SOUTHWESTERN COMMISSION
Council *of* Government

Division of Bicycle & Pedestrian Transportation
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Southern Blue Ridge Bicycle Plan

2018

Ride the Ridge!

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Acknowledgments

STEERING COMMITTEE

Agency Partner: Southwestern Commission

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- Eddie Sylvester
- Joanna Atkisson
- Paul Worley
- Andy Cable
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Thank You!

CONSULTANTS

J.M. TEAGUE Engineering & Planning

Kostelec PLANNING

alta PLANNING + DESIGN

EQUINOX balance through proper planning

chipley

Division of Bicycle & Pedestrian Transportation
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Chapter 1

Introduction and Purpose

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Planning for North Carolina's Westernmost Counties

The small town context of communities in far Western North Carolina combined with some of the most rugged terrain for bicycling in the eastern United States create both challenges and opportunities for developing a bicycle-friendly region.

There is a strong group of bicycling advocates that emphasize road bicycling on numerous rural roads throughout the region. The mountain biking is just as strong and has some great singletrack at places like Jackrabbit and Tsali. Communities like Franklin and Murphy have enjoyed the benefits of their greenways that provide places for young and old to recreate outside.

Making bicycling a safe and appealing form of transportation and recreation for all ages and abilities has the potential to dramatically impact the mobility, commerce, health, and overall quality of life in Cherokee, Clay, Graham and Macon Counties. A growing number of visitors are also attracted to Western North Carolina as a recreational cycling destination, as evidenced by the success of events held at Jackrabbit and the numerous recreational rides organized throughout the year.

LOCAL KNOWLEDGE

The Southern Blue Ridge is the study area for this plan. It is located in the southern end of the Appalachian mountain range and includes four counties: Cherokee, Clay, Graham, and Macon. The area features the Nantahala National Forest, the largest of the four national forests in North Carolina. "Nantahala" is a Cherokee expression for "Land of the Noonday Sun", as sometimes the sun only reaches the floors of the deep gorges when directly overhead at midday.

The Great Smoky Mountain National Park lies at the northern end of the 4-county region, and is the largest protected land area east of the Rocky Mountains, with 276,000 acres in North Carolina and 244,000 acres in Tennessee.

This region is full of the rich cultural history of the Cherokee Native Americans, and most land and water features have Cherokee place names. Scotch-Irish history is reflected in the modern day names of towns and villages, and there are several pioneer history museums in the towns to visit. The Little Tennessee and Hiwassee River basins, along with the Unicoi, Tusquittee, Snowbird, Nantahala and Cowee mountain ranges, define the topography of the area.

Jackrabbit Mountain Trails are a bicycle tourism draw and are enjoyed by bicyclists of all ages and abilities.

Much of the uniqueness and diversity of the region is seen in the downtown shopping districts of Andrews, Franklin, Hayesville, Highlands, Murphy, and Robbinsville. The incorporated municipalities of Fontana Village and Santeetlah also have their unique appeal, encompassing vacation or seasonal get-a-ways. One goal of this plan is to link these towns together with bicycle routes.

Similarly, this bicycle plan has linked together the Tennessee Valley Authority (TVA) dams that dot the region in a connected bike route loop of about 220 miles. The TVA built many dams in the early 20th Century for the purpose of electric power generation and flood control. The impounded waters created lakes that are now popular for many recreational pursuits. Other companies now own or maintain some of these dams, but they are often visited by tourists seeking a historical perspective with a view.

Farm life played a prominent role in the region's past, with a mix of crop lands, active pasture and former pasture currently existing throughout the region, interspersed with large swaths of forest lands, some of which are used for timber

Figure 1-1—Demographic Information for the Four Counties

County	2010 Population	Median Age	Percent Who Bike to Work	Households with No Motor Vehicle	Median Household Income	Individuals Below Poverty	Population Density (people per square mile)
Cherokee	27,444	50.4	---	1.9%	$35,284	19.5%	53
Clay	10,587	49.6	0.3%	2.2%	$36,000	16.2%	41
Graham	8,861	44.8	---	1.7%	$34,778	19.3%	27
Macon	33.922	49	---	3.3%	$39,593	12.6%	58
NC	9,535,483	38.3	0.2%	2.5%	$48,256	12.3%	206

Source: 2010 U.S. Census; 2012-2016 ACS

Cheoah Dam, one of the TVA Dams, in Graham County.

products. The Southern Blue Ridge region has approximately 62,726 acres of farmland and about 842 working farms. This rural and forested backbone make for stunning scenery and ideal bicycling conditions.

The Nantahala National Forest covers much of the land in these four counties, and the US Forest Service's roads make for some scenic mountain biking. These gravel roads are less trafficked, more scenic, and often a little more technically challenging than any paved roadways, which makes them a great change of pace as an alternative to riding on pavement. Two "gravel grinder" bicycle routes are in this plan.

BUILDING A PLAN FOR WESTERN NORTH CAROLINA

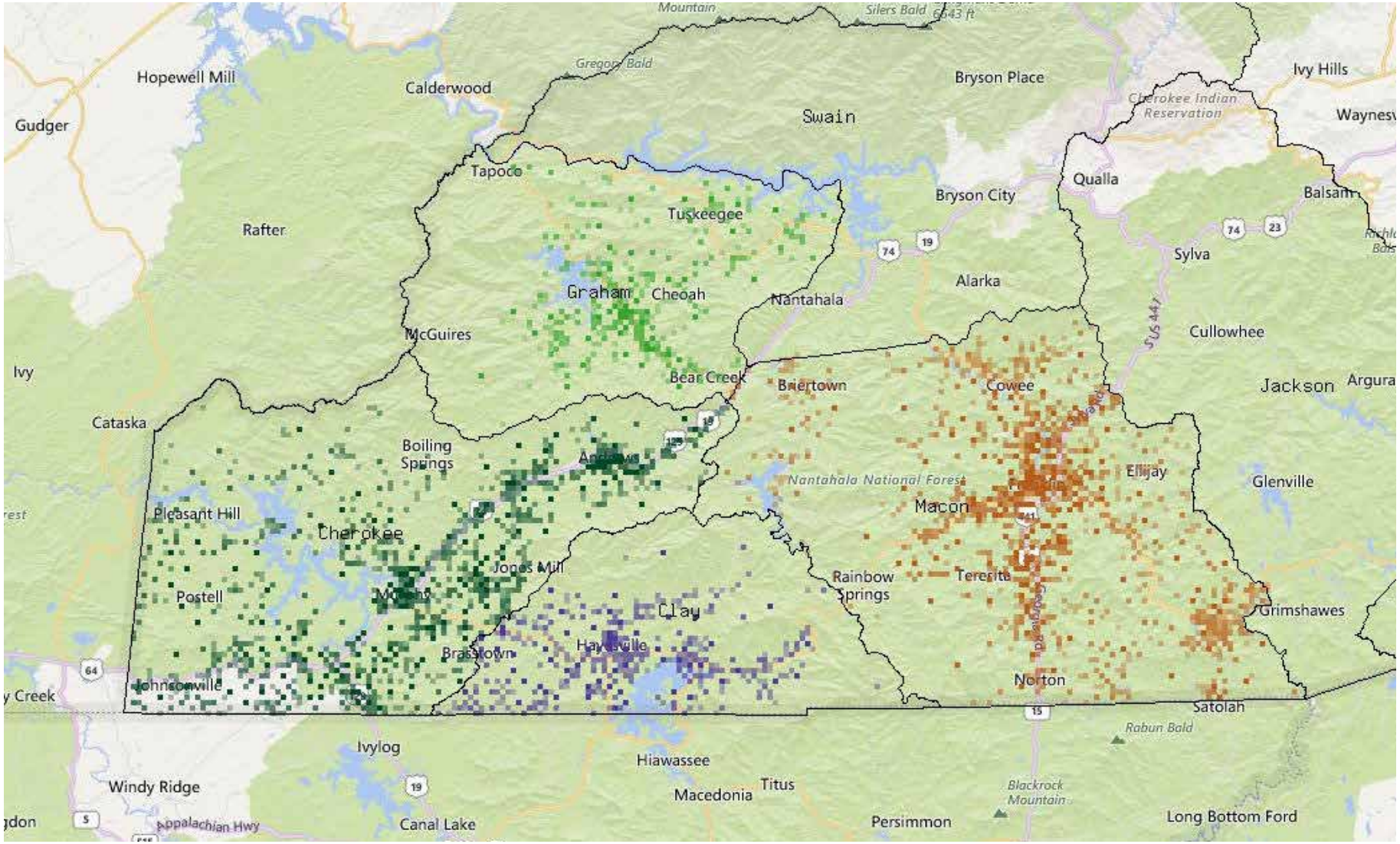
The challenge in developing a plan in the context of these mountain counties means we must balance all of these diverse needs to develop a bicycle plan that promotes health, economic development and community cohesion.

This is not merely a Bicycle Plan; it is a *Bicyclists'* Plan developed through the lens of what it means to be a bicyclist in the far western counties of North Carolina. It is a plan for all riders of all ages and abilities—the "strong and fearless" bicyclists, those are "interested, but concerned" about bicycling due to safety and comfort concerns, and children experiencing their first ride on a bike.

It is also a plan for economic prosperity for the region. Bicycling is becoming an increasingly popular method of transportation and recreation. The region's proximity to metropolitan areas, including Atlanta, Chattanooga, Knoxville and Asheville make it a bicyclists's dream vacation. The diversity of mountain bike trails, challenging climbs and relatively low-traffic mountain roads make it appealing to visitors.

The area has been a tourism magnet for decades and this plan is intended to prepare the area to catch the next wave of active tourism and make bicycling in the region fit the historical themes of outdoor recreation that typify the area's historical approach to attracting hikers, rafters and other adventure seekers.

Figure 1-2—Population Density Map for Cherokee, Clay, Graham, & Macon Counties



Source: U.S. Census 2010

2010 U.S. Census data shows that most population centers are separated by mountainous, rural areas in the county. Robbinsville, Murphy, Andrews, Hayesville, and Franklin are the primary population destinations in the area, but connecting the region as a whole was the focus of this bicycle plan.

The Hiwassee River (seen here in Clay County).

Other focus areas of this plan include:

- Emphasizing an interconnected network of on- and off-street bicycling facilities;
- Identifying safe and convenient connections between downtowns, local parks, schools, shops, neighborhoods, and other popular destinations;
- Developing strategies for the Southwestern Commission, Counties, Towns, Chambers of Commerce and Tourism Development Authorities to develop materials and campaigns that promote the area's bicycling assets and potential to residents, tourists and companies.
- Compiling a set of route maps and queue sheets for bicyclists who want to ride the areas roads and existing state-designated bicycling routes.
- Identifying low-cost, short-term projects and phased action items for longer-term projects;
- Closely coordinating recommendations with NCDOT Division 14 officials to build support for investments in the state's project ranking methods; and
- Identifying tools and partners that allow the communities to feasibly expand and enhance bicycling education, encouragement and enforcement strategies.

STRETCHING BEYOND SPANDEX

In evaluating existing conditions and the potential for greater bicycling in the study area, the plan employed an approach that evaluated bicycling through the lens of different attitudes that riders have. Four distinct types of bicyclists or attitudes toward bicycling were identified in a Portland, Oregon, Office (now Bureau) of Transportation study[1] and are becoming widely used in the realm of bicyclist planning. It is imperative that we assess needs from each perspective and understand the important safe needs of each rider type. These types of bicyclists are, in general:

- **Strong & Fearless:** These bicyclists often ride regardless of roadway conditions and riding is a strong element of their identity. On mountain roads, they are comfortable in most conditions and do not always require dedicated space such as a bikeable shoulder or bike lane. They do not prefer riding on greenways for long distances because of the mix of users.
- **Enthused & Confident:** These riders are comfortable sharing the road with automobile traffic but prefer to do so while riding in their own facility (e.g. bike lanes). They enjoy low volume, low speed roads and will ride for both recreation and transportation depending on where they feel comfortable.

Four Types of Bicyclists: *These four types of bicyclists were used as the basis for identifying recommendations in this plan.*

- **Interested but Concerned:** They are curious about riding a bike but are reluctant to ride where they do not feel safe. They may already mountain bike or use greenways. They desire dedicated facilities but may be reluctant to use bike lanes or shoulders on high speed, high volume roadways.
- **No Way, No How:** This group is not interested in bicycling due to either a lack of interest, inability to ride, or concerns about topography and safety. How can we introduce them to bicycling? Gentle mountain bike trails and greenways are a great start.

A safe bicycling network allows bicyclists in one category to potentially move up into a category of more confident riders. Successful efforts in the realm of bicycle tourism relies on a community or region having routes and facilities that accommodate all of these rider types. It also helps when businesses, such as lodging, restaurants and breweries understand these rider types as it may impact how they accommodate or attract them.

BICYCLISTS MEAN MONEY

Defining bicycle tourism for Western North Carolina and identifying the ways in which bicyclists contribute to the local and regional economy is another key focal point of this plan.

Figure 1-3—Bicycle Tourism Economic Impact

Bicycle tourism is a focus area of this Plan. This image shows how bicycling tourists are the nexus between the economic impacts of facility construction that then translates into long-term impacts in service, transportation, and recreation sectors of the economy.

The economic impacts of bicycling can be broken into four distinct categories:

1. **Bicycle Tourism:** Bicyclists, including recreational road riders, touring bicyclists, mountain bikers, event bicyclists, and low stress/family riders, all contribute to the tourism-based economy. Estimates are that 2% of the exisitng tourism market in Western North Carolina is tied to some type of bicycle tourism.

2. **Job Creation:** Bicycle tourism creates jobs, most notably in the service sector. Bicycling is becoming an increasingly important economic development tool across the United States. During each public input session of this plan, many business professionals and those involvement with economic development in the region discussed how they feel there should be more investment in bicycling facilities--both on- and off-road--as a good way to attract companies, retain physicians, and continue to enhance the area's quality of life.

3. **Construction Impacts:** The building of facilities for bicyclists, including bike lanes, greenways, and trails, also impacts the economy of the region. A study by the Political Economy Research Institute at the University of Massachusetts Amherst found that bicycling infrastructure creates the most jobs for a given level of spending: For each $1 million, cycling projects created a total of 11.4 jobs within the state where the project is located- 46% more than car-only road projects. Pedestrian projects created an average of about 10 jobs per $1 million and multi-use trails create nearly as many, at 9.6 jobs per $1 million[2].Job creation potential decreased as infrastructure dedicated to automobilies increased[3].

4. **Health Impacts:** People who bike regularly are healthier than their peers. The existing evidence reinforces the current efforts to promote cycling as an important contributor for better population health and this plan attempts to estimate some likely health impacts of what increased bicycling would mean for the region's population. Studies have found that adding 30 minutes of daily cycling can save a person $544 in direct medical costs annually[4] as well as numerous other indirect benefits to health[5]. These impacts are monetized in the form of healthcare cost savings, decreased workers compensation claims and increased work productivity.

A PLAN WE CAN IMPLEMENT

Daniel Burnham, considered the Father of Planning, said "Make no little plans. They have no magic to stir men's blood and probably themselves will not be realized." Well, he didn't have to contend with the realities of limited budgets and an ever-increasing competitive market for funding of initiatives.

This plan is meant to offer the counties and towns of Cherokee, Clay, Graham and Macon Counties a set of real options for implementing this plan to improve the area's economy and the health of people in the region.

There are more costly, long-term recommendations, but a majority of what is identified in this plan is implementable by rural communities, small towns and the area's DOT representatives. The recommendations contained in this plan are meant to build momentum for the plan and create some early, easy victories for advocates, planners and transportation officials.

The plan is built with careful emphasis on input from those within the region and bicyclists who contributed to the plan by attending workshops, riding with the project consultants and filling out the plan's survey. It is a plan that is meant for them and those who come after them.

[1] Geller, R. "Four Types of Cyclists," Portland Bureau of Transportation, Portland, OR, 2006. http://www.portlandoregon.gov/transportation/article/264746

[2] Garrett-Peltier, H. "Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts," Political Economy Research Institute, University of Massachusetts, Amherst, MA, 2011. https://www.peri.umass.edu/fileadmin/pdf/published_study/PERI_ABikes_October2011.pdf

[3] Foltynova H, Kohlova M. "Cost-benefit analysis of cycling infrastructure: a case study of Pilsen," No date. http://www.czp.cuni.cz/ekonomie/letskolacraj/bruhovakohlova.pdf

[4] Gotschi, T. "Costs and Benefits of Bicycling Investments in Portland, Oregon," Journal of Physical Activity and Health, 2011. https://www.portlandmercury.com/images/blogimages/2011/03/03/1299202929-portland_bike_cost_study.pdf

[5] World Health Organization Office for Europe. Health Economic Assessment Tool for Cycling. http://www.euro. who.int/HEAT.

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Chapter 2

Building the Plan

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Building the Plan

A Plan Built by Bicyclists

A heavy emphasis on public and stakeholder involvement serves as the cornerston of this bicycling plan. A diverse set of outreach methods were deployed to gather as much information as possible to generate ideas and recommendations for Cherokee, Clay, Graham and Macon Counties.

The efforts to build the plan consisted of a multi-pronged approach to spread awareness of the planning process and ensure a variety of local perspectives were incorporated into the plan. Residents, key stakeholders, and town staff were engaged during the planning process through the following channels:

- Steering Committee Meetings;
- Public Meetings;
- Stakeholder Interviews;
- Bicycle Events; and
- Online Surveys.

OUTREACH AND INVOLVEMENT

Steering Committee

The Steering Committee was comprised of representatives from NCDOT's Division 14, Tri-County Community College, local businesses and community advocates, a health advocacy organization, Southwestern Commission, county representatives, and a county school representative.

The Steering Committee convened on four separate occasions to provide input on bicycling issues and opportunities, served as a sounding board for elements of the planning process, and reviewed plan deliverables. The first Steering Committee meeting was held in February 2016 at the Tri-County Community College Center for Applied Technology. The second Steering Committee meeting was held in May 2016 in Franklin. The third meeting was held in November 2016 in Andrews and the final meeting was held in June 2017, in Franklin.

The Steering Committee's role was to identify common themes and needs for the plan and help determine how and where the plan's focus would occur. The Committee assisted the consulting team in identifying other stakeholders and outreach methods.

The Steering Committee made recommendations about proposed bike routes.

Public Workshops

Given the broad geography of the plan it was determined that workshops would occur in each of the four counties on two separate occasions. The first round was held in March 2016 to gather ideas on bicycling in each of the counties and identify routes to promote for recreational riding, transportation riding and economic development.

Clay County led the way with 24 participants in the March 2016 workshop.

Outreach for the workshops included sending press releases to these newspapers: The Andrews Journal, The Cherokee Scout, The Graham Star, Clay County Progress, Macon County News, The Franklin Press, and The Highlander. Elected officials in each of the four counties were sent flyers in advance of the meetings, along with Graham County Revitalization. Flyers were posted to the following Facebook groups: Town of Franklin, Outdoor 76, Macon County Cyclists, Smoky Mountain Bicycles, Southwestern RPO, Clay County Chamber of Commerce, Mindspring Conservation (formerly Land Trust for the Little Tennessee), Graham County Travel and Tourism, and Nantahala Area Sorba.

Figure 2-2 and 2-3 show the number of people who attended each meeting. Interested participants shared a diverse set of perspectives and suggestions to improve cycling in the region. Meeting participants included area cyclists, small business owners, recreational cyclists, tourism development groups, mayors, and municipal and NCDOT staff.

Stakeholder interviews

Before the workshops in some of the counties, the consultant team hosted several stakeholder interviews. In Macon County, Sarah Tennyson with the organization MountainWise was interviewed, along with Jackie Moore representing Active Routes to School. In Clay County, two focus groups were held, focused on Economic Development and Health. Below is a summary of the Clay County focus group representatives. Input from these meetings have been used in the plan development process.

- Clay Co. Economic Development
- Clay Co. Travel and Tourism
- Clay Co. Health Department
- Clay Co. Recreation Department

Surveys

With feedback from the Steering Committee and SWC Staff, the consultant team developed two public input surveys. The objectives of the first survey were to assess bicycling behaviors and priorities among residents in the region and to identify ways to make it more bicyclist-friendly. Online and print versions were developed.

Flyers with links to the survey were distributed to local businesses around the region. Paper copies of the survey were printed and distributed as well. Half-page handouts were developed and circulated that had a QR code and link to the survey. The survey was also promoted during the first round of community engagement in emails sent to residents and during the county public input meetings.

Figure 2-1— Example of Public Workshop Flyer

Figure 2-2—March **2016** Public Workshop Participants

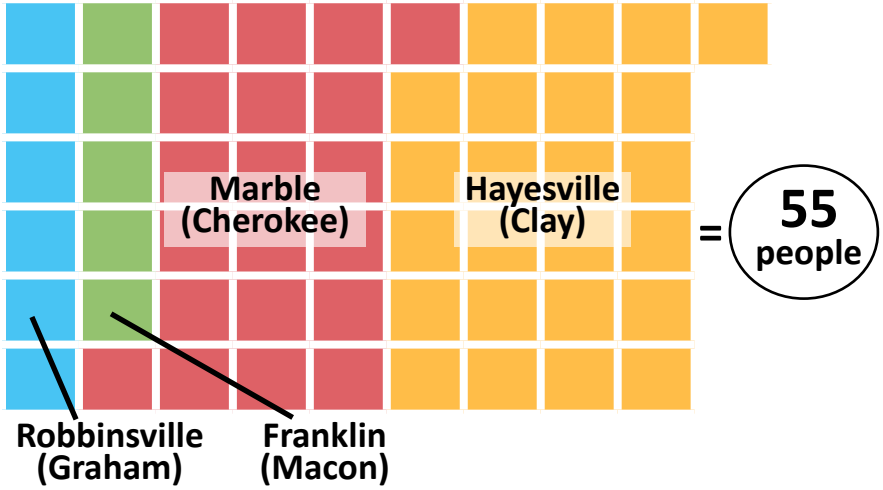
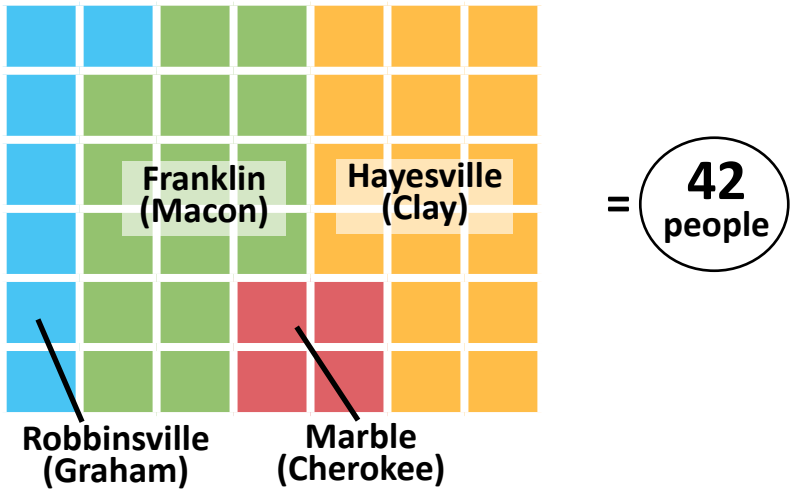


Figure 2-3—March **2017** Public Workshops Summary



The second survey was focused on quantifying the impacts that individuals, residents and visitors, have on the region.

Outreach for this survey included the following.

Bicycle Events:

- Southeastern International Mountain Biking Summit in Bryson City
- Knobscorcher 2016 at Tsali
- Tour de Franklin 2015
- Cycle to Farm 2016

Newsletters:

- Outdoor Chattanooga
- Chattanooga Bicycle Club
- Carolina Tarwheels

Facebook Groups

- Adventure Racing Discussion group
- Clay County NC Chamber of Commerce
- Visit Cherokee County, North Carolina, Murphy, Andrews, Brasstown

Project Website

A dedicated website was developed to inform the public about the plan, to provide a forum for updates and events, and to house draft materials. Links to the survey, existing plans, and interactive mapping tool were included.

A sample screen shot from the website is shown in Figure 2-4.

SURVEY RESULTS

The public input survey was deployed to collect information from residents of Macon, Cherokee, Clay, and Graham counties on their bicycling habits and concerns to gain an understanding of potential opportunities for improvement. Results indicate strong interest in bicycling but significant safety concerns which prevent residents from bicycling as frequently as they would prefer.

Current Bicycling Habits and Concerns

Over 1/2 of respondents bicycle at least 1 day per week while 1/3 bicycle 3 or more days per week. Most respondents currently bicycle for recreation and/or fitness, primarily on off-road trails. Survey results indicate nearly 1/2 of respondents are interested in bicycling but concerned for their safety and

prefer bicycling on separated paths or residential roads with very low traffic.

The most significant factors discouraging bicycling among respondents in order of significance are:

- Lack of bicycle lanes or paved shoulders
- Unaware or inconsiderate motorists
- Lack of separated paths or greenways
- High speed traffic
- Narrow lanes

Responses indicate many streets do not feel safe for respondents to bicycle, and open-ended responses often explicitly state that "most" or "all" roads need improvements to make respondents feel safe bicycling on them. Frequently mentioned streets that need improvement and/or feel particularly unsafe or inconvenient to respondents are:

- US 64
- Myers Chapel Rd
- Hwy 441
- Hwy 129
- Old 64

Figure 2-4—Project Website Screenshot

Preferred Destinations and Improvements

Respondents indicated they would like to bicycle to the following destinations:

- Downtown Hayesville
- Downtown Murphy
- Downtown Franklin
- Greenways and trails in general (especially Jackrabbit Mountain Bike Trails and Tsali trails)
- Parks in general
- Santeetlah Lake

The following facility improvements were most frequently selected as solutions to encourage respondents and members of their households to bicycle more often:

- More separated or off-road paths for bicycles
- More on-street facilities for bicycles
- More share lane markings or signage to increase awareness of cyclists

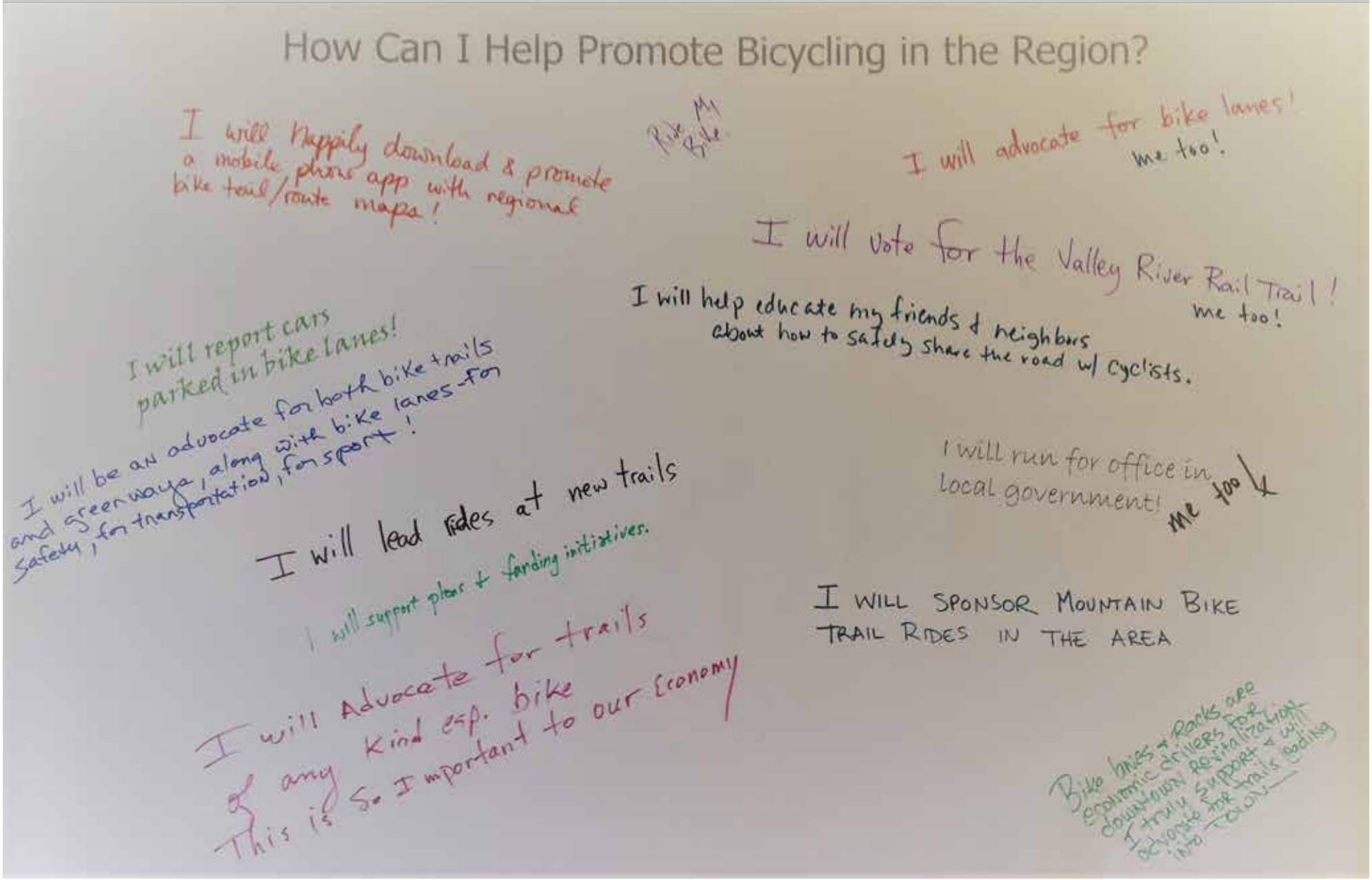
Potential Impact of Improvements

Respondents indicated that improving the safety and convenience of bicycling would make them more likely to bicycle for the following purposes:

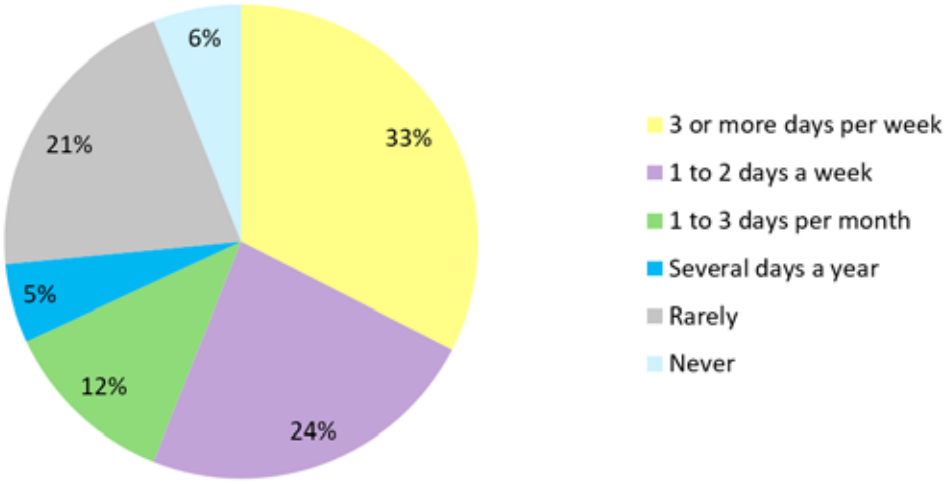
- Limiting automobile use: more than 5 times as likely
- Social opportunities or events: more than twice as likely
- Grocery shopping or daily errands: more than 6 times as likely
- Travel to nearby destinations – more than 3 times as likely
- Commute to school or with children to school – 14 times as likely
- Commute to work – 4 times as likely

Results for each question are discussed in more depth on the following pages.

Figure 2-5—Public Support for Regional Bicycling



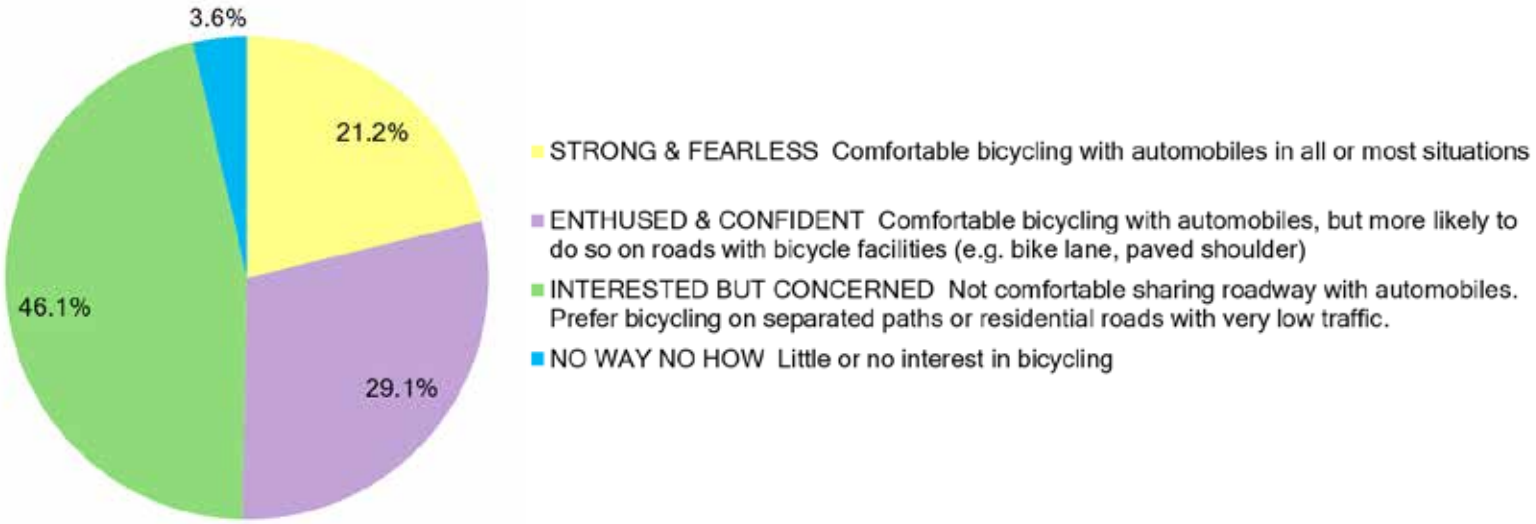
Question 1: How frequently do you bicycle?



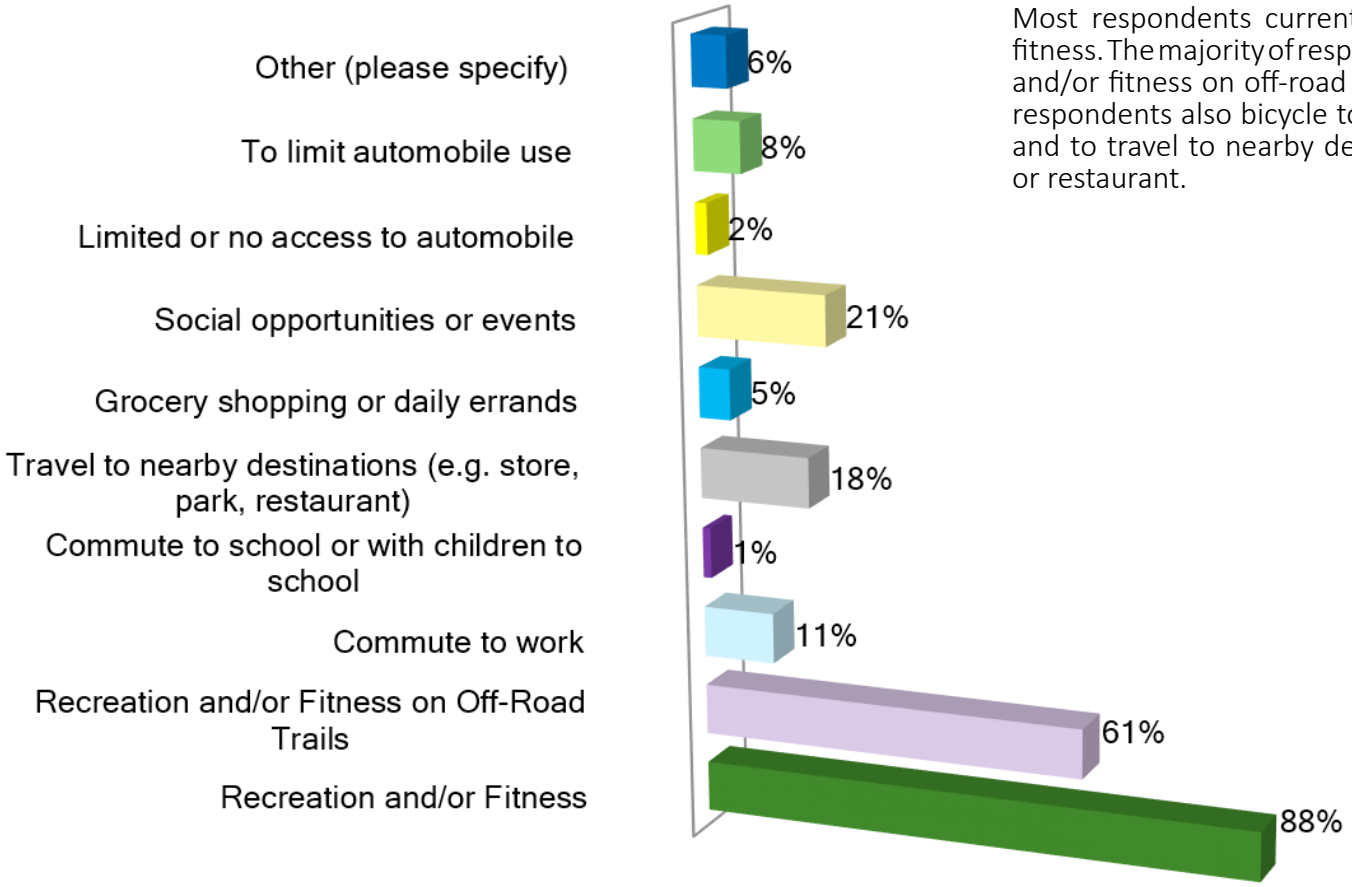
Over half of respondents bicycle at least 1 day per week , while 1/3 bicycle 3 or more days per week.

Nearly 1/2 of respondents are interested in bicycling but concerned for their safety and prefer bicycling on separated paths or residential roads with very low traffic.

Question 2: Which statement best describes your level of comfort on a bicycle?

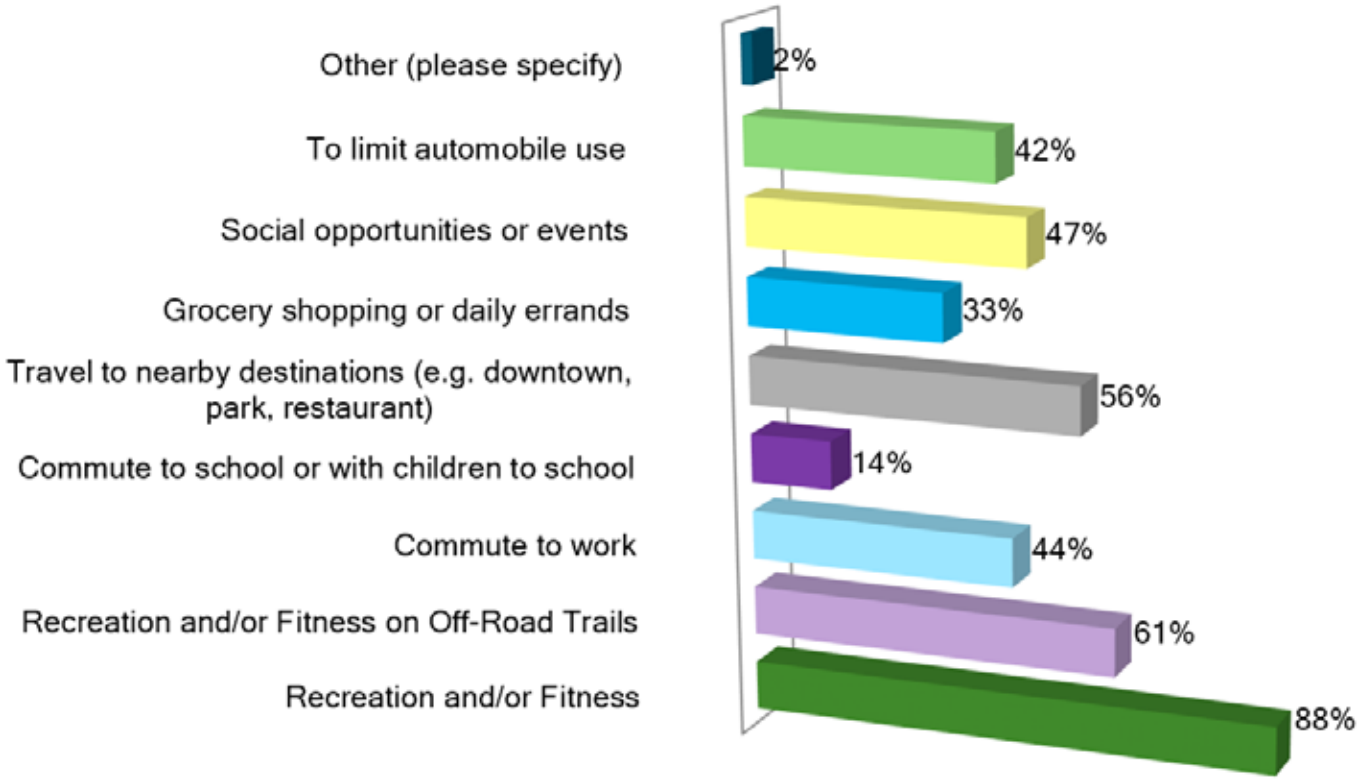


Question 3: For what purposes do you or members of your household currently bicycle? (select all that apply)

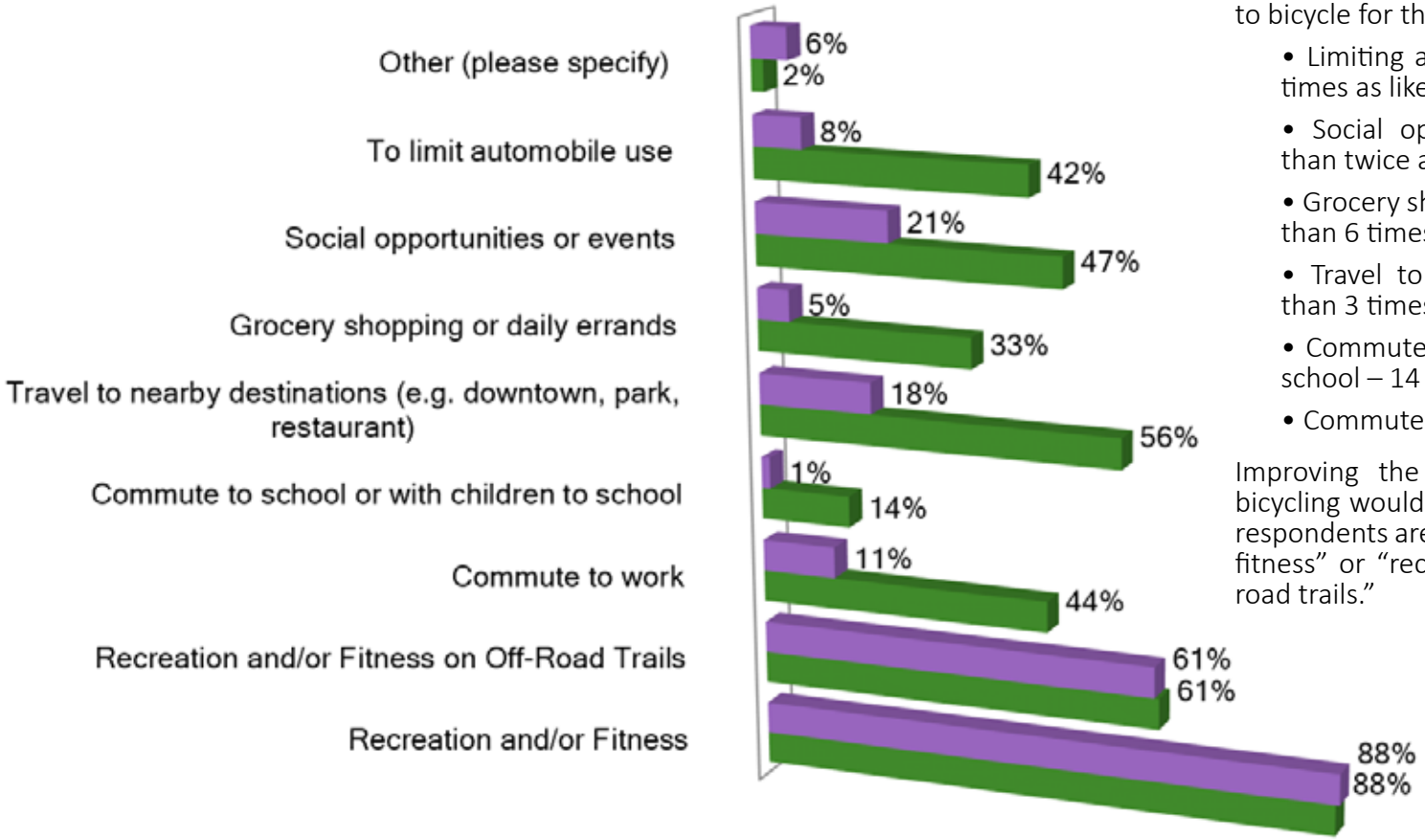


Most respondents currently bicycle for recreation and/or fitness. The majority of respondents also bicycle for recreation and/or fitness on off-road trails. A significant proportion of respondents also bicycle to social opportunities and events and to travel to nearby destinations, such as a store, park, or restaurant.

Question 4: For what purposes would you or members of your household bicycle if it were safer and more convenient to do so? (select all that apply)



Comparison of results for Questions 3 and 4: Assessing the impact of improving the safety and convenience of bicycling

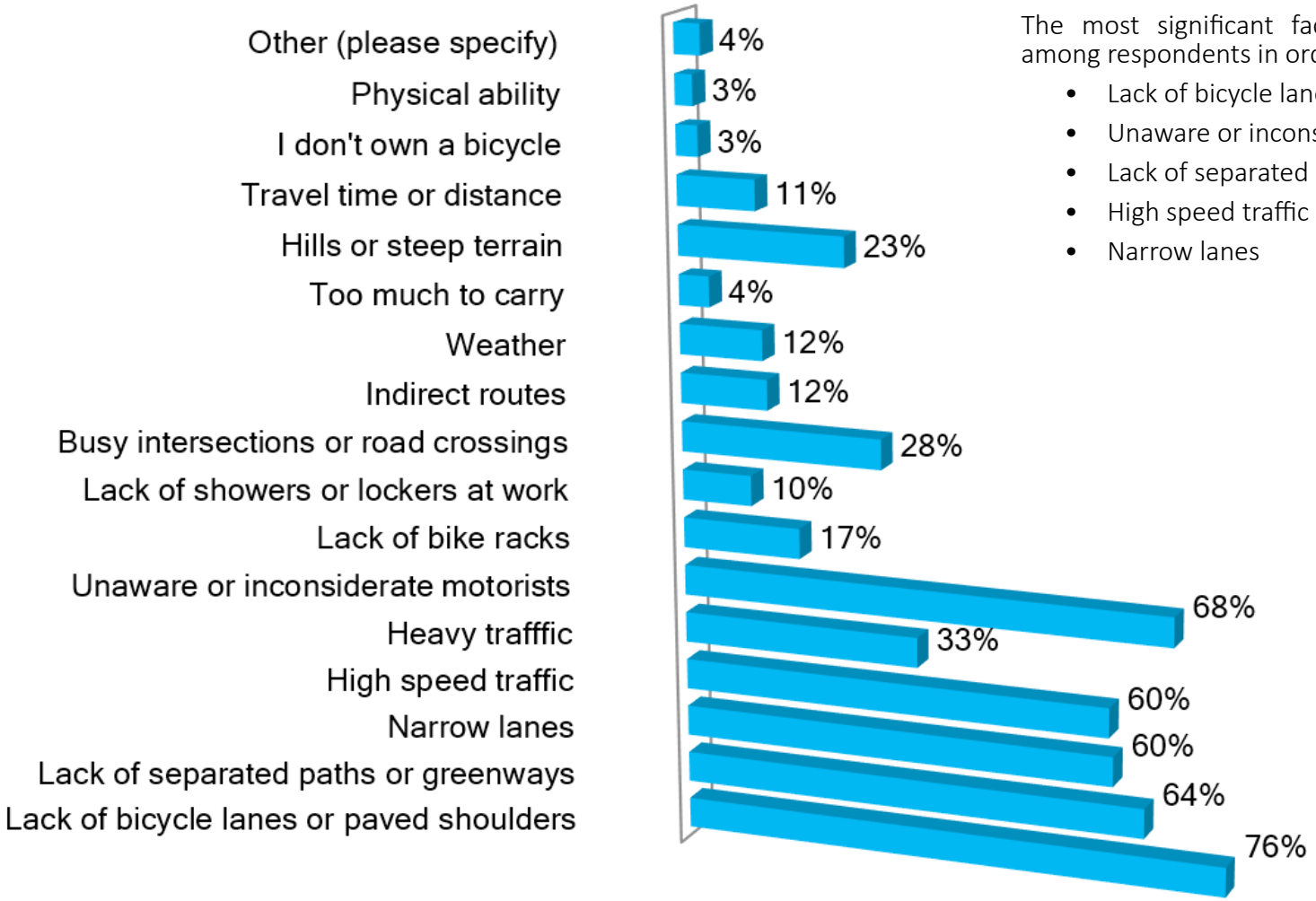


Improving the safety and convenience of bicycling would make respondents more likely to bicycle for the following purposes.

- Limiting automobile use: more than 5 times as likely
- Social opportunities or events: more than twice as likely
- Grocery shopping or daily errands: more than 6 times as likely
- Travel to nearby destinations – more than 3 times as likely
- Commute to school or with children to school – 14 times as likely
- Commute to work – 4 times as likely

Improving the safety and convenience of bicycling would have no impact on how likely respondents are to bike for "recreation and/or fitness" or "recreation and/or fitness on off-road trails."

Question 5: What factors discourage you or members of your household from bicycling more often? (select all that apply)



The most significant factors discouraging bicycling among respondents in order of significance are:

- Lack of bicycle lanes or paved shoulders
- Unaware or inconsiderate motorists
- Lack of separated paths or greenways
- High speed traffic
- Narrow lanes

Question 6: What destinations in the region would you or members of your household like to access by bicycle? (Please include current bicycling destinations)

The destinations most frequently mentioned in open-ended responses were downtown Hayesville, Murphy, and Franklin. Other destinations recurring in open-ended responses include:

- The rec park, with some respondent specifying the Clay County Rec Park
- Greenways and trails in general, with the most popular choices being Jackrabbit Mountain Bike Trails and Tsali trails.
- Santeetlah Lake

Question 7: Which roads or trails do you currently bicycle on in the region?

Respondents mentioned an exceptionally wide variety of road and trails on which they currently bicycle. Some of the recurring roads and trails mentioned were Burningtown Loop, Ellijay Road, Forest Service Roads, Greenways in general, and Hanging Dog Trails. However, respondents name Jackrabbit Trails and Tsali Trails more than any other road or trail.

Question 8: Which roads in the region are most in need of improvements for bicyclists?

While many respondents stated that many or all roads need improvements for bicyclist, the roads most frequently noted as needing improvements include:

- US 64
- Hwy 441
- Hwy 129
- Old 64

Question 9: Are there any proposed greenways or other off-road facilities that you believe would promote bicycling in the region?

