.

More information: https://connect.ncdot.gov/municipalities/state-street-aid/Pages/default.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. 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. State Highway Applicants must use the web-based grant system to submit applications.

For more information: http://www.ncdot.org/programs/ghsp/

Eat Smart, Move More North Carolina Community Grants

The Eat Smart, Move More (ESMM) NC Community Grants program provides funding to local communities to support their efforts to develop community-based interventions that encourage, promote, and facilitate physical activity. The current focus of the funds is for projects addressing youth physical activity. Funds have been used to construct trails and conduct educational programs.

For more information: http://www.eatsmartmovemorenc.com/Funding/CommunityGrants.html

The North Carolina Division of Parks and Recreation

The North Carolina Division of Parks and Recreation and the State Trails Program offer funds to help 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.

For more information: http://www.ncparks.gov/About/grants/main.php

NC Parks and Recreation Trust Fund (PARTF)

The Parks and Recreation Trust Fund (PARTF) provide 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.

For more information: http://www.ncparks.gov/About/grants/partf_main.php

NC Department of Environment and Natural Resources – Recreational Trails and Adopt-a-Trail Grants

The State Trails Program is a section of the N.C. Division of Parks and Recreation. The program originated in 1973 with the North Carolina Trails System Act and is dedicated to 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. The Recreation Trails Program awards grants up to $75,000 per project. The Adopt-A-Trail Program awards grants up to $5,000 per project.

Community Development Block Grant Funds

Community Development Block Grant (CDBG) funds are available to local municipal or county governments that qualify for projects to enhance the viability of communities by providing 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. Two categories might be of support to pedestrian and bicycle projects in 'entitlement communities': Infrastructure and Community Revitalization.

Clean Water Management Trust Fund (CWMTF)

This fund was established in 1996 and has become one of the largest sources of money in North Carolina for land and water protection, eligible for application by a state agency, local government, or non-profit. At the end of each year, a minimum of $30 million is placed in the CWMTF. The revenue of this fund is allocated as grants to local governments, state agencies, and conservation non-profits to help finance projects that specifically address water pollution problems. Funds may be used for planning and land acquisition to establish a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

For more information: http://www.cwmtf.net/#appmain.htm

Safe Routes to School Program (Managed by NCDOT, DBPT)

Safe Routes to School (SRTS) is a program that enables and encourages children 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.

The North Carolina Safe Routes to School Program is supported by federal funds through SAFETEA-LU and MAP-21 legislation. Please note that all SRTS projects "shall be treated as projects on a Federal-aid system under chapter 1 of title 23, United States Code." Although no local match is required and all SRTS projects are 100% federally funded under the SAFETEA-LU, agencies are encouraged to leverage other funding sources that may be available to them, including grant awards, local, state, or other federal funding. SRTS funds can be used for proposed projects that are within 2 miles of a school public or private, K-8, in a municipality or in the county jurisdiction.

In response to the Strategic Transportation Investments law of June 2013, proposed SRTS projects will be considered as part of the Bicycle and Pedestrian project input with Strategic Prioritization Office for funding consideration. Most of the types of eligible SRTS projects include sidewalks or a shared-use path. However, intersection improvements (i.e. signalization, marking/upgrading crosswalks, etc.), on street bicycle facilities (bike lanes, wide paved shoulders, etc.) or off-street shared-use paths are also eligible for SRTS funds.

For more information: http://www.fhwa.dot.gov/environment/safe_routes_to_school/overview/

Or contact DBPT/NCDOT at (919) 807-0774.

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 toward planning and establishing 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 a 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.

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 Programs (CIP). In Raleigh, for example, the greenways system has been developed over many years through a dedicated source of annual funding that has ranged from $100,000 to $500,000, administered through the Recreation and Parks Department. CIPs should include all types of capital improvements (water, sewer, buildings, streets, etc.) versus programs for single purposes. This allows municipal decision-makers to balance all capital needs. Typical capital funding mechanisms include the 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 not already in place.

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.

Other Local Funding Options

- Bonds/Loans
- Taxes
- Impact fees
- Exactions
- Installment purchase financing
- In-lieu-of fees
- Partnerships

PRIVATE AND NON-PROFIT FUNDING SOURCES

Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are several examples of private funding opportunities available.

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 Robert Wood Johnson Foundation

The Robert Wood Johnson Foundation was established as a national philanthropy in 1972 and today it is the largest U.S. foundation devoted to improving the health and health care of all Americans. Grant making is concentrated in four areas:

- To ensure that all Americans have access to basic health care at a reasonable cost
- To improve care and support for people with chronic health conditions
- To promote healthy communities and lifestyles
- To reduce the personal, social and economic harm caused by substance abuse: tobacco, alcohol, and illicit drugs

For more specific information about what types of projects are funded and how to apply, visit www.rwjf.org/applications/

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.