The following proposed greenways or other off-road facilities received significant support from respondents for promoting bicycling in the region:

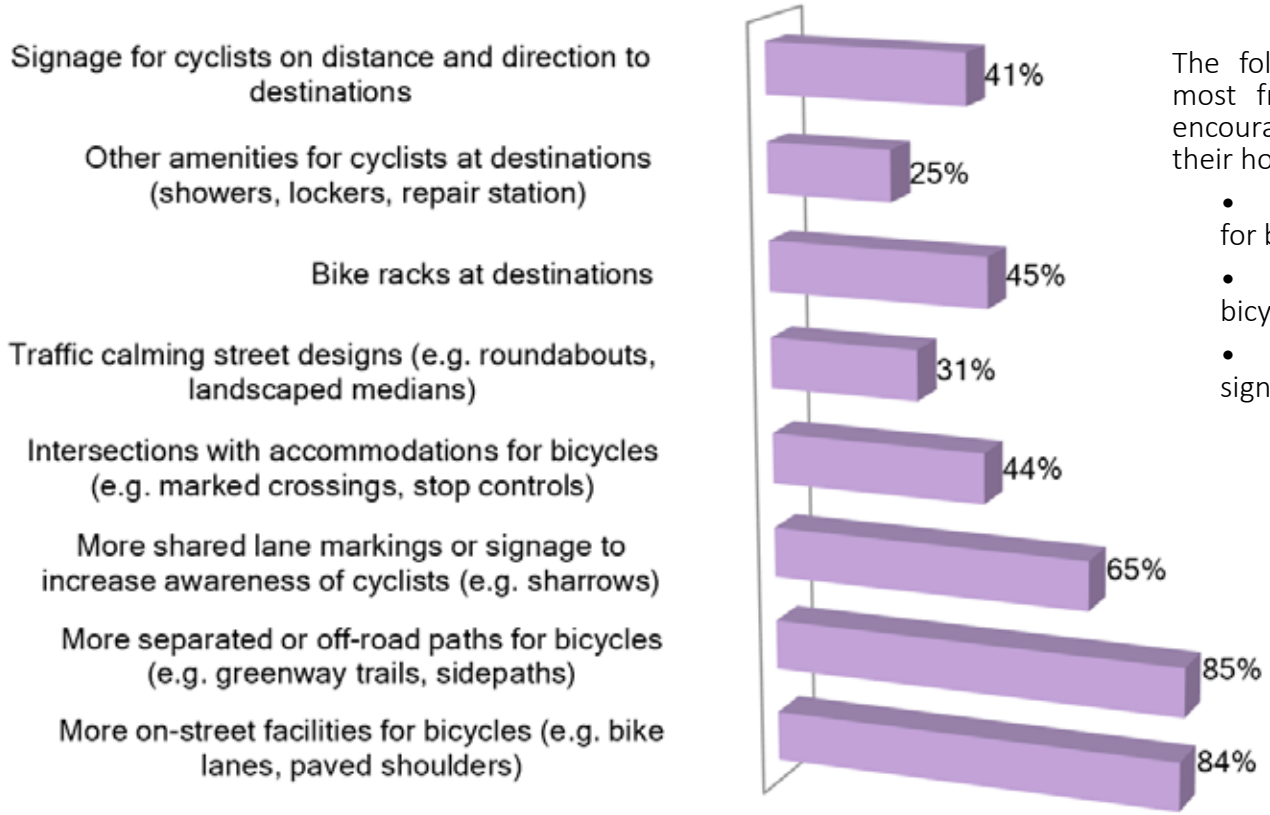
- Piney Knob Trail System
- Rails to trails
- Franklin Greenway Extension

Question 10: Are there any specific locations in the region where there are hazards or other barriers that make bicycling feel unsafe or inconvenient?

Responses indicate most streets do not feel safe for respondents to bicycle. Frequently mentioned locations that feel most unsafe or inconvenient to respondents are:

- US 64
- Myers Chapel Rd
- Narrow winding roads in general

Question 11: What facility improvements would encourage you or members of your household to bicycle more often? (select all that apply)

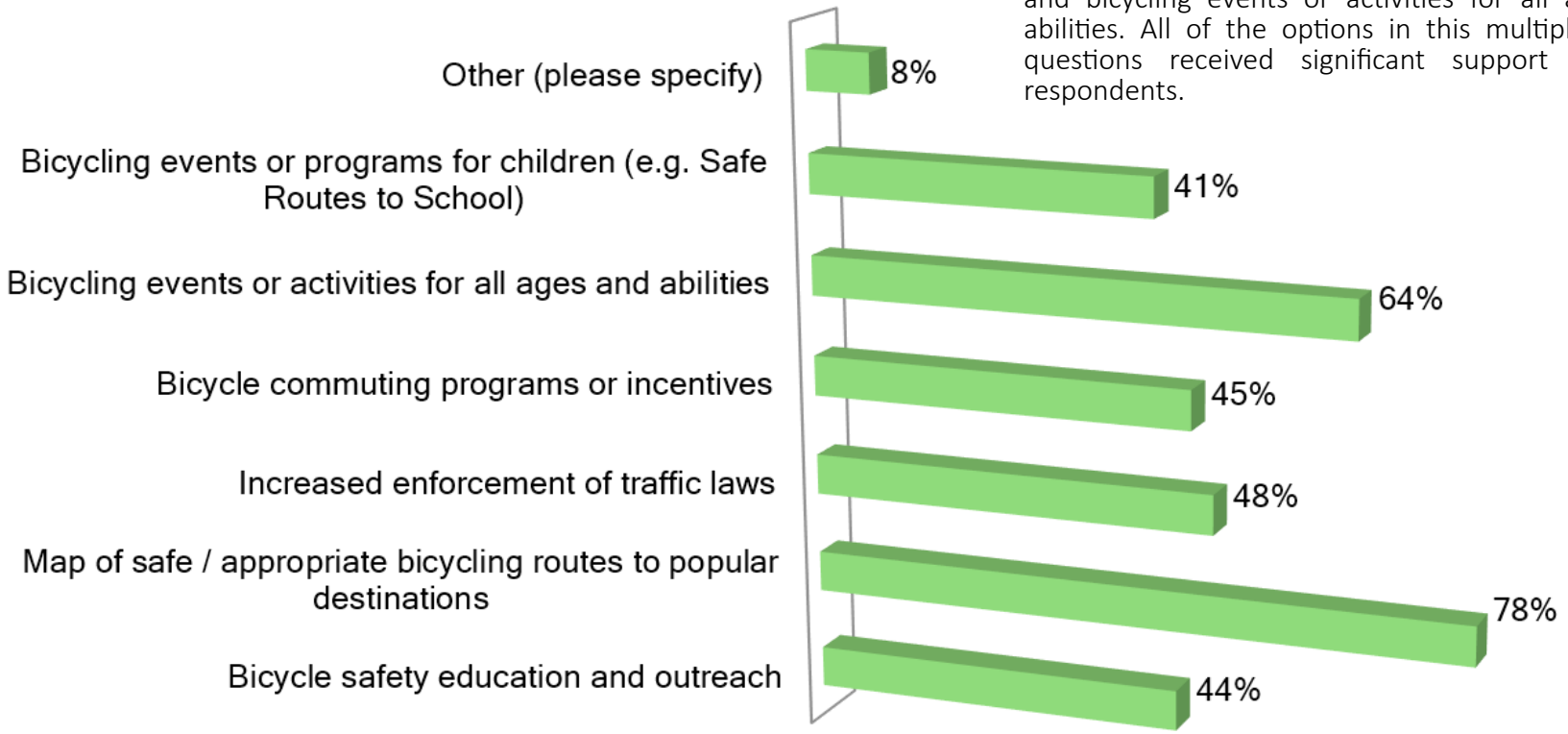


The following facility improvements were most frequently selected as solutions to encourage respondents and members of their households to bicycle more often.

- More separated or off-road paths for bicycles
- More on-street facilities for bicycles
- More share lane markings or signage to increase awareness of cyclists

Question 12: What types of program/policy actions would encourage you or members of your household to bicycle more often? (select all that apply)

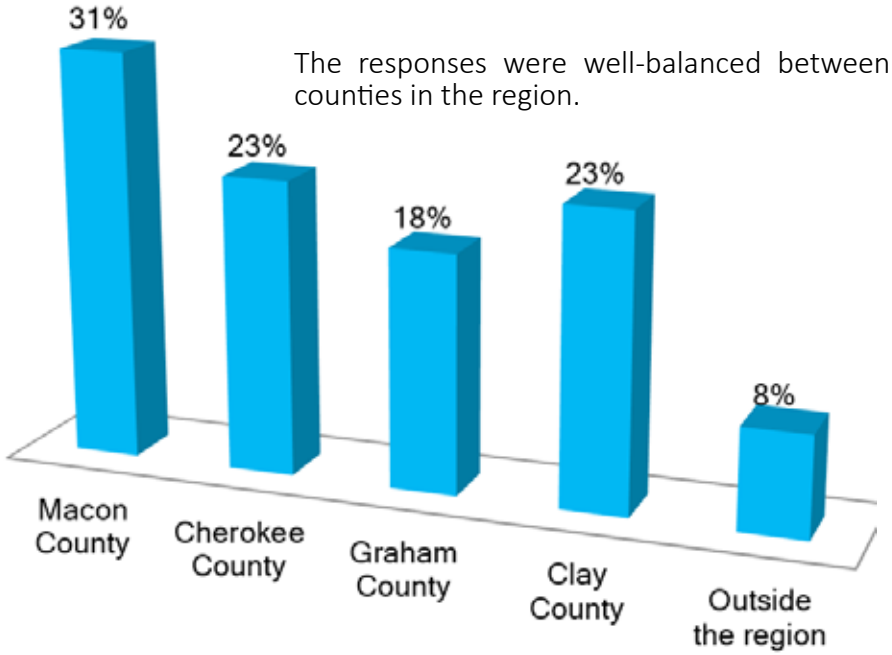
The programs/policy actions which received the most support from respondents are a map of safe/ appropriate bicycling routes to popular destinations and bicycling events or activities for all ages and abilities. All of the options in this multiple choice questions received significant support amongst respondents.



Question 13: Do you have any additional comments regarding bicycling in the region?

Common themes among open-ended responses include the need for improved safety (i.e. bike lanes, wider roads), support for additional greenways and trails, and the potential of these improvements to improve quality of life for locals, support the local economy, and attract tourists.

Question 14: In which county do you live?



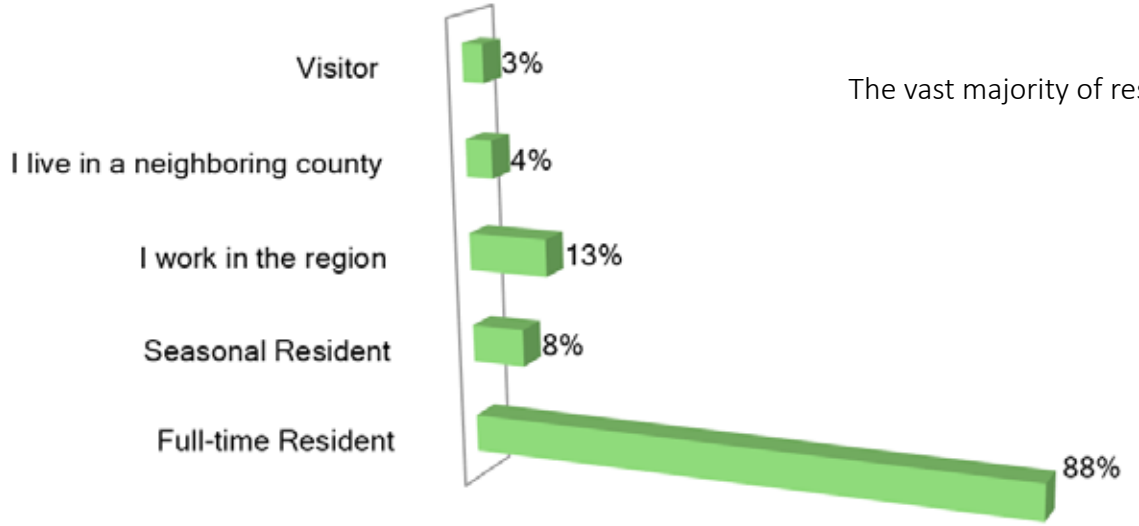
The responses were well-balanced between all four counties in the region.

Question 15: In which city do you live?

Most respondents live in one of the following cities:

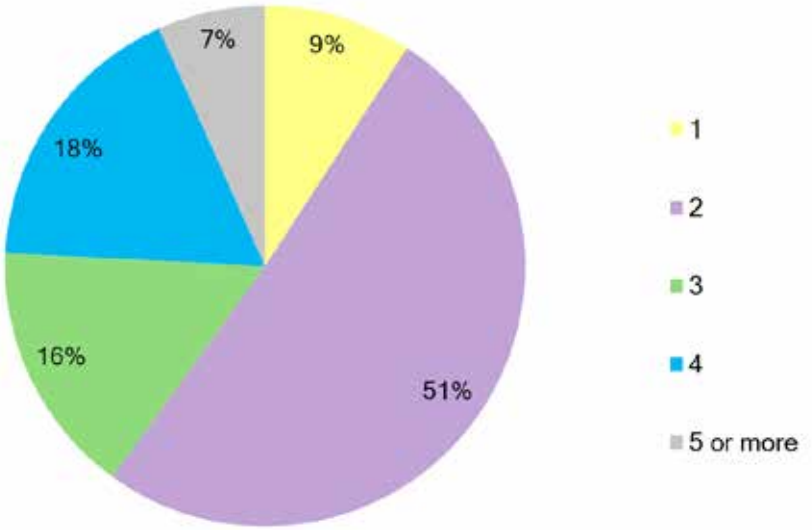
- Franklin (27%)
- Hayesville (17%)
- Murphy (15%)
- Robbinsville (15%)

Question 16: Which category describes your relationship to the region?

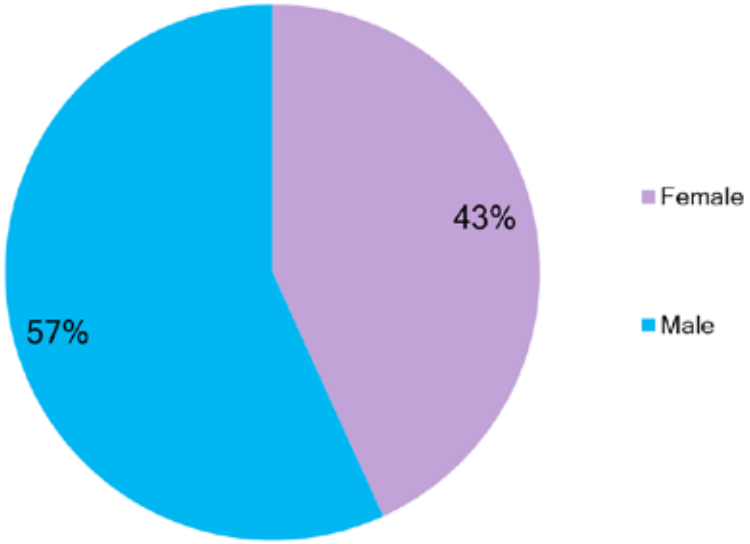


The vast majority of respondents are full-time residents of the region.

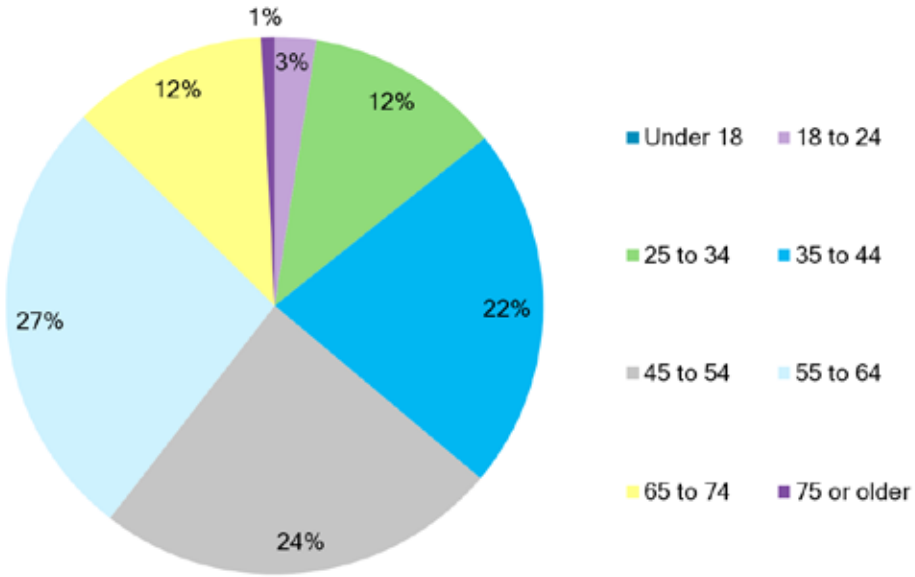
Question 17: How many people currently live in your household?



Question 19: What is your gender?



Question 18: What is your age?



Over half of respondents have a household size of 2 people. Over 40% of respondents have a household size of 3 or more.

Over half of respondents have a household size of 2 people. Over 40% of respondents have a household size of 3 or more.

A slight majority of respondents are male.

Key Survey Findings

1. Tourists come from a wide range of locations to bicycle in Western North Carolina.

A large proportion of bicycle tourism to the area comes from South Carolina, Georgia, and Tennessee. The wide variety of locations represented in responses include many states across the country, and even as far away as Bermuda.

2. Bicycle tourism in North Carolina is happening during all 4 seasons.

Although fall and spring are the most popular seasons for both day and overnight bicycling trips, many cyclists also take trips during the summer and some even take trips in the winter.

3. Businesses in WNC are bike-friendly.

A large majority of respondents rated the bike-friendliness of lodgings, restaurants, and other businesses as either excellent or good. A very small percentage rated the bike-friendliness of businesses as poor.

4. Bicycling tourists to WNC want the following improvements and amenities:

a. more greenways, trails, and paths;

b. more paved shoulders and bike lanes;

c. better motorist education/improved motorist behavior towards cyclists;

d. wayfinding signage with directions and distance to the location.

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Chapter 3

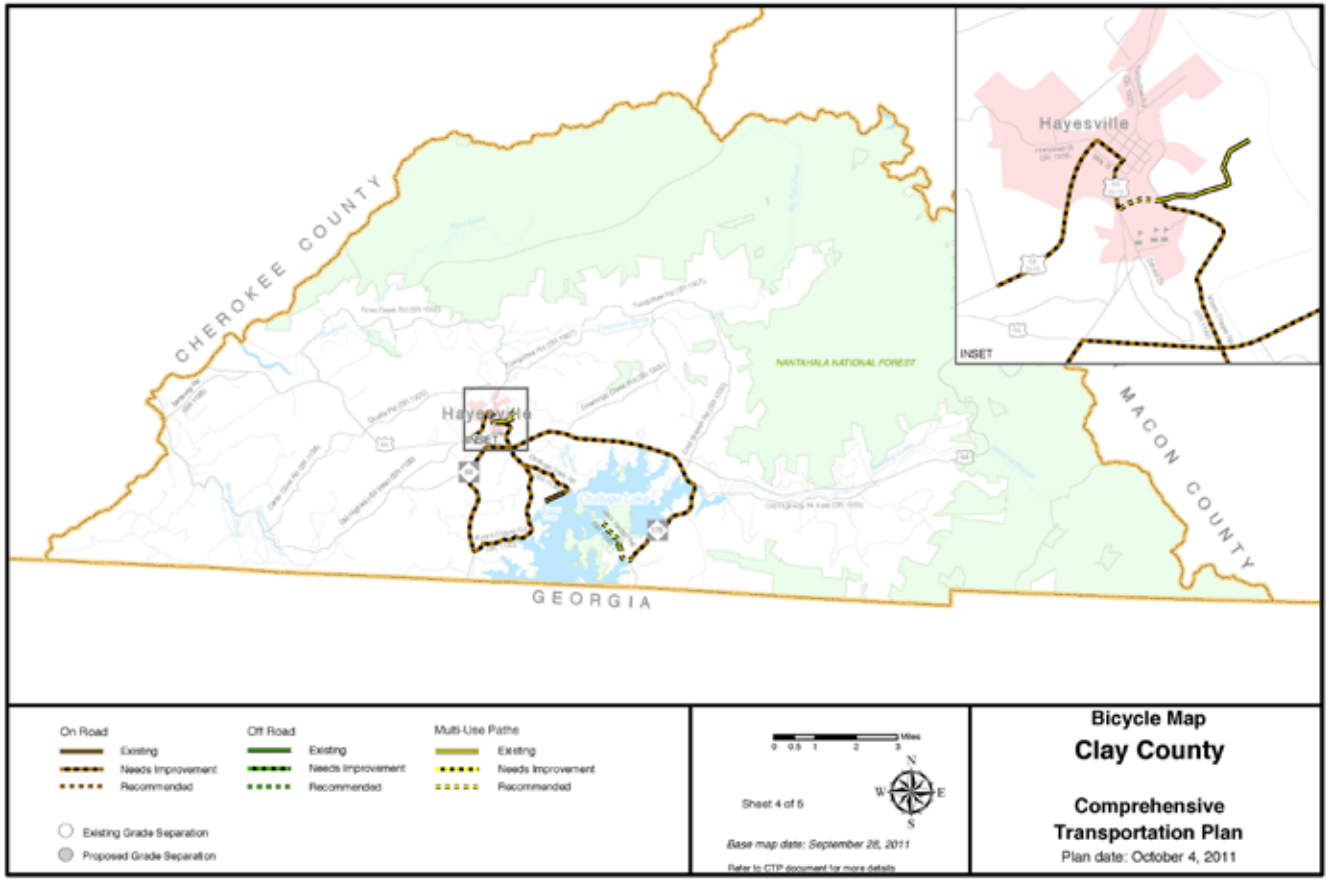
Existing Plans, Programs and Policies

Chapter 3 Review of Existing Plans and Policies

Existing Plan Review

Deeply rooted in southern Appalachian culture, Southwestern North Carolina's people are independent-minded and have been slow to embrace formal planning efforts. Before 2006, few county-wide transportation plans or land use or comprehensive plans existed. Some towns have planned for greenway projects, and there are groups in the region that promote bicycling and events, but only Robbinsville and Franklin have a completed plan for pedestrians or bicyclists. The Southern Blue Ridge Bike Plan is the first formal effort to plan for the bicyclists living in and visiting the region. The following sections summarize the key plans that contain bicycling or multiuse trail projects as well as plans that contribute to building a community that promotes bicycling or bicycle tourism.

Figure 3-1—An Example from Clay County of a CTP Bicycle Facilities Map



COMPREHENSIVE TRANSPORTATION PLANS

According to NCDOT, "A Comprehensive Transportation Plan (CTP) is a mutually adopted legal document between the state and the local area partner(s). When a CTP is adopted by NCDOT, it represents the state's concurrence with the identified transportation needs and proposed recommendations.1" Each County in the Southern Blue Ridge Bike Plan region has a current NCDOT CTP that contains a set of bicycle and multi-use trail recommendations. The region's CTPs identify the bicycle and multi-use trial projects that help the community achieve their multi-modal connectivity goals and increase their choice of transportation modes. All of the CTPs were completed between 2012 and 2015.

Figure 3-2—Comprehensive Transportation Plans—Relevant Projects

Cherokee *CTP Bicycle Projects*

- US 19 Business (Andrews Road)/Pleasant Valley Road /Regal Road: from Peachtree Street to Airport Road
- US 64: from Old US 64 to NC 141
- NC 141: from Old US 64 to Hendrix Road
- Harshaw Road: from US 64 to US 64
- Old US 64: from Clay County to NC 141

Clay *CTP Bicycle Projects*

- US 64: from NC 69 to NC 175
- US 64 BUS: from School Drive to Courthouse Drive
- NC 69: US 64 to Myers Chapel Rd
- NC 175: US 64 to Jack Rabbit Rd
- Chatuge Dam Rd: Myers Chapel to Chatuge Lake
- Chatuge Lake to Chatuge Dam Rd along Chatuge Lake
- Myers Chapel Rd: US 64 to NC 69
- Myers Chapel Rd: US 64 to Veterans Park

Graham *CTP Bicycle Projects*

- Godfrey Street/Ford Street/Moose Branch: From the proposed multi-use path at Long Creek to the proposed multi-use path at Tulula Creek
- US 129 (Rodney Orr Bypass): from the proposed multi-use path at Long Creek to Ford Street
- South Main Street: from Snowbird Road to Front Street
- NC 143 (Santeetlah Road/Snowbird Road) and NC 143 (Junaluska Drive): From recreational trails west of IU Gap Road to NC 143 Business.

Macon *CTP Bicycle Projects*

New Facility

- Siler Road: from Macon Early College to Dowdle Mountain Road

Improvement to Existing Facilities

- US 19: from Cherokee County to Swain County
- US 23-441: from Wide Horizon Road to Siler Road
- US 64 – NC 28: from US 23-441 to Buck Creek Road
- US 64 – NC 28: from Buck Creek Road to Hicks Road
- US 441 BUS: from Lakeside Drive to Wayah Road Both Directions
- NC 28: from US 441 BUS – Main Street to Swain County
- NC 28: from US 441 BUS – Main Street to US 23-441
- NC 106: from Georgia to US 64
- Bates Branch Road: from Pine Road to Addington Branch Road
- Bell Road: from Coweeta Church Road to Pine Road
- Belle Dondle Road: from Middle Skeenah Road to US 23-441
- Brown Road: from US 23-441 to Joe Bradley Road
- C R Cabe Road: from Dowdle Mountain Road to Dowdle Mountain Road Loop
- Cart Slagle Road: from Wayah Road to US 64
- Cat Creek Road: from US 23-441 to Saunders Road
- Cheney Lane: from Buck Creek Road to Flat Mountain Road
- Clarks Chapel Road: from Hickory Knoll Road to Prentiss Bridge Road
- Coweeta Church Road: from Coweeta Lab Road to US 23-441
- Coweeta Lab Road: from US 23-441 to Ball Creek Road
- Depot Street: from US 441 BUS to Wayah Street
- Dowdle Mountain Road: from Clarks Chapel Road to Wells Grove Road
- Ferguson Road: from Rabbit Creek Road to Saunders Road

Figure 3-2—Comprehensive Transportation Plans—Relevant Projects (Continued)

Macon *CTP Bicycle Projects (continued)*

- Fifth Street: from Horse Cover Road to Highlands School II-27 Flat Mountain Road: from Cheney Lane to US 64
- Frazier Road: from Fulcher Road to Clarks Chapel Road
- Fulcher Road: from Clarks Chapel Road to Clarks Chapel Road Loop
- Harrison Ave: from US 441 BUS to Wind Gap Road
- Hickory Knoll Road: from Tessentee Road to Clarks Chapel Road
- Horse Cove Road: from Fifth Street to US 64
- Joe Bradley Road: from Perryman Cabe Road to US 23-441
- John Teague Road: from Wide Horizon Drive to US 64
- Little Ellijay Road: from Walnut Creek Road to Ellijay Road
- Middle Burningtown Road: from Olive Hill Road to Burningtown Road
- Middle Creek Road: from US 23-441 to Perryman Cabe Road
- Middle Skeenah Road: from Belle Dowdle Road to Addington Branch Road
- Mullbery: from the Georgia State Line to US 23-441
- Olive Hill Road: from Airport Road to Middle Burningtown Road
- Onion Mountain Road: from Rabbit Creek Road to Ellijay Road
- Pete McCoy Road: from Clarks Chapel Road to Clarks Chapel Road Loop
- Pine Road: from Bell Road to Bates Branch Road
- Prentiss Bridge Road: from Clarks Chapel Road to Wide Horizon Drive
- River Road: from US 64 – NC 28 to US 64 – NC 28 Loop
- Riverside Road: from Hickory Knoll Road to US 23-441 II-28
- Saldeer Mountain Road: from Burningtown Road to Rose Creek Road
- Siler Road: from US 23-441 to Macon Early College
- Skeenah Road: from Addington Bridge Road to South Skeenah Road
- Southards Road: from Skeenah Road to US 64, also known as Alison Creek Road
- Sam Corn Road- Perryman Cabe Road- River Valley Road: from Georgia to Middle Creek Road

Macon *CTP Bicycle Projects (continued)*

- Stamey Mountain Road: from South Skeenah Road to Belle Dowdle Road
- Tessentee Road: from US 23-441 to end of pavement
- Union School Road: from Middle Skeenah Road to Addington Branch Road
- W Old Murphy Road: from Southards Road to Skeenah Road
- Walnut Creek Road: from Little Ellijay Road to US 64 – NC 28
- West Dills Creek Road: from Southards Road to W Old Murphy Road
- Windy Ridge Road: from Perryman Cabe Road to Tessentee Road

CTP *Multi-Use Path Projects*

Cherokee	• Extend the existing multi-use path less than 0.1 miles: from existing pathway in Andrews, across Valley River to the rest area.
Clay	• Jack Rabbit Road Multi-Use Path along Jack Rabbit Road • Veterans Park Multi-Use Path: from Veteran's Park to Myers Chapel Road • Veterans Park Multi-Use Path Extension: from Myers Chapel Rd to US 64 BUS
Graham	• Cheoah River/Tulula Creek Multi-Use Path: from Godfrey Street to Santeetlah Lake • Long Creek Multi-Use Path: from Cheoah River to the proposed Young America Park • US 129 (Tallulah Road) Multi-use Path: from Ford Street to Tallulah Bog recreation area east of Bear Creek Drive • Additional multi-use paths were recommended in the 2013 Robbinsville Pedestrian Connectivity Plan and the CTP recommends implementation of these projects.
Macon	• Little Tennessee Greenway: The Little Tennessee Greenway runs from Suli March at the intersection of Riverview Street and Arthur Drake Road in the north 4.7 miles to the Cartoogachaye Creek in the south. Currently, the greenway must cross the Little Tennessee River at US 421 BUS. The crossing includes a temporary trail, ramp, and two road crossings. Bridge replacement project B-5125 will address the issues directly related to it, but additional improvements will be needed: from the south end of Morris Trace to the north end of the Old Airport Trail to maintain and improve connectivity and mobility.

COMPREHENSIVE PLANS & REGULATORY REVIEW

Comprehensive Plans

Each County has a recent Comprehensive Plan to guide the county's land use and community service decisions. Of the seven municipalities in the region, only Highlands has a relatively current land use plan. While not a land use plan, the Town of Franklin uses its Ten Principles of Growth to guide the Town's land use decisions.

Cherokee County

Cherokee County leaders adopted **Cherokee County Tomorrow** (CCT) in 2015. Cherokee County does not have a long history of engaging in planning efforts; CCT was the County's first long-range planning effort. The document contains a set of implementation steps as well as a set of concept plans. A handful of the Plan's implementation items are directly related to bicycling and multi-use trail development, and a variety of implementation items promote the county as a recreation and tourism destination. A sample of the implementation items include:

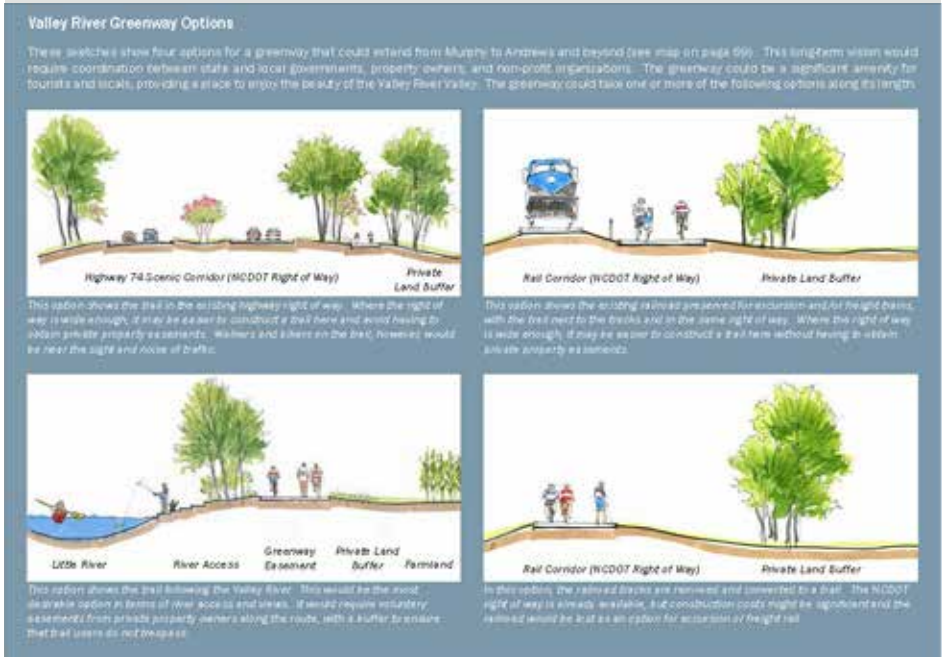
- Complete a continuous recreational trail from Andrews to Murphy.
- Continue to revitalize downtown Murphy and downtown Andrews.
- Think regionally regarding economic and tourism development, including adjacent states.
- Create a long-range Tourism Development Plan that catalogs existing tourist destinations as well as how to improve and market them.
- Increase public access to natural and recreation areas near towns and residential areas.
- Strengthen partnerships with federal, state, and non-profit partners to collaborate on natural resources and recreation issues.
- Work with local partners such as churches, schools, hospitals, and non-profit organizations to promote community health.
- Catalog existing natural, recreation, and heritage assets to better market them.

CCT has design-based concept plans for the Casino Area, the Ranger Area, the Marble Crossroads, the Business Park, the Murphy Depot, and the Valley River Greenway. All plans except for the Ranger and Business Park plans consider multi-use trail connectivity.

Graham County

Graham County has plans developed to improve conditions in Graham County and its county seat, Robbinsville. Many of the plans are design based, containing sketches and concept plans that illustrate how the county and town can enhance its sense of place; **Reimagining Robbinsville** and the **Robbinsville Pedestrian Plan** are two examples. Graham County's **Gateway to Tomorrow**, adopted by the County Commission in 2015, is the county's Comprehensive Plan. Gateway summarizes and incorporates concepts from earlier plans. Additionally, the Gateway Plan contains broad county-wide recommendations and detailed design concept plans for five areas across the county.

Figure 3-3—Valley River Greenway Options in the CCT Plan



The recommendations that promote bicycling include:

- Implement Re-imagining Robbinsville (which emphasizes walkability and connectivity).
- Capitalize on the County's natural and scenic resources as its biggest economic driver.
- Improve the connection between Robbinsville and Lake Santeetlah with a greenway, dredging of the lake for a boat landing, and tubing.
- Identify and promote community hubs for healthy activities and facilities, such as community gardens, greenway trails, and upgrades to walking, bicycling, and recreational connections.
- Connect U.S. Forest Service trails with communities and identify multimodal and recreational needs along major transportation routes.
- Support the implementation of the Robbinsville Pedestrian Connectivity Plan.

The detailed concept area plans emphasize connectivity and walkability through tails, sidewalks, and bicycle paths. The focus areas include:

- Redevelopment of Downtown Robbinsville, Greater Robbinsville, and the Rodney Orr Bypass
- Revitalization of the area around the Steccoah Center
- US 129 Bypass Crossroads
- Massey Branch
- Relocated Visitor's Center
- Robbinsville to Lake Santeetlah Greenway

Clay County Comprehensive Plan

Completed in 2010, the **Clay County Comprehensive Plan** provides an overview of existing conditions and provides recommendations that guide the County toward its vision for the future. The recommendations that pertain to bicycling and multi-use trail efforts include:

- Develop a network of greenways and parks as a natural resource protection measure.
- Establish a system of community pathways (driving, biking, walking, etc.)
- Develop a greenway plan that links recreation areas in the county with one another
- It is desirable that some of the more rural areas of the county remain rural. Therefore, a system of rural pathways and rural crossroads is proposed. Identify safe bicycle and pedestrian paths that follow the rural pathways;
- Ensure all residents and groups are served with park, recreation, and open space facilities. Parks and greenway planning are to be integrated with future decision-making regarding land-use and development.
- Revitalization of downtown buildings to help attract visitors and promoting the area through branding to "capture loop tourists."
- Suggestions for integrating community pathways through historic Hayesville.

Macon County Comprehensive Plan

Macon County's Comprehensive Plan (2011) is comprised of a set of recommendations for each county's service areas. The transportation section emphasizes multi-modal transportation and safety for all roadway users. The recommendations include:

Figure 3-4—Proposed Robbinsville Greenway Connections

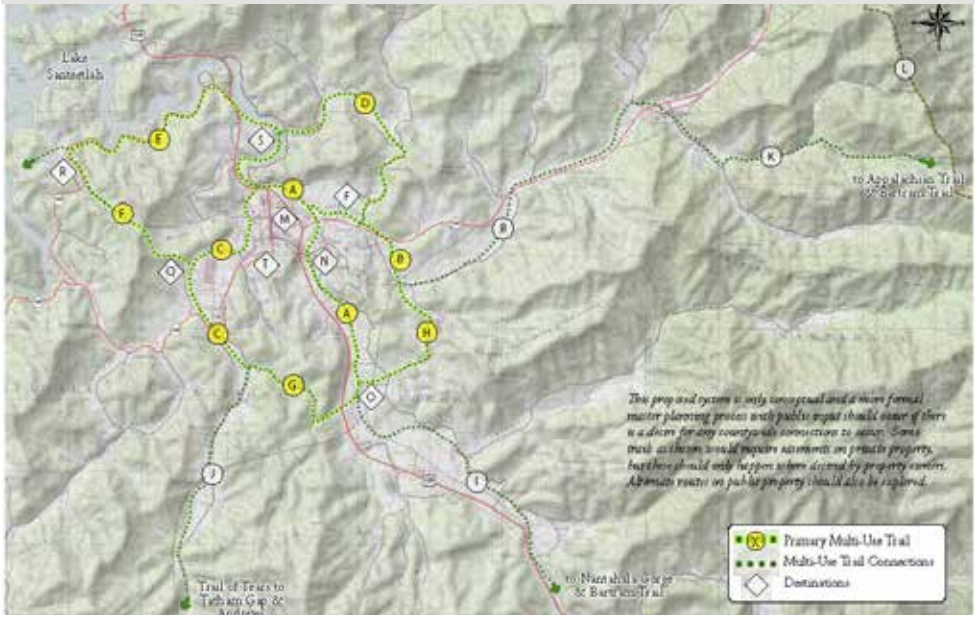


Figure 3-5—Graham County Relocated Visitor's Center

- Consider development of multi-modal transportation planning.
- Integrate development review with transportation planning. Review subdivision ordinance for pedestrian friendly transportation (bike, transit, walking) and consider implementing.
- Encourage growth of local and regional public transportation.
- Support locally developed plans.
- Encourage construction of streets and roads for connectivity (eliminate cul-de-sac concept, keep transportation moving).
- Improve mobility options for aging and disabled populations.
- Consider incentives for development closer to existing commercial centers around Franklin and Highlands. Eliminate sprawl on main thoroughfares.
- Encourage and promote mixed use development.
- Encourage the creation of a Greenway Master Plan. (Explore Rails to Trails).
- Promote sustainability through making transportation choices readily available.

Macon's Comprehensive Plan provides a brief description of the Macon County Bike Routes. The plan states, "Macon County is home to countless miles of designated bike routes. The bike routes stretch to all ends of the county, offering natives and newcomers an opportunity to experience the beauty of Macon County while exercising. Aside from a means of exercise, bicycles are an energy efficient, environmentally friendly transportation option. As the population continues to rise, with more Americans becoming environmentally and health conscious, this option could become more viable in the future."

Regulatory Review

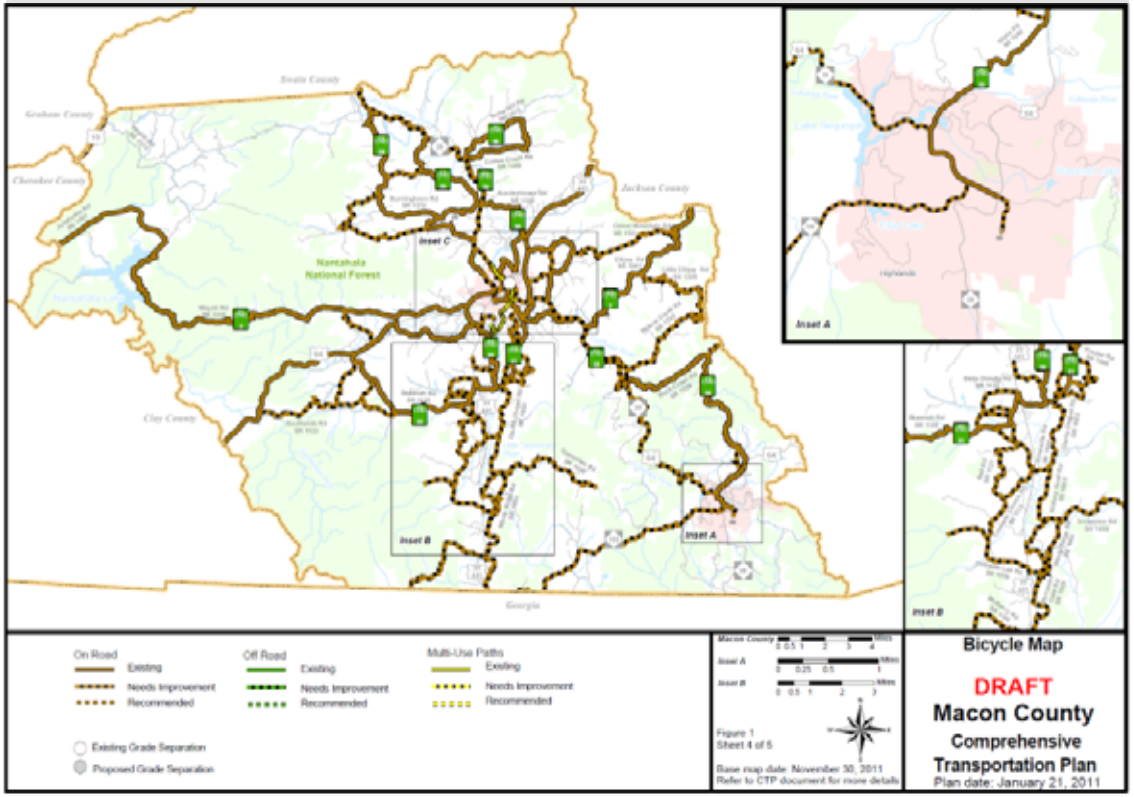
The four counties in the study area do not have a zoning ordinance to regulate land use. Highlands and Franklin in Macon County each has a zoning ordinance, as does Hayesville in Clay County and Murphy and Andrews in Cherokee County. Except for Highlands and Franklin, local regulations do not contain specific regulations that promote bicycling, such as bicycle rack requirements or provisions for traditional neighborhood development, nor do they limit bicycling though local regulations. *(Note: this is based on the ordinances available for review).*

The **Highlands Land Use Plan (2005)** contains encourages the Town to promote greenspace, walkways, and trails during the development process. The Land Use Plan includes a strategy to expand and publicize the town's greenways trail through cooperative efforts of local civic-environmental groups.

Highland's Unified Development Ordinance contains a section on Bicycle Regulation (Highlands UDO, Article VI. – Bicycle Regulations) that has been in effect since 1982. The sections of the Article regulate to whom the regulations apply, applicability of traffic laws to persons riding bicycles, obedience to traffic-control devices, riding on bicycles, riding on roadways and bicycle paths, speed, emerging from an alley or driveway, carrying articles while riding a bicycle, bicycle parking, riding on sidewalks, and lamps and other equipment.

While not a land use plan, the Town of Franklin adopted the **10 Principles of Growth** in 2006. The Principle's Preamble states, "We believe that in order to help maintain what we love about Franklin, and still accommodate growth, we have to change our planning approach to create safe and friendly streets for pedestrians, bicyclists, and motorists…" Principle #8 – Provide a Variety of

Figure 3-6—Macon County Bike Routes in CTP



Transportation Choices highlights the need for transportation choice and that pedestrian transportation is especially important. Principle #8 also states that "Road improvement plans should include safety planning for motorists, pedestrians, bicyclists, and transit users." The principles also encourage development with connections to adjacent properties and provides foot/cycle path connections to adjacent residential and business properties.

In 2007, the Franklin adopted a Unified Development Ordinance that replaced the decades-old, suburban-style zoning code. It translated the Principles of Growth into regulatory language that aims at preserving the quality of life in the town. The UDO has specific regulations designed to create pedestrian-scale development that enhances the streetscape. Certain districts such as the Urban Village, among others, must provide access to bicyclists and pedestrians. Near the downtown core, district rules call for zero setback lines and for rear parking thereby allowing for direct bike and pedestrian access to buildings. The required pedestrian facilities and accommodations correlate directly with the type of zone, its proximity to the downtown core and its density.

OTHER LOCAL PLANS

Cherokee County Heritage Plan (2008) identifies projects that conserve and promote heritage and have an economic development impact. Projects examples include a regional heritage visitor center, development of regional trails, and opportunities to revitalize the towns of Murphy and Andrews.

Andrews NC STEP Community Profile (2008) summarizes Andrews' priorities while it was participating in the NC Rural Center's NC STEP (Small Towns Economic Prosperity) Program. Andrews focused on building a place-based economy from growing and promoting cultural and ecotourism destinations and how it could capitalize on providing for the needs and activities of the second home owners.

REGIONAL PLANS

In the last decade, organizations in Southwestern North Carolina have led regional planning projects to address the region's land development patterns, economic development opportunity, health conditions, tourism development, and regional recreation coordination. Regardless of the regional plan's primary topic (e.g. transportation or economic development), one finds common themes in each of the regional plans.

Figure 3-7—Regions

Some of the common regional themes include:

- Respect for the region's rural history, culture, and environment
- Balancing the need for increased economic activity and development and the need to protect the rural culture and environmental sensitivity
- Agriculture's changing role
- Tourism promotion and asset development
- Main Street revitalization
- Access to improved infrastructure (roads, broadband, water/sewer)
- The need to address the region's health disparities
- Regional collaboration

The regional plans summarized below reflect many of these themes.

Mountain Landscapes Initiative (2008): The Mountain Landscapes Initiative is a guide to development and planning that calls for encouraging development around downtown cores and offers specific recommendations for bicycle, pedestrian, and pathway construction in the region.

The **Southwestern Commission Regional Trails Plan** (2013) is the groundwork document to develop a regional trail network that spans southwestern North Carolina's seven counties. The Trails Plan documents citizen input and ideas about the development of new and enhancement of existing trails. The Plan's definition of trails is not limited to hiking trails – it addresses all types of trails, including hiking, mountain bike, paddle, and equestrian trails. That plan also documents greenways and the connections to and between trails.

The **Southwestern Commisison's Regional Trails Plan's** projects that are relevant to this project are listed here:

Cherokee

- Andrews Greenway — Complete the planned greenway system in the town of Andrews, and envisioned through the Valley Trails efforts of the Andrews Valley Initiative (AVI).
- Greenway between Murphy and Andrews: The idea of a trail linking the two towns has been in discussion for several years. It would require either closure of the railway for a rails-to-trails conversion or land acquisition for rails-with-trails joint use in the corridor.

Clay

- Connect Jackrabbit Mountain Bike & Hiking Trails to Campground Trails: This project is already in discussions with public agencies.
- Designation of Scenic Bikeway on popular bicycle route around Lake Chatuge: This is a popular route for recreational cyclists. The route would follow state and US highways in NC and Georgia. Construct shoulders along routes and develop special signage for Scenic Bikeway.
- Complete Street / Multi-use Trail Linking Hayesville to Chatuge Dam and the Golf Course along Myers Chapel Road: Complete street improvements could include a combination of sidewalk and bikes lanes or construction of a multi-use trail or side path along the road and nearby lakeshore.

Graham

- Robbinsville Greenway: Construct new greenway along Long Creek and Tulula Creek, connecting Stanley Furniture plant area to the High School.

Macon

- Bartram Trail Linkages: Pursue Complete Streets upgrades in the Clarks Chapel area to fill gaps in the Bartram Trail and connect to Franklin along the Little Tennessee River. (Short-term).
- Connect Little Tennessee River to Southwestern Community College and Macon County Library on Siler Road: Construct connection: from Little Tennessee River to area along Siler Road Project may be greenway or combination of sidewalk and bicycle route.
- Construct greenway or hiking trail loop around Franklin: Branch: from Little Tennessee River Greenway to link other areas of Franklin with a multi-use trail or walking loop. May include trail link to Wallace Branch.

Southwestern NC Economic Development Strategy (2012): As highlighted in this 2012 regional strategy, the region's small town quality of life, including walkability and bicycling, plays a big role in attracting and retaining businesses in the area.

MountainWise (2015): is a public-health organization working in the eight westernmost counties of North Carolina, including the four counties covered in this bike plan, to provide opportunities for physical activity, access to local fresh fruits and vegetables, provide support for tobacco-free places and access to services for chronic-disease management. MountainWise's premise is the idea that when environments encourage and are supportive of healthy choices, it becomes easier to make those choices. MountainElements (2015) is the organization's Health Impact Assessment (HIA); the document contains a set of Active Transportation recommendations to improve health across the region. The HIA recommends increasing active transportation options to improve physical activity and participation rates by making walking, bicycling and transit use accessible.

Opt-In Regional Vision (2015): Opt-In, the Opportunity Initiative of Southwestern North Carolina, was a 15-month effort to understand and inform the range of choices facing local governments, businesses, and families in the seven westernmost counties of North Carolina and in the Eastern Band of Cherokee Indians. The Opt-In Regional Vision is a road map, created by region's residents, on how to make those choices a reality. The vision calls for the development of compact downtowns with a variety of transportation choices including biking and walking. The Southwestern Regional Commission, in partnership with the Appalachian Regional Commission, is offering small grants for follow-up projects that implement components of the vision.

STATEWIDE PLANS

2016-2025 NC State Transportation Improvement Program (STIP)

The North Carolina Department of Transportation's STIP is NCDOT's data-driven, multi-year schedule for its transportation projects. A community's project(s) may be included in the STIP after the community scores projects against NCDOT goals. Projects in the STIP Projects include highway, bridge, public transit, bike, pedestrian, rail, and other improvements. The STIP does not include any bicycle or multi-use trail projects for Cherokee, Clay, Graham or Macon counties.

Figure 3-8—NCDOT STIP Projects Under Construction in the 4-County Study Area

County	Project ID	Route	Project Description	Estimated Completion Date	Progress (updated March 2018)
Cherokee	R-3622B	NC 294	Sunny Point to Bear Paw	2018	95%
Clay	R-4416	US 64	Chunky Gal Mountain climbing lane	2019	90%
Macon	B5125	US 441 Business	Bridge #22 over Little Tennessee River	2019	42%

Figure 3-9—NCDOT STIP Projects in Design Phase (Funding Committed) in the 4-County Study Area

County	Project ID	Route	Project Description	Right of Way Date	Construction Date
Cherokee	R-5735	US 19/74/64/129	Improve roadway from end of 4-lane divided section to Martin's Creek Rd.	2018	2019
Cherokee	R-5861	US 129	Widen roadway from GA state line to US 64.	2019	2020
Clay	A-0011C	NC 69	Widen roadway from GA state line to US 64.	2018	2019
Clay	R-5742	NC 175	Modernize roadway from GA state line to US 64.	2017	2019
Clay	R-5863	US 64 Bus	Modernize roadway from Main Street in Hayesville to US 64.	2019	2021
Graham	R-2822B	NC 143	Modernize roadway from NC 143 Business to West Buffalo Creek.	2018	2023
Graham	R-5839	NC 28	Modernize roadway from NC 143 to US 129.	2019	2021
Graham	U-5866	New Connector to High School	Construct new route from US 129 to Robbinsville High School, bridging Cheoah River	2016	2018
Macon	EB-5756	Depot St. Sidewalk	Complete sidewalk from E. Main St. to Wayah St.	2018	2023
Macon	R-5734A	US 441	Upgrade roadway and install median from US 64 to Wide Horizon Dr./Belden Circle	2017	2018
Macon	R-5734B	US 441	Upgrade roadway and install median from Wide Horizon Dr./Belden Circle to Prentiss Bridge Rd.	2018	2021
Macon	U-5604	US 441 Business	Intersection improvements at Womak St. Maple St., Porter St., and Depot St.	2017	2018

WalkBikeNC

North Carolina's Statewide Pedestrian and Bicycle Plan: WalkBikeNC *(2013)* is North Carolina's first statewide master plan to define a vision, goals, and strategies for improving walking and bicycling for residents and visitors. According to **WalkBikeNC**, the plan, "identifies current conditions for walking and bicycling in North Carolina and serves as a guide for state agencies, local governments, and private sector interests to develop a transportation system that safely and efficiently accommodates walking and bicycling." The plan groups its strategies in five pillars: improve mobility, promote safety, contribute to improved health, maximize economic competitiveness, and be good stewards of the environment.

The plan does not have specific city-by-city or county-by-county recommendations, however, the **WalkBikeNC** benefits the Southern Blue Ridge region in that it outlines the framework and policies for statewide bicycle planning.

Additionally, the **WalkBikeNC** plan recommends changes to the state's bike routes. North Carolina's Mountains to Sea bicycle route (NC-2) begins in Murphy and travels through Clay and Macon Counties. **WalkBikeNC** recommends the following NC 2 route improvements:

- The Mountains to Sea Route bike route is often confused with the cross-state Mountains-to-Sea Trail, an off-road hiking trail. Rename NC 2 to avoid this confusion.
- Create a distinctive entryway to the route in Murphy. At the terminus of NC 2 in Murphy, the current "end" sign is placed at the intersection of US 64 with US 19/74/129 in Murphy. This is a barren, high traffic intersection with little to highlight Murphy. Extend route into downtown Murphy continuing straight across the intersection to SR 1326, Hiwassee Street, which should be followed to US 19 Business. This is the "square" in Murphy and is much more interesting and unique than the current "end" intersection.
- Murphy to Cullowhee (in Jackson County): Re-route small section east of Murphy, utilizing new US 64 rather than Old US 64 - use NC 141 to reconnect with current NC 2.

In addition to the recommended route changes, **WalkBikeNC** recommends connections to routes in neighboring states; one recommendation is to connect NC 2 to the Georgia route system south from Franklin. According to **WalkBikeNC**, "Georgia's state bike route system connects to North Carolina less than 15 miles south of Franklin and NC-2. US 441/US 23 could serve as a connector between Franklin, NC and the Georgia state bike route system."

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For additional information about WalkBikeNC, please visit:

https://www.ncdot.gov/bikeped/walkbikenc/

Figure 3-10—NC-2 Bike Route Changes

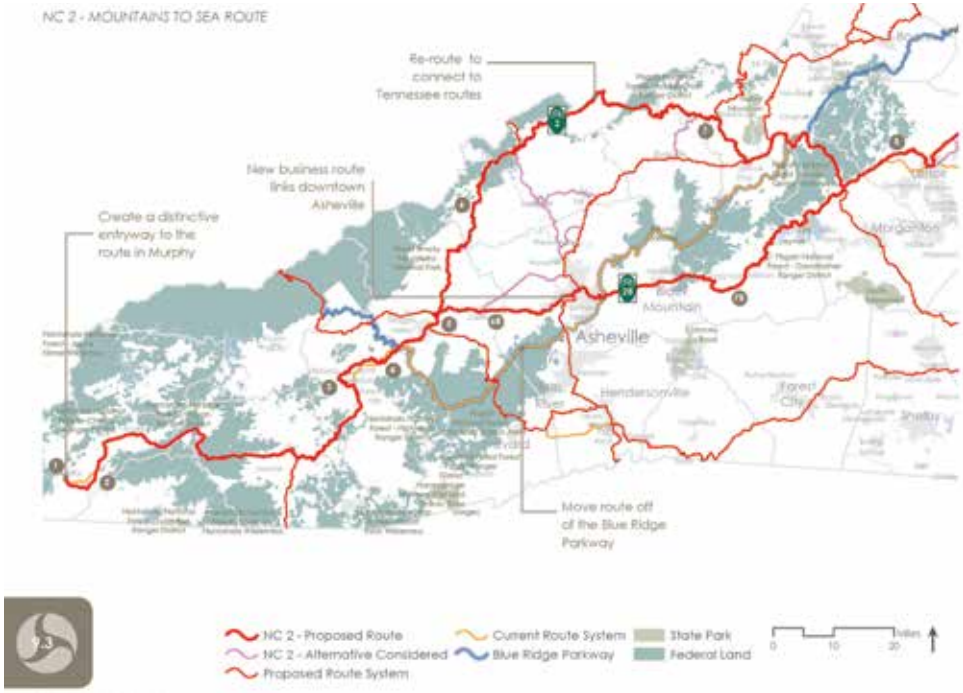
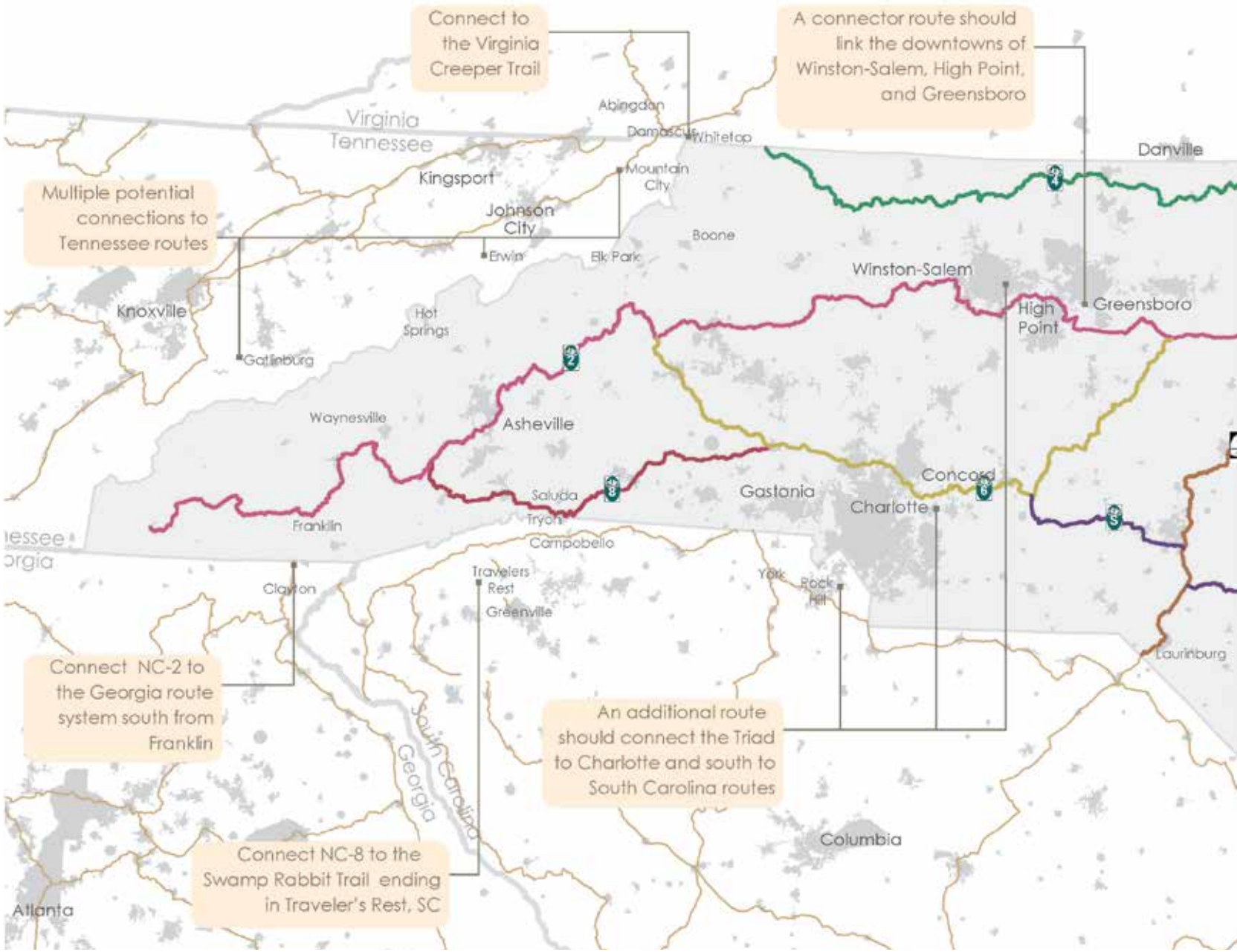


Figure 3-11—Out of State Connections (WalkBikeNC)



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Chapter 4

Bicycling & Safety in the Mountains

Chapter 4

Bicycling & Safety in the Mountains

Is It Safe?

The evaluation of safety factors and crash data for this plan began with a simple question that is often asked by elected officials and others: "Is it safe?"

The data specific to the four counties that are part of this planning effort does not offer any substantive answer to that question. Based on NCDOT data for 1997 through 2012, there were 37 crashes (2.3 per year) in the study area. Of those, there was one fatality (in Macon County).

In an evaluation of North Carolina counties with a population ranking in the lower third of counties in the state, the western counties (along with most mountain counties) have lower per capita crash rates than coastal counties.

To better understand and address bicycling safety in rural, mountainous areas, the consultant team undertook a more academic review of studies and safety data for North Carolina, the western mountain counties and nationwide research to attempt to understand the factors that influence bicyclist crashes.

GROWING CONCERNS

The recent rapid growth of bicycling in the Unitd States has been accompanied by a growing body of research around bicycle safety and accessibility, which is of use in developing local and regional bicycle plans. However, much of this research focuses on uran environments and even less relates specifically to mountainous regions like Western North Carolina.

There are important differences between typical urban and rural bicycle crashes, including locations, crash types, and perhaps most importantly as it relates to severity, the speed at which crashes are likely to occur. Mountainous terrain may mitigate the speed factor but exacerbate other factors leading to conflicts between bicyclists and motorists. Also important to consider are single-bicycle crashes such as running off the road or colliding with wildlife, which are not reported in NCDOT's crash data since a motor vehicle is not involved in the collision.

According to the Insurance Institute for Highway Safety, the percentages of bicyclist fatalities that occur in rural areas has been decreasing steadily for decades, falling from 50% of bicycle fatalities occurring in rural areas in 1975 to only 28% in 2014. Much of this is due to continuing urbanization of the country, as well as the rapid increase in popularity of utilitarian or commuter bicycling in urban areas.

Within the four county study area of this plan, all of the recorded bicycle crashes between 1997 and 2012 (the data available through NCDOT's Pedestrian and Bicycle Crash Analysis Tool) were defined as rural crashes, as no towns in the study area have populations over 5,000. Because of the limited number of crashes within the study area, it would be difficult to draw specific conclusions on crashes within towns versus on rural highways. However, considerations for improving bicycle safety within towns should be slightly different in terms of focusing more on intersections, driveways, and other conflict areas as opposed to addressing visibility around curves, pavement conditions, or motorists passing cyclists which are the major challenges outside densely developed areas.

Specific efforts to focus on the needs of vulnerable bicycling populations may be focused on the towns, where shorter trip distances and relatively flatter terrain make bicycling to destinations a more practical alternative for children, seniors or people with mobility challenges.

Figure 4-1—Bicyclist Crashes in the Four Counties

County	Bicyclist Crashes (1997-2012)	Crashes per 1,000 People
Cherokee	17	0.62
Clay	8	0.75
Graham	4	0.46
Macon	8	0.24

ANALYZING NORTH CAROLINA RURAL CRASH DATA

Thanks to the availability of data through NCDOT and the University of North Carolina Highway Safety Research Center, much of the previous analysis of rural bicycle crashes that is available in the United States has focused on North Carolina. Three papers provided some analysis of crash types and severity using North Carolina data.

In 1999, a Transportation Reserach Board (TRB) study[1] was conducted on the severity of bicycle crashes on two-lane undivided roadways, which make up the majority of the North Carolina highway system. Most (80.5%) of the crashes analyzed occurred in rural areas. They found four factors that significantly increased the severity (in terms of injury to the bicyclist, as 98% of the motorists involved were uninjured): straight grades, curved grades, darkness (without street lighting), and fog.

Only one factor was significantly related to lower crash severity--higher annualized average daily traffic (AADT). Higher levels of traffic tend to reduce speeds and may also discourage distracted driving behaviors.

Grades obviously pose a topic of concern in the mountainous areas of North Carolina, and treatments including passing lanes, wider shoulders, maintenance of shoulders and travel lanes, and signage to alert motorists in steep areas that are popular with bicyclists are all possible mitigation factors. As many areas of this region are rural, street lighting would only be advisable in limited areas (primarily in towns).

Education targeted to bicyclists may focus on having good lights for rural riding, particularly if they ride in all weather conditions, and messages for motorists can include being aware that bicyclists can and do ride in all conditions.

In a 2007 study, researchers from Washington University and University of Missouri – Kansas City utilized NCDOT's 1997-2002 data to study what factors increased the severity of bicycle crashes. They found a number of factors that at least doubled the likelihood of a crash being fatal[2]. They were:

- Inclement weather
- Darkness/no street lights
- Morning peak travel time (6-10 am)
- Head-on collision
- Speeding-involved
- Vehicle speed over 30 mph
- Truck involved
- Intoxicated driver
- Bicyclist age 55 or older
- Intoxicated bicyclist

In another study[3] using NCDOT PBCAT and Highway Safety Information System (HSIS) crash data from 1997-2002, researchers from the UNC Highway Safety Research Center looked specifically at factors contributing to pedestrian and bicycle crashes on rural highways. Five bicycle crash types of particular concern were identified, accounting for the majority of bicycle crashes studied. The most severe was motorist overtaking bicyclist, a common occurrence on rural roads and a particularly dangerous maneuver on steep and/or curving terrain. This type of crash was exacerbated by dark conditions without lighting and higher speed limits.

Twenty three percent (23%) of the crashes identified as this type were hit and runs on the part of the motorist. The highest incidence crash was "bicyclist turn/merge into path of motorist," a crash type with many similarities to the overtaking in that it also involved bicyclist and motorist traveling in the same direction, but in these cases it was determined that the bicyclist moved into the motorist's path as opposed to the motorist attempting to overtake and failing to leave enough space.

Both of these crash types could occur due to poor pavement conditions or debris in the roadway that would cause a bicyclist to have to deviate from a straight path to avoid an obstacle, and both could be mitigated by providing paved shoulders or bicycle lanes of sufficient width to increase separation between bicyclists and passing motorists. Education for both drivers and bicyclists can also help them to understand the conditions that lead to these crashes, and supplemental signage may be of assistance in reminding drivers that they can encounter bicyclists even far from towns. Combined, these two crash types made up 55% of crashes on rural two-lane roadways.

The other three crash types identified all involved bicyclist failure to yield – at mid-block (such as entering the road from a driveway), at intersections on two-lane roads, and at intersections on rural multi lane divided non-freeways. There were 138 of these types of crashes in the dataset, as opposed to 400 of the first two types.

HOW DOES MOUNTAIN TERRAIN AFFECT SAFETY?

Little research is available specifically studying bicyclist safety in mountainous regions and on mountain roads. Grades and specifically curved grades have been identified as a risk factor for severity of bicycle crashes, but mountains region data appears to indicate relatively few crashes and lower severity compared with the coastal region of the state which is also mostly rural but with very different terrain.

While it is beyond the scope of a regional bicycle plan to test these hypotheses, some possible trends appeared in reviewing PBCAT data for the mountains region and comparing it to statewide and coastal region data. One significant challenge is the limited availability of data on both crashes and exposure, and the limits inherent in the way the available data is collected.

In North Carolina, as in many states and Canadian provinces, bicycle crashes are only recorded in the Department of Transportation's crash dataset if they represent a collision with a moving motorized vehicle. A bicyclist running off a road, colliding with a pedestrian, animal, fixed object (including a parked car with its door open), or another bicyclist, or "wiping out" on the road is not captured in the police crash reports.

This naturally suppresses the number of bicycle crashes that can be studied, and may underrepresent crashes related to road conditions which could otherwise be addressed through maintenance projects or relatively simple fixes. Emergency room admission data could supplement the understanding of the full breadth of bicycle crashes in the region and might indicate additional areas of concern. Surveys or applications like "See, Click, Fix" that enable bicyclists and other road users to report unsafe conditions can also help identify these issues.

Another challenge in comparing regions or trying to address prevalence of crashes on certain roadways or roadway types is the limited data collected on bicycle miles traveled and trips taken. Census commute data, often used as a proxy for pedestrian or bicyclist exposure, leaves out most trip purposes and often indicates a bicycle mode share very close to zero in rural areas.

Bicycle counts are being undertaken in many cities of various sizes, but might not produce a lot of data in areas where all types of traffic are relatively low due to population density. Manual bicycle counts collected by volunteers can also assess questions like the age or gender of bicyclists, as more female, senior, and child bicyclists indicate more comfortable bicycling conditions, whereas if almost all observed bicyclists are white males between 25 and 65, it is likely that most residents aren't comfortable with the bicycling conditions.

CRASH, *not accident!*

It is common to see police and media report use the term "accident" when referring to collisions. The term "crash" is used in this plan instead of accident to better reflect the realities of what occurs when a motorist collides with a bicyclist.

As the Associated Press Style Guide notes that use of the term "accident" exonerates the person responsible for the crash and makes an assumption that nothing could have been done to prevent the incident.

Law enforcement, engineers, planners and public officials are strongly encouraged to use the term "crash" instead of "accident" to describe these incidents.

For more information, visit crashnotaccident.com

Because crash data is based on police reports, it is subject to human error and various types of subconscious bias. The version of events recorded is often that of the motorist who is trying to avoid liability for the crash, as bicyclists are often too injured to give statements to police immediately and particularly in rural areas there are often no outside witnesses to crashes. Small police departments may also have limited crash investigation resources, such as limited expertise in reconstructing the speed and position of vehicles involved in a crash.

Finally, as most Americans, including police officers, have much more experience driving cars than riding bicycles, it is natural that they can often find it easier to identify with the motorist involved in a crash and write a report that is more favorable to their perspective.

Despite the limitations of what data is collected, NCDOT's PBCAT allows for fairly extensive analysis of crash data relative to that which is available in other areas of the United States. The low number of crashes that occurred within the four counties during the time period covered by PBCAT (1997-2012) made it difficult

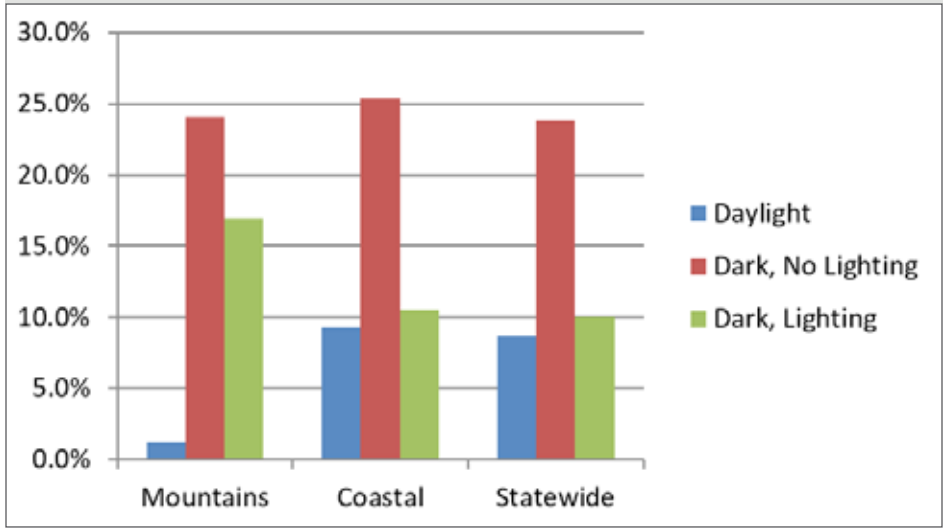
to draw conclusions based on that data, so data for the Mountains region was analyzed in comparison with statewide data and the Coastal region. Coastal data was used for comparison because it also represents a predominantly rural region of the state, but with very different terrain. There were roughly five times as many crashes in the coastal region. The following were some areas where mountains region data stood out.

LIGHTING CONDITIONS

There was a strong correlation between low lighting conditions and crash severity. Statewide, bicyclists were killed or received disabling injuries 23.8% of the time when crashes occurred in darkness with no street lighting, as opposed to 8.7% of the time in daylight and 10% of the time in darkness with street lighting. In the mountains region, the percentage killed or severely injured in dark, unlighted conditions was similar – 24.1% of crashes – but bicyclists struck in daylight were much less severely injured, with only 1.2% of daylight crashes resulting in a fatality or disabling injury.

Lighting appeared to provide slightly less protective effect in night time crashes in the mountains, with 16.9% of bicyclists struck in dark conditions with street lights suffering fatal or disabling injuries. This might reflect that lighting was less intense than in more densely populated areas, or that lighted areas had lower traffic and therefore higher night time speeds.

Figure 4-2—Lighting & NC Bicyclist Crashes (1997-2012)



Source: NCDOT Bicycle and Pedestrian Crash Data Tool

Bicycles are treated as vehicles, right? Not in crash reporting.

In North Carolina, as in many states and Canadian provinces, bicycle crashes are only recorded in the Department of Transportation's crash dataset if they represent a collision with a moving motorized vehicle.

A bicyclist running off a road, colliding with a pedestrian, animal, fixed object (including a parked car with its door open), or another bicyclist, or "wiping out" on the road is not captured in the police crash reports.

Dark and not lighted conditions accounted for 28% of fatalities (7/25) in the Mountains region, 13.9% of disabling injuries, but just 8.9% of all crashes. While lighting may not be practical for much of the study area (and may not be desirable for environmental reasons), awareness of the severity of crashes in low light conditions should be promoted in education campaigns and lighting may be added in limited areas.

Another obstacle to visibility, fog, accounted for only three of 1,167 crashes in the Mountains region, but two of those three crashes were fatal.

GRADES AND CURVES

Mountainous terrain provides unique challenges to cyclists, discouraging some from riding and also creating hazards. As noted in the UNC study, crashes that occurred on either curved or straight grades were disproportionately severe. This was evident in the Mountains region data, as only 47% of crashes occurred on straight, level roadways, compared with 74% statewide.

Grades, both straight and curved, accounted for 38% of crashes in the mountains region, compared with just 18% statewide. Crashes on curved grades appeared to be more severe, accounting for 9% of Mountains crashes but 15.5% of cyclists killed or with disabling injuries. Cyclists in crashes on curved grades were killed or disabled 22.6% of the time, compared with 13.3% in all Mountains region crashes.

On straight grades, death or disabling injury occurred in 14.8% of crashes. The data does not indicate whether cyclists were traveling up or down hill at the time of the crash. One way to address crashes on grades would be to provide climbing

lanes or turnouts where practical on extended or steep grades so that bicyclists traveling well below the average traffic speed can allow other vehicles to pass. Signage and lighting resources can also be targeted toward areas with grade and visibility concerns.

SPEED AND DRIVER BEHAVIOR

Queries of the PBCAT data on estimated speed, excessive speed, and speed limits for the mountain region indicated that the vast majority of motorists involved in collisions with bicyclists were traveling at or below posted speed limits. In fact, excessive speed was indicated in only three of 1,167 incidents and none of the 155 that killed a bicyclist or caused a disabling injury.

Considering the percentage of all motorists on the road who are exceeding posted speed limits at any given time, this appears a bit suspect. One possible explanation is that conditions in the region preclude motorists from speeding, which may be the case in many locations, particularly on grades and curves. However, it is also possible that either a lack of experience in speed reconstruction or a tendency to be forgiving toward motorists involved in crashes with bicyclists is also at play.

It is also common practice not to designate a driver's speed in a crash as "excessive" unless it exceeds the speed limit by at least ten miles per hour. For vulnerable road users, particularly in areas with lower speed limits, differences of 5-10 miles per hour often mean the difference between life and death.

Even though available data doesn't show speeding to be a major contributor, it should be considered that the speed of vehicles involved is always relevant to whether a crash occurs in the first place, as well as the severity of injuries. One positive finding was that hit and run crashes were less prevalent in the Mountains region than state and nationwide, with only one of 25 fatal and four of 130 disabling crashes resulting from hit and runs.

Both drivers and bicyclists appeared somewhat less likely to have consumed alcohol in crashes here, although the data was listed as "missing" in a number of cases. No data was available on driver cell phone use or other distracted driving. Hopefully this data will become available in the future, as laws governing these behaviors have been implemented since the beginning of the PBCAT dataset.

DEMOGRAPHICS

Cyclists involved in crashes in the Mountains region were slightly younger than those in the Coastal region, with more children involved and fewer adults over 55. The gender profile was similar to other parts of the state, with female bicyclists being involved in 15.3% of crashes in the Mountains, 14.9% statewide, and 18.9% in the small sample size for the four counties.

Three out of the 25 bicyclists killed in the Mountains region were female (one was in Macon County). The resulting 12% was similar to the national percentages reported by IIHS.

While it is known that women in the United States cycle less than men, their involvement in crashes and particularly fatalities appears to be lower than their share of the cycling population. Although more cautious cycling or fewer miles traveled may be part of the reason, studies have also indicated that motorists may be more cautious around cyclists they perceive to be female.

It is common to designate a driver's speed as "excessive" only when it's 10 mph or more over the speed limit. For bicyclists, differences of 5-10 miles per hour often mean the difference between life and death.

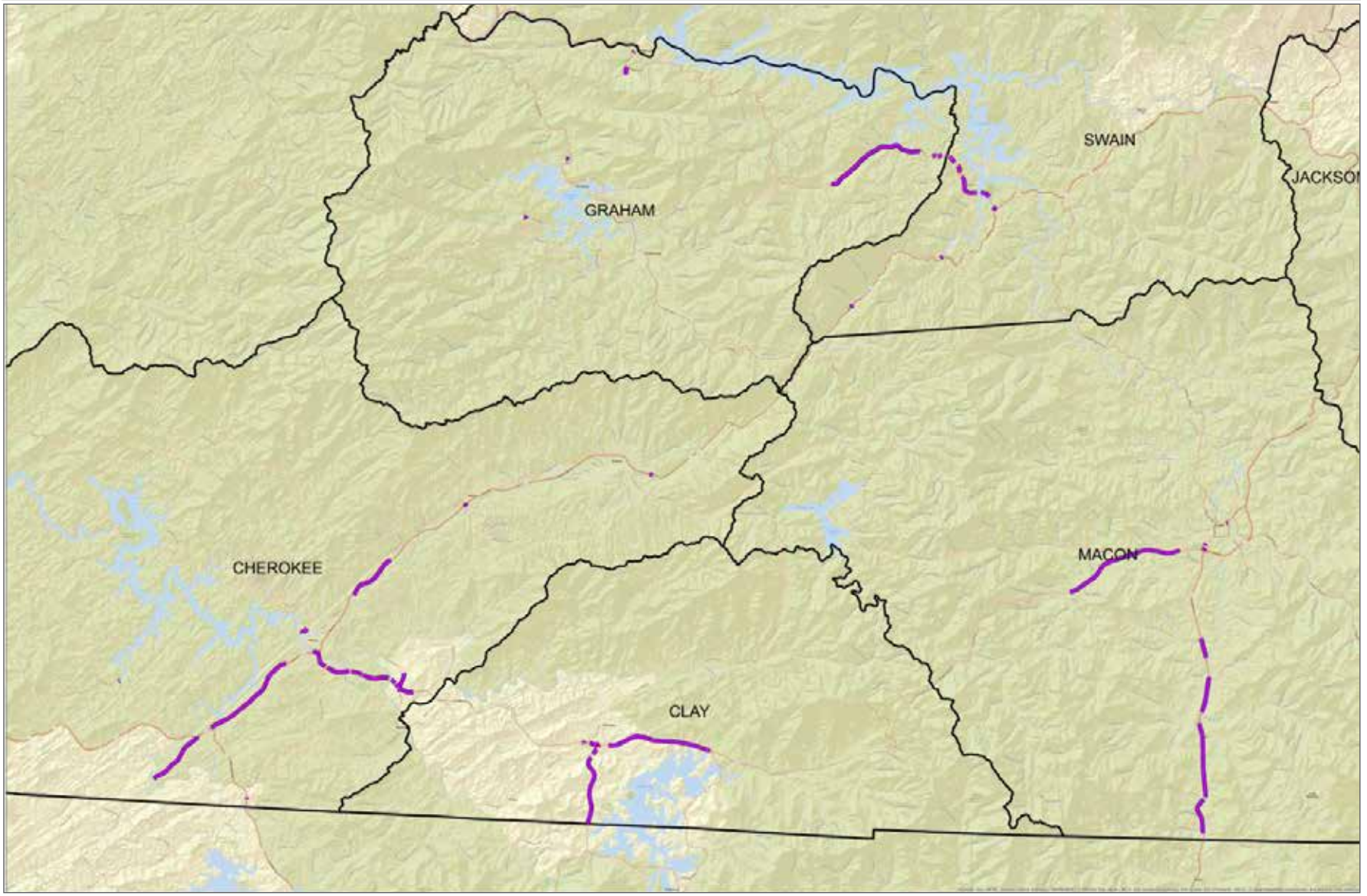
Driver education campaigns humanizing male cyclists ("fathers, sons, husbands") may show promise in incentivizing courteous driving. The majority of cyclists in crashes were white, with only two African American and two Hispanic cyclists injured in Cherokee County and none in the rest of the study area.

However, African American and Latino cyclists did make up 10.8% of the small sample size for the four counties, which is higher than their percentage of the population and therefore consistent with nationwide data showing people of color are overrepresented among vulnerable road user crash victims. Prioritizing routes used by vulnerable communities for utilitarian cycling trips and/or targeted outreach to minority communities may help to address disparities.

ROAD CLASSIFICATION

Crashes in the Mountains region were more likely to occur on US Routes (12.8% vs 6.8% statewide), and state secondary roads (27.3% vs 17.6%) and less likely to occur on local streets (43.7% vs 60.8%) in the mountains than across the state.

Figure 4-3—Existing Roadways with Bikeable Shoulders



Most roads in the 4-county study area are not conducive to safe bicycling for a variety of reasons. However, several key routes, including US-74, US-64, NC-69, US-441, and NC-28, have wide enough shoulders to ride a bicycle comfortably. The shoulders vary from 4 feet wide to 17 feet wide, with 8-10 being typical. It's important to note that these widths vary because riding on a 4-foot shoulder is a lot different from riding on a 12 foot shoulder.

Figure 4-4—Existing Bikeable Shoulder Lengths & Widths

Roadway	Bikeable Shoulder Information
NC-141	Approximately 3,800 linear feet [0.7 miles] of shoulder between 8-10 feet wide.
NC-143	Approximately 800 linear feet of 4-foot shoulder.
NC-28	Approximately 35,000 [6.6 miles] linear feet of 8-10 foot shoulder (16,000 feet are eastbound only).
NC-294	Approximately 200 linear fee of 6-foot shoulder.
NC-60	Approximately 13,000 linear feet [2.46 miles] of 8-foot shoulder.
NC-69	Approximately 17,000 linear feet [3.2 miles] of shoulder (ranging from 4-14 feet, but predominately 10-foot shoulder).
SR-1326	Approximately 1,700 linear feet of 10-foot shoulder.
US-19	Approximately 37,500 linear feet [7 miles] of shoulder (ranging from 4-14 feet).
US-23	Approximately 36,500 linear feet [7 miles] of 8-foot shoulder.
US-441 BUS	Approximately 1,600 linear feet of mostly 12-foot should (with some 6-foot segments).
US-64	Approximately 80,300 linear feet [15 miles] of shoulder (ranging from 4-17 feet wide).

This may be largely due to a higher percentage of roads being state-maintained because relatively little of the Mountains region falls into incorporated municipalities, but it indicates the opportunity for improvements in design standards to be implemented in a more centralized way than in many places in North Carolina.

TIME OF YEAR

The timing of crashes in the Mountains region was fairly similar to statewide and national profiles. Most crashes occurred in the summer months, beginning in May, which matched North Carolina statewide data but was earlier in the year than the peak nationally of August to October. This might indicate less involvement of students biking to school or college and more involvement of tourists, but more study would be needed to draw conclusions.

Also consistent with broader trends, crashes occurred predominantly in the late afternoon to evening hours, with slightly more later in the evening. Crashes during morning peak time were less common but slightly more severe. Somewhat surprisingly, weekend days, particularly Sunday, were underrepresented, which might lead to different explanations than the months during which crashes occur, namely more utilitarian cycling and less recreational, or it could indicate safety in numbers for "weekend warrior" cyclists. Rider surveys could provide more information with which to consider the timing and circumstances of crashes.

ACTION STEPS TO IMPROVE SAFETY

- **Count Bicyclists:** The region's health organization, MountainWise, purchased automated counters for trails and greenways. The region can utilize these to gain a better understanding of use of these facilities. For on-road facilities, local volunteers are needed to count bicyclists on popular riding routes. This could be organized by local advocacy organizations or institutions such as Western Carolina University. Understanding bicyclist volumes, and how they change over time, help make a better policy argument and will help the region better understand safety in the region.
- **Work with NCDOT to better understand safety issues in the Mountains:** Data from PBCAT did not provide the opportunity to analyze all safety issues noted in papers from the 2014 International Cycling Safety Conference. These include the impact of pavement skid resistance, crosswinds, and the impact of age on a cyclist's risk of being involved or injured in a single bicycle crash. This knowledge can help inform future investment and policy decisions.
- **Continue to build on the success of Active Routes to School programming throughout the region.**

[1] *Klop, J, Khattak, A. "Factors Influencing Bicycle Crash Severity on Two-Lane, Undivided Roadways in North Carolina," Transportation Research Record Journal of the Transportation Research Board (TRB) 1674: 78-85, 1999. https://www.researchgate.net/publication/235358673_Factors_Influencing_Bicycle_Crash_Severity_on_Two-Lane_Undivided_Roadways_in_North_Carolina*

[2] *Kim, J, Kim, S, Ulfarsson, G, Porrello, L. "Bicyclist Injury Severities in Bicycle-Motor Vehicle Accidents," Accident Analysis and Prevention, 2007 March, 39(2): 238-51. https://www.ncbi.nlm.nih.gov/pubmed/17005154*

[3] *Carter, D. and Council, F. "Factors Contributing to Pedestrian and Bicycle Crashes on Rural Highways", Transportation Research Board 86th Annual Meeting Paper #07-2457, Transportation Research Board (TRB). http://gulliver.trb.org/news/blurb_detail.asp?id=7286.*

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Chapter 5

Bicycling Health & Economics

Chapter 5

Bicycling Health & Economics

Is Riding Healthy?

There are numerous challenges to overcome when trying to make conditions safe for all bicyclists in the mountain communities of Western NC. However, despite these potential barriers to personal safety and sense of safety, the benefits realized from regular bicycle riding are extensive, may add up to another year of life for regular riders, and studies have shown they far outweigh the possible risks associated with difficult riding conditions. Beyond the presence of facilities, bicycling should be evaluated for health through the following elements: movement of the body, the journey, and the destinations. This chapter is organized around those themes.

In fact, one of the most rewarding physical activities to the human body is riding a bicycle. The connection between a human being and a bicycle is one that provides countless health benefits for the body, mind and spirit. While riding, a person's brain is stimulated by processing the conditions of the environment and the physiological needs to continue riding. Joints are stretched and kept limber by the low impact movement of a steady ride. Muscles are worked aerobically keeping them strong and flexible. The lungs and heart are exercised and steadily worked keeping them in good condition. Really, the benefits of riding a bicycle for people of all ages and abilities are extensive and cannot be overstated. When rides are coupled with friends and family and/or link to desirable locations in a community, the benefits beyond physical health and mental health are bolstered through the improvements to economic, social, emotional and intellectual health.

The health benefits derived from a bike ride can be broken out by three phases. The movement, the journey, and finally the destination should be seen as individual parts to an overall equation. All three components of a ride contribute to the various measures of health for a person and are described in greater detail in this chapter.

THE MOVEMENT

Operating a bicycle requires coordination, muscle strength and movement, concentration, endurance and power. The physiological reaction to such outputs means the human body is in a constant state of action using its various systems. The skeletal system including joints, ligaments and tendons are in constant use including the knees and hips while pedaling, the spine, elbows, shoulders and neck while adjusting to the conditions along the ride. The muscular system is used to pump blood, push and pull pedals, stand, turn and balance on a bicycle to meet the demands of friction and gravity along a route. The circulatory system such as the heart and arteries, are constantly being exercised along with the muscles in the lungs which react to conditions by providing more oxygen to the working muscles. The nervous system including the autonomic, peripheral and central systems are also used, while the brain and spine work in unison to dictate to the body how to respond to the conditions a rider is facing. All of these elements of the human body work together like a symphony orchestra to propel a person via bicycle along a street or path and to their final destination.

How the Movement Relates to the Community Health Needs Assessment

Each of the four western counties have targeted health goals determined through their Community Health Needs Assessment (CHNA) and the more specific Community Health Improvement Plans (CHIP). Each plan includes a priority list of three or four list of health-specific goals for the county to pursue. Some of these goals relate directly to the results from riding a bicycle. Those relationships are described below and can be incorporated into future health strategies and surveys.

Chronic Disease Prevention

By far the most common concern among the four counties is the reduction and prevention of chronic diseases. It is addressed in all four counties CHIPs. Nationally, 7 out of the top 10 causes of death are chronic diseases. Such diseases include but are not limited to: cardiovascular disease like heart attacks and stroke, arthritis, cancers such as colon and breast cancer, diabetes, epilepsy and seizures, and obesity.

Figure 5-1—Health Benefits of Cycling

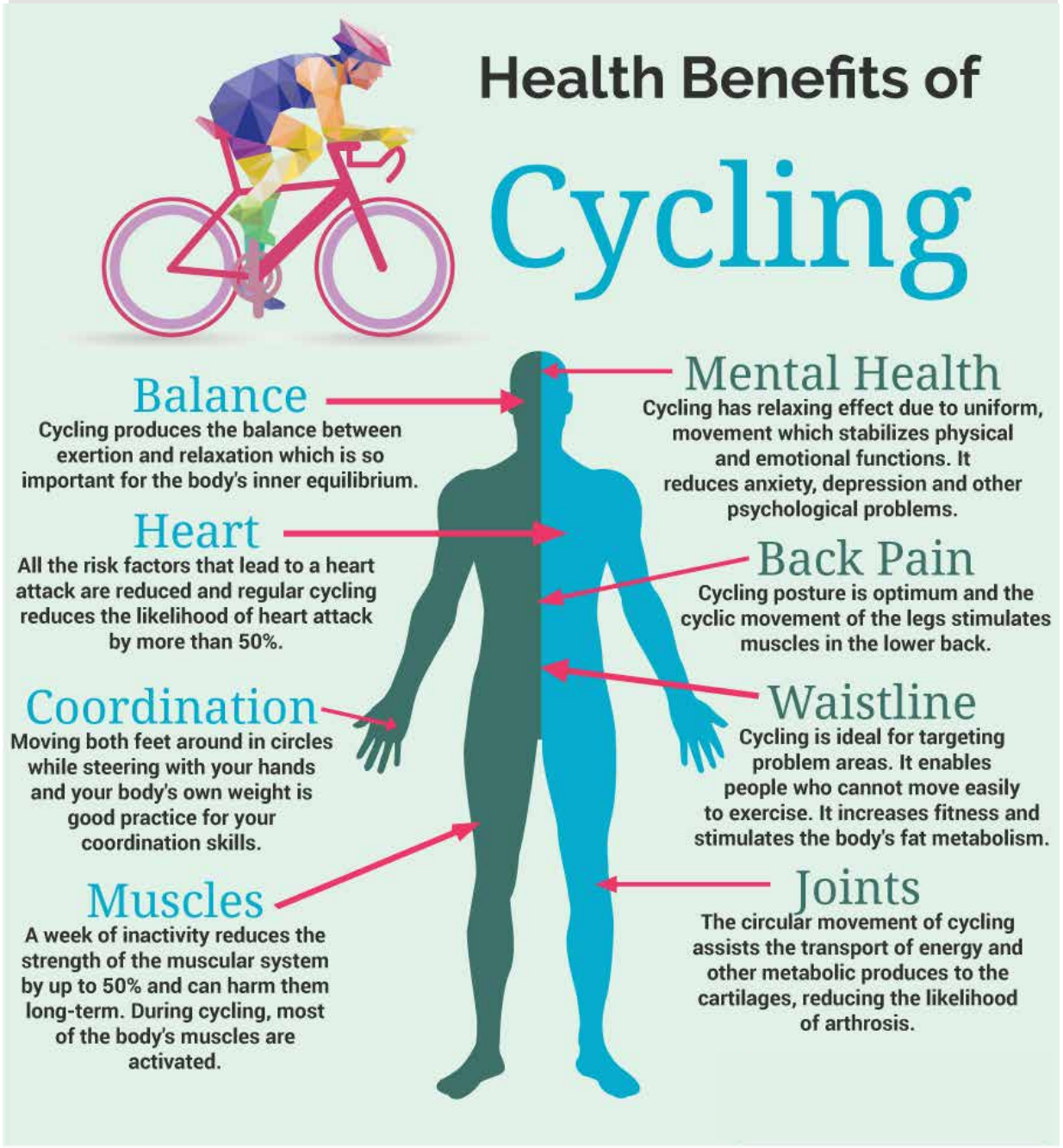


Image credit: Asian Samra Multi Specialty Hospital

As described previously, riding a bicycle is an aerobic activity that is low impact on joints and engages numerous systems. When regular bouts of physical activity such as bike riding are achieved, health benefits result. The chances of developing chronic diseases can be reduced by participating in regular sessions of physical activity. If a chronic disease has already developed, the effects from it can also be significantly reduced and in some cases reversed.

For diseases of the heart, prolonged sessions of aerobic activity exercise the heart muscles, reducing the possibility of heart disease, stroke, and even cholesterol build up. Bicycling is a perfect activity, as an elevated yet steady heart rate is ideal for such exercise. For diabetes, exercise via bicycling helps insulin absorb glucose, thereby regulating blood sugar. Arthritis is a joint problem that causes severe pain due to inflammation. Bicycling, being a low impact effort, moves these joints and reduces the effect of arthritis by keeping the cartilage around joints lubricated.

Cancer Prevention

An estimated 25%-30% of cancer deaths are attributed to physical inactivity, poor diet, and obesity. Cancer prevention is noted in Clay and Cherokee County CHIPs. In many cases certain cancers can be prevented. Such cancers include breast, cervical, esophageal, colorectal, prostate, and testicular cancers. Doctors consistently recommend 30 minutes a day of physical activity to reduce potential for such diseases. In the instance of a bike ride, the ability to ride roughly 5-10 miles would be the approximate distance within the 30 minute period of time. Medical research also shows that 30 minutes of exercise accumulated through multiple, shorter bouts of exercise is also beneficial. So facilities that allow people to incorporate shorter trips into their day- like running errands, taking kids to school, etc.- will also be helpful. Safe bike facility connections to shopping centers, schools, and

other community resources/amenities is another important strategy to providing increased opportunities for physical activity.

This means that people need facilities that are safe and accessible for longer distances to achieve the medical recommendation via bicycle. Loop rides, trails, multi-use path or even rural roads can all help to accommodate such uninterrupted conditions.

Obesity & Physical Activity

Weight management via physical activity is a vital piece of the overall health equation and specifically noted in the Graham CHIP. Continual research has proven that most of a persons weight management comes via diet and their own genetic disposition. However, caloric expenditure does play a factor, not only in weight management and prevention of obesity, but also preventing other diseases and ailments.

The human body is meant to move and built for moving. Bicycling requires effort in the form of muscle recruitment, which leads to conversion of stored energy into calories burned while riding.

Rough Estimate of Calories Burned per Hour of Cycling Activity by Body Weight

	Calories Burned Per Hour			
Activity	130 lb.	155 lb.	185 lb.	205 lb.
Cycling, 12-13.9 mph, moderate	472	563	654	745
Cycling, 14-15.9 mph, vigorous	590	704	817	931
Cycling, 16-19 mph, very fast, racing	708	844	981	1,117
Cycling, >20 mph, racing	944	1,126	1,308	1,489

Mental Health

Though not specifically cited as a primary goal for the four counties, mental health and the overall happiness of area citizens was a common concern within the CHA reports. Mental health is a complicated issue that stems from a plethora of life experiences and conditions. Bicycle riding is but one way for participants to legitimately feel better. Similar to a "runner's high," bicyclist can experience the same rise in dopamine that runners do, which improves the mood and perspective of bicyclists. Such a chemical reaction is proven to improve overall mental health.

THE JOURNEY

The second phase of a bike ride is the journey from one place to another. As a person is pushing their pedals to generate movement, they are gliding across some kind of surface in a setting that can also be therapeutic. The journey portion of a ride is not so much about the physical response nor the energy needed to propel a bicycle. The journey is more of a transcendental experience had by either an individual or a group. Riding in a serene place, soaking up the environment, having a stimulating conversation while riding, are all viable benefits to riding and can help one's overall health in several ways.

How the Journey Relates to the Community Health Needs Assessment

Environmental Health. The ability to enjoy nature, be surrounded by a picturesque setting, listening to the wind blow through tree canopies, hearing the rushing waters of a stream or river, are critical elements to the human/environment relationship. People generally long to be in nature and bike rides certainly promote such interactions. Being in a natural environment and knowing that riding doesn't harm the environment fulfills a psychological need that is important, especially for the people of western North Carolina. There is a deep connection with nature among residents and fostering such a bond through bicycling is important for attaining environmental health.

Spiritual. The ability for a person to connect with something beyond themselves, something that taps into a deeper connection between mind, body and soul is how spiritual health can be achieved. Bike riding, especially in beautiful natural settings, or for some sort of cause or purpose (like a

charity ride) can illicit such a response. By putting down electronic devices, using your body in a physical way, and absorbing in the environment and company around you as a rider, spirits can be lifted and an improved mental state achieved.

Emotional. Being emotionally content is a critical element to a healthy mental state. Riding a bicycle, especially with other people, allows a person to decompress from the stresses of daily life. Riding presents a freedom as well. Knowing that an automobile doesn't always have to be the primary means of transport can also be relieving in that the financial burden of gas, oil changes, and other maintenance needs are exponentially lower for bicyclists. When riding with others, often a bond is formed or strengthened, a camaraderie and sense of connection developed. This too is a contributor to emotional health.

Bicycling that occurs is small towns, for utilitarian or recreation trips, has similar mental and emotional benefits: Being on a bike allows one to see and talk to those on the street—unlike the anonymity of driving in a car. One can still enjoy the sense of being "outdoors" even if biking in a town setting setting.

Recruitment of Medical Personnel. One of the goals within the CHNA's of both Macon, Graham, and Clay County was to attract more medical personnel. Due to the rural setting, this has proven to be a challenge. Having places to ride and achieving a safe reputation for bicycle riding can help. According to Ruralhealthinfo.org, demonstrating to prospective doctors and nurses that "amenities that match family interests, such as outdoor recreation, arts/culture" are present, should be a top priority when recruiting candidates. Many doctors, nurses, dentists, and others in medical fields enjoy being active and bicycle facilities can be appealing when deciding if or where to relocate.

THE DESTINATION

The final element of the a complete bicycle ride is reaching the destination. The place where someone seeks to access by bicycle is also an essential element to a persons health. This can be any number of places, many of which have some kind of healthy impact. Parks, schools, libraries, work places, grocery stores, social gatherings or spaces, or other private or public sites all have something to offer the visitor that adds some piece to complete health. For many, the ride and the journey aren't always what the evolution using a bicycle is about; it is the destination that is paramount. For those riders, ensuring that access to such places through enhanced facilities and proper locating is critical.

How the Destination Relates to the Community Health Needs Assessment

Access to Health Care. A common theme within the CHNA's was increasing access to health care providers. This goal is achieved through various means be it financial access, increased numbers of providers, or even enhancing the ways in which we physically access a hospital or doctor's office.

For a person using a bicycle, access means that facilities allow destination to be accessed from residential areas on streets that have either dedicated space to ride or along low stress routes, and where vehicles are less threatening and interruptions to momentum are limited. It also means that health care facilities themselves be centrally located and of a reasonable distance to residential areas as well as having convenient places to park a bike.

Intellectual Health. Another element of total health is intellectual health. This stimulation and rejuvenation of the mind is imperative to being a productive and efficient person. Places where intellectual health can be achieved include schools and universities, work places, libraries, social gathering spots where cultural events may take place, civic locations like city halls or County buildings, and many others. Oftentimes these places can be accessible when located in central locations. When faced with

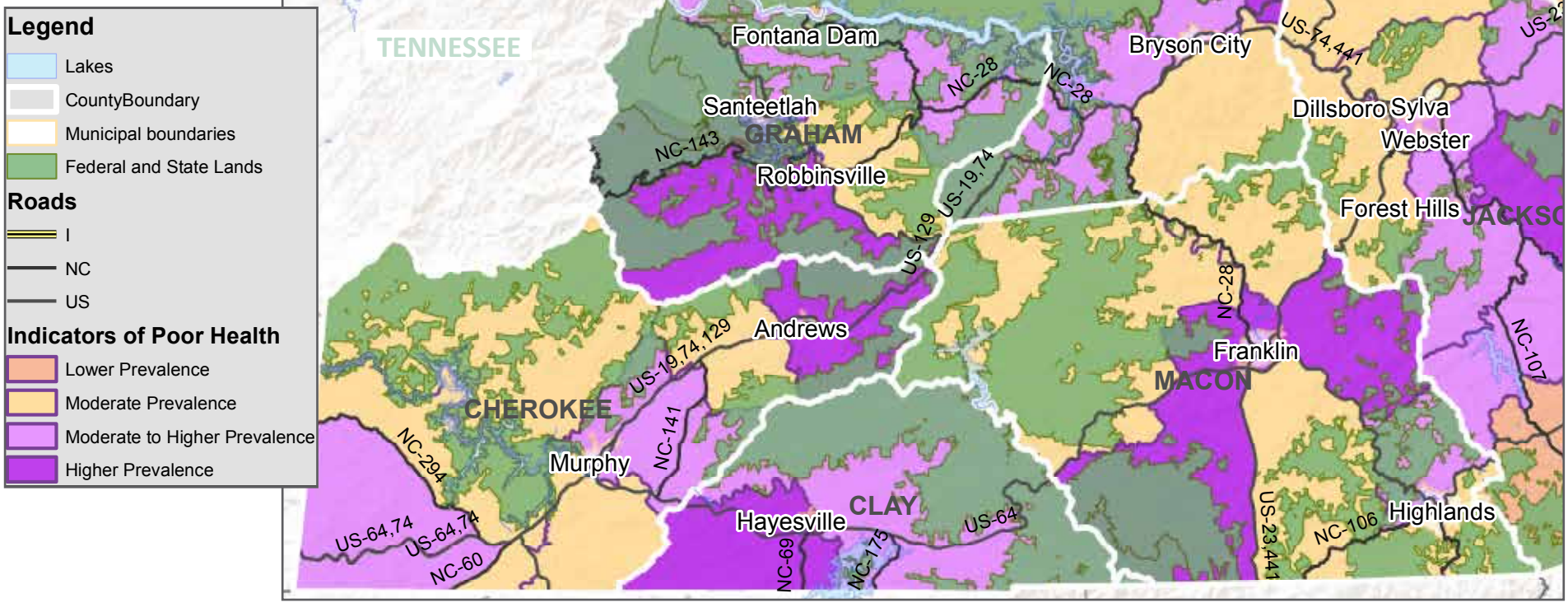
the need for a new building or expansions, institutions such as schools and public agencies, do so in inaccessible locations that are void of shorter and/or direct connections. They are oftentimes so far removed from patrons (including many that may not have access to a vehicle) that riding a bike becomes difficult if not impossible.