For more information: http://nccommunityfoundation.org/

Walmart State Giving Program

The Walmart Foundation financially supports projects that create opportunities for better living. Grants are awarded for projects that support and promote education, workforce development/economic opportunity, health and wellness, and environmental sustainability. Both programmatic and infrastructure projects are eligible for funding. State Giving Program grants start at $25,000, and there is no maximum award amount. The program accepts grant applications on an annual, state by state basis January 2nd through March 2nd.

Online resource: http://foundation.walmart.com/apply-for-grants/state-giving

Rite Aid Foundation Grants

The Rite Aid Foundation is a foundation that supports projects that promote health and wellness in the communities that Rite Aid serves. Award amounts vary and grants are awarded on a one year basis to communities in which Rite Aid operates. A wide array of activities are eligible for funding, including infrastructural and programmatic projects.

Online resource: https://www.riteaid.com/about-us/rite-aid-foundation

Z. Smith Reynolds Foundation

This Winston-Salem-based Foundation has been assisting the environmental projects of local governments and non-profits in North Carolina for many years. They have two grant cycles per year and generally do not fund land acquisition. However, they may be able to offer support in other areas of open space and greenways development.

For more information: www.zsr.org

Bank of America Charitable Foundation, Inc.

The Bank of America Charitable Foundation is one of the largest in the nation. The primary grants program is called Neighborhood Excellence, which seeks to identify critical issues in local communities. Another program that applies to greenways is the Community Development Programs, and specifically the Program Related Investments. This program targets low and moderate income communities and serves to encourage entrepreneurial business development.

For more information: www.bankofamerica.com/foundation

Duke Energy Foundation

Funded by Duke Energy shareholders, this non-profit organization makes charitable grants to selected non-profits or governmental subdivisions. Each annual grant must have:

- An internal Duke Energy business "sponsor"
- A clear business reason for making the contribution

The grant program has three focus areas: Environment and Energy Efficiency, Economic Development, and Community Vitality. Related to this project, the Foundation would support programs that support conservation, training, and research around environmental and energy efficiency initiatives.

For more information: http://www.duke-energy.com/community/foundation.asp

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 ($250 to $2,000) 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, and building trails. Grants cannot be used for academic research, institutional support, lobbying, or political activities.

For more information: www.conservationfund.org

National Trails Fund

American Hiking Society created the National Trails Fund in 1998, the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. 73 million people enjoy foot trails annually, yet many of our favorite trails need major repairs due to a $200 million backlog of badly needed maintenance. 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 $240,000 to 56 different trail projects across the U.S. for land acquisition, constituency building campaigns, and traditional trail work projects. Awards range from $500 to $10,000 per project.

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: http://www.americanhiking.org/national-trails-fund/

The Conservation Alliance

The Conservation Alliance is a non-profit 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 (one to two years).
- Funding emphasis may not be on general operating expenses or staff payroll.

For more information: http://www.conservationalliance.com/grants

National Fish and Wildlife Foundation (NFWF)

The National Fish and Wildlife Foundation (NFWF) is a private, non-profit, 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 awards matching grants under its Keystone Initiatives to achieve measurable outcomes in the conservation of fish, wildlife, plants, and the habitats on which they depend. Awards are made on a competitive basis to eligible grant recipients, including federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations. Project proposals are received on a year-round, revolving basis with two decision cycles per year. Grants generally range from $50,000-$300,000 and typically require a minimum 2:1 non-federal match.

Funding priorities include bird, fish, marine/coastal, and wildlife and habitat conservation. Other projects that are considered include controlling invasive species, enhancing delivery of ecosystem services in agricultural systems, minimizing the impact on wildlife of emerging energy sources, and developing future conservation leaders and professionals.

For more information: http://www.nfwf.org/pages/grants/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 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

Blue Cross Blue Shield of North Carolina Foundation (BCBS)

Blue Cross Blue Shield (BCBS) focuses on programs that use an outcome approach to improve the health and well-being of residents. The Health of Vulnerable Populations grants program focuses on improving health outcomes for at-risk populations. The Healthy Active Communities grant concentrates on increased physical activity and healthy eating habits. 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.

For more information: http://www.bcbsncfoundation.org/

Alliance for Biking & Walking: Advocacy Advance Grants

Bicycle and pedestrian advocacy organizations play the most important role in improving and increasing biking and walking in local communities. Advocacy Advance Grants enable state and local bicycle and pedestrian advocacy organizations to develop, transform, and provide innovative strategies in their communities. With sponsor support, the Alliance for Biking & Walking has awarded more than $500,000 in direct grants, technical assistance, and scholarships to advocacy organizations across North America since the Advocacy Advance Grant program's inception. In 2009 and 2010, these one-year grants were awarded twice annually to startup organizations and innovative campaigns to dramatically increase biking and walking. The Advocacy Advance Partnership with the League of American Bicyclists also provides necessary technical assistance, coaching, and training to supplement the grants.

For more information, visit www.peoplepoweredmovement.org

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.