Social Health. The final piece to total health is made through social inclusion. Social health is largely achieved when people interact. Visiting loved ones, meeting friends for an activity or a meal, or even interacting with work colleagues or students are all ways in which social health can be gained. With this in mind, it Is paramount that those places where social interactions occur are prioritized in making bicycling investments. Maps, way-finding signage, sponsorship of trails or bike share programs, regular bicycling events, or employer programs are examples of how social destinations can be accessed and promoted.

Bicycling & MountainElements Recommendations

The MountainElements document contained "hot spot" maps that displayed the concentration of poor health indicators across the region, by Census tract. These maps help identify tracts that are considered priority areas for outreach and special consideration for infrastructure projects. By investing in bicycling infrastructure, working with community partners to promote bicycling for utilitarian and recreational purposes, and ensuring that desired healthy land uses are accessible and inviting, one of the major recommendations may be accomplished. “Active transportation can improve physical activity rates” was a clear statement and future objective for the participating counties to strive for in the future. As described in the previous sections, increasing participation in physical activity by bicycling can have tremendous positive health consequences for the populations of the four counties.

Figure 5-2—MountainElements' Prevalence of Indicators of Poor Health



In **Cherokee County**, tracts that had health concerns displayed high rates of stroke and heart disease. Both health issues can be largely prevented or risks minimized with regular exercise such as bicycling.

In **Clay County and Graham County**, rates of high stroke, lung cancer, and a high population paying over 30% for rent were factors in higher prevalence tracts. Like heart disease and stroke, lung cancer is mostly avoidable through life choices. Exercising the lungs through bicycling has a correlation with reduced rates of lung cancer and can be part of an overall reduction strategy.

For **Macon County**, tracts with elevated concern had high rates of stroke and heart disease but also the number of households paying over 30% for housing costs. Bicycling does have an economic impact and even providing citizens with a choice of transportation options may reduce their monthly expenditures, which improves economic health.

For information about NCDOT's goal of influencing health benefits by creating bikable communities, visit:

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

Beyond Physical Benefits

The American Automobile Association's (AAA) annual study "Your Driving Costs" showed in 2013 that owning and operating a motor vehicle in the United States continues to become more expensive. Based on driving 15,000 miles per year, depending on vehicle type, owning and operating a vehicle can cost an average of 60.8 cents per mile or $9,722 per year.

Safe non-motorized transportation options, combined with access to public transportation, are critical components of a transportation network that connects people— especially low-income households— with jobs, education, and essential services, providing "ladders of opportunity."

ECONOMIC IMPACTS OF BIKING

Based on local tourism expenditure data and visitor profiles for Western NC, Bikes in Beds (Haywood County TDA and Southwestern Commission's report on bicycle tourism in the region) estimated that bicycle tourism accounts for roughly 2% of total trips to the county and generates more than $3 million in annual expenditures by visitors. The report lists these bicyle tourism numbers for the region:

- $14 million estimated total impact of bicycle tourism in Western North Carolina.
- $150,000 to $170,000 estimated visitor spending per year from the Blue Ridge Breakaway.
- $500,000 estimated economic impact of the 2014 Lake Logan Multisport Festival.
- 91.5 million Americans went biking in 2013.
- 33 percent of cycling tourists staying overnight.
- $76 spent per day of overnight stay and $50 per day trip.
- 2.8 people in the average group of cyclists.

Nearby Asheville, NC, was able to provide incentives for a large California brewery to build their eastern factory, distribution center, and taproom in the city. The brewery chose its location partly because it was adjacent to the French Broad River and an anticipated greenway connector. In exchange for NCDOT Complete Streets improvements and city concessions, the company designed and built the greenway segment during facility construction. Now, trail users can easily walk right up to the taproom after exercising and the city has valuable new tax revenue.

Greenways attract new business, increase tourism, enhance property values, and help promote a strong local economy. Many studies show increased property value and faster home sales near greenways. For example, homes near the Carolina Thread Trail were estimated to increase approximately 4% in value due to proximity to the trail.

A study[1] of Greenville County's Swamp Rabbit Trail shows that the trail has generated $6.7 million for area businesses in 2013 - an excellent example of the positive influence greenways can have on a community's economy. Travelers Rest, SC, attracted more than a half million walkers, joggers, and bicyclists in 2013. Additionally, the number of businesses in their three-block business district increased from 4 to 60 after the trail was constructed.

Defining bicycle tourism for Western North Carolina and identifying the ways in which bicyclists contribute to the local and regional economy is another key focal point of this plan.

The economic impacts of bicycling can be broken into four distinct categories:

1. **Bicycle Tourism:** Attracting bicyclists of all types, including recreational road riders, touring bicyclists, mountain bikers, event bicyclists, and low stress/family riders, will contribute to the tourism-based economy. Estimates are that 2% of the exisitng tourism market in Western North Carolina is tied to some type of bicycle tourism.

Asheville's New Belgium Brewery promoted its site design to the community. It features a completely new greenway segment (a vital link in the city's greenway plan recommendation), brownfields amelioration, stream restoration, Complete Streets improvements (including bicycle lanes), on- and off-street low impact parking, and bicycle parking at the facility.

2. **Job Creation:** Bicycle tourism creates jobs, most notably in the service sector. Bicycling is becoming an increasingly important economic development tool across the United States. During public input on this plan, economic developers and others discussed that they feel the region should invest in more bicycling facilities--both on- and off-road--as a way to attract companies, retain physicians and continue to enhance the area's quality of life.

3. **Construction Impacts:** The building of facilities for bicyclists, including bike lanes, greenways and trails, also impacts the economy of the region. A study by the American Association of State Highway Transportation Officials (AASHTO) found that the job creation value of building facilities for bicycling and walking was nearly 50% higher than traditional highway-based transportation investments.

For information about NCDOT's goal of maximizing economic competitiveness, return on investment, and employment opportunities by creating bikable communities, visit:

https://www.ncdot.gov/bikeped/walkbikenc/pillars-of-plan/economy/

BICYCLING SUCCESSES IN THE REGION

The Southern Blue Ridge region has considerable draw for bicycle tourism and pride, with some of the best mountain biking vacations available in North Carolina. This area features world-class mountain biking in some of the most beautiful terrain in the country, with trails for all skill levels, from technically challenging to loops easy enough for children or older folks. There is room for growth, expansion of the facilities, and connections in the network as well. These are some of the regional bicycle initiatives, clubs, and rides:

- The **Jackrabbit Trail** in Clay County was specifically designed to be fun for all ages and skill levels. Jackrabbit is a machine constructed, singletrack design based on a stacked-loop design. The whole family can have fun mountain biking together on this trail. Whether you are an advanced biker or a beginner, the 14-mile trail has great elevation changes and scenic views of woods, ridgetop, and beautiful Lake Chatuge. The Jackrabbit Trail is the location of the 2018 USA Cycling Regional Championship Series Race #5.

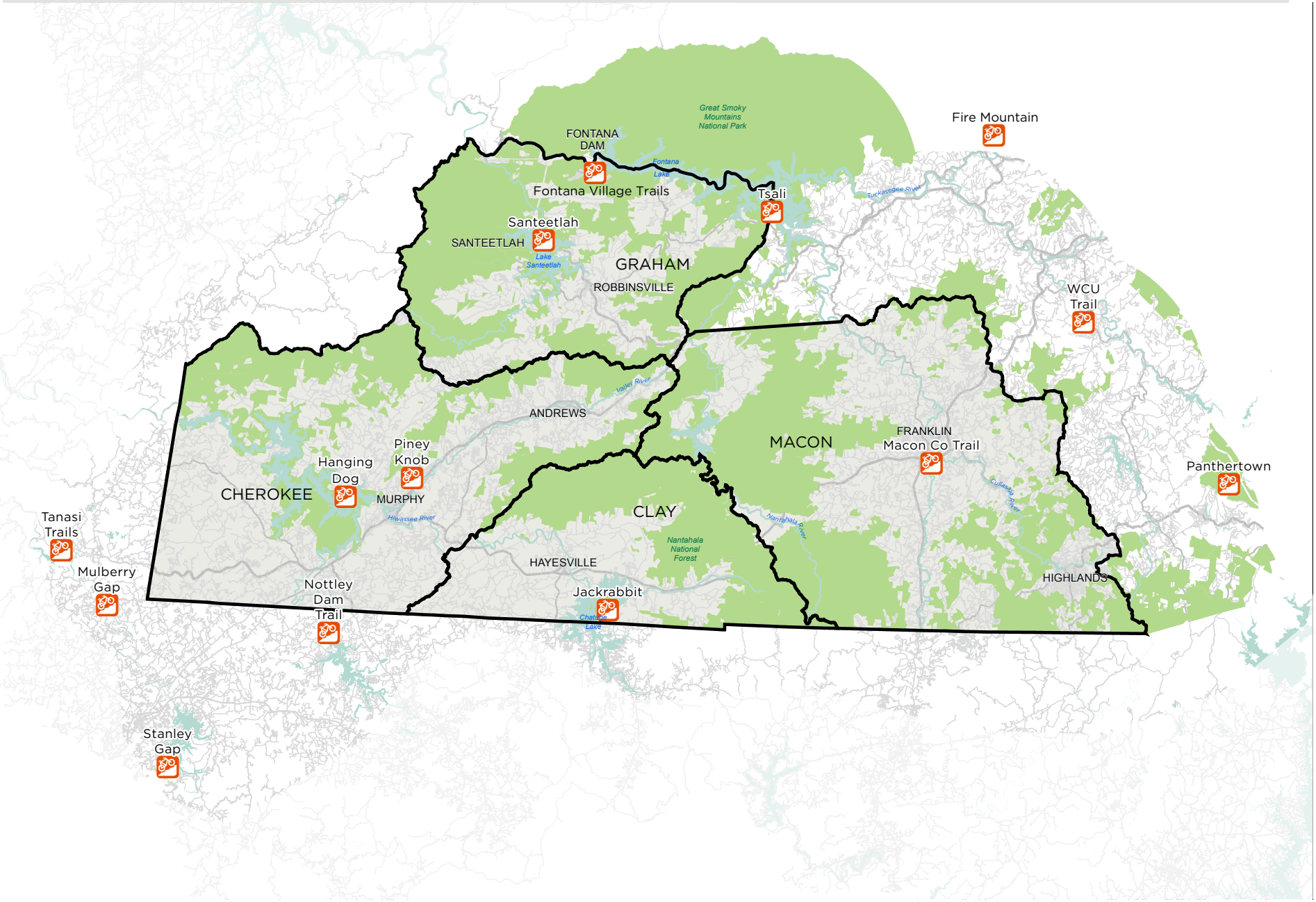
- Some of the best mountain biking in North Carolina, and the east coast of the United States, can be had in the **Tsali Recreation Area** of the Great Smoky Mountains (a short drive from Robbinsville). Tsali contains 40 miles of fast hardpacked singletrack, tight curves and hilly passes. Cyclists are rewarded with the outstanding views of Fontana Lake and the Great Smoky Mountains National Park.

- The town of Murphy, North Carolina is working to construct 22.3 miles of recreational hiking and mountain biking trails on the 700+ acre Murphy Watershed property off of **Piney Knob** Hill Road. The first

Success Story - Jackrabbit Trail

Over 15 years ago, one of the regions more successful trails began; not with the idea of the trail itself but instead as an outcome from the implementation of an afterschool program that taught kids about bike safety and maintenance and the importance of being physically active. The Jackrabbit Trail was a result of a need for students to ride in a place that was away from moving cars, immersed in nature and proximate to their neighborhood. Over time the trail went from concept to reality through the hard work of many area stakeholders. Now, the trail appeals to users well beyond the immediate area and encourages riding and hiking. Though the trail is an example of off street improvements, it was created to fulfill a need for more bicycle infrastructure. Investing in additional projects that exist on surface streets or as trails will result in the many health benefits derived from increased physical activity – the stated goal of most everyone in the four county region.

Figure 5-3— Map of Mountain Bike Trail Facilities in the 4-County Region



phase of the project is complete and several trails are now open. This first phase converted a preexisting logging road into a smaller, more sustainable natural surface trail suitable to foot traffic and cyclists of all skill levels. In the future, this first phase trail will serve as the main access trail to the more advanced sections of the park. All trails are dirt single-track trails and are designed in accordance with International Mountain Bike Association (IMBA) standards.

- **Hanging Dog Trail** is 4 miles total out-and-back on a gravel service road, combined with several planned singletrack loops off the main out-and-back. There are two fairly long climbs, both of which are steep. The road has a thick layer of gravel in most places. This trail is seeing more use and bicyclists are keen to develop the area further for recreational use. Murphy could position itself as a major bicycling hub.
- The **Southern Appalachian Bicycle Association (SABA)** welcomes riders of all ages and abilities, with skill levels ranging from novice to elite. Individual interests vary from those who just like touring at a casual pace, to those who love competition and racing. Scheduled rides include both road and mountain biking in areas of North Georgia, Southeastern Tennessee and Southwestern North Carolina. SABA invites all interested bicyclists to join the club and encourages those vacationing in the region to inquire about road and trail information and to join in on group rides.
- The friendly folks at the **NOC Bike Shop** in Bryson City (adjacent Swain County) or **Smoky Mountain Bicycles in Franklin** are dedicated to keeping locals engaged with group rides and making sure tourists can experience the best mountain biking in North Carolina. Bike sales, bike service and bike rentals are available at both locations.

REGIONAL BICYCLE TOURISM

Chipley Consulting led the bicycle tourism analysis. A separate survey was developed to identify visitors' spending to the area. Members of the consultant team completed outreach at multiple bicycle events and partnered with a local non-profit organization tasked with survey outreach. A total of 606 completed surveys were gathered from visitors who live outside the area.

In-person survey outreach was conducted at the following events during the summer of 2016 for survey collection:

- Mountain Sports Fest

People are traveling to regions with Forest Service roads for the purpose of riding their bicycles through beautiful forests. This image is from the Wilson's creek area of Pisgah National Forest in Caldwell County.

- Fletcher Flyer
- Mountain Sports Fest
- Southeast International Mountain Bike Summit
- Cycle to Farm
- Knobscorcher
- Tour de Franklin

In addition, the consultants shared flyers via Facebook and the newsletters with the following groups:

- Carolina Tarwheels
- Adventure Racing Discusssion Group
- Outdoor Chattanooga
- Chattanooga Bicycle Summit
- Asheville on Bikes
- Outdoor 76
- Smoky Mountain Bicycles

- Nantahala Area Sorba
- Mindspring Conservation
- Friends of the Greenway (FROG)
- Macon County Cyclists
- Visit Cherokee County

After the survey collection process was complete, IMPLAN economic modeling software was used to estimate spending flows through each geographic region. The model, based on the national input-output spending relationships between industries, households, and governments, was customized to match the existing local economies. IMPLAN is the industry-standard platform for estimating economic impacts and is widely used by governments, universities, and professional economic analysts.

Methodological Overview:

• Spending amounts and spending categories derived from the field survey.

- The average per person daily spending of a visiting bicyclists is $189.66

- The average stay is 2.04 nights

• Total visitor and bicycling volumes from 2014 North Carolina Regional Travel Summary, Economic Development Partnership of North Carolina, August 2015.

- 2.8 percent of the 9 million overnight visitors to the 23 WNC counties participated in “Biking/Road Biking/Cycling.”

• Bicycling volumes were proportioned to the Southwestern and four-county regions based on travel expenditures from 2015 Economic Impact of Travel on North Carolina Counties, U.S. Travel Association, prepared for Economic Development Partnership of North Carolina.

Overnight Visiting Bicyclist Economic Impacts:

Terms

• This report uses the term “visiting bicyclists” or just “bicyclists” but only considers overnight visitors.

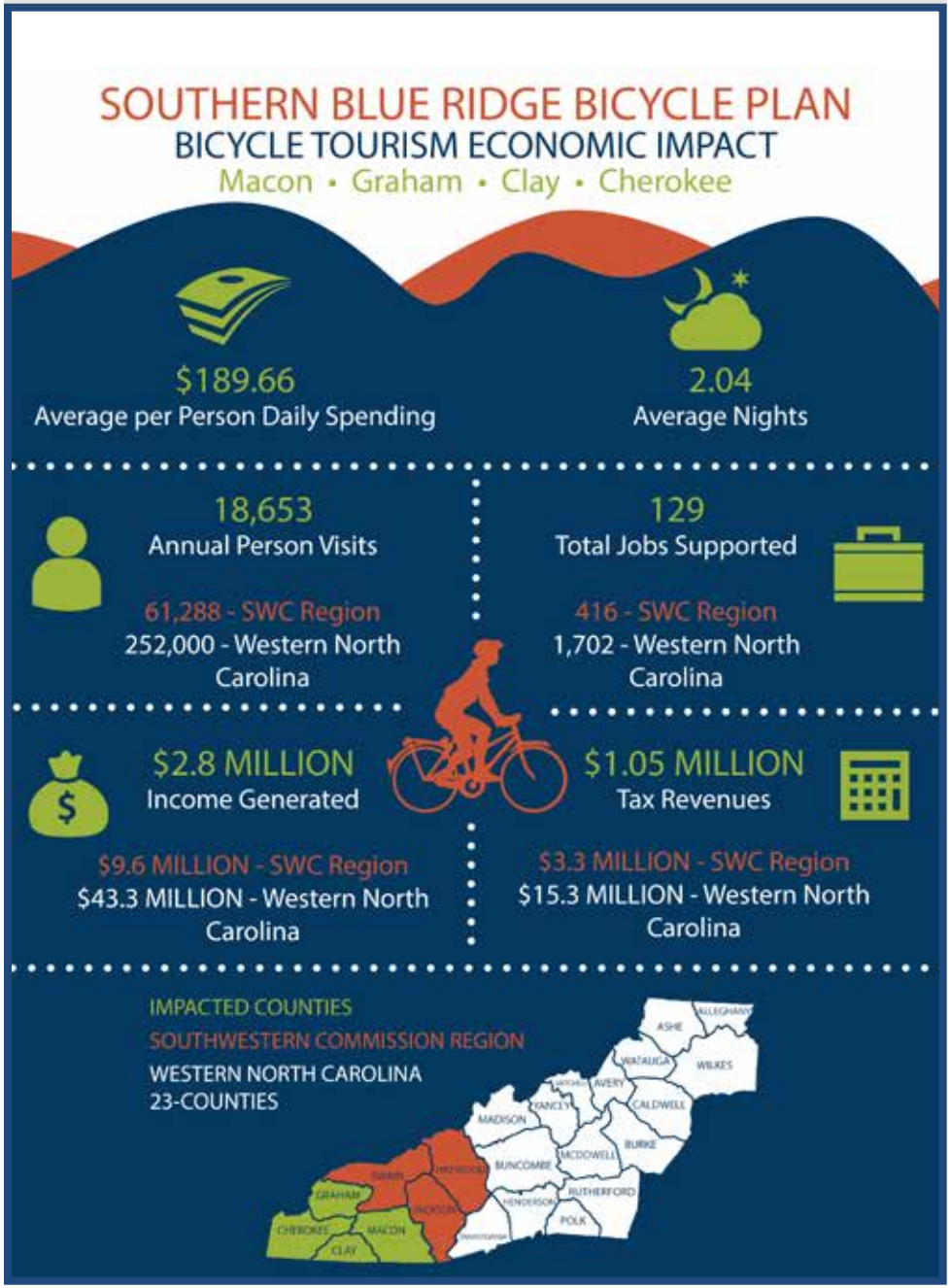
• “Labor income” is the income (wages, salaries, and proprietor’s income) from the supported jobs.

• “Value added” is the increase in additional economic activity caused by the impact. Technically, value added is the value of output less the value of intermediate consumption.

• “Direct” is the initial impact, “indirect” is the backward supplier impacts (what has to be purchased to supply the direct impact) and the “induced” impact which is the additional household spending from the jobs supported by the direct and indirect supplier impacts.

[1] Reed, J. 2012, "Greenville Health System Swamp Rabbit Trail Year 3 Findings", Furman University; Clemson International Institute for Tourism Research & Development

Figure 5-4— Economic Impact of Bicycle Tourism



This comparative graphic illustrates the economic impact of bicycling in the 4-county study area, compared with the Southwestern Commission's overall 7-county region and Western North Carolina (23 counties).

The following pages show the same information, split apart into the three distinct regions - with detailed analysis for each.

Four Counties (Cherokee, Clay, Graham, Macon)

- Bicyclists spend **$7.2 million annually** while visiting the area.

- Bicyclist spending supports **129 local jobs.**

  - Their spending directly supports **102 local jobs**.

    Major directly impacted industries include overnight accommodations (hotels, campgrounds and RV parks), restaurants, and local retails establishments.

  - Indirect impacts supports 27 jobs (major indirectly impacted industries include local real estate operations and local artists).

- Local labor income increases by **$2.8 million annually** ($2.1 million directly and $700,000 indirectly).

- In terms of value added; the activity from bicyclists' spending raises local economic activity by $3.9 million ($2.7 million directly and $1.2 million indirectly).

- Additional tax revenues generated by bicyclists' spending:

  - Total **$1.04 million**

    Federal: $621,000

    State: $276,000

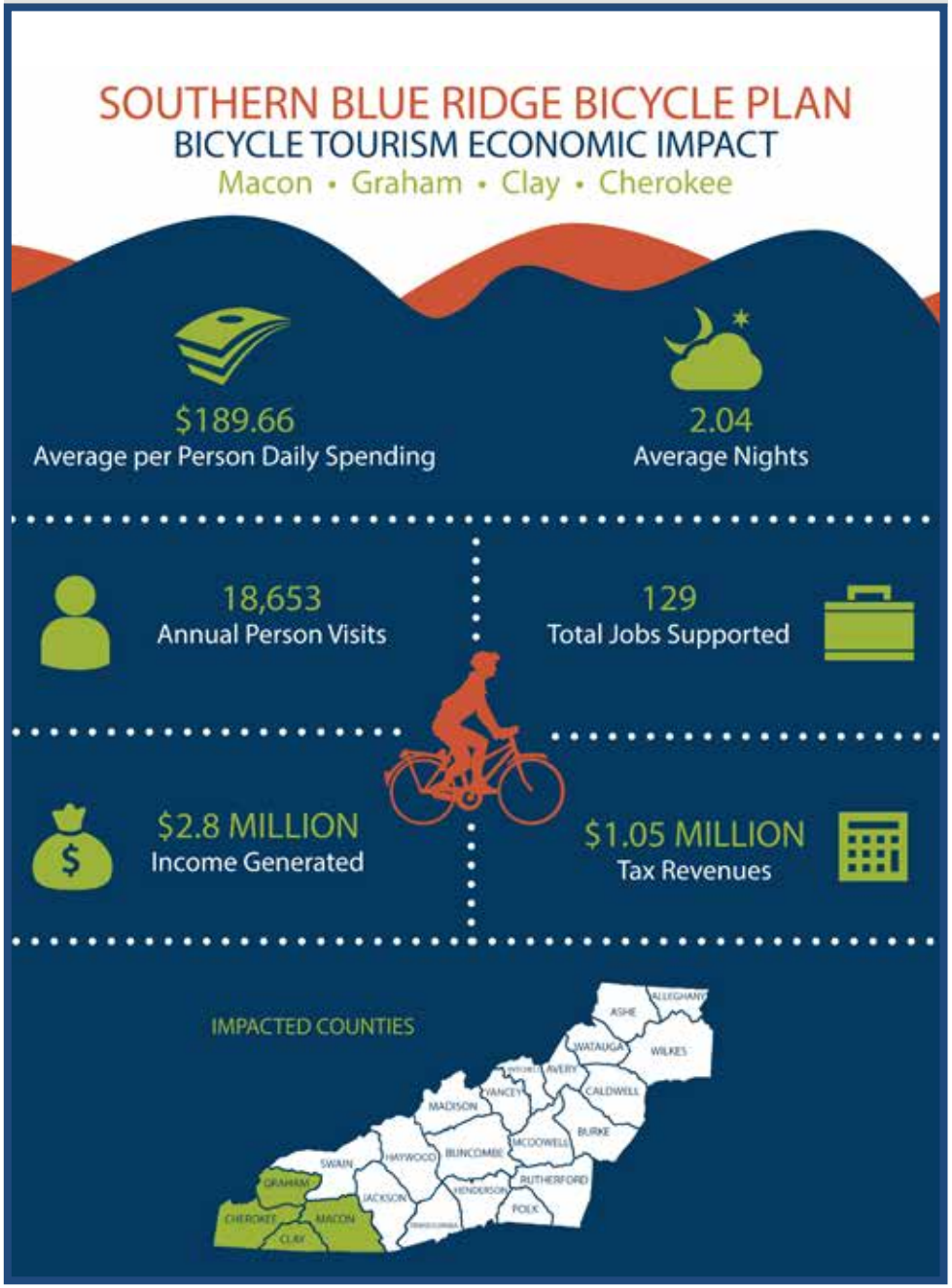
    Local (counties & municipalities): $150,000

- *Multipliers:*

  - For every local job supported directly, another ¼ local job is supported indirectly.

  - For every dollar of local labor income generated directly, another $0.30 of local labor income is generated indirectly.

Figure 5-5— Economic Impact of Bicycle Tourism (4 Counties)



Southwestern Commission Region (Cherokee, Clay, Graham, Haywood, Jackson, Macon, Swain)

- Bicyclists spend **$23.7 million annually** while visiting the area.

- Bicyclist spending supports **416 local jobs.**
  - Their spending directly supports **329 local jobs**.

    Major directly impacted industries include overnight accommodations (hotels, campgrounds and RV parks), restaurants, and local retails establishments.

  - Indirect impacts supports 86 jobs (major indirectly impacted industries include local real estate operations and local artists).

- Local labor income increases by **$9.6 million annually** ($7.3 million directly and $2.3 million indirectly).

- In terms of value added; the activity from bicyclists' spending raises local economic activity by $13.1 million ($9 million directly and $4.1 million indirectly).

- Additional tax revenues generated by bicyclists' spending:
  - Total **$3.4 million**

    Federal: $2 million

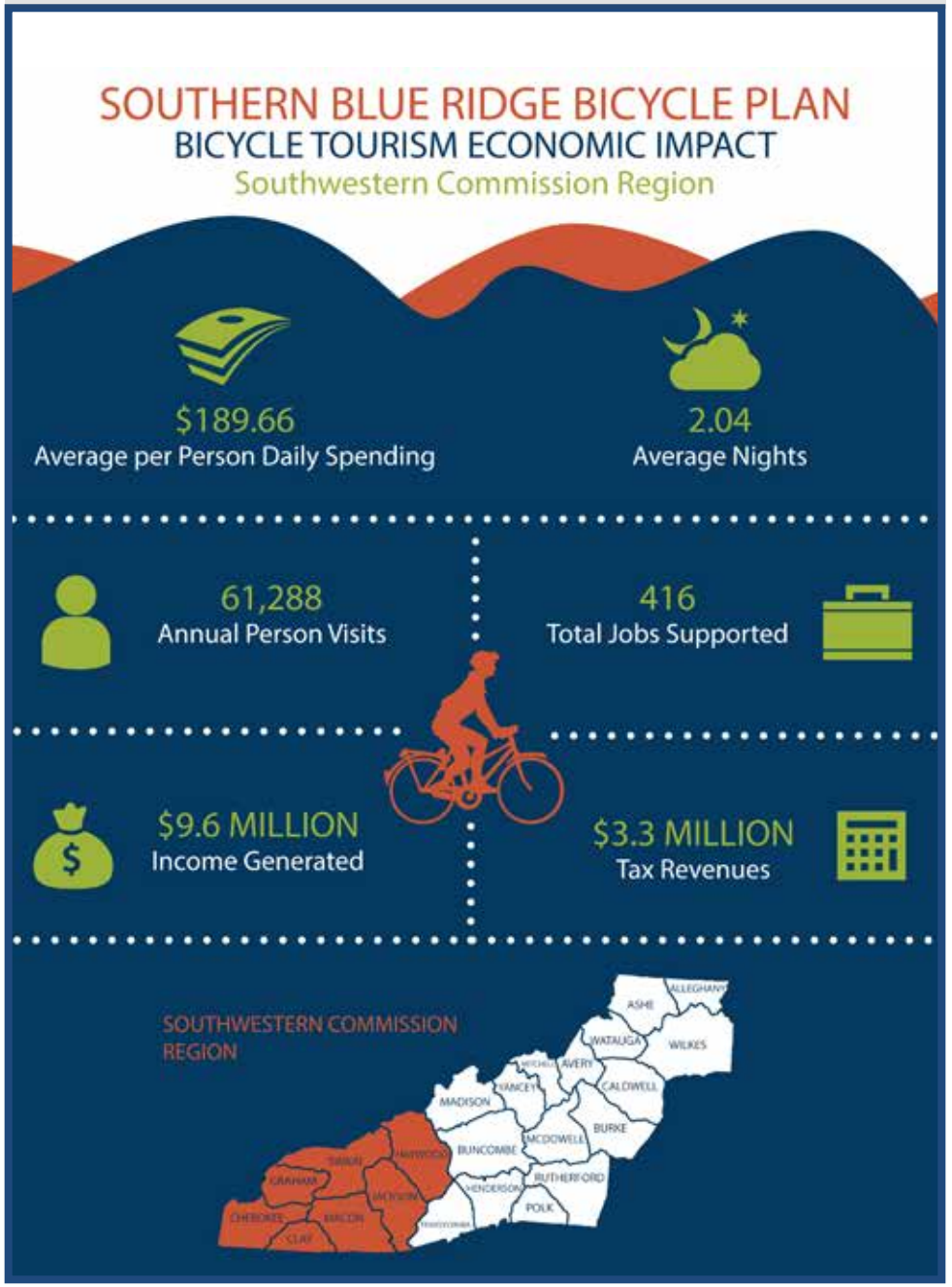
    State: $846,000

    Local (counties & municipalities): $547,000

- *Multipliers:*
  - *For every local job supported directly, another ¼ local job is supported indirectly.*

  - *For every dollar of local labor income generated directly, another $0.32 of local labor income is generated indirectly.*

Figure 5-6— Economic Impact of Bicycle Tourism (Region)



Western North Carolina (23 Counties)

- Bicyclists spend **$97.5 million annually** while visiting the area.

- Bicyclist spending supports **1,702 local jobs.**

  - Their spending directly supports **1,305 local jobs**.

    Major directly impacted industries include overnight accommodations (hotels, campgrounds and RV parks), restaurants, and local retails establishments.

  - Indirect impacts supports 397 jobs (major indirectly impacted industries include local real estate operations and local artists).

- Local labor income increases by **$43.3 million annually** ($30.8 million directly and $12.5 million indirectly).

- In terms of value added; the activity from bicyclists' spending raises local economic activity by $60 million ($38.5 million directly and $21.5 million indirectly).

- Additional tax revenues generated by bicyclists' spending:

  - Total **$15.2 million**

    Federal: $9.2 million

    State: $3.6 million

    Local (counties & municipalities): $2.4 million

- *Multipliers:*

  - For every local job supported directly, another 1/3 local job is supported indirectly.

  - For every dollar of local labor income generated directly, another $0.41 of local labor income is generated indirectly.

Figure 5-7— Economic Impact of Bicycle Tourism (WNC)

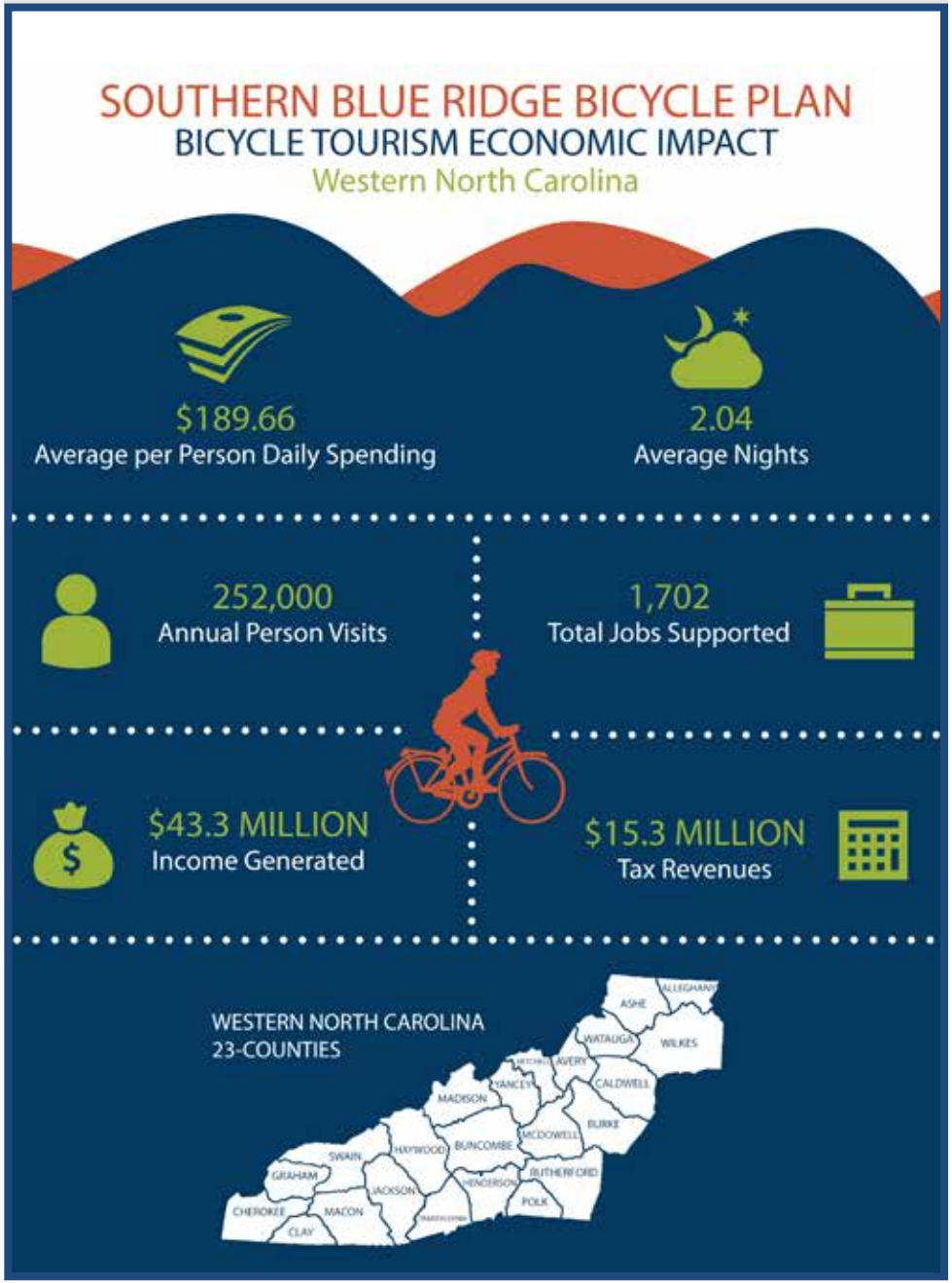
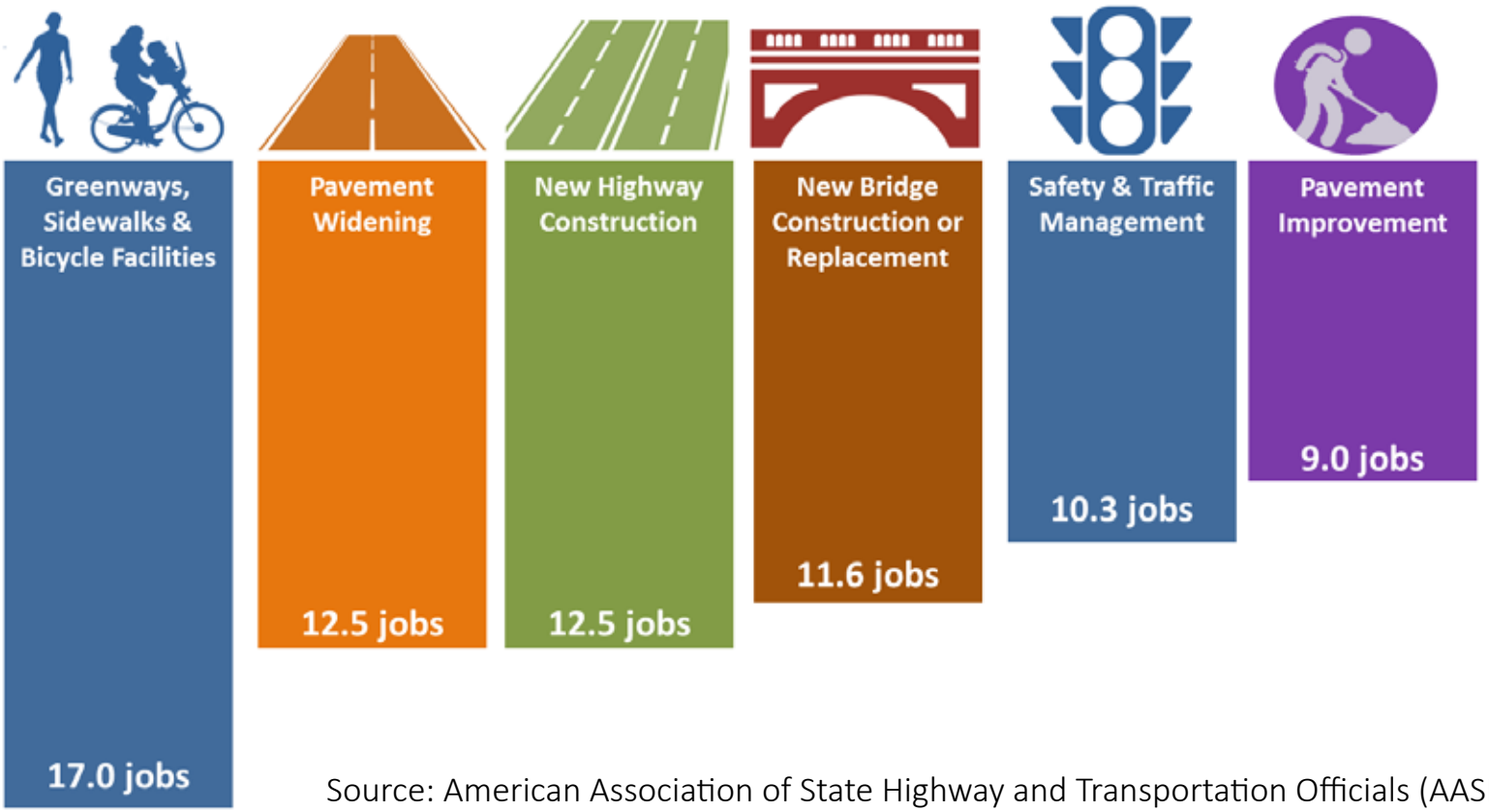


Figure 5-8— AASHTO Average Direct Jobs by Project Type



Source: American Association of State Highway and Transportation Officials (AASHTO)
Average Direct Jobs by Project Type (2012); Job in terms of full-time equivalents (FTE)

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Chapter 6

Recommended Bicycle System Plan

Chapter 6

Recommended Bicycle System Plan

Existing Bicycling Conditions

Known for great scenic beauty, southwestern North Carolina is a mountainous region containing phenomenal natural and cultural resources. Steeped in the history of the Native Americans, the land has many square miles of forests, including the famous Joyce Kilmer Forest; scenic pastures and farms in the valley agricultural areas; whitewater creeks and rivers; and prominent ridge lines. All of these features invite recreational road bicycling.

The four counties covered by North Carolina's Southern Blue Ridge Bicycle Plan are rural with very low highway traffic volumes when compared with urban and suburban areas. At about 54 residents per square mile, the region is only one-third as densely populated as the rest of North Carolina (2014). Suburban style development exists on some of the major highways around the small towns of the region, though all towns retain interesting features in historic downtowns.

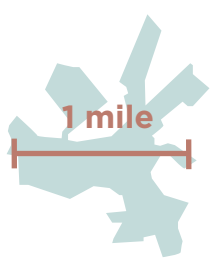
Motorists in this region generally do not expect to routinely encounter bicyclists on the road, so it is important for cyclists to stay visible and obey traffic laws. In 2007 the Department of Transportation installed rumble strips on most of the paved shoulders on the primary routes in the region. Due to an outcry from cyclists, the local Division of the Department now uses guidelines that are accommodating to bicycle traffic. Routes resurfaced since 2007 generally do not have rumble strips on paved shoulders, so riding on divided four-lane highways, despite sometimes heavy traffic, is often a more comfortable place to ride. The portion of Corridor "K", NC 28 from Almond to Stecoah, is an example of a low traffic volume scenic divided four-lane with paved shoulders that is very comfortable and enjoyable to ride by bicycle.

Most of the secondary road system in the region has been paved, and these traditionally "farm to market" roads offer quiet, scenic beauty. These roads are generally winding and often steep due to the terrain, so cyclists need to listen for traffic, and especially avoid being in blind spots as motor vehicles come around curves behind them. Some roads are so remote that a vehicle may not pass for an hour or more, and cellular telephone service is not universal, so these factors should be evaluated when deciding whether or not to ride alone.

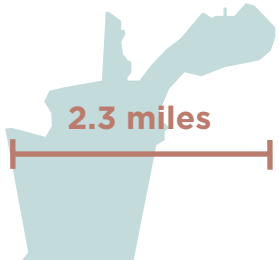
Although popular cycling roads may have "Share the Road" signs, practically all lane widths are too narrow for real sharing. Secondary roads have widths as narrow as eight feet, though nine and ten are more common. Primary routes usually have twelve-foot lanes, though some newer multi-lane routes have 14-foot wide lanes designed for sharing unless there is a bikable shoulder. Fortunately, in 2016 state legislators decriminalized crossing a double yellow line to pass a cyclist, and increased the required passing clearance to four feet. The steepest grades on primary routes do not usually exceed seven percent, though some eight percent routes exist. Grades on primary routes above five or six percent for more than half a mile are usually advised of with warning signs. Grades on paved secondary roads generally don't exceed twelve percent but can be as steep as 18 percent, usually for only a short section. Do not expect paved shoulders on secondary roads.

In rural communities, most residents live long distances from services. Fortunately, most small towns offer a compact central area well-suited for bicycle trips.

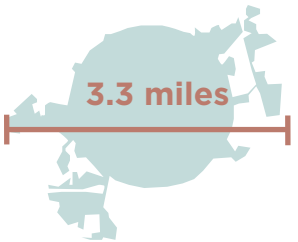
1 mile bike ride = 6 minutes
(at an average of 10 mph)



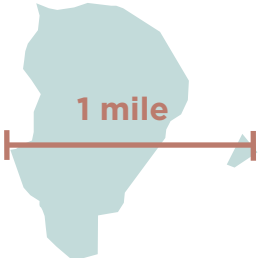
Hayesville, NC
Population 338



Murphy, NC
Population 1,604



Franklin, NC
Population 3,898



Robbinsville, NC
Population 620

Building a Bicycle System Plan

The process of identifying projects for the Southern Blue Ridge Bicycle Plan consisted of:

- Reviewing project recommendations from past planning efforts;
- Gathering feedback at the Steering Committee meetings and public involvement efforts (citizen input);
- Conducting field evaluation of biking conditions along roadways and evaluating likely greenway routes where property access was available;
- Identifying popular destinations and biking routes.

Most bicycle infrastructure recommendations in the four county CTPs are reflected in this plan's project recommendations -- the proposed bicycle route system incorporates many of the CTP roadway projects.

From this input, the project recommendations contained in this chapter are developed at what is referred to as “planning level,” meaning that they were examined for their relative value and evaluated based on field observations. Detailed right-of-way or design processes were not conducted as part of this Plan. Rather, those steps will follow as the Southwestern Commission, NCDOT, and others work toward implementation.

The cost estimates are based on planning level evaluation and prevailing costs per mile of similar facilities at the time of Plan development; they are reflective of the entire project. Costs will change, as they always do. It is best to work through NCDOT Division 14 at the time a project grant is being pursued so these estimates can be updated. Most projects will require funding and grant pursuits from stakeholders - municipalities, RPOs, and county governments.

PROJECT DEVELOPMENT

Project Development. To become reality, projects may go through up to four phases depending on level of complexity.

1. Feasibility studies may occur on projects like greenways or streetscape plans to gather more information. This could include a field review by municipal- or county-level staff or with the help of consultants;

2. Most projects begin with design, which is the surveying, measuring and scoping of the project to produce a set of drawings to define the exact parameters of the projects and the manner in which it can be constructed;

3. Acquisition of land may then occur if the project design process indicates additional land is needed; in some cases there may be existing right-of-way to accommodate the project; and

4. Construction proceeds once a project is designed and land has been acquired and funding is available.

A majority of the projects identified in this Plan will be at a point they can move into either a design phase or a joint feasibility study / design phase. Depending on the implementing agency, design may be done by in-house staff or can be contracted through a design consultant.

All pedestrian and bicycle facility recommendations along NCDOT-maintained routes require review by NCDOT Highway Division 14 prior to implementation. Some of the projects depicted in this plan will require easements or rights-of-way that do not currently exist. Any private property shown in these depictions would not be acquired without the process of negotiation and compensation as required by law.

Project #	Project Title
1	The Hiwassee River Greenway
2	The Valley River Rail Trail
3	Two-Way Cycle Track (near Otto)
4	US-64 Bicycle Climbing Lanes (Eastbound)
5	US-64 Bicycle Climbing Lanes (Westbound)
6	Georgia Road Bicycle Lanes
7	NC-175 Bicycle Lanes
8	Little Tennessee River Greenway Ext.
9	Regional Bicycle Routes
10	Bike Route Sign System
11	Bike Route Safety Improvements
12	"Cyclist Ahead" Warning Flashers
13	Bike Racks & Fix-It Stations
14	Rumble Strip Remediation

PROJECT RECOMMENDATIONS

Project recommendations vary from regional treatments to specific corridors, and include 14 miles of greenway trails that accommodate all bicyclist skill levels (flat, safe), safety enhancements to key areas, improvements to bicycle support infrastructure, and specific roadway sections for bike lanes.

Project #1 – The Hiwassee River Greenway: The proposed Hiwassee Greenway is a 4-mile river's edge multiuse path from Hayesville to Chatuge Lake. It would serve to provide citizens and visitors of Hayesville and Clay County an opportunity to connect from the Clay County Recreation Department, Spikebuck Mound (a culturally significant Cherokee site), and neighboring schools, to expansive vistas found along the Chatuge Dam trail. From the Dam trail, users can easily connect to the Clay County Recreation Park. Along the route, users will enjoy the vast agricultural open spaces of the fertile Hiwassee River corridor floodplain. Users will also find several improved locations to access the Hiwassee River.

Project #2 – The Valley River Trail: This proposed trail, using the rail line and rail bed from Andrews to Murphy, has potential as two alternative options depending on the continuation of passenger or freight rail services; the rail line can either be converted to a paved multiuse surface for bicyclists and pedestrians, or a new paved trail could be installed adjacent to the tracks. Both rail-with-trail and rail-trail options would use the approximately 10-mile rail corridor that connects Murphy to Andrews through an easement under the ownership of the NCDOT Rail Division. This corridor would improve bicyclist safety by keeping them off US-19/74, and could have significant economic impact if paired with other attractions along the Valley River Trail (like the casino, campgrounds, fishing, and bicycle excursions).

Project #3 – Two-Way Cycle Track (Macon County): Keeping bicyclists from having to perform dangerous turns and avoid busy roads will help lower the chances of collision and injury. This project takes advantage of the existing extra-wide paved shoulder on US-23/441 (Georgia Road) near the Otto Post Office south of Franklin, to create a short section of safe travel for bicyclists. Curb delineators and traffic paint could be used to create a two-way cycle track on this shoulder so that cyclists would not have to cross US-23/441 twice at the two southbound left turns required to traverse this 0.30-mile (1,500 foot) section. Existing conditions mandate that bicyclists cross five lanes without signalized assistance twice to get from Tessentee Road to Brown Road. This project would eliminate the need to take such an unnecessary risk.

Project #4 and #5 – Bicycle Climbing Lanes (US-64): NCDOT TIP Project R-4416 is under construction (as of February 2017), encompassing 4 miles of grading, drainage, and paving along US-64 in Clay County. This recommendation is to coordinate with NCDOT to request a five-foot shoulder upgrade, marked as a bicycle lane, on the uphill travel lane. Nearby, A future NCDOT TIP project to provide a truck climbing lane on US-64 at Winding Stair has been discussed. Coordinate with NCDOT to ensure that bicycle facilities are included in the scope of the project. US-64 carries high speed traffic through this region; a climbing lane allows bicyclists to avoid lengthy exposure while riding uphill at their slowest pace.

Project #6 – Bicycle Lanes & Intersection Improvements on Georgia Road: R-5734 and U-5604 are funded NCDOT STIP roadway projects on US-441 Business and US-23/441 in Franklin. This Plan recommends communication with NCDOT to include bicycle facility features- 5-foot buffered bike lanes on both sides of the road along Georgia Road (from US-64 to Addington Bridge Road/Prentiss Bridge Road) and shared lanes along Wayah Road to Depot Street.

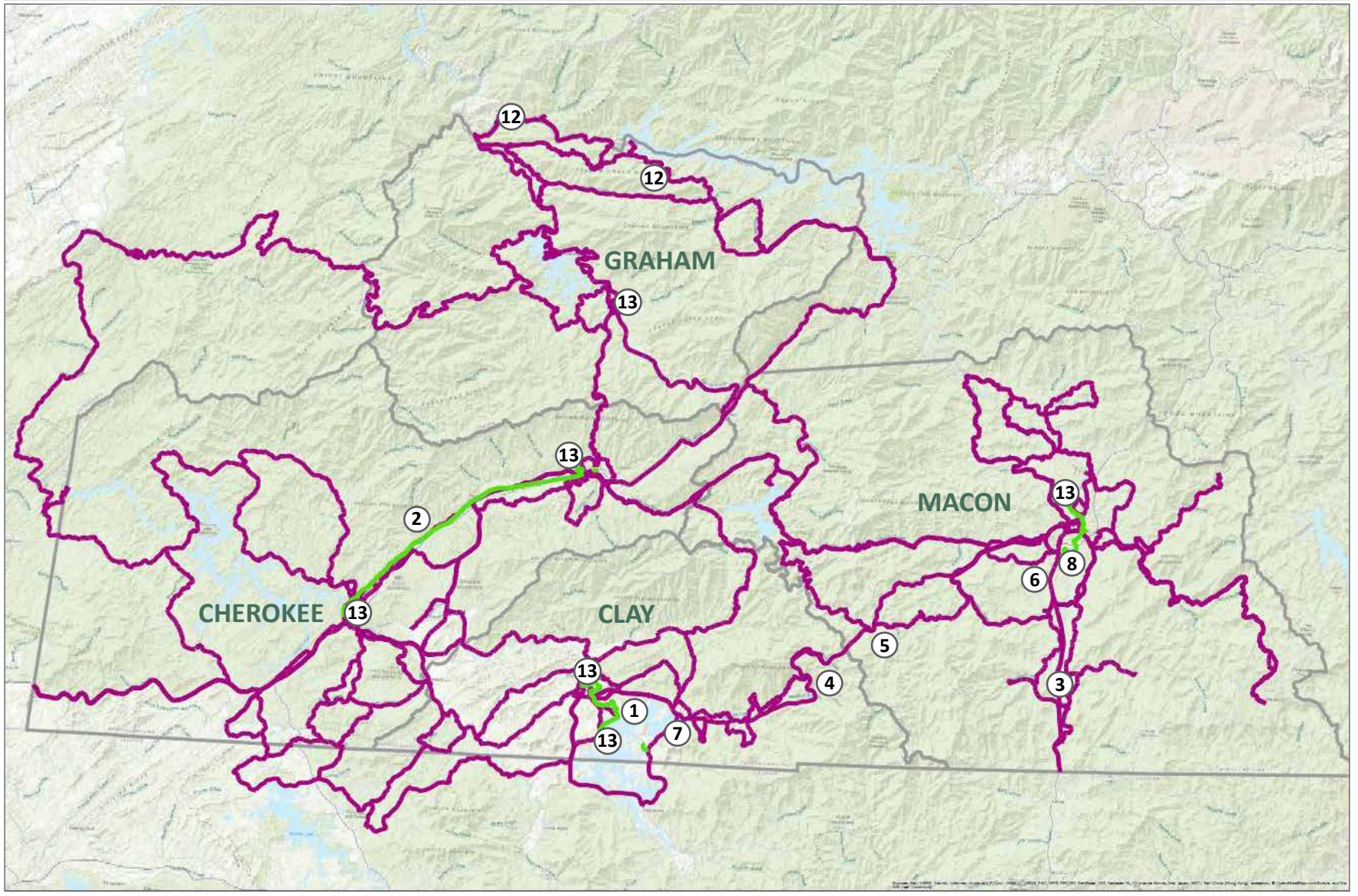
Project #7 – Bicycle Lanes on NC-175: R-5742 is a funded STIP roadway upgrade project on NC-175 (improvements from Georgia state line to US-64). This Plan recommends open communication with NCDOT- the need for bicycle facility features to be included on both sides of the road, where feasible. Active coordination by the Southwestern Commission and Clay County are needed to ensure that these features are included in this project.

Project #8 – Little Tennessee River Greenway Extension: Creating a 10'-12' paved path from the end of the existing trail (behind the Macon County LIbrary) to the Macon County Recreation Park would broaden the scope of access to this greenway dramatically, providing a crucial link in the bicycling system for all users- recreational, commuter, and tourist alike. The distance is short, but completing this section can have a big impact for bicyclists, connecting a variety of public uses, commercial corridors, and the town of Franklin.

Project #9 – Regional Bicycle Routes: Regional bicycle routes were developed by the project team to help advance several goals: improving bicycle tourism in the area, demonstrating support for bicyclists in the community, and opening the door to cooperation between county and state infrastructure projects. Some key themes to the routes were "Main Streets" (connecting two downtowns) and "TVA Dams" (connecting two or more dams).

Routes were identified from several sources (some are well-worn with riders in the community), field-checked for applicability, and compiled in interactive map form.

Figure 6-1 — All Project Recommendations



The project team produced four formatted printable versions to distribute as a tourism product - one folded edition for each county. These maps include safety tips, a description of NC bicycle laws, some general information about the region, inset maps of key towns in each county, and selected route elevations graphics. Each route had mileage categorized (under 10, 20-30, etc.), elevation gain, and road conditions.

In addition to the large-format glossy maps, cue sheets were developed for each individual route, so cyclists can print out a usable guide for their ride- with a map on one side and turn-by-turn directions on the other.

Project #10 - Bicycle Route Sign System: A bicycle route system should have appropriate directional and informational markers. Maps and cue sheets can be dramatically supplemented by signs, helping guide bicyclists and providing visual reinforcement that they are on the right path and that bicyclists are welcome and expected in the area. Together, these elements encourage greater use of roadways by bicyclists.

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. 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 (informing bicyclists of route direction changes) and confirmation signs that indicate on which route you are traveling (with information about direction, distance, and destination).

Project #11 - Safety Improvement Along Bicycle Routes: Developing a bicycle route system should include the targeting of roadway improvements along important or heavily used sections. The route selection process often reveals barriers to bicycling such as bridges with inadequate width or low railings and roadways that need bicycle improvements such as bike lanes, wide curb lanes, or wide paved shoulders to provide a continuous safe corridor of travel.

Recommendations for safety improvements along bicycle routes:

- Where paved shoulders (less than 4 feet wide) and 10 feet of right-of-way already exist, widen the road to include 5-foot shoulders on each side. Mark as bike lanes.
- Coordinate with NCDOT and Southwestern Commission to include bikeable shoulders in future STIP roadway investments. Saving small towns and rural counties money in construction costs is imperative to ease of implementation.
- Always recommend designated bicycle facilities on roadways with average daily vehicular traffic (AADT) of 2,000 or more.
- Consider phasing construction of shared lane markings ("sharrows") and bike lanes (where feasible) along all routes as they pass through downtown areas.
- Bicycle parking facilities should be installed at public spaces in every Main Street in the four-county region, including town halls, courthouses, and along Main Street itself.

Project #12 - "Cyclist Ahead" Actuated Warning Flashers: At locations with steep grades and poor sight distance, it would help improve safety for bicyclists to combine a bicycle detector with an actuated warning flasher to create a timed warning of a cyclist ahead. Some devices indicate how far ahead the cyclist is and can track bicyclist usage over time by keeping daily counts. The warning flasher will make sure motorists are prepared to slow down and/or pass a bicyclist ahead, and the counts can be used to help promote future bicycling investments.

Recommended locations include US-129 at Deal's Gap (this is the only direct route to NC-28 from Tennessee) and NC-28 between Fontana Village and Stecoah. During the public input process, attendees also recommended these devices at each end of NC-175, along Joe Brown Highway, and Burningtown.

Project #13 – Bike Racks & Fix-It Stations: Providing fix-it stations and bicycle parking at appropriate locations can make sure that cyclists in the region have the tools they need to facilitate travel. These small infrastructure improvements show support for bicycling in the community.

Recommended locations include Andrews Recreation Park, Clay County Recreation Park, and Tassee Park on the Little Tennessee River Greenway. During the public input process, attendees also recommended that these facilities be installed in parks downtown, creating a broader network of bicycle infrastructure.

Project #14 – Rumble Strip Remediation: This recommendation is to pave over rumble strips, which are depressed gouges along a road's edge designed to change the noise a vehicle's tires make and warn drivers of the edge of the road. The preference is not necessarily to remove the rumble strips entirely, but to create gaps for bicyclists to transition between the travel lane and shoulder (while rumble strips can present rideability issues for bicyclists- the presence, composition, and integrity of the shoulder surface can affect where a bicyclist chooses to travel – they

are helpful in preventing automobile drivers from accidentally swerving off the side of the road). This plan recommends working with NCDOT to add bicycle priority to resurfacing schedules. Many shoulders have already been resurfaced since rumble strips were installed wholesale in 2007. Regular scheduled resurfacing presents the best opportunity for removing or upgrading rumble strips.

IMPACTS OF RECOMMENDED PROJECTS

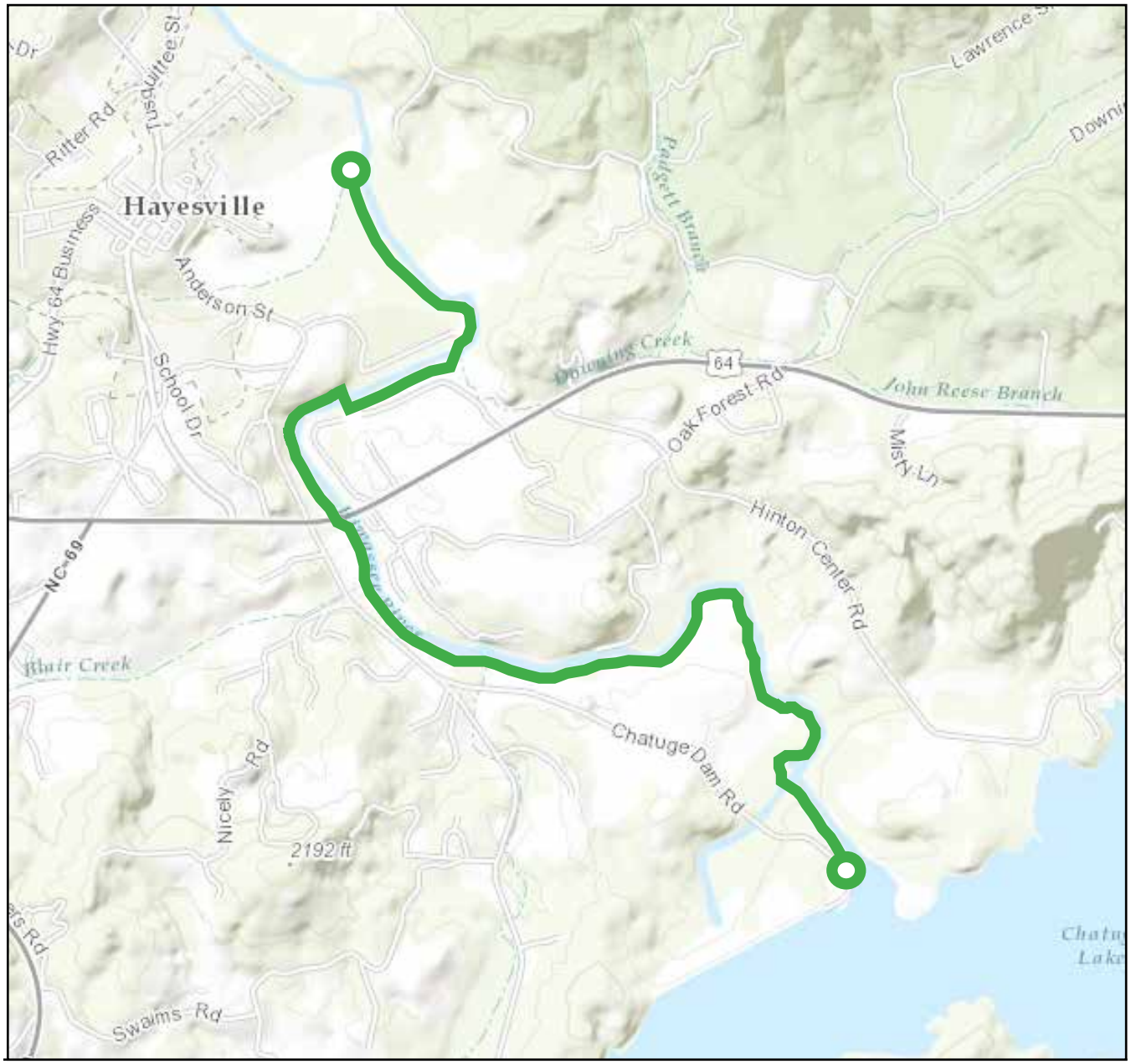
Stronger communities are created by offering recreation, exercise, and non-motorized transportation opportunities for all citizens. Greenways, bike lanes, and other bicycle infrastructure provide a safe place for people to enjoy nature and experience a sense of community and create stronger social and familial ties, while enabling physical fitness opportunities by encouraging healthy behavior - likewise, these amenities attract tourism and business investment which can spur the local economy and affect the community's wellbeing.

Bicycle networks can also reinforce the identity of a community by incorporating public art and highlighting local history into the design.

The specific project recommendations of the Southern Blue Ridge Bike Plan affect the community's health in different ways.

- New greenways will connect schools to recreational opportunities, help users appreciate the scenic beauty of the area - its agricultural land and winding rivers, connect towns to each other, and encourage commercial, business, and real estate investments and returns.
- Bicycle climbing lanes serve as safety and comfort measures, enabling cyclists to ride at their own pace without feeling as though they are slowing down traffic (truck lanes do the same thing). Encouraging cyclists to ride more strenuous uphill routes can improve their overall physical health and stamina as well.
- New bicycle lanes help demonstrate support for the cycling community by offering designated facilities. They also encourage more timid riders who may feel uncomfortable on narrow shoulders or shared lanes, thereby increasing interest in a healthy method of transportation and increasing the number of people commuting and traveling by bike.
- Bicycle routes may encourage more group rides and cycle events (races, charity fundraisers, themed rides), while printable maps of a regional route system can have a positive effect on branding the area as a bicycling tourism destination.
- Bike racks and fix-it stations help ensure peoples' bicycles are in working order and do not get stolen, thereby encouraging the practice in general and demonstrating support from the community.
- "Cyclist Ahead" actuated warning flashers offer a clear safety improvement, helping motor vehicle drivers maintain awareness of the cycling community, while improving the relative security of cyclists as they traverse particularly winding roads.

Project 1 The Hiwassee River Greenway



PROJECT DESCRIPTION

The Hiwassee River Greenway will serve to provide citizens and visitors of Hayesville and Clay County an opportunity to connect from the Clay County Recreation Department/ Spikebuck Mound, a culturally significant Cherokee site, to expansive vistas found along the Chatuge Dam trail. From the Dam trail, users can easily connect to the Clay County Recreation Park.

Along the route, users will experience the serenity of vast agricultural open spaces of the fertile Hiwassee River corridor floodplain, which are rich with cultural heritage. Users will also find several improved locations to access the Hiwassee River.

COST ESTIMATE

$4.2 m

LENGTH

4 Miles

USERS (see page 3 for more info)

- Enthusiastic & Confident
- Interested but Concerned
- No Way, No How

HEALTH & ECONOMIC IMPACTS

This greenway will increase tourism dollars and provide increased health benefits for community.

Project 1 The Hiwassee River Greenway

INFLUENCES:

- Connection from downtown to existing Lake Chatuge trail system
- Loosely follow Hiwassee River Corridor
- Access to Food
- High School cross country team use

DESIGN CONSIDERATIONS:

- Consider accommodating "natural surface" parallel section for cross country use.
- Agricultural land use interface/exclusion of private property.
- Primarily off-road, but some roadway interface will be necessary.
- May consider initial establishment of right of way and natural path, but may ultimately be a highly used (paved) greenway.

DESTINATIONS:

- Lake Chatuge day use area and trail system
- Clay County Recreation Park
- Chatuge Aerating Infuser Weir interpretive areas
- Clay County Parks/Spikebuck Mound
- Hiwasee River Access (along Myers Chapel Road)

CONSTRAINTS:

- Bridge crossing(s), either under or at-grade.
- Interface with Lake Chatuge spillway and associated encroachments.
- Potential rock outcrop section
- Floodplain/floodway.

POTENTIAL PARTNERS

Clay County Soil and Water Conservation District

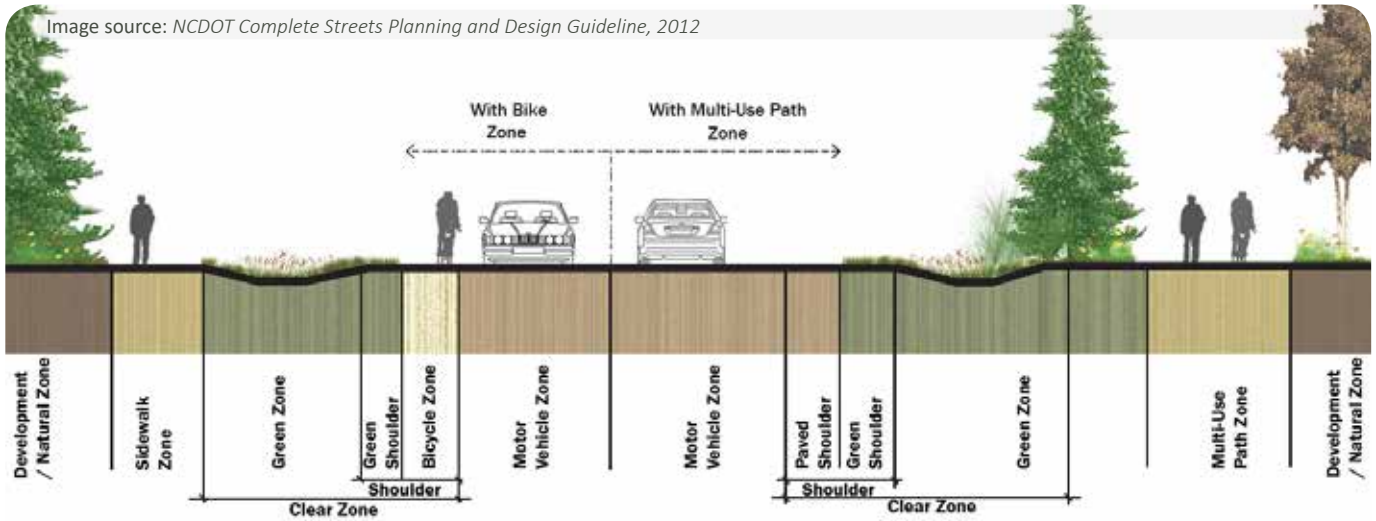
Clay County Communities Revitalization Association (grant writing)

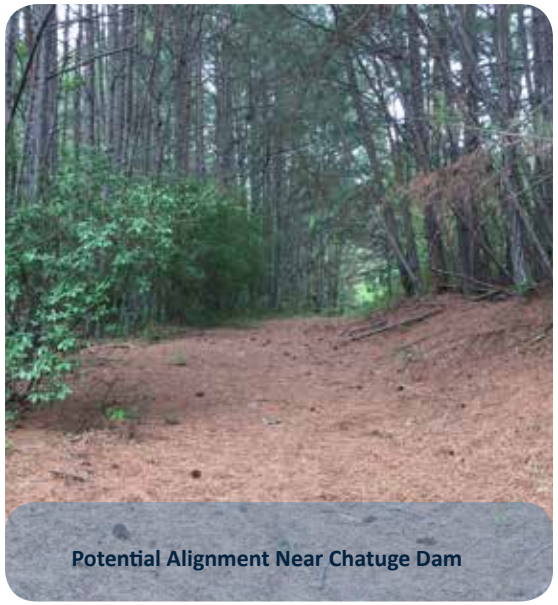
Southwestern NC Resource Conservation & Development (RC&D) Program

Potential Alignment at Chatuge Dam

Potential Design Treatments & Accents

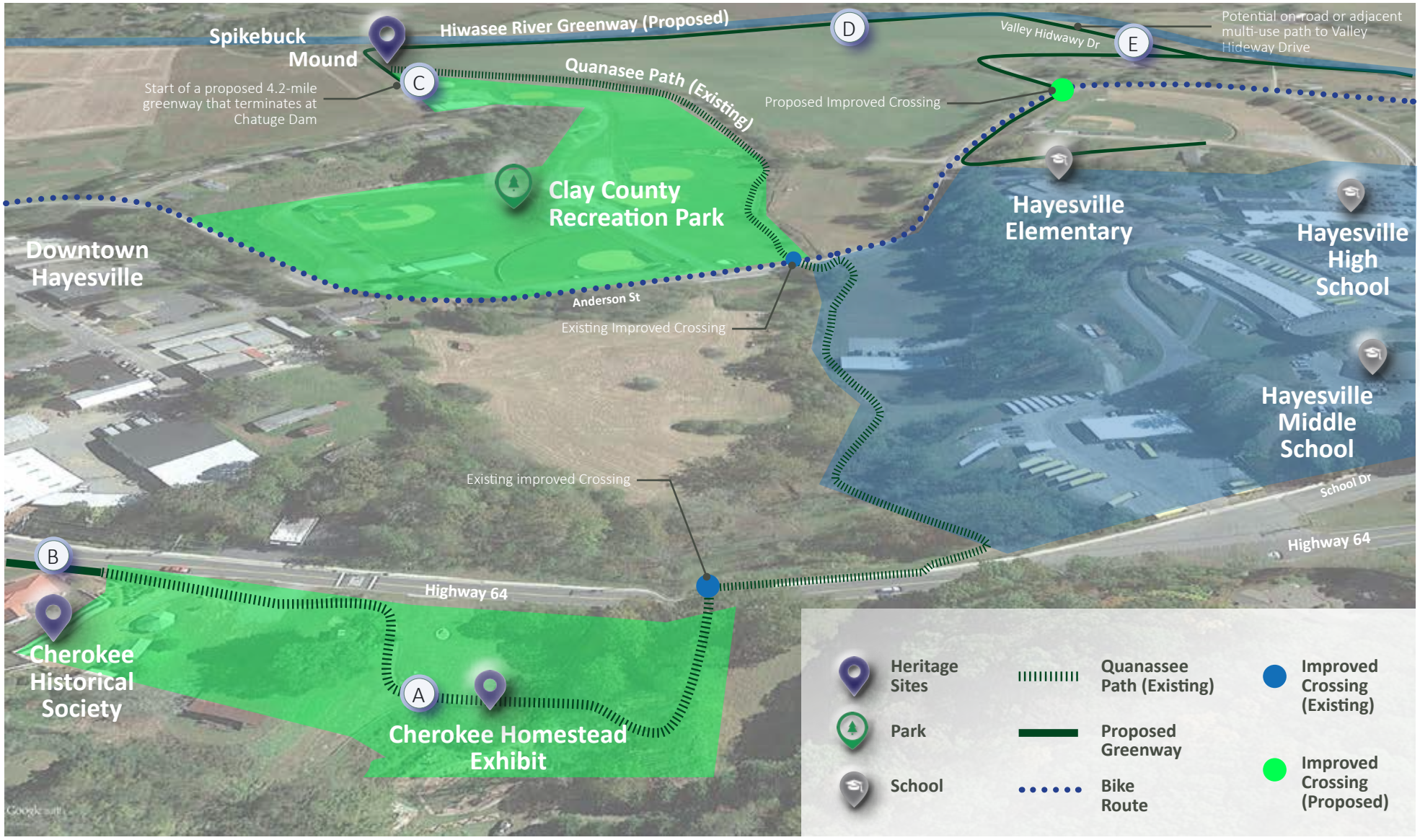
Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*



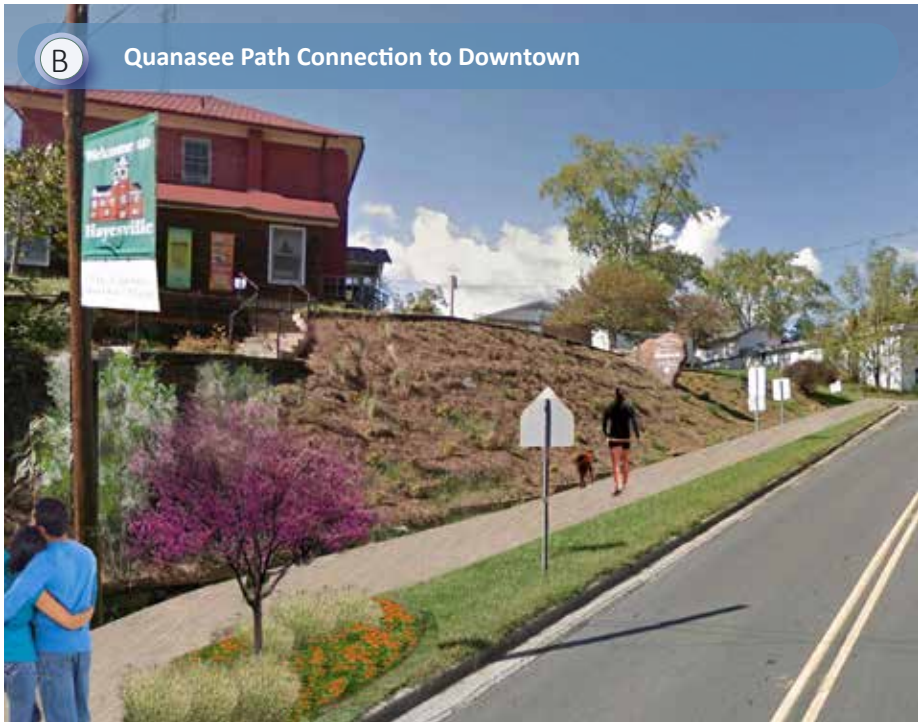


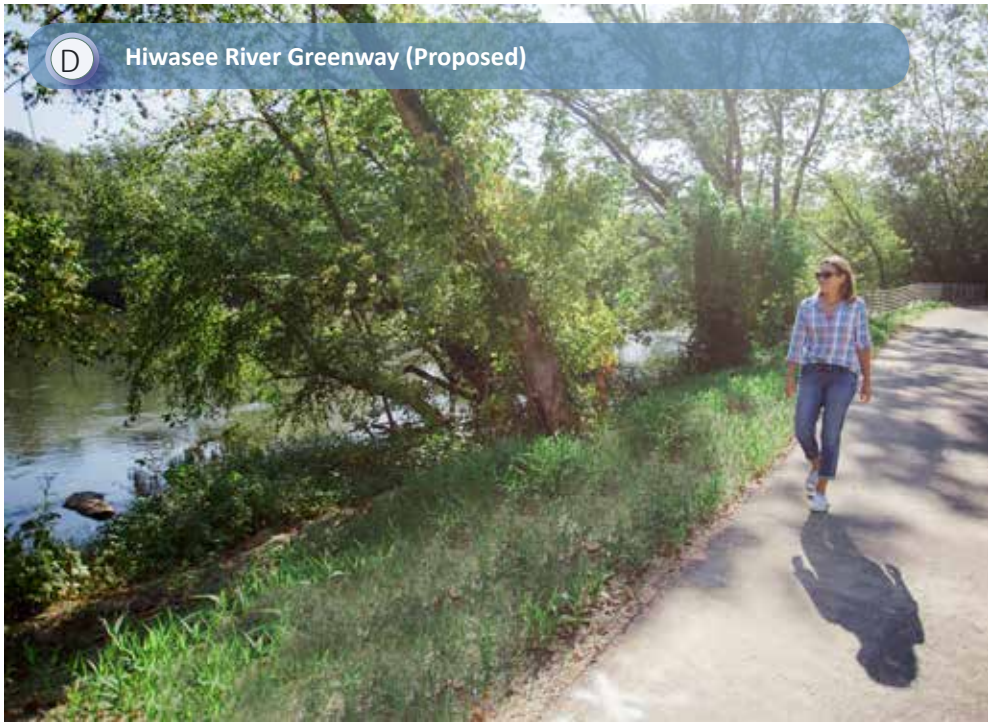
Potential Alignment Near Chatuge Dam

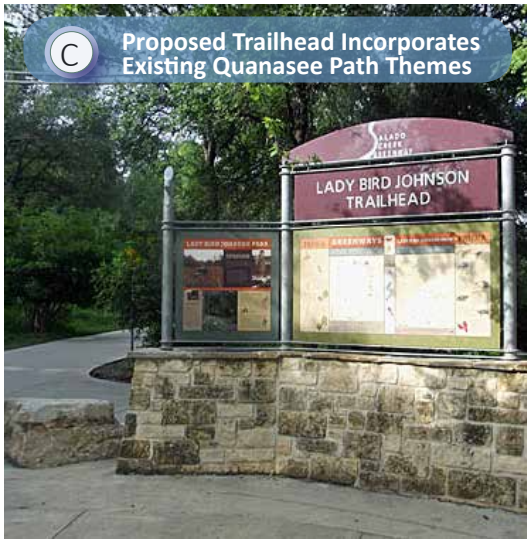
Project 1 The Hiwassee River Greenway

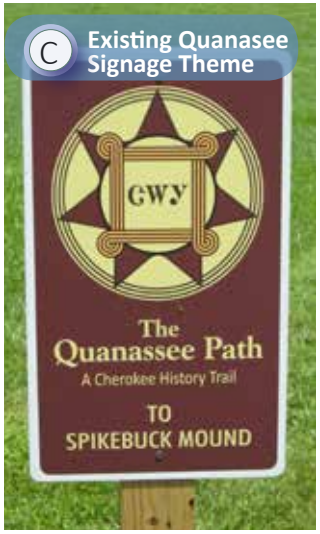


Project 1 The Hiwassee River Greenway

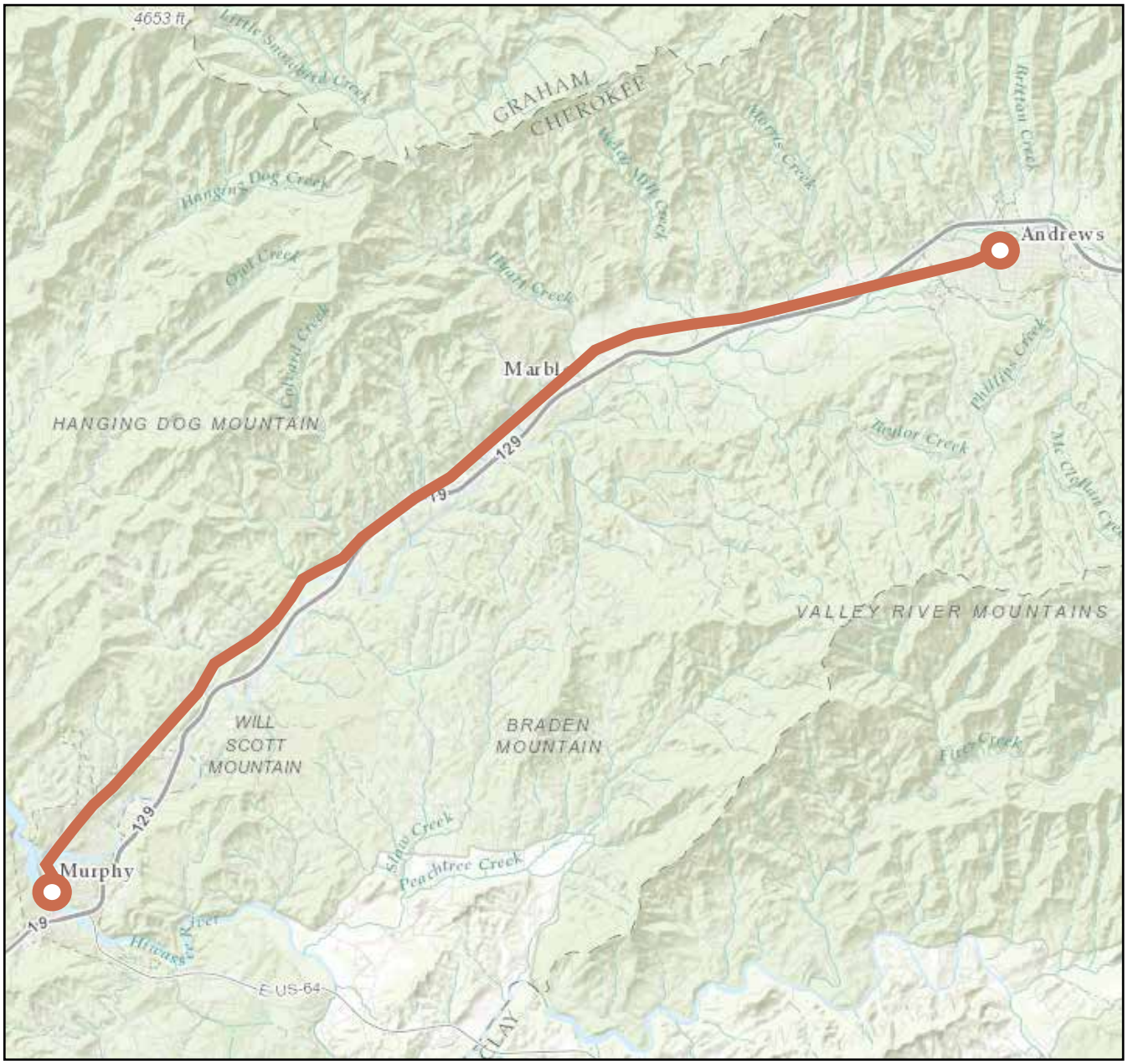








Project 2 The Valley River Trail (Rail-with-Trail or Rail-Trail)



PROJECT DESCRIPTION

The Valley River Rail Trail, using the rail line and rail bed from Andrews to Murphy, has potential as an alternative option if passenger or freight rail is determined infeasible. Both rail-with-trail and rail-trail options would use the approximately 10-mile rail corridor that connects Murphy to Andrews through an easement under the ownership of the NCDOT Rail Division.

This corridor could have significant economic impact if paired with other attractions along the Valley River Trail, like the Casino, campgrounds, fishing, Piney Knob trails, and bicycle excursions from Murphy or Andrews.

COST ESTIMATE

$8-10 Million* * Not incuding additional land acquisition or ROW encroachments, but does includes new or existing bridge repair

LENGTH

Approximately 10 Miles

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned
- No Way, No How

HEALTH & ECONOMIC IMPACTS

Economic development opportunities for outdoor recreation and supporting commercial businesses. Can serve as main bicycle/pedestrian connection of valley.

Project 2 The Valley River Trail (Rail-with-Trail or Rail-Trail)

INFLUENCES:

- The Valley River
- Scenic views of agriculture, the river, and mountains
- The Nantahala Scenic Byway (Highway 74/19)
- Several RV resorts and campgrounds

DESIGN CONSIDERATIONS:

- 10-foot greenway, 12-foot greenway within Murphy and Andrews.
- Repair and reuse existing structures which included three major bridges, several smaller bridges.
- Several major trailheads located in Murphy, Marble, near the Casino, and in Andrews. This could include improvements to the existing Depots.

POTENTIAL PARTNERS

NCDOT, The Town of Murphy, The Town of Andrews, Cherokee County, the Southwestern Commission, Cherokee County Chamber of Commerce, Great Smoky Mountain Railroad, Rails-to-Trails Conservancy, Hiwassee River Watershed Coalition, and Heritage Partners (Murphy River Walk)

DESTINATIONS:

- Murphy/Murphy River Walk
- Andrews
- Harrah's Cherokee Valley River Casino
- Marble Elementary, Andrews High School, Murphy High and Middle School

CONSTRAINTS:

- NCDOT owns 200' easement, of which some or all may only be used for railroad use. Easement language should be clarified.
- Some encroachment of homes and businesses within the 200-foot easement occur and would need to be resolved.
- Great Smoky Mountain Railroad (GSMR) owns a portion in Andrews, and was not included in consideration for rail trail. Further discussions with GSMR would need to occur to determine use of their section of line.
- Three bridges, including a 35' high trestle bridge, and two metal trestle bridges are in need of major repairs. Several smaller bridges are in need of minor repair. Many other costs were identified in the Andrews to Murphy (A2M) Rail Activation Study.

The Existing Rail Line

Potential Design Treatments & Accents

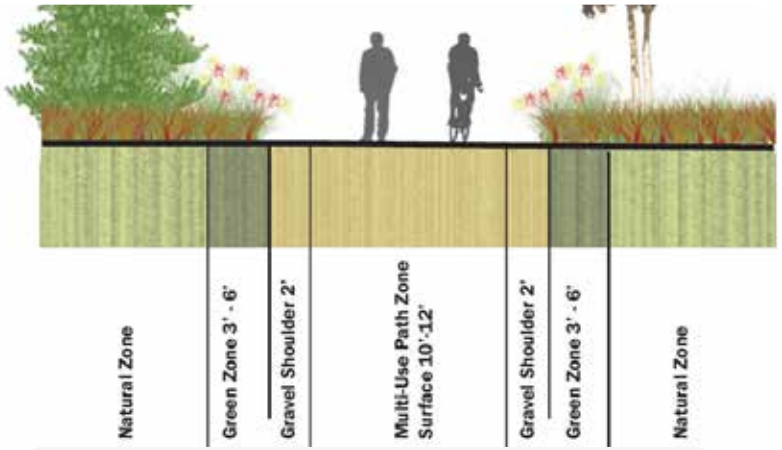


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*

Example of potential greenway treatment through Murphy or Andrew's town centers
Image source: *Courtesy of Laura Sandt*

Existing Timber Trestle Bridge in Need of Significant Repair
Image source: *Andrews to Murphy Rail Activation Study, 2015*

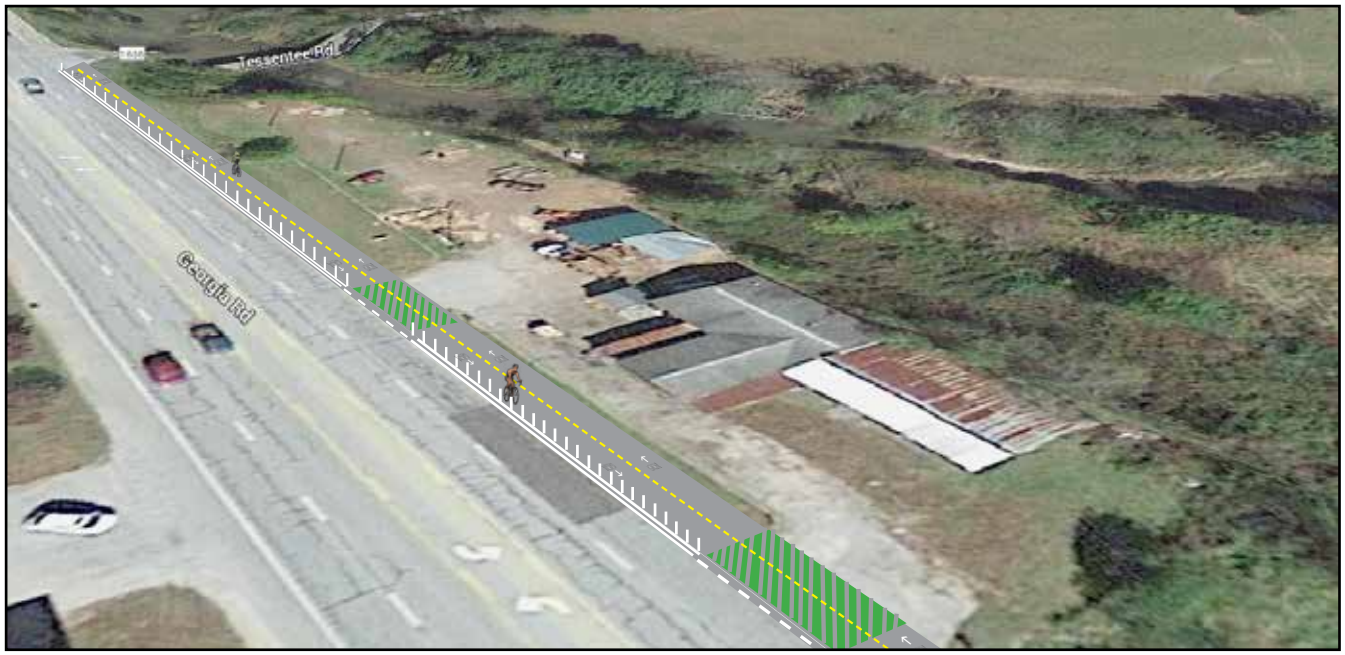
Project 2 The Valley River Trail (Rail-with-Trail option)

Project Rendering

Project 2 The Valley River Trail (Rail-Trail option)

Project Rendering

Project 3 Two-Way Cycle Track (Macon County)



PROJECT DESCRIPTION

The existing paved shoulder on US-23/441 (Georgia Road) is extra wide between Tessentee Road and Brown Road, near the Otto Post Office south of Franklin.

Curb delineators and traffic paint could be used to create a 2-way cycle track on this shoulder so that cyclists would not have to cross US-23/441 twice at the two southbound left turns required to traverse this 0.30-mile (1,500 foot) section.

COST ESTIMATE

$18,000

LENGTH

Approx. 0.3 miles (1,500 feet)

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned

HEALTH & ECONOMIC IMPACTS

Allows bicyclists to avoid two potentially hazardous 5-lane road crossings.

Project 3 Two-Way Cycle Track (Macon County)

INFLUENCES:

- The Little Tennessee River
- Scenic views of agriculture, the river, and mountains
- Several RV resorts and cabin rentals
- Rural/Residential connections

DESIGN CONSIDERATIONS:

- 10-foot cycle track, allowing for 5-foot lanes in each direction.
- Green thermoplastic markings to clearly indicate the bicycle facilities.
- Physical delineators along the cycle track can be useful in further protecting bicyclists and making sure they feel comfortable.

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, The Town of Otto, Macon County, the Southwestern Commission, Otto Elementary School, Otto Volunteer Fire Department

DESTINATIONS:

- Otto Post Office
- Franklin
- NC/GA border
- Otto Elementary School, South Macon Elementary School, Union Academy
- Lupita Mexican Store, Culpepper's Otto Depot

CONSTRAINTS:

- Two commercial driveways cross the proposed facility, though not heavily used.
- Grassy shoulders and large trees behind metal guard rails could become overgrown in the cycle track, impeding cyclist travel.

OPPORTUNITIES:

- Project connects two rural secondary roads, providing a continuous path for two of the routes in this plan.
- Grassy shoulders and large trees behind metal guard rails could become overgrown in the cycle track, impeding cyclist travel.

Delineators separating bikes from cars

Potential Design Treatments & Accents

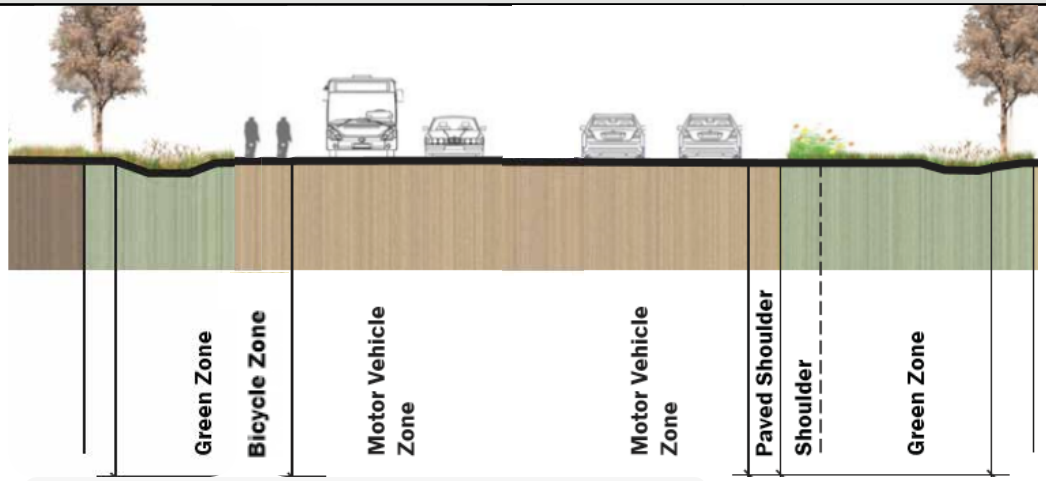
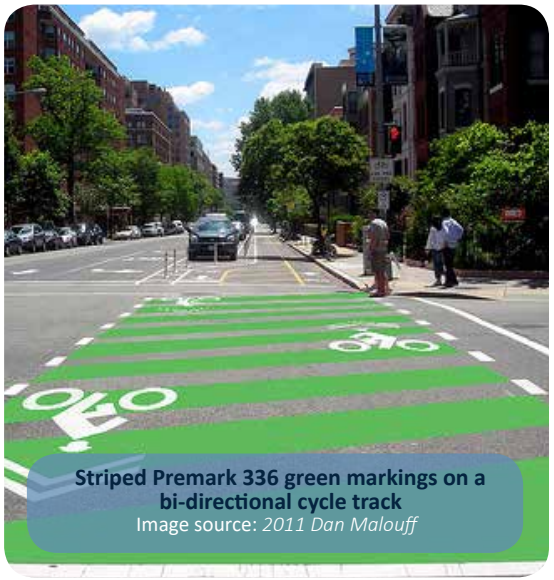
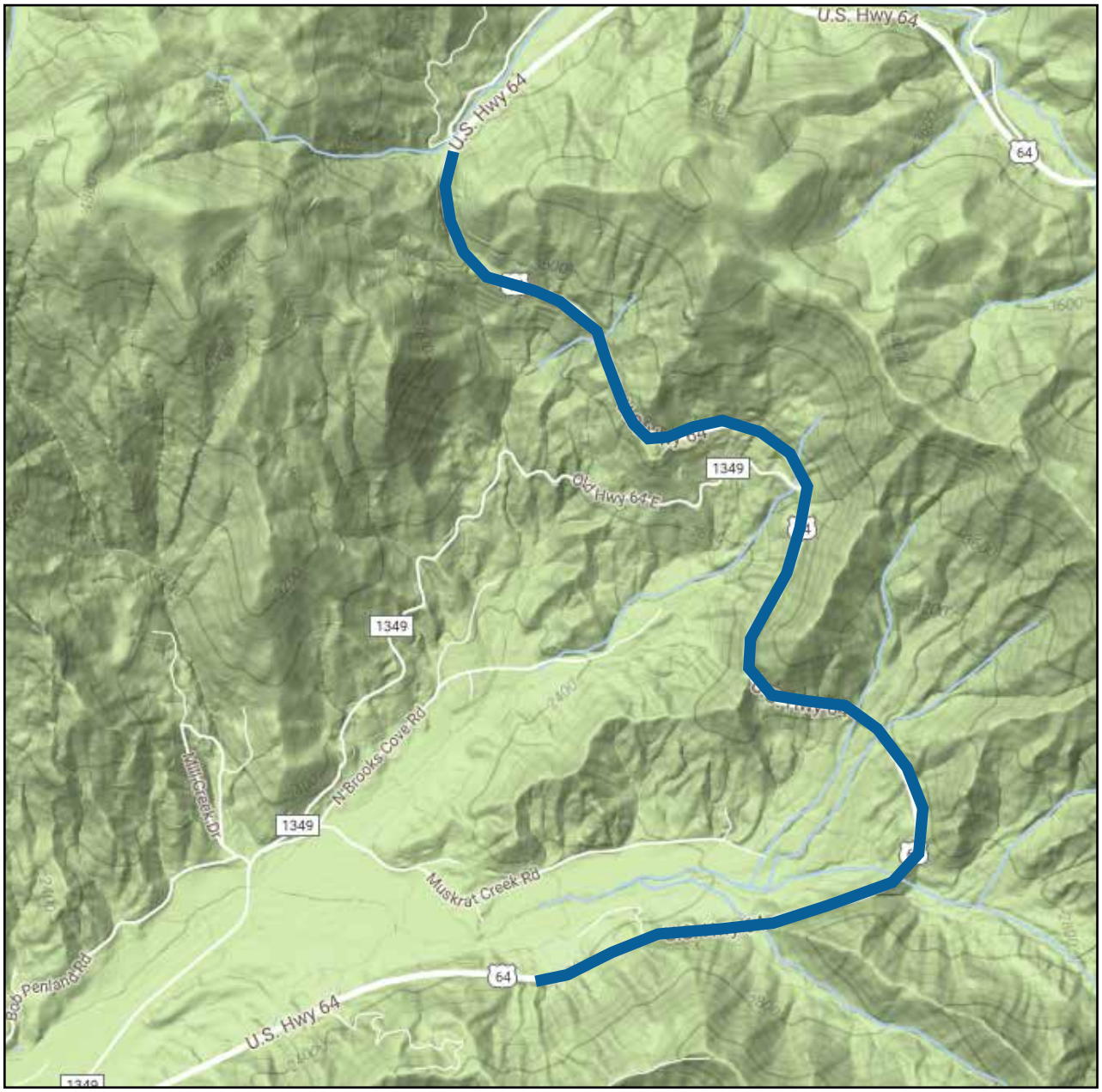


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*



Striped Premark 336 green markings on a bi-directional cycle track
Image source: *2011 Dan Malouff*

Project 4 Chunky Gal Gap Climbing Lane (US-64)



PROJECT DESCRIPTION

NCDOT STIP Project R-4416 is under construction (clearing and grubbing complete), encompassing 4 miles of grading, drainage, and paving along US-64 in Clay County. Approach NCDOT to request a five-foot shoulder upgrade, marked as a bicycle lane, on the uphill travel lane from Brown Drive to National Forest Road at the Chunky Gal Trailhead.

If NCDOT accepts the request, they can pay for 100% of the cost.

COST ESTIMATE

$600,000
(as a stand-alone project if not incorporated into NCDOT's TIP R-4416).

LENGTH

Approximately 4 miles

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident

HEALTH AND ECONOMIC IMPACTS

Encouraging regional bicycle tourism and improving safety for cyclists.

Project 4 Chunky Gal Gap Climbing Lane (US-64)

INFLUENCES:

- Nantahala National Forest
- Scenic views of the mountains, agricultural land, and nearby lakes
- Appalachian Trail
- Churches, cabin rentals, and vineyards

DESIGN CONSIDERATIONS:

- US-64 carries high speed traffic through this region; a climbing lane allows bicyclists to avoid lengthy exposure while climbing at their slowest pace.
- Seek to have a 5-foot paved shoulder with no rumble strips added to the NCDOT STIP project. Rumble strips can adversely affect a cyclist's ride and limit their ability to enter the travel lane when necessary.

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, The Town of Hayesville, Macon County, Clay County, the Southwestern Commission

DESTINATIONS:

- Franklin and Hayesville
- Cartoogechaye Elementary School
- NC/GA border
- Chatuge Lake and Dam; Jackrabbit
- Standing Indian Campground

OPPORTUNITIES:

- Partnering with NCDOT and the Complete Streets philosophy is the most practical and cost-effective way to achieve this improvement.
- Improving safety for bicyclists at their slowest speeds adjacent to or in the travel lanes with high-speed vehicular traffic.
- This climbing lane, paired with the Winding Stair climbing lane, will enable bicyclists to travel more easily between Hayesville and Franklin along the most direct route.

Existing paved shoulders are often wide enough to accommodate bike lanes.

Potential Design Treatments & Accents

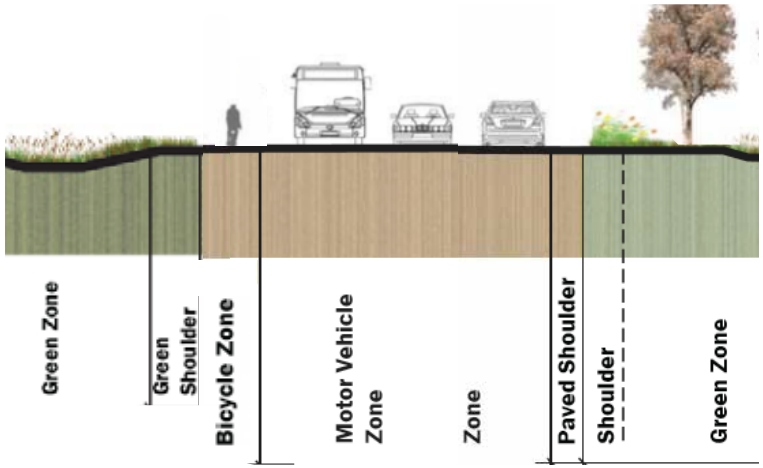


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*

A lighter bike is easier to ride uphill, but every rider slows to a crawl on the steepest inclines.

Greater separation between automobiles and cyclists improves safety.

Project 5 Winding Stair Climbing Lane (US-64)

PROJECT DESCRIPTION

A future NCDOT TIP project to provide a truck climbing lane on US-64 at Winding Stair has been discussed. Coordinate with NCDOT to ensure that bicycle facilities are included in the scope of a project along this corridor, so that a 5-foot minimum bikeable shoulder is featured on the westbound side of the road from SR-1448 to Rainbow Springs Road.

Existing conditions include a narrow shoulder with continuous rumble strips.

COST ESTIMATE

$640,000
(as a stand-alone project, if not incorporated into NCDOT's proposed TIP project).

LENGTH

Approximately 4.3 miles

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident

HEALTH AND ECONOMIC IMPACTS

Encouraging regional bicycle tourism and improving safety for cyclists.

Project 5 Winding Stair Climbing Lane (US-64)

INFLUENCES:

- Nantahala National Forest
- Scenic views of the mountains, agricultural land, and nearby lakes
- Appalachian Trail
- Cabin rentals, churches, and RV parks

DESIGN CONSIDERATIONS:

- US-64 carries high speed traffic through this region; a climbing lane allows bicyclists to avoid lengthy exposure while climbing at their slowest pace.
- Seek to have a 5-foot paved shoulder with no rumble strips added to the NCDOT STIP resurfacing or roadway improvements project (like a truck climbing lane). Rumble strips can adversely affect a cyclist's ride and limit their ability to enter the travel lane when necessary.

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, The Town of Hayesville, Macon County, Clay County, the Southwestern Commission, West Macon Volunteer Fire Department

DESTINATIONS:

- Franklin and Hayesville
- NC/GA border
- Cartoogechaye Elementary School
- Chatuge Lake and Dam
- Standing Indian Campground
- Cartoogechaye Creek Campground

OPPORTUNITIES:

- Partnering with NCDOT and the Complete Streets philosophy is the most practical and cost-effective way to achieve this improvement.
- Improving safety for bicyclists at their slowest speeds adjacent to or in the travel lanes with high-speed vehicular traffic.
- This climbing lane, paired with the Chunky Gal Gap climbing lane, will enable bicyclists to travel more easily between Hayesville and Franklin along the most direct route.

A 5-foot bike lane accommodates and encourages use by a wide variety of cyclists.

Potential Design Treatments & Accents

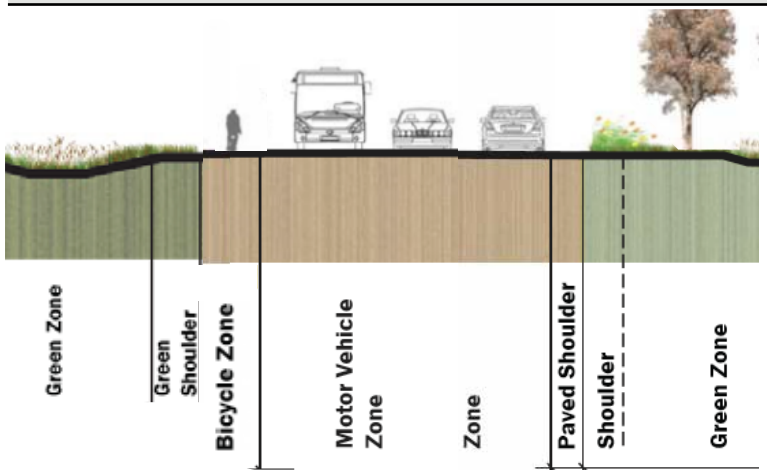


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*

The climbing lane ends when the route reaches a peak and begins to head downhill

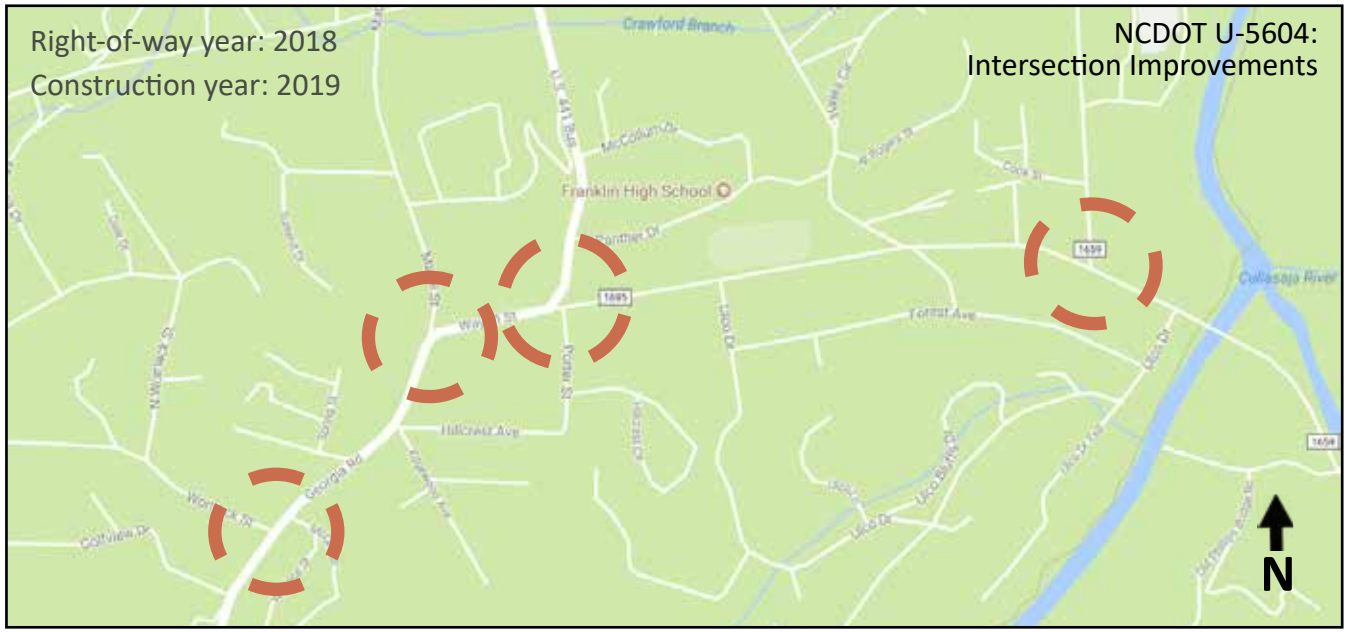
Project 4 Chunky Gal Gap Climbing Lane (US-64)

Project Rendering

Project 5 Winding Stair Climbing Lane (US-64)

Project Rendering

Project 6 Georgia Road Bike Improvements (Macon County)



PROJECT DESCRIPTION

R-5734 and U-5604 are funded NCDOT STIP roadway projects on US-441 Business and US-23/441 in Franklin. This Plan recommends communication with NCDOT to include bicycle facility features - 5-foot buffered bike lanes on both sides of the road along Georgia Road (from US-64 to Addington Bridge Road/ Prentiss Bridge Road) and shared lanes along Wayah Road to Depot Street.

COST ESTIMATE

R-5734(A) - $6.29 million
R-5734(B) - $31 million
U-5604 - $7.7 million

Only state NCDOT construction dollars are needed to procure "standard" bicycle elements.

LENGTH

Approximately 4.3 miles

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident

HEALTH AND ECONOMIC IMPACTS

Encouraging regional bicycle tourism and improving safety for cyclists.

Project 6 Georgia Road Bike Improvements (Macon County)

INFLUENCES:

- Little Tennessee River Greenway
- Hotels, restaurants, pharmacies, clinics, banks, industry, and many other businesses along this route
- Downtown Franklin

DESIGN CONSIDERATIONS:

- The route in these projects has several major intersections (some signalized) and many commercial driveways; frequent curb cuts can severely impose on bicyclists because vehicular traffic movements are often unpredictable and cyclists are often overlooked.
- Ideally, on-street bicycle facilities should have physical separators along Georgia Road to help keep motor vehicles out of the bicycle lane.

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, Macon County, the Southwestern Commission

DESTINATIONS:

- Franklin High School
- NC/GA border
- Macon County Recreation Park
- Smoky Mountain Center for the Performing Arts
- Franklin Golf Course
- Franklin Chamber of Commerce

OPPORTUNITIES:

- Partnering with NCDOT and the Complete Streets philosophy is the most practical and cost-effective way to achieve this improvement. Installing bicycle facilities along these corridors is unlikely without STIP funding.
- Improving safety for bicyclists (local citizens and tourists) along high volume, high speed, high commercial development along US-23/441.
- These highway corridors connect to the same shopping and employment destinations as the number one ranked project in BikeWalk Franklin; improving bicycle access makes these destinations available by bicycle.

Green paint can greatly accentuate a bike lane and clearly delineate the separation from the motor vehicle lane.

Image Source: 2011 Dan Malouff

Potential Design Treatments & Accents

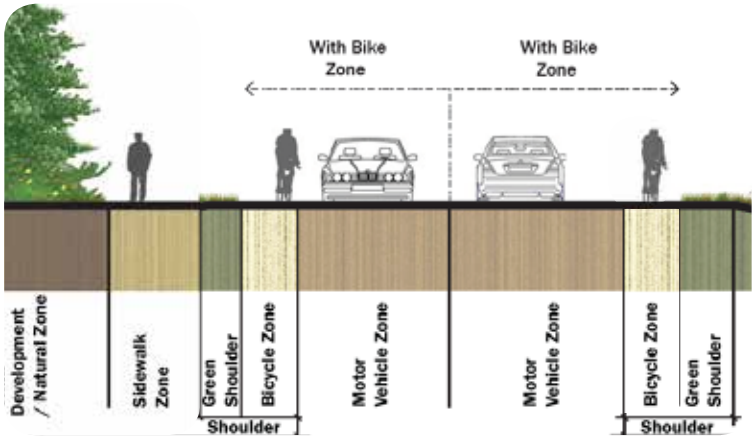
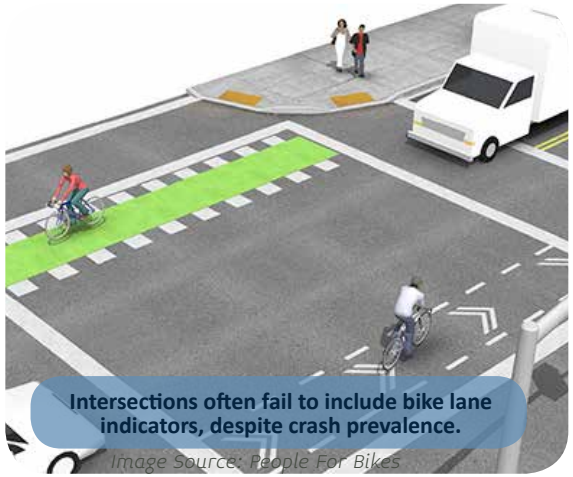


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*



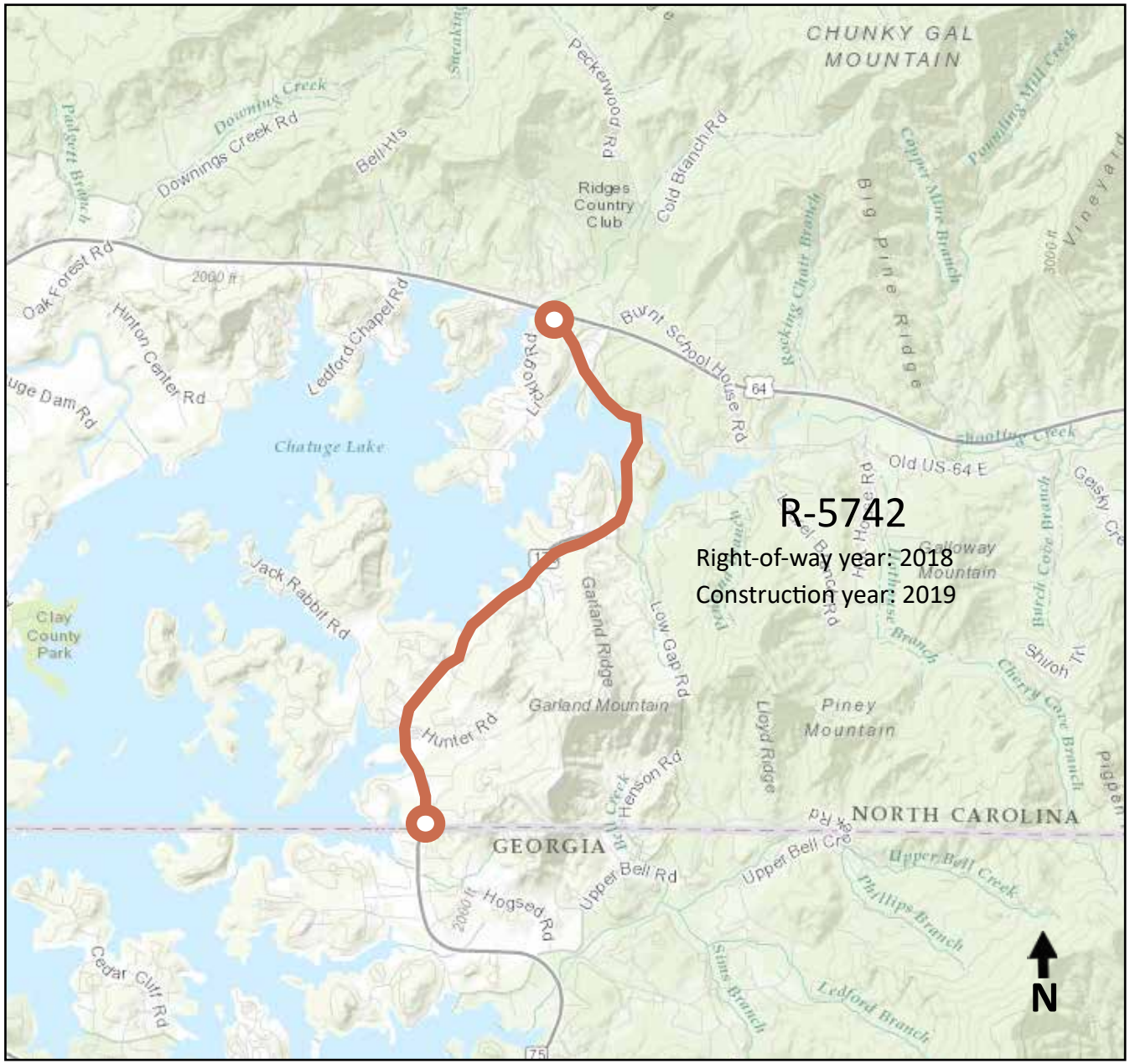
Intersections often fail to include bike lane indicators, despite crash prevalence.

Image Source: People For Bikes

A bike box allows cyclists to position themselves for a left turn at an intersection and remain visible to cars turning right.

Image Source: BikeSide LA

Project 7 Bicycle Lanes on NC-175 (Clay County)



PROJECT DESCRIPTION

R-5742 is a funded STIP roadway project on NC-175 (improvements from Georgia state line to US-64). Communicate to NCDOT the need for bicycle facility features to be included on both sides of the road.

Active coordination by the Southwestern Commission and Clay County are needed to ensure that these features are included in this project.

COST ESTIMATE

R-5742 - $12.8 million

Only state NCDOT construction dollars are needed to procure "standard" bicycle elements.

LENGTH

Approximately 4 miles

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned

HEALTH AND ECONOMIC IMPACTS

Encouraging regional (and interstate) bicycle tourism and improving safety and comfort for cyclists.

Project 7 Bicycle Lanes on NC-175 (Clay County)

INFLUENCES:

- Hayesville and Franklin
- Churches, campgrounds, cabin rentals, marinas, and other businesses along this route

DESIGN CONSIDERATIONS:

- This corridor has only narrow shared lanes and often no shoulder at all, with some limited sight distance.
- A bicycle repair station is a helpful amenity to add to popular bike routes, providing cyclists with tools to fix their bikes.

POTENTIAL PARTNERS

NCDOT, The Town of Hayesville, Clay County, Georgia DOT, the Southwestern Commission

DESTINATIONS:

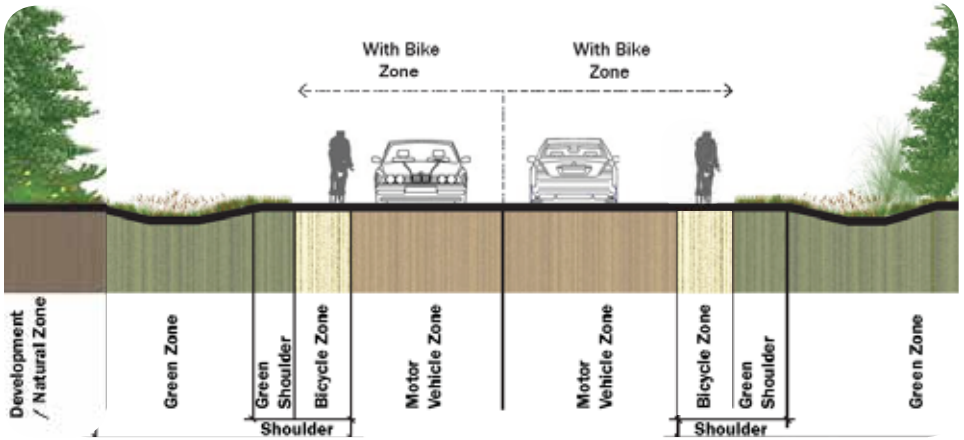
- Chatuge Lake and Dam
- NC/GA border
- Clay County Recreation Park
- Hiawassee, GA
- Jackrabbit Mountain campground and trails

OPPORTUNITIES:

- Partnering with NCDOT and the Complete Streets philosophy is the most practical and cost-effective way to achieve this improvement. Installing bicycle facilities along these corridors is unlikely without STIP funding.
- Improving safety and comfort for bicyclists (local citizens and tourists) along this scenic route can boost interstate tourism between North Carolina and Georgia.
- There are several intersections and bridge crossings along this corridor; Jackrabbit campground and mountain biking trails are accessed from this road.
- This is one of only two through routes connecting Hayesville with Hiawassee, GA, and the pair of routes are popular with cyclists riding around Lake Chatuge (one of the bicycle routes in this plan).

Most roadway widening projects will have paved shoulders, but they won't be wide enough to serve as bike lanes unless communities provide input to NCDOT.

Potential Design Treatments & Accents



Cyclists are forced to use the travel lane when there is no paved shoulder, causing safety issues and potential conflict.

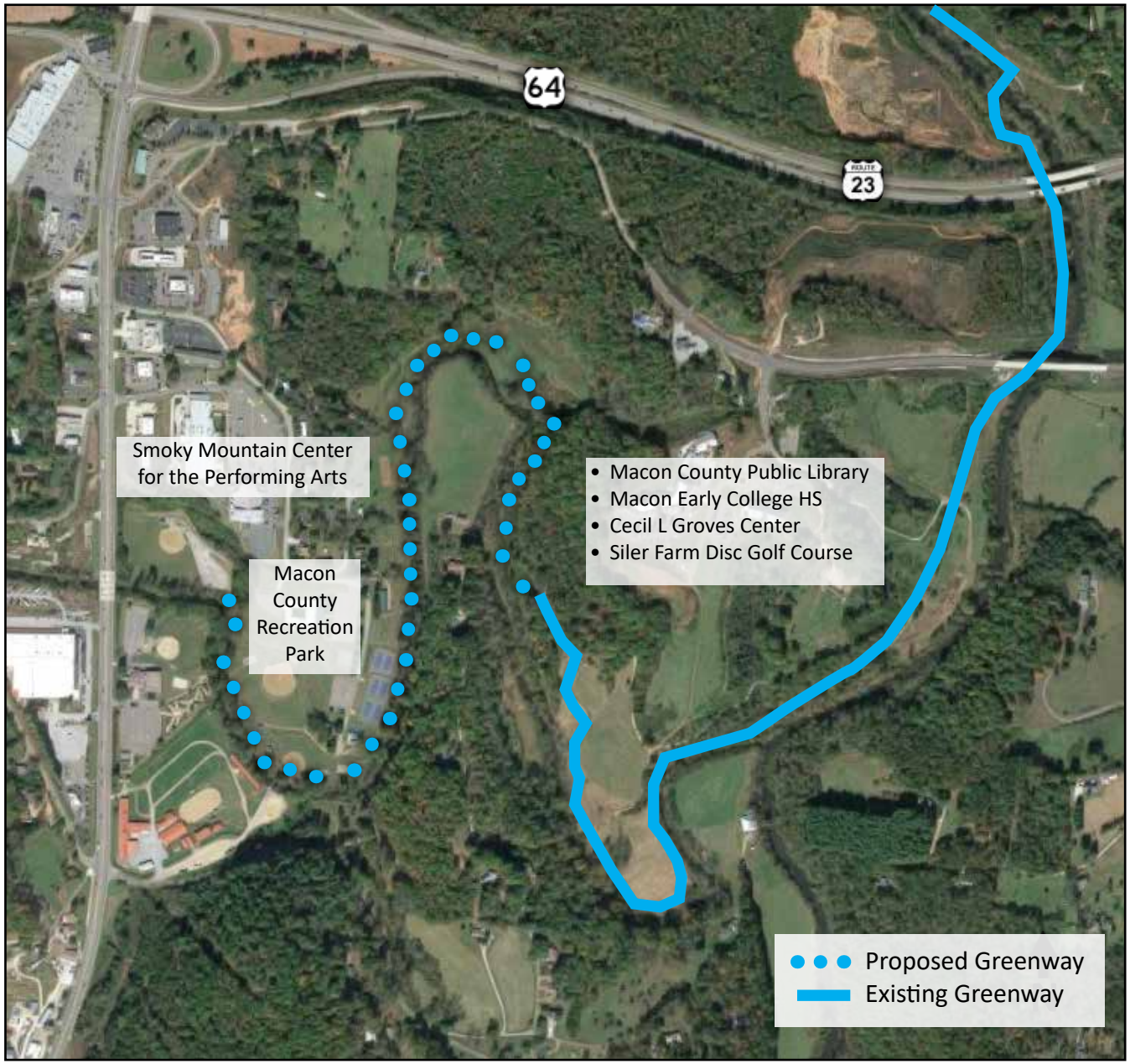
Project 6 Bicycle Lane on Georgia Road (TIP R-5734)

Project Rendering

Project 7 Bicycle Lanes on NC-175 (Clay County)

Project Rendering

Project 8 Little Tennessee River Greenway Extension



PROJECT DESCRIPTION

The Little Tennessee River Greenway can be continued around the loop of Cartoogechaye Creek or by crossing the creek twice for a much shorter trail; contruct a 10'-12' paved trail from the existing trail behind the library to the rec park facility.

The trail should be continued well into the park, even as far as the main building, which would mean upgrading the existing creek bridge that connects the main building to baseball fields, the pool, a playground, and a larger pavilion. The pedestrian bridges should be another focus for future upgrades, demonstrating commitment to recreation in the region and ensuring accessibility.

COST ESTIMATE

$550,000

LENGTH

Approximately 4,000 linear feet

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned

HEALTH AND ECONOMIC IMPACTS

A facility dedicated to physical health would become accessible by means of active transportation, encouraging regional bicycle tourism and improving safety and comfort.

Project 8 Little Tennessee River Greenway Extension

INFLUENCES:

- Franklin
- Public facilities and businesses along this route

CHALLENGES:

- Property owners along this section of river may be against selling their riverbank parcels or issuing an easement agreement.
- The Recreation Park already has substantial parking facilities, but promotion of the greenway through the design and construction of trailheads and wayfinding are important.

DESTINATIONS:

- NC/GA border
- Macon County Recreation Park
- Macon County Public Library
- Cecil L. Groves Center (and Isothermal Community College's Macon Campus)
- Macon Early College High School
- Commercial corridors

OPPORTUNITIES:

- This short connection completes a link in the system, creating a relatively safe loop for cyclists to use getting around town.
- Improving safety and comfort for bicyclists (local citizens and tourists) along this scenic route can boost tourism between North Carolina and Georgia and throughout the region.
- This section would directly link two key public areas - the recreation facilities to the west and the library facility to the east, while also ensuring that bicyclists can bypass Georgia Road on their commute or recreational trip.
- Completing this section of the Little Tennessee River Greenway provides a crucial pathway for all users and connects all of Franklin's main commercial areas.

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, Macon County, Isothermal Community College, the Southwestern Commission, Smoky Mountain Center for the Performing Arts

Signs for the greenway along sidewalks and streets can help advertise the trail and guide passersby to the entrance.

Source: City of Milwaukee WI

Potential Design Treatments & Accents

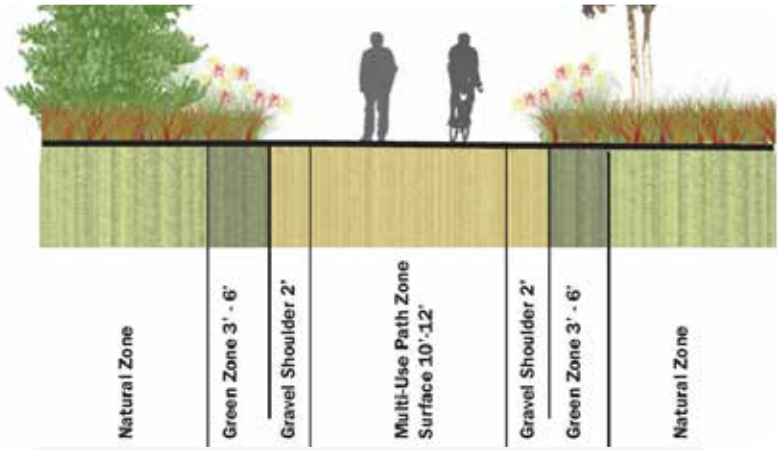


Image source: *NCDOT Complete Streets Planning and Design Guideline, 2012*

Greenways and their bridges should be accessible to everyone, so designing them with ADA parameters is essential.

Greenway parking and entrances along major thoroughfares can attract a larger number of visitors and users of convenience.

Source: 2016 Angie Cook/Jackson County

Project 9 Regional Bicycle Routes

The TVA Dams connected by bicycle routes are Apalachia, Chatuge, Cheoah, Emory, Fontana, Hiwassee, Mission, Nantahala, Nottely, and Santeetlah.

The Main Streets routes run between these towns: Andrews, Fontana Village, Franklin, Hayesville, Highlands, Murphy, Robbinsville, and Santeetlah.

PROJECT DESCRIPTION

Regional bicycle routes were developed by the project team to help advance several goals: improving bicycle tourism in the area, demonstrating support for bicyclists in the community, and opening the door to cooperation between county and state infrastructure projects.

Routes were identified from several sources (some are well-worn with riders in the community), field-checked for applicability, and compiled in interactive map form. The bicycle routes range in length, elevation change, and overall difficulty. Some are out-and-back trips, some are loops, and some connect two destinations.

The project team produced four formatted printable versions to distribute as a tourism product - one folded edition for each county. These maps include safety tips, a description of NC bicycle laws, some general information about the region, inset maps of key towns in each county, and selected route elevation graphics. Each route had mileage categorized (under 10, 20-30, etc.) and the maps note their elevation gain, road conditions, and a recommended skill level.

In addition to the large-format glossy maps, cue sheets were developed for each individual route, so cyclists can print out a usable guide for their ride - with a map on one side and turn-by-turn directions on the other.

A good bicycle map provides information to guide novice cyclists to less-traveled routes, helps an experienced cyclist get around unfamiliar pats of town, and guides users to recreational opportunities in the area.

Project 9 Regional Bicycle Routes

KEY THEMES:

Tennessee Valley Authority (TVA) Dams - Connecting these dams to one another establishes bicycle routes that combine stunning vistas with historical intrigue, linking a water management system that that has served the region for 75 years. Hopefully, these routes will become well-known and lead to racing events.

Main Streets - Making sure bicyclists have clear routes between downtown areas in the 4-county region is helpful for commuters, tourists, and everyone in between. It is important to provide opportunities for the bicycling community to experience the many wonderful Main Streets in the region, as a sightseeing effort and economic driver.

(Total Elevation Gain / 100) + Total Miles = Skill Level

This calculation was used to measure each bicycle route's "effort" and together with safety considerations and challenges, was used to categorize each route as one of three levels - Novice, Intermediate, and Advanced. *Please note that none of the bicycle routes are recommended for beginner cyclists; they all use roads without dedicated bicycling facilities.*

CHALLENGES:

Some key elements of bicycle route selection include roadways with adequate width high quality pavement (although gravel grinders are featured), curves with good sight distance, and hills without steep grades. Effort was made to find routes with those elements, but the terrain and roadways of Western North Carolina are particularly tricky at times. Traffic conditions such as motor vehicle volume, posted speed limits, and high percentages of truck traffic were also considered. Projects 12 and 13 attempt to address concerns about safety in a variety of ways and certain specific areas.

Multi-County

- A Tatham's Gap Crossing
- B Main Streets: Murphy to Hayesville
- C Main Streets: Andrews to Robbinsville
- D Main Streets: Hayesville to Andrews
- E Cherokee Route 3 Loop
- F Main Streets: Franklin to Andrews
- G TVA Dams: Apalachia to Santeetlah
- H TVA Dams: Emory to Chatuge
- I TVA Dams: Fontana to Nantahala
- J Winding Rainbow Tusquittee Half Gravel Grinder Loop
- K TVA Dams: Apalachia to Santeetlah

Cherokee

- 1A Murphy Town Runabout Loop
- 1B Andrews Town Loop
- 1C Andrews 12 Miler
- 1D Andrews 13.5 Mile Loop
- 1E TVA Dams: Hiwassee to Apalachia
- 1F Cherokee Route 2 Loop
- 1G Main Streets: Murphy to Andrews
- 1H TVA Dams: Mission to Nottely
- 1I Murphy & New US-64 Loop
- 1J Tennessee Connector
- 1K TVA Dams: Nottely to Hiwassee
- 1L South Cherokee County Loop
- 1M Valley River Run Loop
- 1N Cherokee Route 1 Loop
- 1O Upper Bear Paw Joe Brown Hiwassee Dam Loop

Clay

- 2A Myers Chapel Out-&-Back
- 2B Hayesville Ten-Miler Loop
- 2C TVA Dams: Chatuge to Mission
- 2D Chatuge Lake Loop
- 2E Tusquittee Adventure Loop
- 2F Clay Co. West Side Loop
- 2G Clay Co. East Side Loop
- 2H Three Logs Tour - Pine Log, Ivy Log, Gum Log

Graham

- 3A Main Streets: Robbinsville to Santeetlah
- 3B TVA Dams: Santeetlah to Cheoah
- 3C Santeetlah 12 Mile Loop
- 3D TVA Dams: Cheoah to Fontana
- 3E Main Streets: Santeetlah to Fontana Village
- 3F Fontana Village 30 Mile Rural Loop
- 3G Cherohala Skyway Highest Point Out-&-Back
- 3H Robbinsville to Fontana Out-&-Back
- 3I Graham County Big Loop

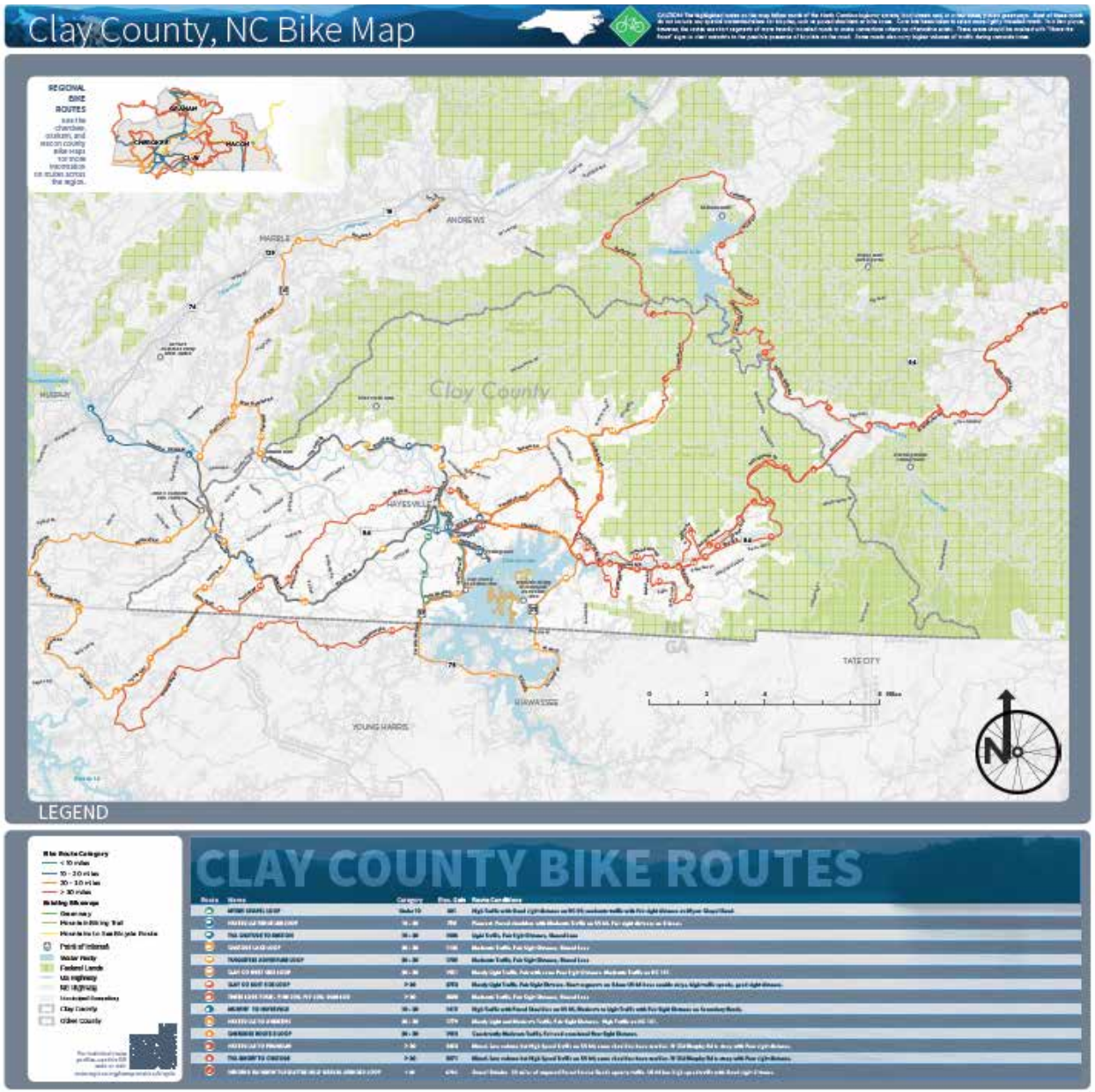
Macon

- 4A Sugarfork Recommended Alternative to NC#2
- 4B NC Route #2 Highway Connector to GA Route #85
- 4C NC#2 Scenic to GA#85
- 4C Coweta Lab Loop
- 4E Tessentee Out-&-Back
- 4F Main Streets: Franklin to Highlands
- 4G TVA Dams: Nantahala to Emory
- 4H Tour de Franklin (53 Mile Loop)

Bicycle Route Color Codes

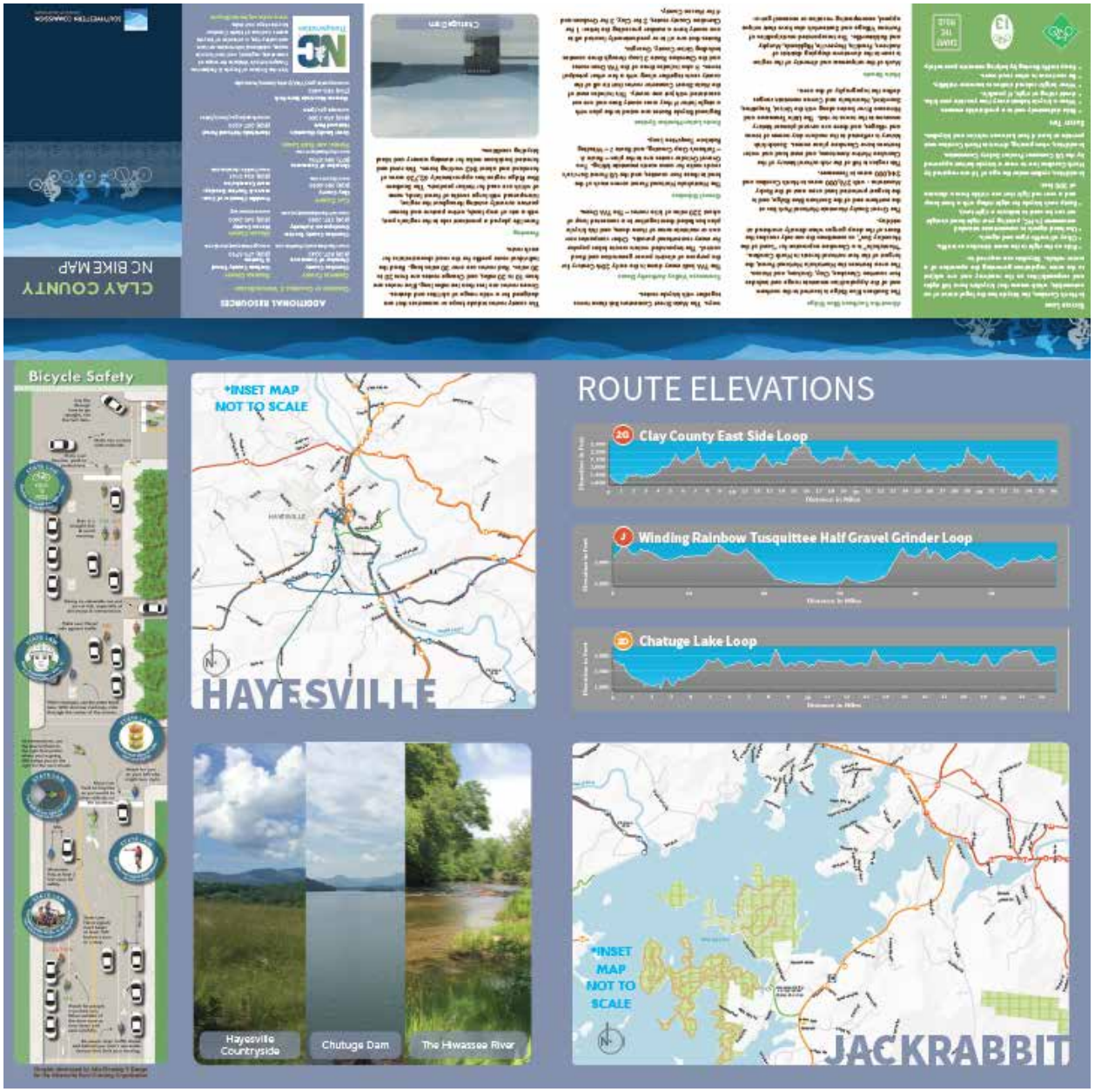
- < 10 miles
- 10 - 20 miles
- 20 - 30 miles
- > 30 miles

Project 9 Regional Bicycle Routes - Clay County



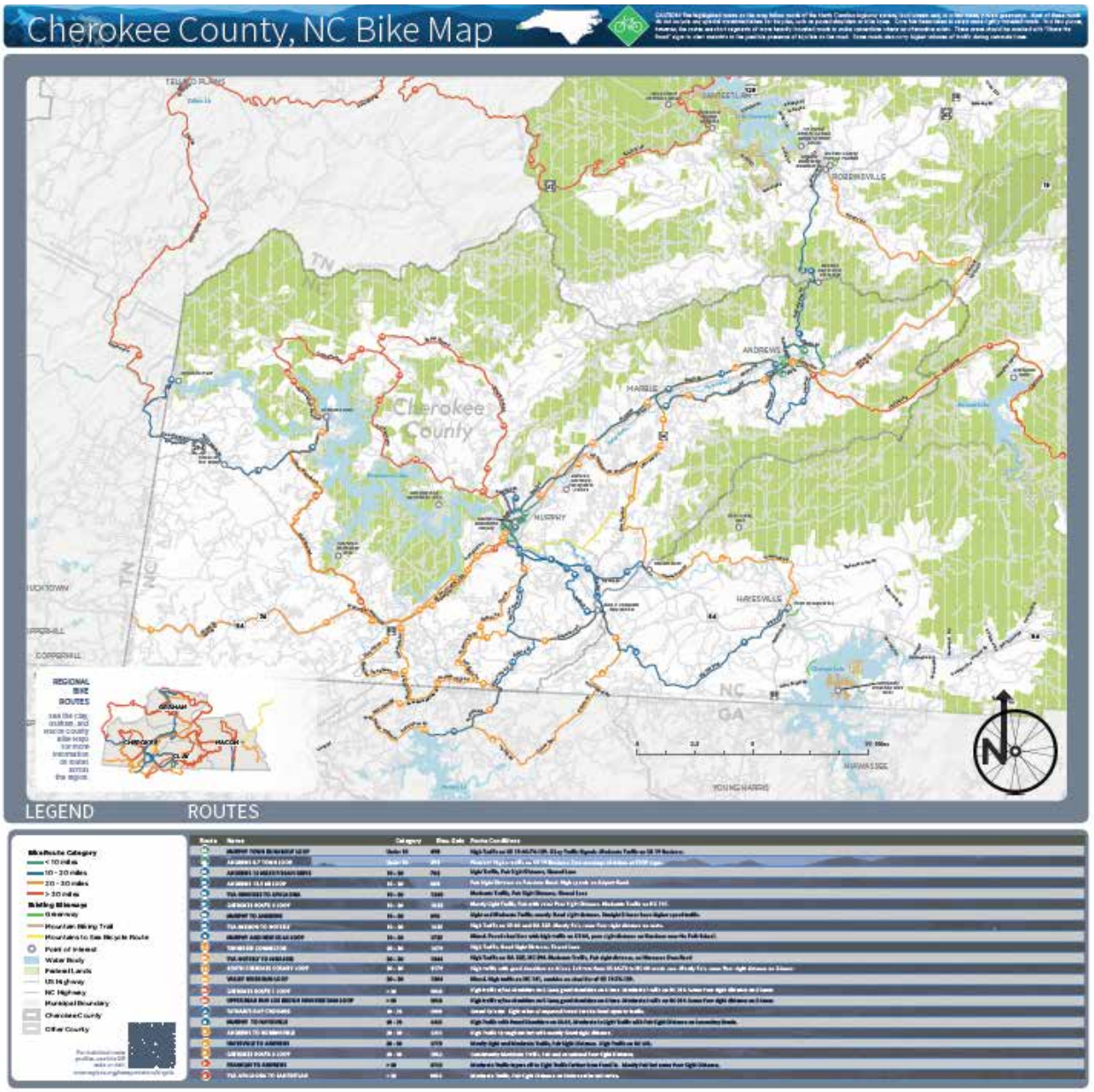
cue sheet example

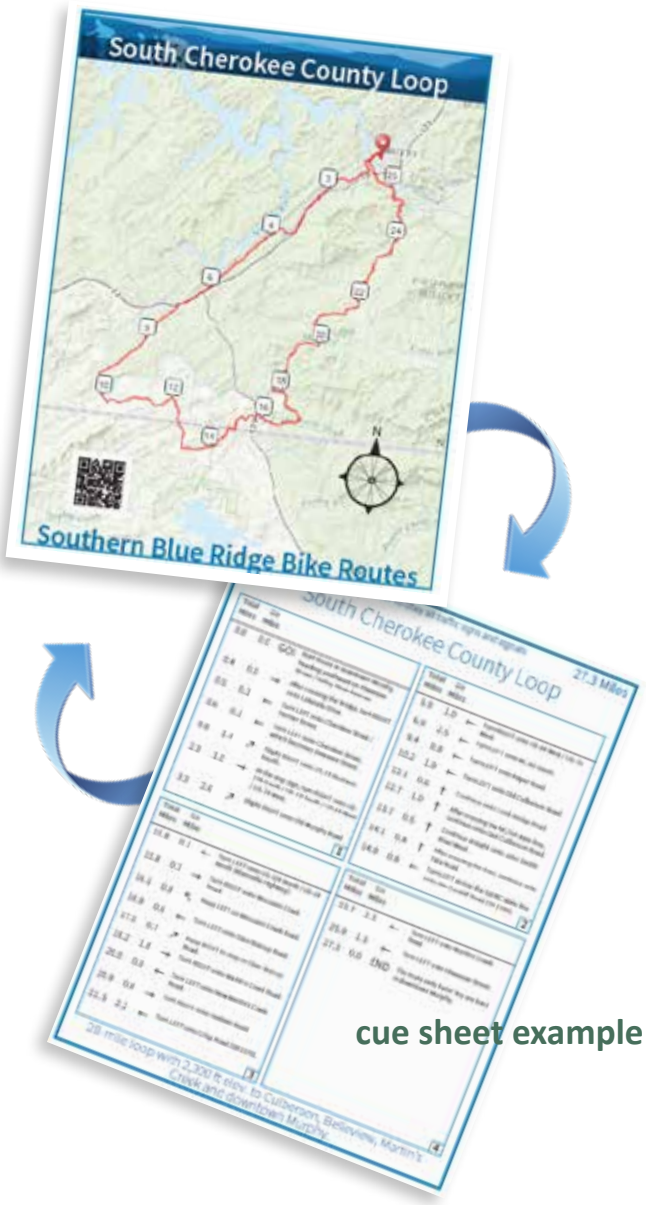
Project 9 Regional Bicycle Routes - Clay County



cue sheet example

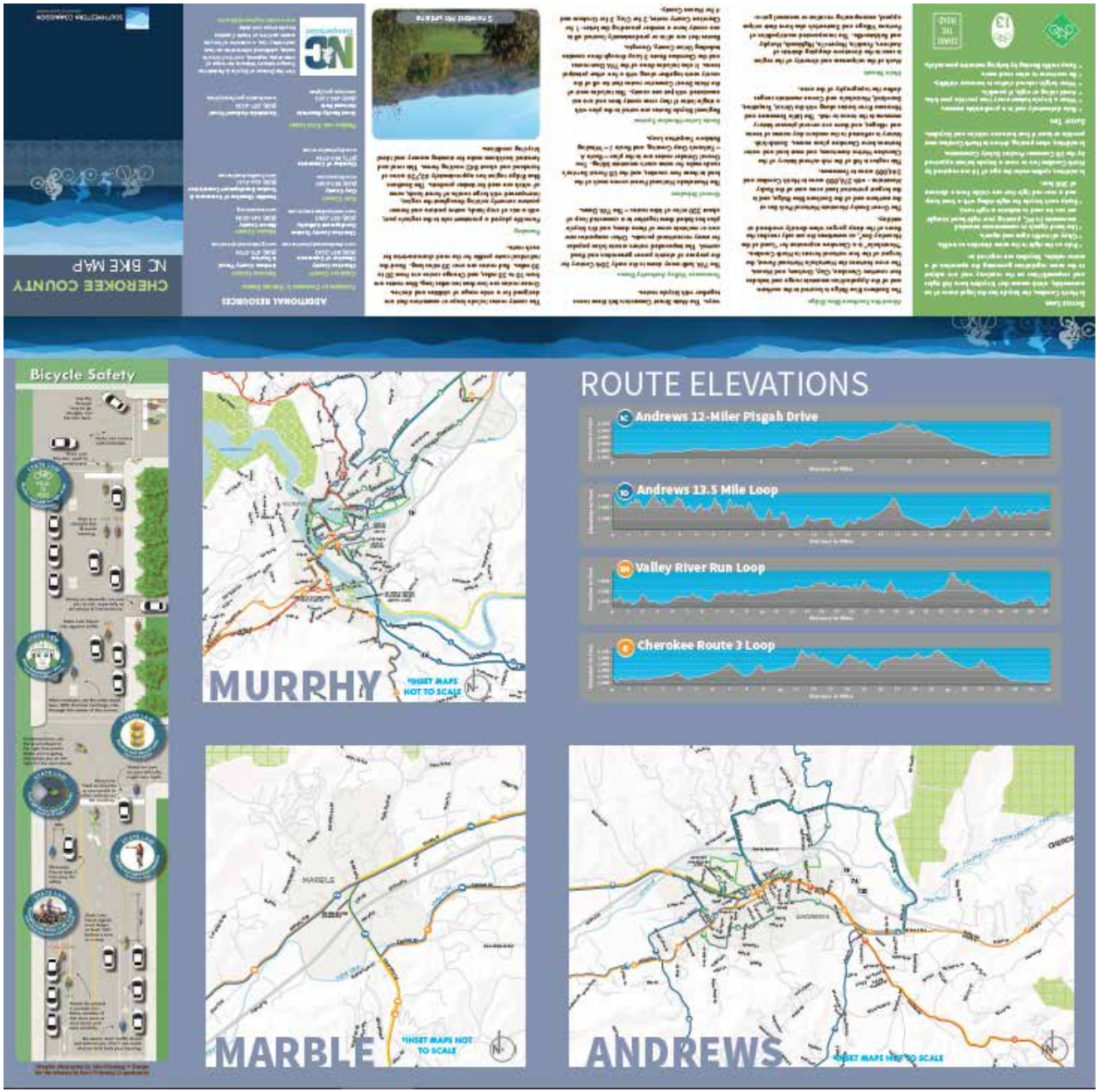
Project 9 Regional Bicycle Routes - Cherokee County





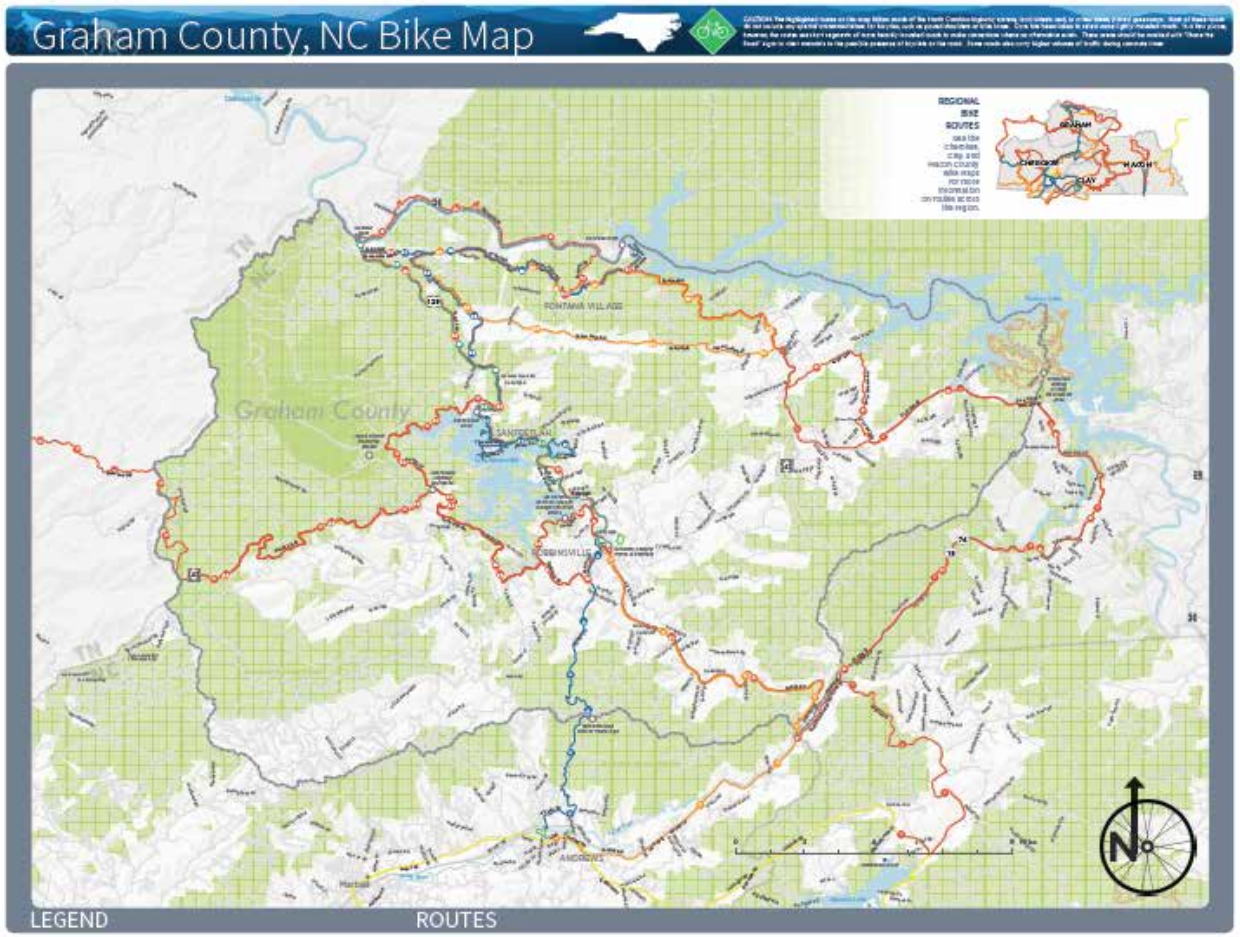
cue sheet example

Project 9 Regional Bicycle Routes - Cherokee County



cue sheet example

Project 9 Regional Bicycle Routes - Graham County

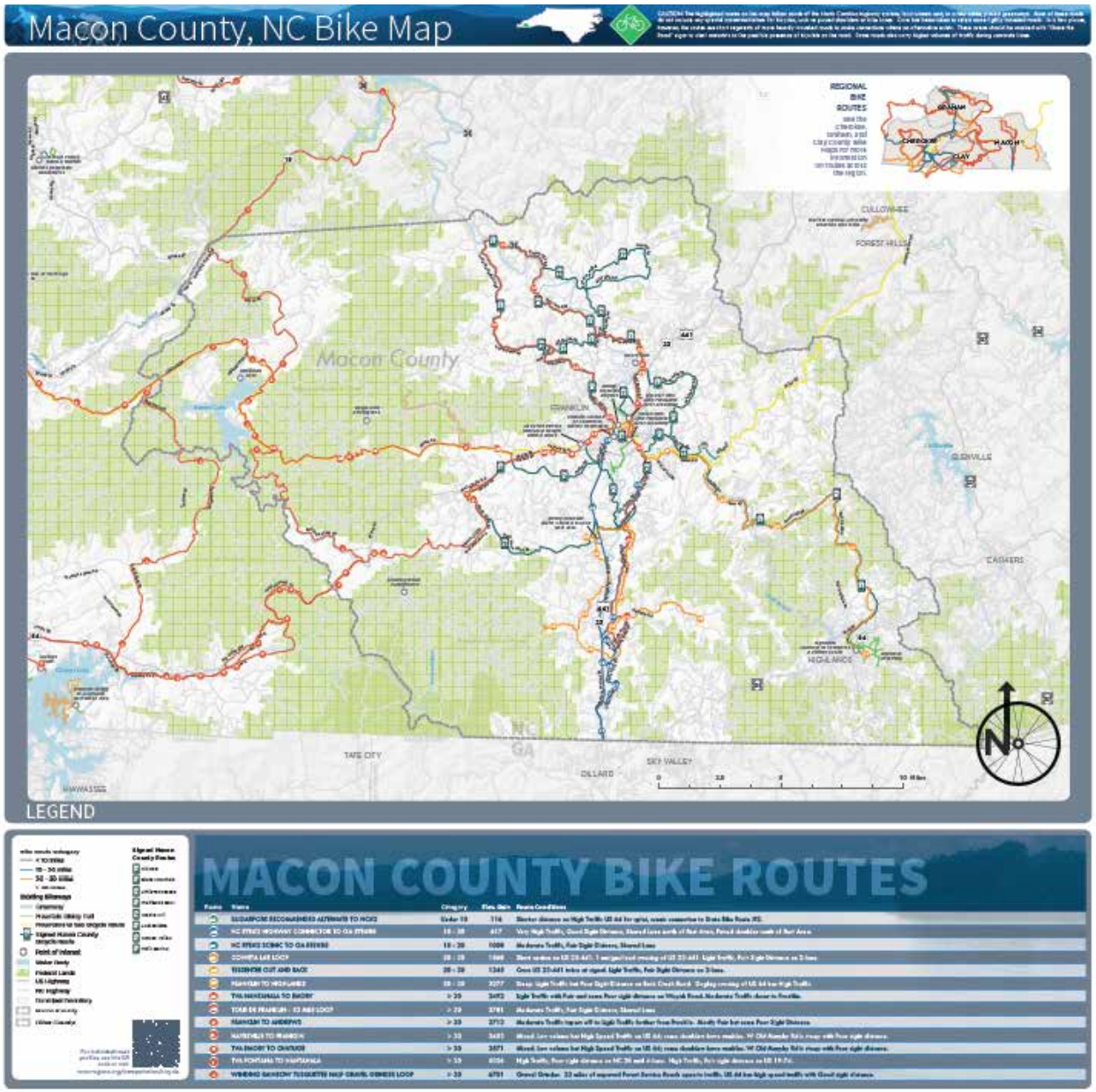


cue sheet example

Project 9 Regional Bicycle Routes - Graham County

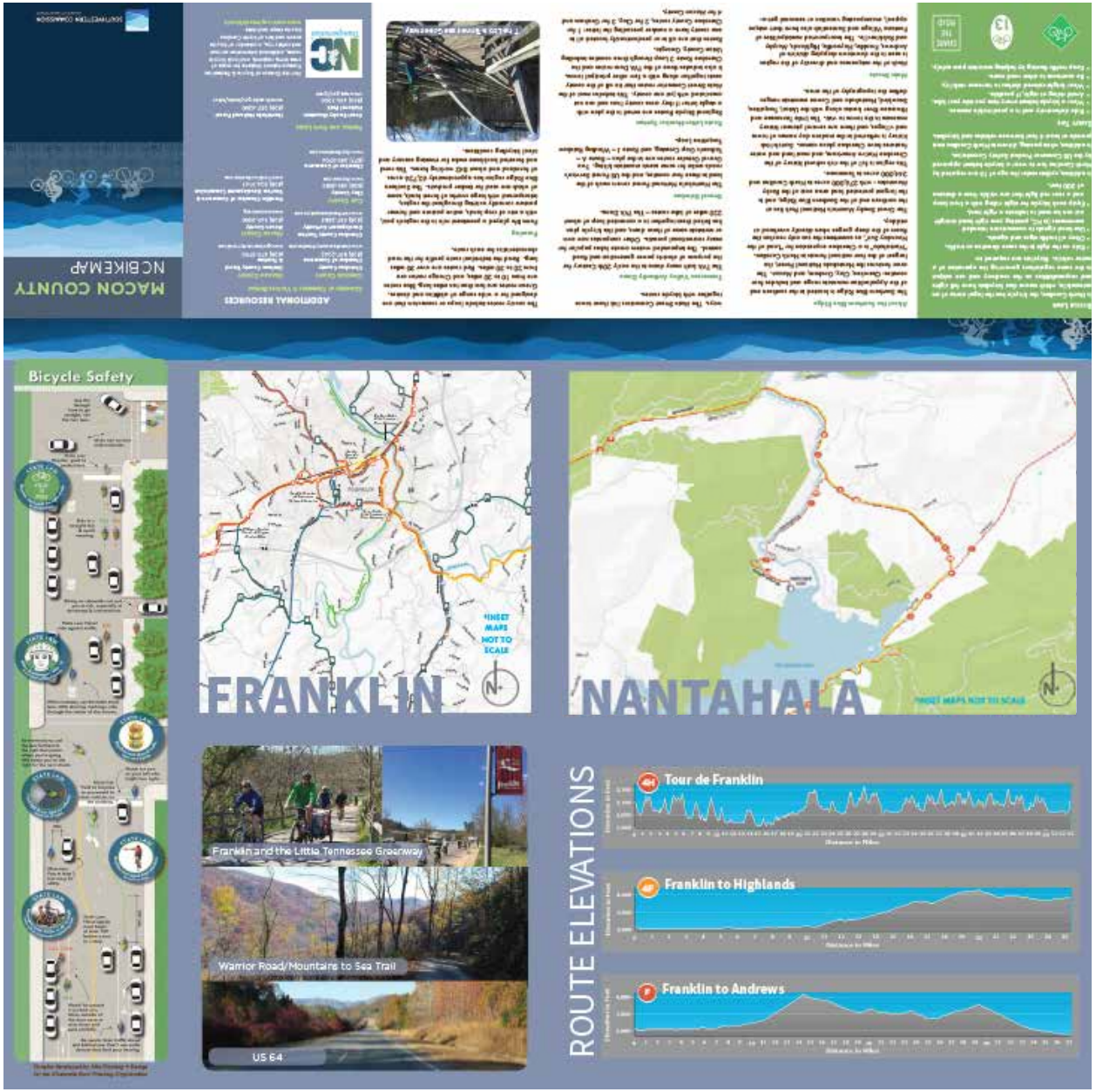
cue sheet example

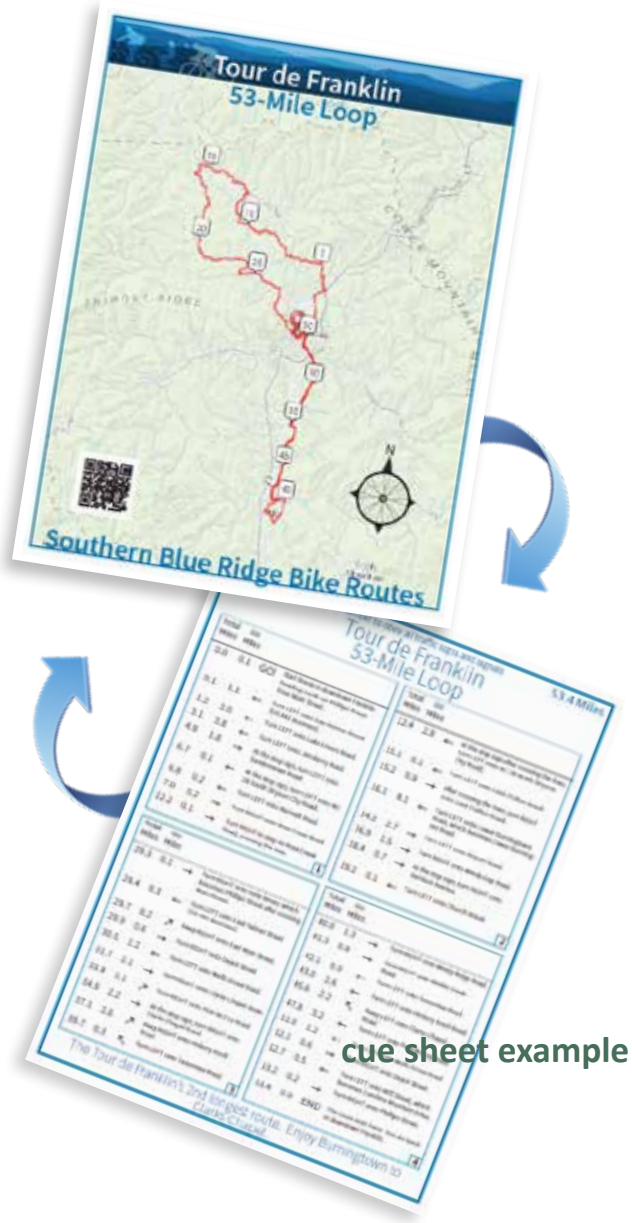
Project 9 Regional Bicycle Routes - Macon County



cue sheet example

Project 9 Regional Bicycle Routes - Macon County





cue sheet example

Project 10 Bicycle Route Signs

Bike route signs can be customized to highlight different towns within each county within the MUTCD's M1-8 sign.

Bicycle parking should be installed at each route's beginning and end point, with signs informing cyclists.

Each county and/or town can investigate installing additional wayfinding signs for local destinations.

Large county route maps should be installed at kiosks in each Main Street town to help cyclists plan a ride.

PROJECT DESCRIPTION

A bicycle route system should have appropriate directional and informational markers. Maps and cue sheets can be dramatically supplemented by signs, helping guide bicyclists and providing visual reinforcement that they are on the right path and that bicyclists are welcome and expected in the area. Together, these elements encourage greater use of roadways by bicyclists.

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. 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 (informing bicyclists of route direction changes) and confirmation signs that indicate on which route you are traveling (with information about direction, distance, and destination).

Counties and towns should work with NCDOT to establish a branding and color scheme for the regional bicycle routes and install permanent signs along each route. In addition, install "Share the Road" and "Bicycles Yield to Peds" signs and Sharrow Pavement Markings where needed and appropriate.

POTENTIAL PARTNERS

NCDOT, the Southwestern Commission, County and Town Staff

HEALTH AND ECONOMIC IMPACTS

Encouraging regional bicycle tourism and visually indicating to motorists that they are driving along a bicycle route and should use caution.

Project 10 Bicycle Route Signs

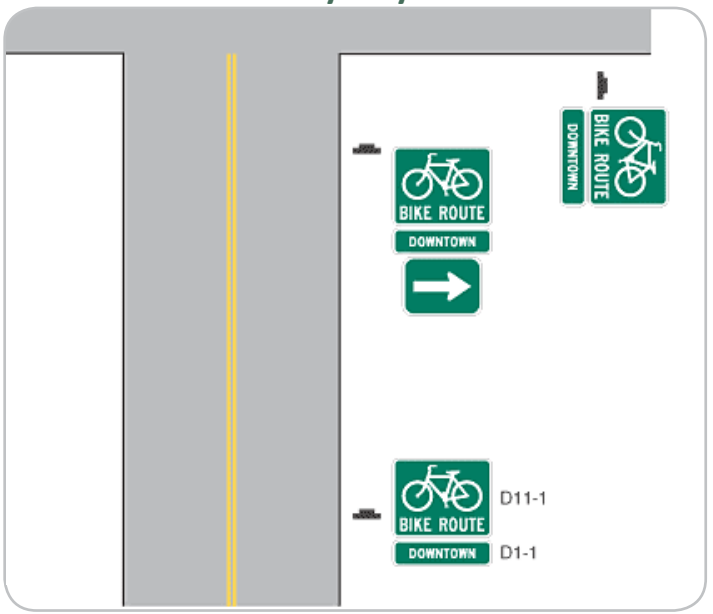
DESIGN CONSIDERATIONS:

- Decision signs should be placed in advance of all turns or decision points along a route, and should include directional arrows to guide the bicyclist. Ideally, these signs should also include distance and travel time information.
- In urban areas, FHWA recommends that signs be placed approximately every 400 meters (1/4 mile), at every turn in the route, and at all signalized intersections.
- FHWA recommends that all bicycle signs along shared use paths have a lower clearance of between 4ft and 5ft. Signs should be between 3ft and 6ft from the edge of the path.
- Route signs should be placed soon after turns to confirm destinations.

CHALLENGES:

- There are a lot of routes recommended in this plan. Installing signs for all of them will require a concerted effort by county staff and NCDOT to make sure they are marked at all turns, at regular intervals, and in a consistent manner.

Proper sign placement for an on-roadway bicycle route

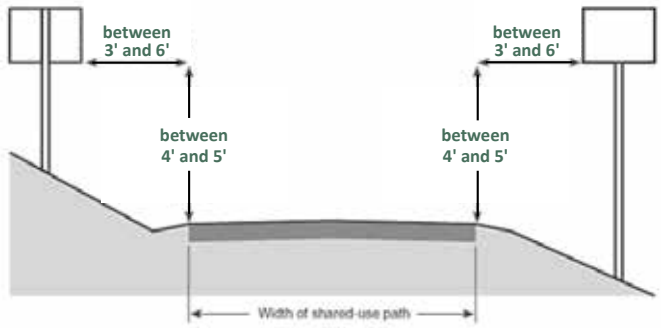


Potential Design Treatments & Accents

Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Image Source: Stephen & Lucy Dawson

Supplemental connector signs can indicate direction and distances to other recreation amenities, trail loops, and town resources.



FHWA recommended sign placement on shared-use paths (i.e. greenways or rail-trails).

Project 11 Safety Improvements Along Bike Routes

PROJECT DESCRIPTION

Developing a bicycle route system should include the targeting of roadway improvements along important or heavily used sections. The route selection process often reveals barriers to bicycling such as bridges with inadequate width or low railings and roadways that need bicycle improvements such as bike lanes, wide curb lanes, or wide paved shoulders to provide a continuous safe corridor of travel.

RECOMMENDATIONS for SAFETY IMPROVEMENTS along BICYCLE ROUTES:

- Where paved shoulders (less than 4 feet wide) and 10 feet of right-of-way already exist, widen the road to include **5-foot shoulders on each side.** Mark as bike lanes.
- Coordinate with NCDOT and Southwestern Commission to **include bikeable shoulders in future STIP roadway investments.** Saving small towns and rural counties money in construction costs is imperative to ease of implementation.
- Always **recommend designated bicycle facilities on roadways with average daily vehicular traffic (AADT) of 2,000 or more.**
- Consider phasing construction of **shared lane markings ("sharrows") and bike lanes (where feasible) along all routes as they pass through downtown areas.**
- **Bicycle parking facilities should be installed at public spaces in every Main Street** in the four-county region, including town halls, courthouses, and along Main Street itself.

PRIORITY CORRIDORS *for* SAFETY IMPROVEMENTS:

CHEROKEE COUNTY

Old Ranger Road and Old Murphy Road - This plan attempts to route bicyclists along these roads instead of US Highway 64 to the southwest of Murphy. Four recommended routes traverse these roads and they are essential to bicyclist safety in the region. Until US-64 features bicycle lanes, these two roads should be prioritized for safety improvements.

NC-141 - From Marble to SR 1548 (Tri-County Community College and Murphy Medical Center). The Mountains-to-Sea Bike Route and two of this plan's recommended routes follow this road. Safety improvements would help connect Murphy, Marble, and Hayesville.

Airport Road - This road between Marble and Andrews, with three recommended bike routes, is a direct link between towns, connecting churches and schools. Until the Valley River Rail Trail comes to fruition, Airport Road should be prioritized for improvements in bicycle safety. Fairview Road should also be targeted for improvements.

State Highway 294, Lower Bear Paw Road, and Hiwassee Dam Access Road - These roads are pivotal to four recommended bike routes. Connecting US-64 to Hiwassee Dam safely for bicyclists would greatly help bicycle tourism in the county.

Valley River Ave - Five different bike routes come through Murphy from US-64 to Connahetta St.

2nd Street - Up to 9 different bicycle routes use this key downtown street through Andrews.

CLAY COUNTY

Myers Chapel Road - Highly popular with bicylists with at least three recommended routes from this plan. From Hayesville to the state line, this should be prioritized for safety improvements.

US Highway 64 - From Myers Chapel Road to Downings Creek Road, this section fills a short, but needed, gap in various routes recommended in this plan. Keeping bicyclists off US 64 is important until that road is improved, but this short section - if prioritized - could help a lot.

Fires Creek Road - Many bicyclists in the region indicate that this road is important for bicycling in the area and has up to three recommended routes along it. Fires Creek should be prioritized for safety improvements from Hayesville to Mission Dam.

Anderson St/Tusquittee St - Improvements are recommended through downtown Hayesville.

Old Highway 64 West and East- From Hayesville to Brasstown, this road serves four different routes. From NC-175 to Shooting Creek, this road serves five different routes.

Project 11 Safety Improvements Along Bike Routes

PRIORITY CORRIDORS *for* SAFETY IMPROVEMENTS:

GRAHAM COUNTY

Rhymers Ferry Road and Meadow Branch Road - These key connections linking Cheoah Dam to Fontana Dam feature up to four recommended bicycle routes and are important to the bicycling community. These roads serve a direct TVA Dam route, but are also important for several other loop routes.

Old Field Gap Road - From Meadow Branch Road to Yellow Creek Road, this winding, steep road is an important segment of three recommended bike routes. It's also an alternative to Tapoco Road (129), which has more vehicular traffic.

Tallulah Road - This road connects commuter bicyclists to Robbinsville and the surrounding area and is a primary route to the Nantahala Gorge. Two bicycle routes follow this road for its entire length.

Tathams Gap Road and County Road 1110 - A potentially direct route between Robbinsville and Andrews, making sure this is a well-paved, bikeable road can help boost commuter cycling and tourism between the two towns/counties.

Fontana Road - Two recommended routes traverse this road from Upper Tuskeegee Road to Fontana Village. There is tremendous potential for shoulders and bike lanes.

Tapoco Road - From Cheoah Dam to Santeetlah Dam, this road (129) needs safety improvements to be the scenic bicycle corridor it should be. Two recommended routes follow this segment in its entirety, with others also using Tapoco Road as well.

MACON COUNTY

Clarks Chapel Road - Three different bicycle routes traverse this road from Wells Grove Road to Prentiss Bridge Road (SR 1649), with several schools and churches along the way.

Depot Street - Two routes from this plan, as well as the Mountains-to-Sea Bike Route, travel along this major commercial, industrial, and commuter route in Franklin. Continuing safety along Wells Grove Road would dramatically improve connectivity for bicyclists.

Main Street, Hicks Road, and Buck Creek Road - Creating a safe facility from Highlands to Franklin, with a connection to Cashiers, affects three bicycle routes.

Old Murphy Road - This plan recommends that bicyclists use this road as an alternative to riding on US Highway 64 from Franklin to Wayah Road. Old Murphy Road should be prioritized as a primary bicycle connection.

Wayah Road - This is one of the key roads for six bicycle routes from Franklin to Nantahala Dam.

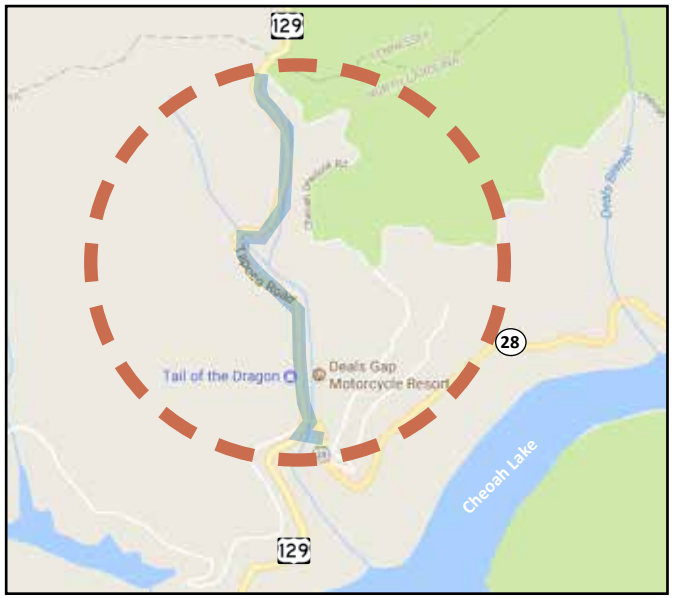
New downtown bike lanes should be advertised, as a courtesy to users and to promote bicycling in the region.

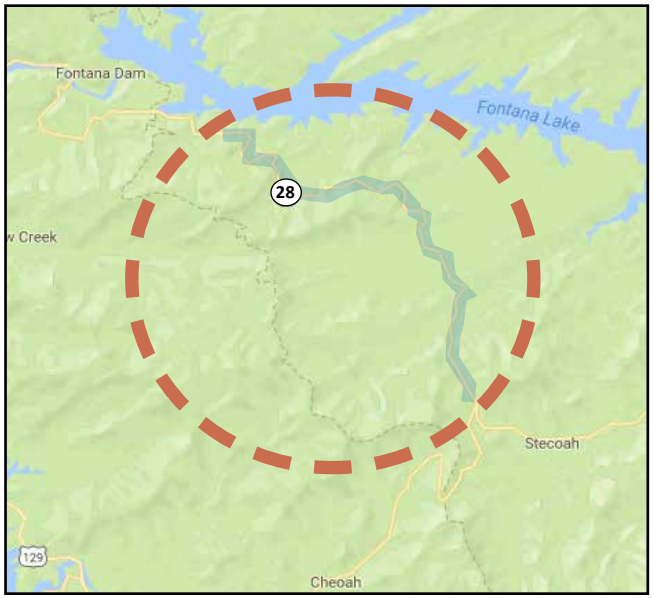
Image Source: [illegible]

Downtown bicycle facilities should be substantial enough to encourage all users, and safe enough for the most vulnerable.

Image Source: Collier County, FL

Project 12 "Cyclist Ahead" Actuated Warning Flasher





PROJECT DESCRIPTION

At locations with steep grades and poor sight distance, combine a bicycle detector with a flashing LED beacon to create a timed warning of a cyclist ahead. Use a warning sign of a cyclist (W11-series or special sign).

Recommended locations include US-129 at Deal's Gap; this is the only direct route to NC-28 from Tennessee.

NC-28 between Fontana Village and Stecoah is also an appropriate location for actuated warning flashers.

COST ESTIMATE

$8,000

LENGTH

Approx. 0.3 miles (1,500 feet)

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned

HEALTH & ECONOMIC IMPACTS

The display can improve cycling safety by informing drivers that a road is frequently used by cyclists and communicating to cyclists that they count.

Project 12 "Cyclist Ahead" Actuated Warning Flasher

INFLUENCES:

- Lake Santeetlah
- Scenic views of the river, creeks, and mountains
- Foothills Parkway
- Great Smoky Mountains National Park

DESIGN CONSIDERATIONS:

- W11-series signs are appropriate (see image).
- Flashing beacons can be configured in numerous ways and in different combinations.
- These devices are available with solar power and wireless transmission between the sensor detecting bicycles and the display.

POTENTIAL PARTNERS

NCDOT, TDOT, Fontana Village, The Town of Robbinsville, Graham County, the Southwestern Commission

DESTINATIONS:

- Deal's Gap Motorcycle Resort
- Historic Tapoco Lodge
- TN/NC border
- Cheoah and Fontana Dams
- Fontana Village
- Robbinsville

CONSTRAINTS:

- Poor sight distance on US-129.
- Ownership and maintenance responsibilities for the devices.
- Remote location (potentially hard for installation/maintenance).

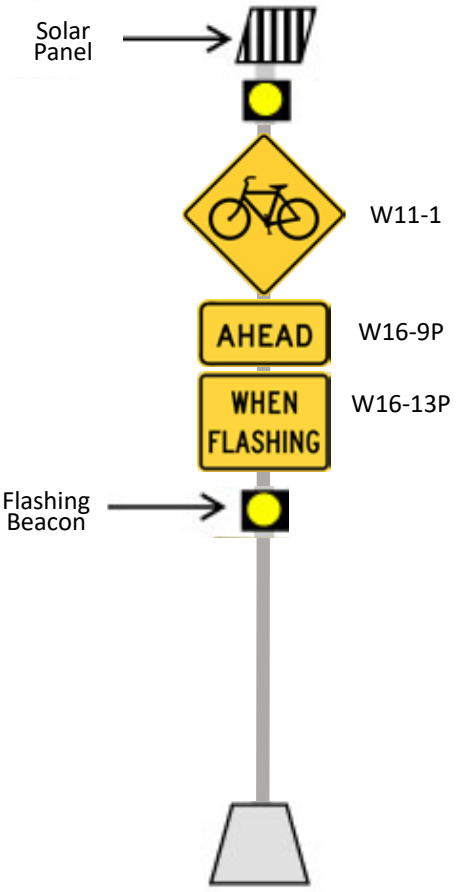
OPPORTUNITIES:

- Project influences how motor vehicles interact with bicyclists along the dam routes in this plan.
- North Carolina can serve as an example to neighboring states, demonstrating that our state is physically active and attentive to the safety of cyclists on our roadways.

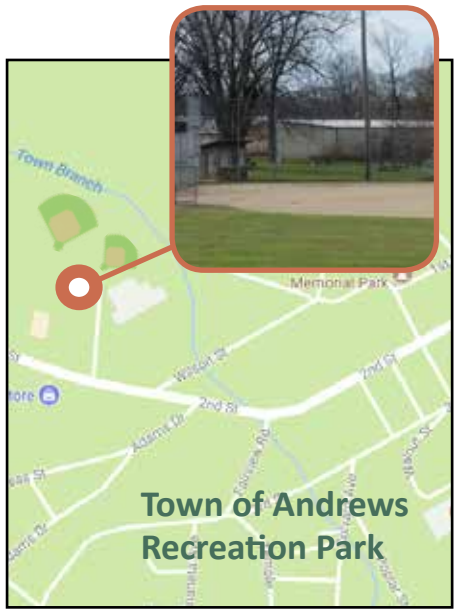
Sample System Overview

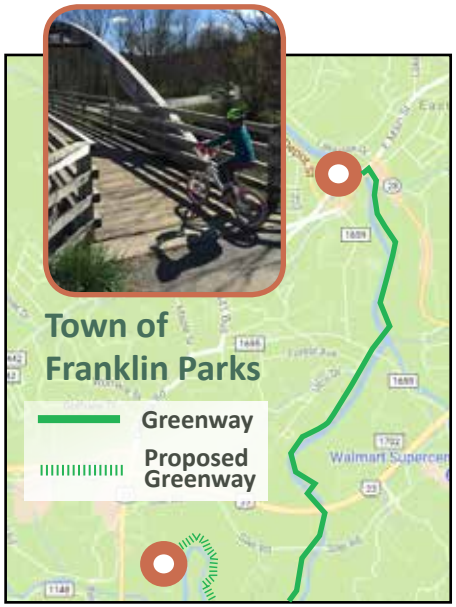
Some bicycle detecting systems combine a bicycle counting systems with a portable, real-time display. The interactive display encourages cycling and should be considered for high-volume areas such as greenways; it is also a good way to promote ride-to-work or bike-to-school campaigns. The systems can display both daily and cumulative bike counts.

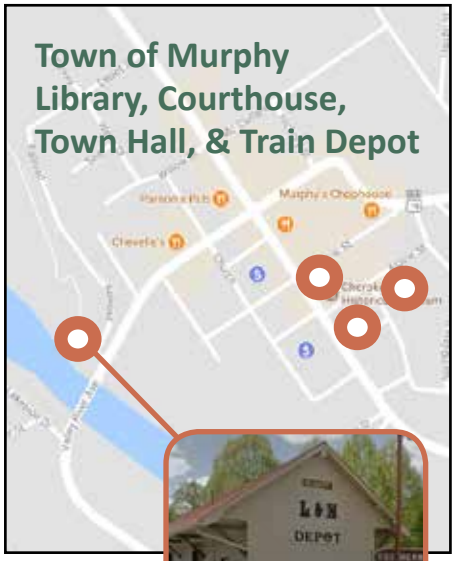
For Project 12, a counter is not necessary. The goal is to have bicyclists trigger a flashing LED beacon to warn motorists behind them of their presence ahead.



Project 13 Bike Racks and Fix-It Stations







PROJECT DESCRIPTION

Provide fix-it stations and bicycle parking at appropriate locations in three of the four counties:

- Andrews Recreation Park
- Clay County Recreation Park
- Tassee Park in Franklin
- Macon County Rec Park
- Hayesville Rec Center

These small improvements will advocate for more bicycling in the community by providing infrastructure support for visitors and local residents.

Additional bike parking is recommended as a component of Project 11.

COST ESTIMATE

$1,000 for five (5) bike racks
$2,000 for one (1) fix-it station, (installation included) using NCDOT's cost estimator

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned
- No Way, No How

HEALTH & ECONOMIC IMPACTS

Health and safety effects related to maintaining functional bicycles and keep valuable property securely locked.

Project 13 Bike Racks and Fix-It Stations

INFLUENCES:

- Support for bicycle maintenance
- Scenic views of agriculture, rivers, and mountains

DESIGN CONSIDERATIONS:

- "U"-style bike racks are recommended because they accommodate all types of bike locks, provide two-point contact when a bike is resting against it, and can support two bikes each.
- Dero Fixit Work Station features a hands-free bicycle mount, QR code with repair instructions, stainless steel cables, tamper-proof fasteners, an air pump, and tools (screwdrivers, wrenches, tire lever, hex tools).

POTENTIAL PARTNERS

NCDOT, The Town of Franklin, The Town of Andrews, The Town of Hayesville, Macon County, Cherokee County, Clay County, the Southwestern Commission, Chatuge Dam, Andrews Community Center

DESTINATIONS:

- Chatuge Lake & Chatuge Dam
- Franklin, Hayesville, and Andrews
- NC/GA border
- Jackrabbit Mountain
- Andrews Elementary School, East Franklin Elementary School

OPPORTUNITIES:

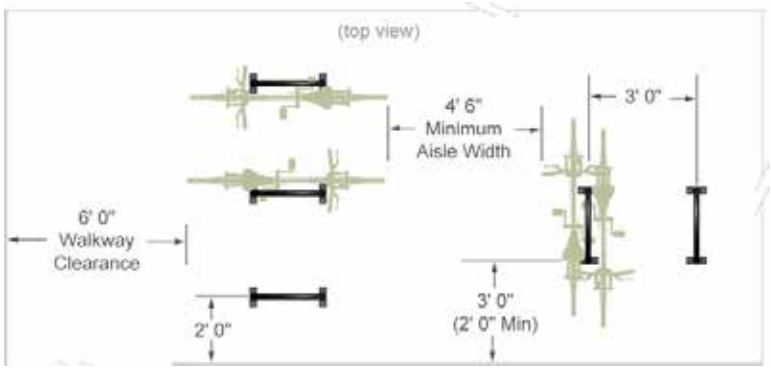
- Provide fix-it stations at locations where cyclists park vehicles to begin cycling trips, such as recreation parks. This enables maintenance before and after bike rides.

CHALLENGES:

- Establishing ownership and maintenance responsibilities for fix-it stations, which require regular oversight (to avoid missing tools and make sure the bicycle pump works).

U-style bicyle racks.

Potential Design Treatments & Accents



Clearances and separation widths for U-style bike racks.
Image source: *CycleSafe Secure Bicycle Parking*

Bicycle fix-it station installation and maintenance costs could be sponsored by private businesses.

Installing fix-it stations near bicycle parking facilities helps ensure that users are not left stranded with repair needs.

Project 14 Rumble Strip Remediation (all 4 counties)

PROJECT DESCRIPTION

This recommendation is to pave over rumble strips (depressed gouges along a road's edge designed to change the noise a vehicle's tires make and warn drivers of the edge of the road) either entirely or creating gaps for bicyclists to transition between the travel lane and shoulder.

While rumble strips can present ride-ability issues for bicyclists - the presence, composition, and integrity of the shoulder surface can affect where a bicyclist chooses to travel.

Work with NCDOT to add bicycle priority to resurfacing schedules. Many shoulders have already been resurfaced since rumble strips were installed wholesale in 2007. Regular scheduled resurfacing presents the best opportunity for removing or upgrading rumble strips.

COST ESTIMATE

$75,000 per shoulder mile.

USERS (see page 3 for more info)

- Strong & Fearless
- Enthused & Confident
- Interested but Concerned

HEALTH AND ECONOMIC IMPACTS

Encouraging regional bicycle tourism along key routes and improving safety for cyclists by ensuring travel in the safest lane.

Project 14 Rumble Strip Remediation (all 4 counties)

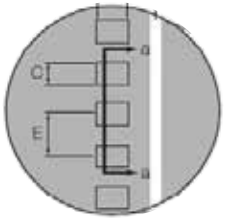
DESIGN CONSIDERATIONS:

- The FHWA notes that bicyclists are affected by shoulder rumble strips, recommending recurring short gaps to allow for ease of movement from one side of the rumble strip to the other
- The 2012 AASHTO *Guide for the Development of Bicycle Facilities* states that "rumble strips are not recommended on shoulders used by bicyclists unless there is a minimum clear path of 4 feet from the rumble strip to the outside edge of a paved shoulder, or 5 feet to the adjacent curb, guardrail, or other obstacle."
- Many states have begun installing narrower (12 inches or 8 inches) rumble strips, rather than the previous standard of 18 inches to provide more room on the shoulder for bicyclists.
- Some state DOT policies ensure installation of edge line rumble strips if the paved shoulder is less than 6 feet wide; if the shoulder is 6 feet or wider, use of shoulder rumble strips is allowed. Others use shoulder rumble strips on controlled access roads and edge line rumble strips on all other roads.
- It is recommended using a pattern with 10- to 12-foot gaps in every 40 to 60 feet of continuous rumble strips.

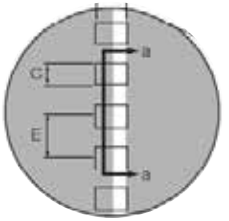
POTENTIAL PARTNERS

NCDOT, the Southwestern Commission

Shoulder Rumble Strips



Edgeline Rumble Strips



CHALLENGES:

- Unless a highway segment is being reconstructed, the cost and environmental impact of widening the roadway cross-section for any significant length is often prohibitive.
- Properly installed rumble strips can improve safety for motor vehicles; proper design and coordination must be taken to not render cycling faciities useless but also improving motor vehicle safety.

Potential Design Treatments & Accents

The FHWA offers a Rumble Strip Implementation Guide, which specifically addresses bicycle issues on two-lane roads

Rumble strips, when offset from the center line, can severely limit the bikeable area.

This shoulder is both wide enough for ease of travel and has gaps (though too short) in the rumble strips for cyclists to pass through.

Education & Encouragement

Bicycle programs that encourage and educate residents how best to make use of bicycle infrastructure improvements are critical to creating a safe and supportive bicycling environment and culture. Developing such a bicycle-friendly culture in the four-county region of far Western North Carolina will require a diverse mix of programmatic efforts to address the needs of the community. This section identifies existing resources and opportunities for bicycle programs and policies to educate and encourage bicycling in the region.

Targeted education and encouragement strategies improve residents' health, safety, and their ability to incorporate bicycling into everyday life. Consequently, they support the development and use of physical infrastructure. Visitors to far Western North Carolina will benefit from the implementation of such programs, which will target all potential cyclists and motorists. A program may be presented as a campaign, on-going initiative, or onetime event, depending on its purpose. In essence, these different efforts market bicycling to the general public and ensure the maximum return on investment in bicycling facilities in the form of increased mode shift to bicycling.

This section provides recommendations in education and encouragement that will support the goals of the Southwestern Commission's Regional Bicycle Plan. These initiatives can be undertaken by local agencies, regional organizations, community organizations, or by any combination of partnerships between such agencies and organizations. Program recommendations were developed with the guidance of the project's Steering Committee and were based on the following inputs:

- Knowledge about existing programs in the region;
- The foundational aspects of this plan, including steering committee input; and
- Stated community needs and concerns (as communicated through public outreach and engagement activities and discussions at Steering Committee meetings).

EDUCATION

Providing educational opportunities is critical for increasing bicycling across the far Western North Carolina region. Education programs should span all age groups, cultures, abilities, and population groups, and they should include motorists as well as current and potential cyclists. The focus of an educational campaign can range from information about the rights and responsibilities of road users to tips for safe behavior; from awareness of the area-wide benefits of bicycling to technical trainings for local agency staff. Educational programs for decision-makers, such as engineering and planning staff, raise the level of local expertise. They develop the skill sets needed to design and construct state of the art bikeways, walkways, and greenways for the short- and long-term future of the bicycling environment at the local and regional levels.

ENCOURAGEMENT

Encouragement programs are critical for promoting and increasing bicycling. These programs should address all ages, abilities, and user groups including school age children, young adults, college students, working adults, and seniors. They should also address both recreational and utilitarian cycling.

According to a 2008 survey by the National Highway Traffic Safety Administration (NHTSA), "Seventy-one percent of Americans said they would like to bicycle more than they do now." As bicycle infrastructure improvements are made, communities in the far Western North Carolina region must simultaneously develop targeted strategies for encouraging bicycling and communicate information about safe and inviting places to bicycle. Encouragement programs that promote transportation and recreation choices and healthy, active lifestyles will help to develop a more bicycle-friendly region.

For information about NCDOT's efforts in education and encouragement and a wealth of program ideas, see Chapter 7 of the WalkBikeNC Plan- "Programming for Health, Safety, and Active Living":

https://www.ncdot.gov/bikeped/walkbikenc/pictures/ChapterSeven.pdf

Program Recommendations

Each program recommendation presented in this section includes the following information:

- program type (Education, Encouragement, or both);
- the purpose of the program;
- a description of the basic approach; and
- key partners for implementation.

SAFE ROUTES TO SCHOOL

Type: Education, Encouragement

Purpose: Promote physical fitness and health by helping children walk and bicycle to school; improve school traffic safety through physical improvements and programs.

Audience: School-aged children and their parents; school administrators, faculty, and staff.

Partners: School districts, parent-teacher associations, municipalities, health partners, community members, Active Routes to School Project Regional Coordinator, local Eat Smart Move More Coalitions, Southwestern Rural Planning Organization (RPO).

Safe Routes to School programs use a "5 Es" approach (Engineering, Education, Encouragement, Enforcement, and Evaluation) to improve safety and encourage children to walk and bicycle to school. The programs are usually run by a partnership of city government, teachers, school officials, parents, students, and neighbors.

Currently in North Carolina, the Active Routes to School Project, which is supported by a partnership between the NC Department of Transportation and Division of Public Health, provides Regional Coordinators to create SRTS programming throughout the state. The far Western counties of this project fall within Region 1 of the ARTS project. The Region 1 Coordinator is already actively working on SRTS projects (both walking and bicycling) in many of the communities in the area, including Walk to School days, Bike Rodeos, and safe bicycling/walking curriculum in schools through the "Let's Go NC" project.

Students from Andrews Middle School on a bicycling trip.

Robbinsville Elementary student practicing mountain bike maneuvers.

As of February 2017, the schools involved in the four counties are:

CHEROKEE: Murphy Elementary, Hiwassee Dam Elementary, Peachtree Elementary, Ranger Elementary, Martin's Creek Elementary.

CLAY: Hayesville Elementary, Hayesville Middle School.

GRAHAM: Robbinsville Elementary.

MACON: East Franklin Elementary, Iotola Elementary, Nantahala School, and Cartoogechaye Elementary.

In a rural environment, a majority of school trips are too long for students to make the entire trip by bicycling. In these areas, the focus should be on creative efforts to help schoolchildren increase their physical activity in other ways. This focus lends itself ideally to working with public health partners, who also see increasing youth physical activity as a major goal.

For example, in a Park and Bike campaign, children are dropped off at a pre-determined location near the school, such as a park, and then bicycle the remaining distance with parent volunteers or school staff. Park and Bike campaigns can reduce congestion and improve traffic safety near schools while increasing youth physical activity. Teachers also report that children who bike to school arrive awake and "ready to learn." Likewise, a Safe Routes to Bus Stops program can help children safely access bus transportation by bicycling. Several schools in the region are already conducting remote Park and Walk programs. Adding the option to bicycle from the remote drop-off locations may be the next step in expanding active transportation options for students at these schools.

International Walk to School Day in October is an excellent annual event that offers all families and children the opportunity to participate in healthy school transportation. Greenville, NC's Walk to School Day has one of the highest participation rates in the state and could be looked at as a model Walk to School Day event that promotes year-round physical activity. Walk to School Day does not have to be limited to encouraging children to walk; children who wish to bicycle to school can be encouraged to bike, and resources like bicycle-train chaperones can be made available. The campaign is led by an ongoing partnership between public health nonprofits, county school districts, PTAs, and other agencies.

Hayesville has an active Walk to School group.

Hiawassee Dam Middle School mountain bike program.

A major next step towards creating safer active travel opportunities for schoolchildren is to create a Safe Routes to School Plan for every elementary school in the far WNC region, with a priority emphasis on in-town schools that are more conducive to bicycling and walking. This will necessarily be a coalition effort that may be eligible for grant funding through the North Carolina Department of Transportation's (NCDOT) Safe Routes to School program.

Sample Programs:

- Active Routes to School (North Carolina SRTS Project): *https://www.ncdot.gov/download/programs/srts/srts.pdf*
- Partners for Active Living Walk to School Day Program (Spartanburg, SC): *http://www.activeliving.org/Walk-to-School-Day.html*
- Ira B. Jones School Walking to School Program (Asheville, NC): *http://www.saferoutesinfo.org/program-tools/success-stories/asheville-north-carolina-encouraging-walking-and-wheeling-school-wide*

OPEN STREETS EVENTS (CICLOVIAS)

Type: Encouragement

Purpose: Encourage bicycling in a community by periodically closing a street to automobile traffic and creating a safe and inviting place for cyclists of all abilities to bike.

Audience: General public, tourists, local communities

Partners: Municipal and County Parks and Recreation Departments, Police Departments, cycling clubs, tourism and business groups, local merchants/ business leaders

Open street events have many names: Sunday Parkways, Ciclovias, and Summer Streets. The events are periodic street "openings" (i.e., "open" to users besides cars), usually on Sundays, that create a temporary park open to the public for walking, bicycling, dancing, hula-hooping, roller-skating, and other non-motorized activities. They have been very successful internationally and are rapidly becoming popular in the United States. Open street events promote health by creating a safe and attractive space for physical activity and social contact, are cost-effective compared to new parks for the same purpose, and are generally well-attended. Events can be held in all communities in the region as weekly events or one-time occasions. In small towns, they can be conducted in coordination with local farmers markets or other established local events.

Resources:

- The Open Streets Project *http://openstreetsproject.org/*
- Portland Sunday Parkways: *http://www.portlandonline.com/Transportation/index.cfm?c=46103*, *http://www.streetfilms.org/portlands-sunday-parkways/ (video)*

BICYCLING ITINERARIES & MAPS

Type: Encouragement

Purpose: Encourage biking by highlighting bicycling routes and destinations.

Audience: General public, tourists

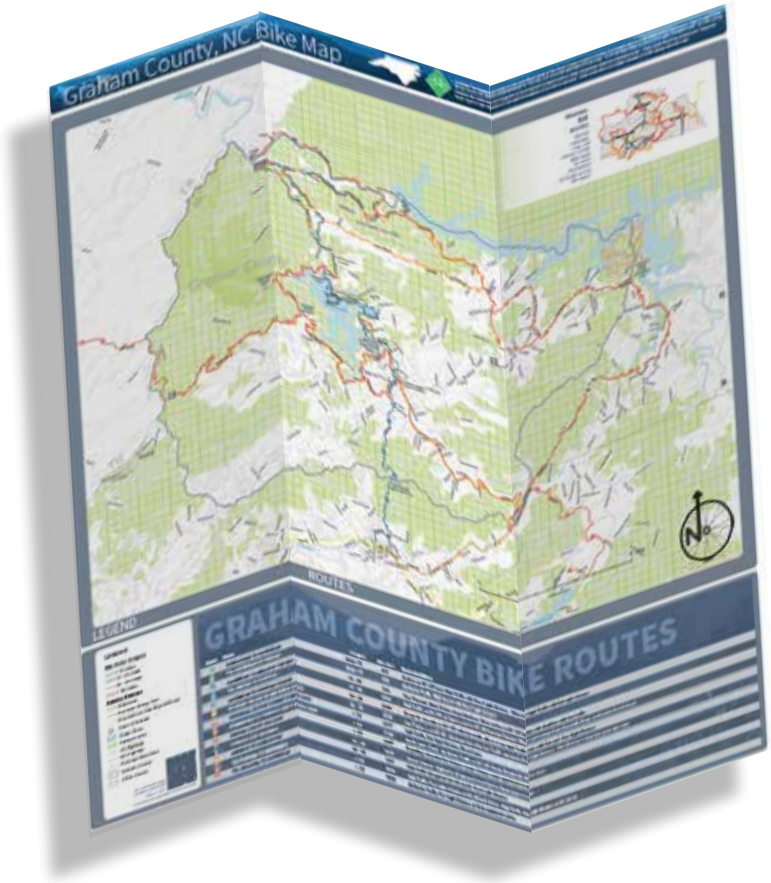
Partners: County and municipal planners and GIS technicians, businesses, local advocates and tourism agencies, Chambers of Commerce, Tourism Development Authority, Southwestern RPO, cycling and trails groups

A key component of this plan was development of promotional grade maps and route cue sheets. These can be built upon by identifying sample itineraries for bicycling tourists. These could include 24-hour, 48-hour, 72-hour

and weeklong samples of destinations and sights to see by bike.

The maps created for this plan should evolve over time as new routes and destinations emerge. The Southwestern Commission is interested in developing a regional portal for bicycle tourism and related economic developing. Expanding the four-county reach of this plan to encompass all seven Southwestern Commission Counties and have one regional map and individual county maps is advised and the four individual county maps produce for this plan are a great starting point.

Maps should be printed as needed and actively distributed to residents and visitors; they should also be updated on a regular basis as new facilities are implemented (every five years or less).



As a next step, local partners in each county could collaborate to create one or more guided tour routes based on popular local themes, such as local history, arts and crafts, agriculture, etc. Live tours should be hosted by knowledgeable tour guides (annually or more frequently as demand permits) and publicized widely. The tour routes should be preserved in a brochure and a self-guided (e.g., iPod-based) tour as well so that people can participate even if they are unable to attend the live, guided tour.

Area universities, agencies, merchants, and historical societies may be willing to support this effort by helping with historic and cultural research; some may also be willing to supply local information and images to be used in tour materials. Local merchants along the tour route would likely be able to help publicize and market the schedule for the guided tours and the resources for the self-guided tours.

Sample Guided Walks and Maps:

- Des Moines (IA) Region Trails Map: *http://www.dsmbikecollective.org/dmbcfiles/maps/DM_Complete.pdf*
- Wilsonville (OR) Walking Route Maps: *http://www.ridesmart.com/Index.aspx?page=190*
- Bedford County (PA) Walking Tours: *http://www.visitbedfordcounty.com/walkingtours.html*
- Austin (TX) Historic Walking Tours: *http://www.austintexas.org/visitors/plan_your_trip/historic_walking_tours*
- Charleston (SC) Route Book: *http://coastalcyclists.org/maps/routebooksample.pdf (sample route)*

PROFESSIONAL DEVELOPMENT COURSES

Type: Education, (and Evaluation, Enforcement)

Purpose: Educate and train planners and engineers on bicycle facility design and policy issues.

Audience: Professionals in planning, engineering, landscape architecture, etc.

Partners: Southwestern RPO, municipal and county staff, NCDOT Division 14, NCDOT Division of Bicycle and Pedestrian Transportation (DBPT)

Professional development courses provide training to transportation and other professionals who may not have extensive experience or training in bicycle facilities. This can be a successful way to institutionalize knowledge of bicycle facility design and create an agency culture that values bicycling.

Potential topics include the following:

- Bicycle and pedestrian facilities standards – Manual on Uniform Traffic Control Devices (MUTCD), American Association of State Highway and Transportation Officials' (AASHTO) Guide for the Development of Bicycle Facilities, and National Association of City Transportation Officials' (NACTO) Urban Bikeways Design Guide;
- FHWA's Small Town and Rural Multi-modal Transportation Guide;
- Americans with Disabilities Act (ADA) compliance for transportation facilities – Public Right of Way Accessibility Guidelines (PROWAG), ADA Transition Plans, liability issues, etc.;
- Complete intersections, including operations, lighting, planning, accessibility, etc.;
- Complete Streets – Implementing the policy;
- Greenway and path crossings;
- Pedestrian facilities – Planning, design, and implementation; and
- Working with law enforcement on traffic safety campaigns.

Sample program:

Institute for Bicycle and Pedestrian Innovation: *http://www.pdx.edu/ibpi/*

CONSISTENT WAYFINDING SIGNAGE PROGRAM

Type: Education, Encouragement

Purpose: Encourage bicycling to popular destinations; educate residents and visitors on the locations of key destinations in each community.

Audience: General public

Partners: Southwestern RPO, State and local parks and recreation agencies and departments, municipalities, Pedestrian and Bicycle Safety Coalitions, cycling clubs, local merchants

The far Western North Carolina region should develop and install standardized, branded wayfinding signs to support the circulation of cyclists within each community, and cyclists making connections between communities in the region. A great example of a trail-based wayfinding system is at the Jackrabbit Mountain trails on Lake Chatuge. Road-oriented wayfinding signs could follow the same designs schemes but would need to be legible for road riders. Larger informational kiosks or panels placed in parks or wayside areas could show broader routes and linkages between routes and communities.

Wayfinding signage enhances resident and visitor orientation. A clear wayfinding system should support the character of the region and contribute to economic development by indicating key destinations, restaurants, and entertainment venues. Directional signage targeted for use by motor vehicle drivers, pedestrians, and cyclists will complete a multimodal legibility package.

Image Source: NACTO

Materials for signage should reflect the character of the entire region with local customization as desired, be designed through collaboration with all communities, and be selected for longevity and ease of maintenance.

CYCLING SKILLS TRAINING

Type: Education, Encouragement

Purpose: Educate children, teenagers and adults on safe bicycling skills; encourage bicycling.

Audience: General public.

Partners: Municipal and County Parks and Recreation departments, SABA, other cycling clubs

Most bicyclists do not receive any training on safe bicycling practices, the rules of the road, and bicycle handling skills. Cycling skills courses can address this education gap. The most common program is the League of American Bicyclist's course series (including Traffic Skills 101, Traffic Skills 201, and Commuting), taught by League Certified Instructors (LCIs). There are currently over 50 LCIs in North Carolina (the updated list can be found here: *www.bikeleague.org/programs/education/)*.

The Hayesville area has one of the area's only trail riding skills programs for children. Representatives from SABA and the school system take kids to ride at the Chatuge Dam to learn basic riding skills before unleashing them on the Jackrabbit Mountain Trails to hone their skills on the singletrack.

Courses cover bicycle safety checks, fixing a flat, on-bike skills, crash avoidance techniques, and traffic negotiation. At least one course per year in each county in the far Western North Carolina region would be an excellent starting place.

Materials for the League of American Bicyclists courses must be purchased and courses often require a fee for participation in order to cover costs. However, Southwestern RPO and its partners may choose to seek sponsorships to defer costs and offer courses at no expense to the student. Communities could also choose to offer scholarships to a select number of participants. This may reduce barriers to participation and increase the diversity of the audience.

Bicycle education courses can be supplemented with a media campaign describing the rights and responsibilities of bicyclists. Palmetto Cycling Coalition, located in South Carolina, showcases a "Safe Streets Save Lives" campaign that offers free resources for communities seeking to educate residents about safe bicycling practices, including professionally developed Public Service Announcements.

Currently, bicycle skills training courses are available for children in Clay, Macon, and Graham Counties. At Hayesville Elementary School in Clay County, "Project Discovery" provides an intense 5-week bicycle training program to children, many with no previous bicycling experience, as a summer program. Safety tip sheets are also sent home at the end of these training courses to educate and inform parents on bike safety.

Sample programs:

- CAN-bike, Canada: *www.toronto.ca/cycling/canbike/canbike.htm*
- League of American Bicyclists, USA: *http://bikeleague.org/programs/education/courses.php*
- Safe Streets Save Lives: *www.safestreetssavelives.org*

WALK & BIKE FOR HEALTH CAMPAIGN

Type: Encouragement.

Purpose: Increase physical activity.

Audience: General public.

Partners: Public health agencies and departments, MountainWise, Eat Smart Move More Coalition, Municipal Parks and Recreation departments, hospitals and private health professionals.

Bicycling for transportation is still challenging in many parts of the far Western North Carolina region, as described in Chapters 3 and 4 of this report. For that reason, encouraging people to bicycle for health and recreation may be a more realistic starting place for communities, rather than directly encouraging non-motorized commuting. Numerous regional partners, particularly in the health arena, could assist with developing and implementing a Walk and Bike for Health campaign.

Sample programs:

- Find Thirty. It's Not a Big Exercise® is an Australian marketing campaign aimed at increasing the amount of moderate-intensity physical activity that is incorporated into the daily lives of Australians. The program targets adults and health professionals to receive information on the benefits of a healthy lifestyle. The Find Thirty campaign uses a professional and regularly updated website, television advertisements, and events to promote their cause of increasing daily exercise. More information: *http://www.find30.com.au/*

- Let's Move® is an U.S. marketing campaign aimed at improving national rates of obesity by providing common sense programs and resources for parents, children, schools, and others. Launched in 2010 by the First Lady, Michele Obama, the program includes a "Get Active" campaign to promote healthier lifestyles through fun, exciting, and challenging opportunities for increased physical activity. More information: *www.letsmove.gov/get-active*

POLICE OFFICER BICYCLE TRAINING

Type: Education, Encouragement (and Enforcement).

Purpose: Educate law enforcement officers on bicycle laws and safety. Encourage officers to pursue bicycle training and encourage officers to issue citations to motorists and non-motorists for violations of bicycle laws, increasing the enforcement of laws pertaining to bicyclists.

Audience: Police officers.

Partners: Municipalities and counties, police and sheriff's departments, Pedestrian and Bicycle Safety Coalitions.

Most law enforcement professionals do not receive training specific to bicycle laws or safety. Police education courses can help officers improve public safety and enforce existing laws more effectively by providing them with the training they need. These courses should include comprehensive information about laws and statutes pertaining to bicycling; information about common crash types and causes; prevention and enforcement techniques against the most serious offenses; and options for enforcement and education (e.g., when a citation vs. warning should be issued, diversion class options, and safety materials that can be handed out during a traffic stop or public event).

The training should be offered annually, hosted in different communities each year. Local bicycle clubs may serve as key partners in providing clarification of North Carolina laws as they relates to bicyclists.

Sample program:

- The Wisconsin Pedestrian and Bicycle Law Enforcement Training Course includes curriculum on how bicycle and pedestrian crashes happen, laws relating to walking and bicycling, effective enforcement, crash reporting, best practices, etc. The course is open to all law enforcement entities for a fee, which covers instruction and materials. More information: *www.bicyclinginfo.org/enforcement/training.cfm*

BICYCLE LAW CITATION & WAIVER PROGRAM

Type: Education, Encouragement (and Enforcement).

Purpose: Encourage officers to issue citations to bicyclists in violation of bicycle laws, enforce bicycle laws, educate bicyclists on bicycle laws, and

encourage safe bicycling practices with the appropriate equipment and accessories.

Audience: Bicyclists, police officers.

Partners: Municipalities and counties, police and sheriff's departments, local Pedestrian and Bicycle Safety Coalitions.

A "first time offense citation waiver program" should be considered for a pilot program by Police Departments in the far Western North Carolina region. If a bicyclist is observed without the legal equipment and accessories for bicycling, a citation should be issued to the offending cyclist. The cyclist would purchase the necessary equipment or accessory (helmet, reflector, light, etc.) and present the item, a receipt of sale, and the citation to the respective County Clerk of Courts Office. The Clerk's Office would waive the citation fee if it was the first violation by the cyclist.

This program could be expanded to include violations of "rules of the road" for safe bicycling. If a bicyclist is observed bicycling on sidewalks or not bicycling properly with the flow of automobile traffic, a citation should be issued to the offending cyclist. The cyclist would have an option to participate in a bicycling safety education course to have the citation fee waived. Once they have completed a bicycling safety education course, the cyclist would present their citation, along with their certificate of course completion to the respective County Clerk of Courts Office. The Clerk's Office would waive the citation fee if it was the first violation by the cyclist.

If the pilot program is successful in the early adopter communities, other municipalities and counties in the far Western North Carolina region should adopt the program.

"WATCH FOR ME NC" CAMPAIGN

Type: Education, Encouragement (and Enforcement).

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

Audience: Pedestrians, cyclists, motorists, law enforcement officers.

Watch For Me NC bumper stickers are also offered in Spanish to help communities reach a broader audience.

Partners: NCDOT, Southwestern RPO, municipalities and counties.

The "Watch For Me NC" campaign is intended to influence the behaviors of drivers and bicyclists through safety messaging and enforcement. The effort was launched in 2012 through Transportation Enhancement funding provided by the NCDOT and federal funds from the NHTSA. The bicycle component was funded and expanded in 2013. A pilot version of this program also occurred on the Outer Banks in May, 2013, in partnership with the OBX Pedestrian and Bicycle Safety Coalition. In Western North Carolina, the Town of Murphy and Jackson County have deployed the Watch for Me NC program.

The Southwestern RPO may request that NCDOT host an informational workshop for local officials and staff, and provides a "toolkit" of materials for implementing the program locally across the entire region. Each municipality and county in the far Western region should request funding for program development and guidance for utilizing local staff and resources to bolster the program. Bicyclists' safety, rights and etiquette, along with street crossing rules, traffic signal messages and meanings, and how to follow and obey pavement markings should be taught to children and adolescents to increase their safety and reduce automobile-bicycle crashes in the region.

Resource: NCDOT Watch for Me NC: *www.watchformenc.org/about/*

LET'S GO NC!

Type: Education.

Purpose: Aid instructors in teaching and encouraging safe pedestrian and bicycle behaviors.

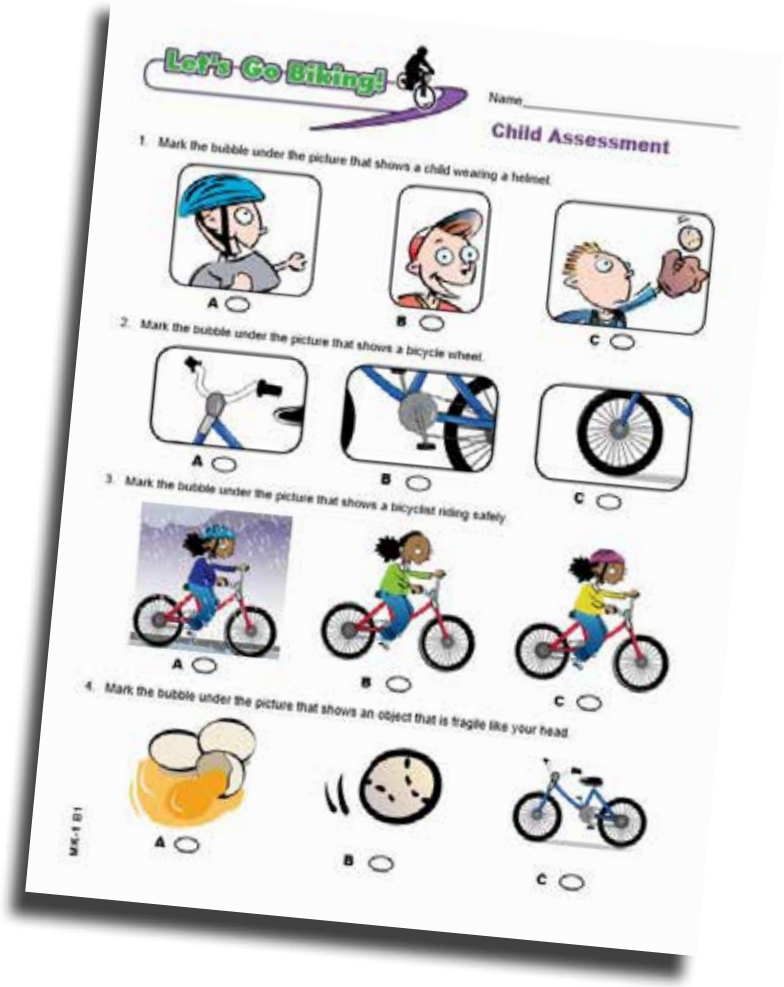
Audience: Elementary school aged children.

Partners: Active Routes to School, school districts, municipalities.

The Division of Bicycle and Pedestrian Transportation worked with NCSU's, Institute of Transportation Research and Education to develop "Let's Go NC!, A Pedestrian and Bicycle Safety Skills Program for Healthy, Active Children", designed to aid instructors in teaching and encouraging safe pedestrian and bicycle behaviors. Through this curriculum children develop skills that will promote healthy transportation choices. "Let's Go NC!" gives instructors throughout NC elementary grade schools, community centers such as YMCA and 4H-Clubs, health programs, law enforcement agencies, and more the tools needed to help inform decision making in the battle against obesity, child traffic injuries and death, and the urgent need to create in our youth healthy active lifestyles.

Educating children on pedestrian and bicycle safety can reduce the number of child traffic injuries and deaths. Children who don't understand traffic and the rules are more likely to be injured. Approximately 16 child pedestrians and 3 child bicyclists between 0-15 are involved in fatal crashes each year in NC and hundreds more are injured.

Child safety and wellbeing is paramount to NCDOT and is part of its mission and goal to make NC safer for persons of all ages and abilities. Teaching both the pedestrian and bicycle lessons will give children the skills necessary to be safe, healthy and active in their daily lives. The goal of the curriculum is to develop walking and biking skills for active lifestyles that can be carried into adulthood. The purpose of the program is to help children transfer the knowledge they learn into automatic responses in their behaviors. These behaviors will benefit future generations and will work to promote a healthy, well informed culture for safe active living and will improve transportation choices all North Carolinians.



Teachers can use Let's Go NC! curricula to help explain safety, basics of force and motion, and mechanics.

You can download all curriculum materials, including lesson plans, lesson videos, and guidance materials for instructors from the "Let's Go NC!" online interface: https://www.ncdot.gov/bikeped/safetyeducation/letsgonc/

REGIONAL WALK BIKE WEBSITE

Type: Education.

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

Audience: General public.

Partners: Southwestern RPO, municipalities and counties, local advisory committees (BPACs), local cycling clubs.

Southwestern Commission may build upon the idea of a bicycle tourism portal to create a more robust regional website for all active transportation topics. The full-scale Southwestern RPO website could be a "one-stop shopping" website that includes:

- A list of all walking and bicycling groups, including clubs, racing teams, and advocacy groups;
- Information about the specific committees that discuss walking, bicycling, and trail issues (including how to get involved, meeting times and dates, agendas and minutes, etc.);
- Information about current projects and how to get involved (e.g., public meetings, comment periods);
- Maps and brochures (e.g., links to online maps and brochures, where to find in person, and how to request mailed materials);
- Links to laws and statutes relating to bicycling;
- Information about bicycling and running events (e.g., rides, classes, volunteer opportunities) and an events calendar;
- Links to events, information and clubs in nearby Georgia and Tennessee;
- A list of local bike shops, including phone numbers and addresses; and
- Relevant contact information for the public.

A one-stop bike website will not be difficult to set up, but it will only be successful if the site is both easy to use and updated regularly. All website content should be reviewed regularly for accuracy. If a Regional Bicycle and Pedestrian Advisory Committee is formed, the RPO should consider adding a standing agenda item for BPAC meetings to discuss the website in order to hear about new content that should be added or out-of-date content that should be updated or removed.

Sample website: Bike Long Beach (CA): *www.bikelongbeach.org/*

ACHIEVE BICYCLE-FRIENDLY COMMUNITY STATUS

Type: Education, Encouragement (and Enforcement).

Purpose: Recognize accomplishments towards improving bicycling conditions.

Audience: Elected officials, media Partners: Southwestern RPO, municipalities and counties, local cycling clubs, advisory committees.

The League of American Bicyclists has a well-respected Bicycle-Friendly Communities (BFC) award program. The League recognizes four tiers of bicycle-friendly communities: bronze, silver, gold, and platinum. Communities fill out a detailed application that covers bike-related facilities, plans, education efforts, promotion initiatives, and evaluation work that has been completed by the jurisdiction. The award is designed to recognize progress that has been made, as well as assist communities in identifying priority projects to improve bicycling conditions. Receiving the award is a media-worthy event, and may give elected officials the opportunity to receive media coverage for the positive work they are doing. The Pedestrian and Bicycle Information Center recently launched a sister program for Walk Friendly Communities (WFC) that has recognized 11 communities around the nation.

The RPO should work with towns and cities in the region to assess their readiness to apply for WFC and/or BFC designation, and encourage them to apply. The application can be completed by local

agency staff with the support of the RPO, particularly if a Bicycle and Pedestrian Advisory Committee is formed.

More information:

- Bicycle Friendly Communities Program: *www.bicyclefriendlycommunities.org*
- Walk Friendly Communities Program: *www.walkfriendly.org/*

POSITIVE MEDIA CAMPAIGN

Type: Education, Encouragement.

Purpose: Normalize/humanize the image of bicycling in the region.

Audience: General public.

Partners: Local Pedestrian and Bicycle Safety Coalitions, local cycling clubs, local merchants/business leaders, municipal and county staff.

Often the general public thinks of negative stereotypes when they hear about "cyclists." A media campaign that shows a wide range of ordinary residents using their bicycles for a variety of purposes will help break down those stereotypes and raise awareness of bicycling and geniality towards people who ride bicycles. One excellent example is the "I Ride" campaign from the Community Cycling Center in Portland, Oregon. They have created well-photographed posters showing people in a wide variety of ages, races, body types, and with a wide variety of bicycle types, and each person has been invited to complete the sentence "I ride _____." The images are being distributed as bus stop and bus bench ads, as well as online.

In the far Western region, the "I ride" slogan may be considered, or another equally humanizing slogan could be created. The effort could be spearheaded by a variety of groups, from public agencies to nonprofits to volunteers. Health partners may be interested in funding and/or implementing this campaign. Donated media placement should be sought for print media and other public installations (such as benches, transit media options, billboards, or other locations).

A good photographer should be engaged, and opportunities for people to be photographed should be created (such as at public bicycling events). Key community members should be invited to participate as well, particularly if they are well-known.

More information on the Portland "I Ride" Campaign can be found at: *www.communitycyclingcenter.org/introducing-the-i-ride-bicycling-campaign/*

Image Source: Bike Pittsburgh

KEY PARTNERS TO CONSIDER FOR IMPLEMENTATION OF BICYCLE PROGRAMS

- Incorporated towns in the four counties of the far Western North Carolina region – Towns are important parties in initiating and supporting programmatic efforts;
- Active Routes to School Project – NC's Department of Transportation and Division of Public Health support this SRTS program. The Regional Project Coordinators are key partners for implementing SRTS programming in any community. The far Western counties of this project fall within Region 1, whose Coordinator is already actively working on SRTS projects (both walking and bicycling) in many of the communities in the area;
- Any local bicycling/trails committees – Communities with existing Bicycle or Trails/Greenways Committees can help coordinate efforts and may be able to connect needs with interested volunteers;
- Public health agencies and nonprofits – Public health professionals can help to implement and evaluate recommendations that will help residents increase daily physical activity;
- Major employers and universities – The far Western region has several employers who may be engaged in bicycle-related issues;
- Local police departments and county sheriff's offices – Law enforcement professionals can help support safety campaigns through strategic enforcement and educational events;
- School districts – School districts and schools are natural partners for Safe Routes to School efforts as well as for education programs related to student safety;
- Parent Teacher Associations (PTAs) and Organizations (PTOs) – PTAs and PTOs can be effective partners in implementing Safe Routes to School efforts and other school-oriented traffic safety initiatives;
- Parks and Recreation – Parks and Recreation departments are natural partners for public events and classes such as organized walks;
- YMCA, Boys & Girls Clubs, and other youth-oriented service providers – These groups can partner on programs that benefit children;
- Cycling clubs – Clubs may be able to provide volunteer support for bicycling programs;
- Chambers of commerce, business improvement districts, downtown development associations – These groups may be interested in supporting initiatives that bring residents and visitors to the downtowns and business districts;
- Economic and tourism development organizations – These groups may be interested in supporting initiatives that bring visitors to the region;
- Senior centers and retirement communities – More and more organizations that work with seniors are interested in projects that help their clients live active, healthy lives;
- Hospitals and private health professionals – Private sector partners with an interest in promoting health and wellness can serve as local champions and funders of education and awareness campaigns.

Policy Recommendations

Highlands, Franklin, Hayesville, Murphy, and Andrews all have local zoning ordinances. Except for Highlands and Franklin, local regulations do not contain specific policies that promote bicycling, such as bicycle rack requirements or provisions for traditional neighborhood development, nor do they limit bicycling though local regulations.

The Highlands Land Use Plan contains language encouraging the Town to promote greenspace, walkways, and trails during the development process. The Land Use Plan includes a strategy to expand and publicize the town's greenway trail through cooperative efforts of local civic-environmental groups.

Highland's Unified Development Ordinance contains a section on Bicycle Regulation (Highlands UDO, Article VI. – Bicycle Regulations) that has been in effect since 1982. The sections of the Article regulate to whom the regulations apply, applicability of traffic laws to persons riding bicycles, obedience to traffic-control devices, riding on bicycles, riding on roadways and bicycle paths, speed, emerging from an alley or driveway, carrying articles while riding a bicycle, bicycle parking, riding on sidewalks, and lamps and other equipment.

While not a land use plan, the Town of Franklin adopted the 10

Principles of Growth in 2006. The Principle's Preamble states, "We believe that in order to help maintain what we love about Franklin, and still accommodate growth, we have to change our planning approach to create safe and friendly streets for pedestrians, bicyclists, and motorists…" Principle #8 - Provide a Variety of Transportation Choices - highlights the need for transportation choice and states that "Road improvement plans should include safety planning for motorists, pedestrians, bicyclists, and transit users." The principles also encourage development with connections to adjacent properties and the importance of providing foot/cycle path connections to adjacent residential and business properties.

In 2007, Franklin adopted a Unified Development Ordinance that translated the Principles of Growth into regulatory language, with specific regulations designed to create pedestrian-scale development that enhances the streetscape. Certain districts such as the Urban Village, among others, must provide access to bicyclists. Near the downtown core, district rules call for zero setback lines and for rear parking thereby allowing for direct biyclist access to buildings.

Highlands and Franklin should continue to assess their policies and update their policy documents to reflect current priorities. Franklin has put forth the funding to develop a Land Use Plan, which should include language reflecting the goals of the Southern Blue Ridge Bike Plan.

Bicycle (and Pedestrian) Coordinator: A number of larger cities around the country staff a part- or full-time Bicycle/Pedestrian Coordinator. The coordinator is responsible for current bicycle planning and safety efforts, and assisting with the implementation of municipal bicycling programs. Towns in the four counties should consider budgeting for an ongoing Bicycle/Pedestrian Coordinator position, or partnering with a local planning consultant. In addition to supporting existing programs, job duties for this staff/volunteer position may include the following:

- Monitoring facility planning, design, and construction that may impact bicycling;
- Staffing bicycle advisory committee meetings;
- Coordinating the implementation of the recommended projects and programs listed in this Plan;
- Conducting annual benchmarks to include measures for success, bicycle/pedestrian counts, gather data on number of new of bike lanes, sidewalks, and best practices adherence as it pertains to all bike plan projects, pilot programs, and facility treatments;
- Identifying new projects and programs that would improve the Town's bicycling environment and improve safety for bicyclists;
- Coordinating evaluation of projects and programs, such as bicycle counts;
- Pursuing funding sources for project and program implementation;
- Overseeing opportunities for construction and maintenance for bicycle improvement implementation.

MUNICIPAL POLICIES

Vision Zero Policy: Vision Zero is a holistic approach that aims to achieve zero deaths and zero serious injuries while traveling, regardless of transportation mode. This is done by making safety the top priority for the transportation system and requires a collaborative approach that addresses land use and transportation infrastructure, enforcement, and education. Principles of Vision Zero include the following:

- Traffic deaths and injuries are preventable;
- People will make mistakes; the transportation system should be designed so human error is not fatal;
- Safety should be the primary consideration in all transportation decision-making.

To implement Vision Zero policies, municipalities within the study area will need to have a multi-faceted approach that brings together government, advocacy, and private sector actors and fully engages the public to become part of the solution. If a town like Franklin or Hayesville chooses to implement Vision Zero, it is recommended that the first step be to create a Vision Zero Task Force. This Task Force will be responsible for the following:

- Collecting and sharing data between agencies;
- Evaluating parties and causes of serious or fatal crashes;
- Identifying and mapping high-crash corridors and intersections;
- Developing strategies and countermeasures to reduce or eliminate fatal or serious crashes;
- Working with the Town's Bicycle/Pedestrian Coordinator (if one exists) to develop a robust outreach strategy;

- Encouraging the Town government to adopt Vision Zero policies, programs, and projects.

Sample policies:

- City of New York: *nyc.gov/html/visionzero/pdf/nycvision-zero-action-plan.pdf*
- City of Austin: *austintexas.gov/visionzero*
- City of San Francisco: *visionzerosf.org*

Resources:

- Silicon Valley Bicycle Coalition, Vision Zero Toolkit: *bikesiliconvalley.org/files/150820-SVBC-CalWalksVision-Zero-Toolkit.pdf*
- Vision Zero Network: *visionzeronetwork.org*

Complete Streets Policy: Complete streets policies aim to develop integrated, connected networks of streets that are safe and accessible for all people, regardless of ability, income, or chosen mode of travel. Complete streets make walking and bicycling convenient by increasing access to employment centers, commerce, and educational institutions; and allow greater choice in transportation options that help to reduce transportation costs for residents. Complete streets policies are holistic - rather than just focusing on the physical changes of streets, these policies aim to inform transportation planning, design, maintenance, and funding decisions.

While bicycle travel is the focus of this Plan, it is recognized that, ideally, all streets would accommodate the needs of all transportation system users equally; however, limited right-of- way and resources frequently require trade-offs and compromises. Some municipalities have developed a transportation mode hierarchy to help establish policy-level priorities for the transportation system and to guide design decisions on individual projects. The adoption of a transportation mode hierarchy for downtown cores in towns like Andrews or Murphy could help streamline decision-making and clarify priorities for different areas of the town based on the surrounding land use and transportation plans.

The resulting modal hierarchy plan could be codified as part of an official "complete streets" policy to support each municipality's goals for multimodal transportation and the aligning regional connections. Active transportation thus becomes a standard component of any new design or upgrade to the towns' roadway network. The policy should also provide multimodal level of service metrics to allow evaluation to monitor the success of the policy.

Successful policies are those that incorporate the thoughts and opinions of a broad group of stakeholders: transportation planners and engineers, elected officials, transit agencies, public health departments, and members of the community. Complete streets can be achieved through a variety of policies:

- Ordinances and resolutions;
- Rewrites of design manuals;
- Inclusion in comprehensive plans;
- Internal policies developed by public works departments;
- Executive orders from elected officials, such as mayors;
- Policies developed by stakeholders from the community and agency staff that are formally adopted by an elected board of officials.

Resources:

- Complete Streets Policy Development 101 Presentation: *smartgrowthamerica.org/complete-streets/changing-policy/policy-elements*
- Complete Streets Local Policy Workbook: *smartgrowthamerica.org/documents/cs/resources/cs-policyworkbook.pdf*
- National Complete Streets Coalition, Elements of an Ideal Complete Street Policy: *smartgrowthamerica.org/documents/cs/policy/cs-policyelements.pdf*
- Taking Action on Complete Streets: Implementing processes for safe, multimodal streets: *smartgrowthamerica.org/documents/cs/impl/ taking-action-on-cs.pdf*
- National Complete Streets Coalition, The Best Complete Streets Policies of 2016: *https://smartgrowthamerica.org/resources/the-best-complete-streets-policies-of-2016/*

Speed Limit Policies: Around the country, communities are now reconsidering lower speed limits, particularly on downtown streets. Cities as diverse as New York City, Burlington (VT), Miami Springs (FL), and San Mateo (CA) have recently implemented speed limits of 25 mph. While some larger arterials through the study area are likely to keep higher speeds in keeping with their role in regional travel, many arterial collector streets are appropriate for reduced speed limits.

Source: NCDOT

Andrews' downtown speed limits can be restricted further to offer a safer environment for bicycling and help connect residents to the proposed Valley River Trail, the Cherokee Casino, and Murphy.

Lower speeds produce less traffic noise, improve crosswalk yielding behavior, and contribute to a more people-friendly environment. In addition to creating a more pleasant streetscape for people, reduced speed limits are critical for safety and comfort along the proposed low-stress bike facility network that the Southwestern Commission seeks to expand in the region. Creating a viable bicycle system for every user type relies on having low stress riding conditions on the segments of roadway that do not have bicycle infrastructure.

However, arbitrarily lowering speed limits can lead to poor compliance, difficult enforcement, and resentment of regulatory speed limits. Speed reductions should generally be achieved through physical infrastructure changes, including lane width reduction, bike lanes, street trees, medians, and streetscape enhancements as well as changing speed limit signs throughout town. Most people will drive at a speed that feels safe based on the physical conditions presented to them, so downtown and neighborhood streets should be designed for lower vehicular speeds.

Andrews, Murphy, Hayesville, Robbinsville, Franklin, and Highlands should examine the speed limits on arterials and local streets and ensure that they are set at levels that contribute to safe bicycling conditions.

Update Bicycle Operation Ordinances: Each town in Cherokee, Clay, Graham, and Macon Counties should update its laws related to bicycling to improve conditions and demonstrate support for multimodal transportation. As the laws are updated, law enforcement personnel should be trained to enforce the new provisions, which could include:

- Specifying that bicyclists may "share the road" (ride in the right-most lane of the cyclists' direction of travel);
- Specifying that bicyclists may "take the lane" (when conditions warrant);
- Specifying that bicyclists may ride two-abreast;
- Requiring a three-foot minimum passing distance when motorists pass a bicyclist;
- Specifying that children may bicycle on sidewalks, or permitting other circumstances for bicycling on sidewalks outside of the central business district.

Any updates to local ordinances should remain in accordance with statewide bicycle laws (*www.ncdot.gov/bikeped/lawspolicies*).

Resources:

- Sioux Falls, SD Bicycle Ordinance Update: *www.siouxfalls.org/planning-building/planning/transportation/highlights/bicycle-planning/on-st-bike-ord-updates.apx*
- Fort Wayne, IN Bicycle Ordinance Update: *www.cityoffortwayne.org.2289-proposedchanges-make-city-even-more-bike-friendly. html*
- Zimmerman, Sara, and Karen Kramer. "Getting the Wheels Rolling: A Guide to Using Policy to Create Bicycle Friendly Communities." 2013. *http://www.changelabsolutions.org/bike-policies*

ADDITIONAL POLICY RECOMMENDATIONS

- The Southwestern Commission could spearhead an effort to review existing municipal and county land use codes for opportunities to include specific language for bicycle friendly development outcomes. A bicycle-friendly development task force should be developed to evaluate land use codes and plans throughout the region to identify opportunities for further promoting bicycling, increasing connectivity, and highlighting the need for safer streets. The towns' and counties' Planning Boards provide a good avenue to initiate this effort.

- Update the design manuals in existing subdivision regulations to reflect best practices for walkable, bikeable street design. These should include recommended cross-sections with context-sensitive options for bicycle infrastructure. When developers design new projects, they must understand that bicycling and walking are important considerations in the approval process. An area's land use pattern and density have proven to have a significant influence on a person's decision to bicycle for non-recreational travel. Recommended actions to ensure that future land development patterns are conducive to cycling are:

  - Encourage and promote the development of a highly connected street network by adopting guidelines for minimum levels of connectivity based on other commonly used standards such as the Connected Node Ratio or Block Length Analysis;

  - Encourage and promote higher density development patterns with a greater mix of land uses;

  - Interconnect land uses with off-road facilities.

- The Southwestern Commission should assist municipalities and counties in overcoming the need for coordination between departments by facilitating ongoing communication, partnerships, and goal-setting. Each town in the study area should coordinate planning, design, implementation, and maintenance of bicycle improvements with the surrounding municipalities, counties, and surrounding areas in order to effectively promote regional connectivity. Meanwhile, municipalities should use the Southern Blue Ridge Bike Plan to guide planning, design, and implementation of bicycle infrastructure in conjunction with other local plans and projects.

- Increase the availability of bicycle parking by developing new standards and updating existing standards for bicycle rack type and placement. The standards are not always followed, and training is necessary to ensure proper types and placement of bicycle racks. A Bicycle (and Pedestrian) Coordinator, whether volunteer or staff, can begin the process of assessing or developing standards, while monitoring conditions and needs within town limits and at public venues (parks, libraries, etc.) throughout each county. Planning staff can oversee bicycle rack purchasing and installation to ensure those existing policies and standards are enforced and meet existing and updated codes for bike parking.

- Work with municipal police departments and county sheriff's offices to increase awareness of bicycle-related traffic laws and enforcement of existing and new laws. The Southwestern Commission could provide support for on-going training for police officers regarding bicycle safety laws and issues; and initialize support to increase the number of bicycle patrol officers in the region.

- Work with TDAs to encourage increased bicycling by promoting health, recreation, transportation, tourism opportunities, and environmental benefits.

- Make sure the four counties have policies in place that state the goal of including bicycle infrastructure with planned transit systems. As new fixed-route bus lines become part of the transportation network throughout WNC, it is important to have bike racks at key stops and stations. Local officials should also advocate for buses that are capable of carrying bicycles.

- Consider using tactical urbanism—small, strategic, temporary interventions to change the look and feel of a street—to encourage conversation about positive change in the built environment. This could be town-led initiatives or partnerships with local artists, architects, student groups, and individuals who have ideas about bicycling the towns wish to promote. These efforts are meant to be short-term, low-cost, and scaleable interventions to catalyse long-term change.

- To ensure adequate upkeep over the long term, towns in the study area should budget and prioritize dedicated resources for the maintenance of bicycle facilities, including funding for dedicated maintenance of regional greenway systems.
- The towns in Cherokee, Clay, Graham, and Macon Counties should invest in public media, with the help of the Southwestern Commission. Government websites, maps, and interactive community input tools are critical for documentation and helping to move plan implementation forward. GIS data on new bikeways, bike parking, and other information critical to measuring plan progress will be key to effective and efficient reporting by and to departments and the public.
- Hayesville, Murphy, Franklin, Highlands, and Robbinsville include front-in angled parking in their downtowns, allowing for bicycle travel in shared travel lanes. With front-in angled parking, drivers tend to enter spaces at high speeds and have limited visibility as they back out of spaces into moving traffic. There is evidence that back-in angled parking can reduce crash rates and improve safety, particularly for bicyclists. A pilot project could be implemented in these towns (similar to efforts by Franklin in switching to parallel parking), and especially along Main Street in Highlands, to install back-in angled parking. By reversing the angled parking, the same number of spaces could be maintained, but drivers would need to slow and stop within the travel lane before they reverse into a parking space. This allows bicyclists, as well as motorists, time to assess the situation and react. Upon exiting the space, drivers have a better view of oncoming traffic, including bicyclists.
- Partner with NCDOT to assess opportunities to improve signal detection for bicyclists. There are many different technologies that can be used to detect vehicles at traffic signals, some of which work better for bicyclists. By working with vendors to improve detection capabilities for bicyclists, especially during low-light or shadowed conditions where bicyclists are often not detected, the region can demonstrate its commitment to becoming a hub for bicyclists. As technology improves, detection equipment and/or software should be upgraded to improve detection for all light and weather conditions.
- Work collaboratively between towns, the Southwestern Commission, and county parks and recreation departments to incorporate bicycle counters into all new on-street and trail infrastructure projects. This policy recommendation supports infrastructure projects in this chapter by the expansion of bicycle data collection efforts and the creation of a robust pre- and post-construction evaluation of new bicycle facilities. Counters installed at the time of construction will enable evaluation of usage from Day 1 and ensure their appropriate integration into facility design.

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Chapter 7

Designing for Bicyclists

Chapter 7

Designing for Bicyclists

Applying Complete Streets

Just because a street has bike lanes does not always mean it is "complete" from the perspective of safely accommodating all users of all ages and abilities. Careful consideration must be given to the needs of bicyclists and how they interact with traffic along different routes. Destinations along or near a proposed bicycle route will determine what types of users to expect.

NCDOT's Complete Streets policies, related guidelines, and practices mean that the state is likely to improve streets with bicycling and pedestrian facilities when they are part of other major roadway upgrades or changes in configuration. Given current constraints, it is not likely that NCDOT will add capacity to every street in every community, nor along every suggested bike route detailed in this plan.

The addition of bike lanes or bikeable shoulders, for instance, is most likely to occur through resurfacing of the streets by NCDOT (in partnership with municipalities to add pavement width where possible) or through towns independently pursuing federal or local funds to add the lanes to state-managed and other routes. Often, streets where these facilities are desirable either have curb & gutter without enough room for a separate lane and/or any widening would require right-of-way from adjoining property owners. The NCDOT's resurfacing projects have never been set up to procure right-of-way or to remove curb and gutter.

While Complete Streets are being implemented by NCDOT, it is still imperative that municipalities and their representatives remain diligent about how bicyclists are accommodated on roadway projects. Cities and towns should work with their local NCDOT Division offices to articulate these needs during the project development process so proper input can be given to the designers, who are oftentimes housed in Raleigh and are not as familiar with local context. There are several positive examples across the state where this type of constant interaction has yielded better design for bicyclists along state highways.

EMERGING TRENDS

The Southern Blue Ridge Bike Plan is a document that emphasizes priorities over a multi-year time frame. However, it is likely that design guidance may be outdated when some recommendations of this plan are implemented. Prevailing design guidelines will always be a step or two behind the prevailing needs of bicyclists and pedestrians, which means it is difficult for designers to justify treatments that are not part of adopted design guidelines due to liability concerns. This section summarizes some emerging trends in bicycle facility design and organizations that are addressing the emerging trends.

WalkBikeNC Implementation. There are several recommendations contained in North Carolina's statewide pedestrian and bicycle plan that could influence how NCDOT and other communities across the state implement future designs for bicycling facilities. Municipal governments and residents of Cherokee, Clay, Graham, and Macon counties should keep track of the progress of this, in concert with the Southwestern Commission as well as subsequent updates to the state's Complete Streets Planning and Design Guidelines, to ensure the most modern application of treatments for bicyclists are accommodated.

https://www.ncdot.gov/bikeped/walkbikenc/about/

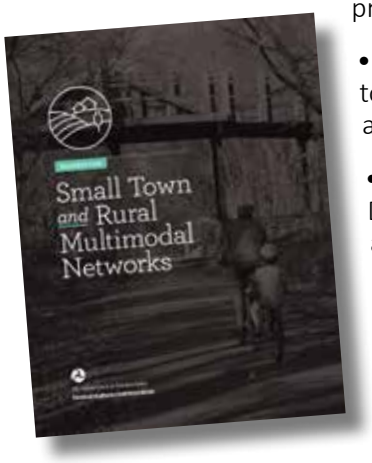
NACTO Urban Bikeway Design Guide. The National Association of City Transportation Officials (NACTO) has recognized that prevailing guidance from AASHTO is not well-suited for bicycle mobility in urban areas. They developed this design guide as a way to account for those unique needs. The NACTO guide is available online and includes several innovative treatments, many of which are acceptable applications within what MUTCD allows.

Cycle tracks and colored bicycle lanes are prevalent in the Design Guide, as are various treatments for bicycle boulevards and how to accommodate bicyclists at intersections. WalkBikeNC recommends NCDOT endorse this design guide so that communities and NCDOT are comfortable with applying some of its concepts. Many communities across the country, including Charlotte, have already endorsed it.

https://nacto.org/publication/urban-bikeway-design-guide/

Small Town and Rural Multimodal Networks Report. The FHWA developed this 2016 report as a resource and idea book intended to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities. It provides a bridge between existing guidance on bicycle and pedestrian design and rural practice, encourages innovation in the development of safe and appealing networks for bicycling in small towns and rural areas, and shows case studies and visual examples of appropriate facilities.

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

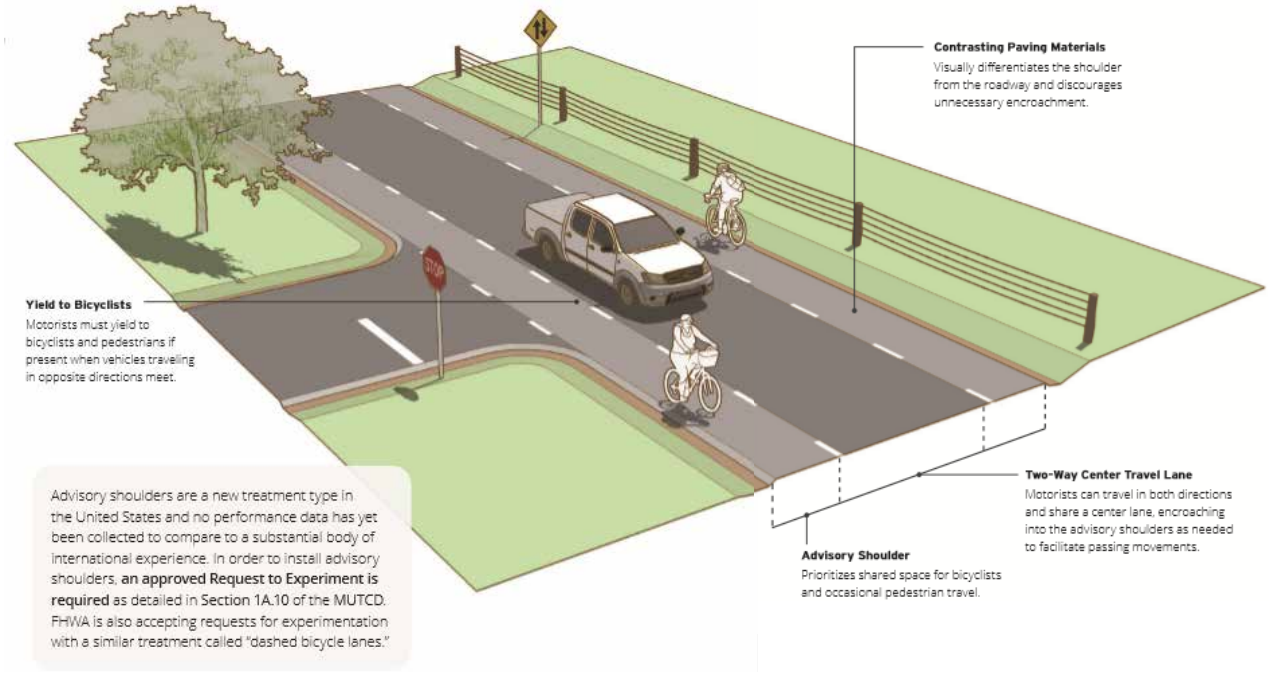


Designing for Bicyclists

In addition to the state's Complete Streets policy, NCDOT operates under an adopted Bicycle Policy that stems from the state's 1974 Bicycle and Bikeways Act. Some important elements of the bicycle policy to remember when projects are pursued are:

- Bicycle compatibility shall be a goal for state highways in order to provide reasonably safe bicycle use, except on fully-controlled access highways, where bicycle use is prohibited.
- All bicycle facilities shall conform with the (state) adopted Design Guidelines for Bicycle Facilities on state-funded projects, and also with guidelines published by the American Association of State Highway and Transportation Officials (AASHTO) on federal aid projects.
- Paved shoulders shall be encouraged as appropriate along highways for the safety of all highways users, and should be designed to accommodate bicycle traffic.

Figure 7-1—FHWA Advisory Shoulder Rendering



As prescribed in NCDOT's Bicycle Policy, most of the prevailing guidance on the design of bicycling facilities stems from AASHTO. In 2012 the organization published its Guidelines for the Development of Bicycle Facilities, which serves as the foundation for the design guidance contained in this chapter. Municipal offices should purchase this document to have on-hand for future discussions as it is not universally known about or applied in North Carolina.

The other prevailing design guidance for transportation engineers is the Manual on Uniform Traffic Control Devices (MUTCD), which sets the standards for traffic control practices across the United States. The application of MUTCD is why speed limit signs look the same in most states and the striping and signage along highways and streets is consistent. The most recent MUTCD was adopted in 2009 and includes the most comprehensive set of considerations for signage and pavement markings for bicyclists. Engineers, in most cases, are hesitant to deviate from its guidance due to fears of litigation.

In some instances, NCDOT's own design guidelines have identified features that are more bicycle friendly, such as how to determine appropriate bikeable shoulder width based on the speed of adjacent motor vehicle traffic.

The important thing to note is that as the bicycling culture is changing in America, the design standards are also evolving rapidly and new guidance is being published yearly from various organizations.

NEIGHBORHOOD GREENWAYS

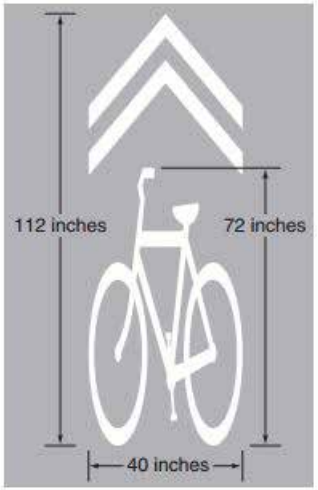
A neighborhood greenway is a signed bicycle route on a slow speed, low traffic residential street. These routes always have bicycle route signing and may also include pavement marking "sharrows" and/or "Share the Road" or "Bikes May Use Full Lane" signs (which may not currently be compatable with state allowances) to alert motorists to the presence of bicyclists. They are intended to prioritize bicycling movements.

Neighborhood bicycle routes and bicycle wayfinding are popular on streets where there is not the need for dedicated bicycling facilities. If contextually appropriate, towns may pursue designating a neighborhood bicycle route or historic bicycle tour through a system of pavement markings and/or signage.

Bicyclists can be given additional priority on these streets through other measures such as traffic calming via chicanes, chokers and dead end streets with narrow paths that allow bicyclists to go through.

SHARED LANE MARKINGS ("SHARROWS")

The use of shared lane markings has become more popular on streets where adding a bicycle lane or shoulder is not feasible or planned. A shared lane marking is defined by AASHTO as a "pavement marking symbol that indicates an appropriate bicycle positioning in a shared lane, which is a lane of traveled way that is open to both bicycle and motor vehicle travel."



Shared lane markings send other messages to bicyclists and motorists: 1) That a bicycle has a right to use the lane and the lane should be shared; 2) Positions a bicyclists in a travel lane with on-street parking in a location where they can avoid opening car doors; and 3) Positions a bicyclist in a travel lane without on-street parking in a location where they are not squeezed out or riding along the right edge of pavement.

Special care should be taken when marking a shared lane. MUTCD recommends a 10-foot or 11-foot distance from the center of the marking to the curb face when on-street parking is present. However, local conditions may vary and necessitate placing the marking further out into the travel lane or in the middle of the travel lane.

BICYCLE LANES

A bicycle lane is defined by AASHTO as a "portion of roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and signs. It is intended for one-way travel, usually in the same direction as the adjacent traffic lane."

The bicycle lane is the most common application for dedicated bicycling facilities and typically ranges in width from four feet to six feet, adjacent to a motor vehicle lane. This width does not include the width of the gutter pan as it is not usable space for a bicyclist.

Four-foot wide lanes are most appropriate on low-speed streets such as collectors where there is not as much discrepancy in the speed of the bicyclist versus the speed of the motorist. On higher speed facilities, the width should be greater (5 feet on 35 mph to 45 mph streets; 6 feet on streets with speed limits greater than 45 mph).

BIKEABLE SHOULDERS

Bikeable shoulders are similar to bike lanes except there is no curb and gutter and the shoulder may or may not be marked as a bike lane. The 1994 The NC Bicycle Facilities Planning and Design Guide defines it as a "portion of roadway contiguous with the traveled way that accommodates stopped vehicles, emergency use and lateral support for the roadway surface. Shoulders that are 4 foot (less than 35 mph speed limit) or 5 foot (35 mph to 45 mph speed limit) are considered bikeable because they are a width similar to a bike lane."

SEPARATED BIKE LANES

There is a special type of bike lane called a cycle track. Cycle tracks can be one-way or two-way, and may be either buffered or separated. Buffered bike lanes are divided from the adjacent motor vehicle travel lane only by a painted or marked island, whereas separated bike lanes have a vertical element such as a curb, a raised median or a row of delineation posts between the bicycle lane and the motor vehicle lane. Motor vehicle parking may even be used to separate the travel lane from the cycle track. When a barrier is used between a motor vehicle travel lane and the bike lane, the separated bicycle lane is also known as a protected bike lane. The application of cycle tracks is increasingly popular on urban streets. Cycle tracks are similar to multi-use trails but are located within the street and intended only for bicyclists; a sidewalk is still needed for pedestrians.

SHARED USE PATHWAYS / SIDEPATHS

These facilities are also commonly called multi-use paths or greenways. Design principles for shared use pathways and sidepaths take both pedestrian and bicyclists' needs into account. Bicyclists need more space for two-way operation, especially when pedestrians also use the facility; this is why these paths are wider than standard sidewalks. A pathway that accommodates both types of users should be 10-feet wide at minimum; (8-feet is allowed in short, constrained sections) but 12-foot or 14-foot wide pathways are preferred in high volume areas or near parks and schools.

A common response to building greenways is that some residents and officials feel that giving a bicyclist a separated trail will get them off the road. This may be true for less confident riders but a trail should not be seen as a substitute for on-road facilities as some bicyclists will prefer to be on the road.

Some special considerations on shared pathways include:

- A firm and stable surface that can accommodate a wide variety of bicycle types. Narrow tires on road bikes can make travel unsafe on gravel or sand paths.
- Sidepaths should be placed in areas where there are few driveway cuts or low potential for future driveway cuts. Motorists do not expect two-way bicycle traffic on a pathway crossing a driveway.
- Curb ramps and crosswalks at intersections of greenways and other pathways should be a width that conforms to the width of the pathway. Oftentimes, especially in North Carolina since NCDOT does not have a greenway curb ramp design standard drawings, communities place a five-foot wide ramp at an intersection with a multi-use trail. This is not compliant with Americans with Disabilities Act requirements or AASHTO's design guidelines.

OTHER TREATMENTS

Bicycle Boulevards: Bicycle boulevards are street segments, or a series of contiguous street segments, that are modified to accommodate through bicycle traffic and minimize through motor vehicle traffic. Bicycle boulevards are best suited for street sections that link major destinations like a park or school to a greenway or other major bicycling facility where a dedicated greenway connection is infeasible or a bicycle lane is not practical due to the low-speed, low-volume nature of the street. Bicycle boulevards typically consist of special signage and pavement markings denoting them as a space where bicyclist movement is prioritized. "Stop" signs and traffic signals along such a route should be oriented to favor bicycle traffic, a process that itself requires special analysis and procedure.

Green Lanes: Painting a bicycle lane or sections of a bicycle lane with green paint is becoming a more popular treatment to help visually offset the bicyclist's space of the roadway as a way to improve safety and visibility. The most common treatment of green bicycle lanes is applying the paint where a motorist is merging across a bicycle lane, either at an intersection to reach a right-turn only lane or at a freeway interchange. Green lanes require special permission from the Federal Highway Administration as they are not yet universally accepted in prevailing design standards .

OTHER BICYCLIST ACCOMMODATIONS

Parking lots and driveway entrances/exits are surprisingly hazardous for bicyclists. Motorists are not conditioned to notice bicyclists in these environments. Sometimes novice bicyclists will "cut through" parking areas to avoid perceived hazards on the road, and engage in bad practices such as cutting across parking aisles. Driveway entrances sometimes have channelized islands that allow motorists to make high-speed turns into a parking lot that can pose hazards for both bicyclists and pedestrians.

Bicycle parking: Bicycle parking racks can almost literally come in any shape or style you can imagine, thanks to some vendors catering to special markets for event centers, universities with specific mascots, municipal icons, and artists.

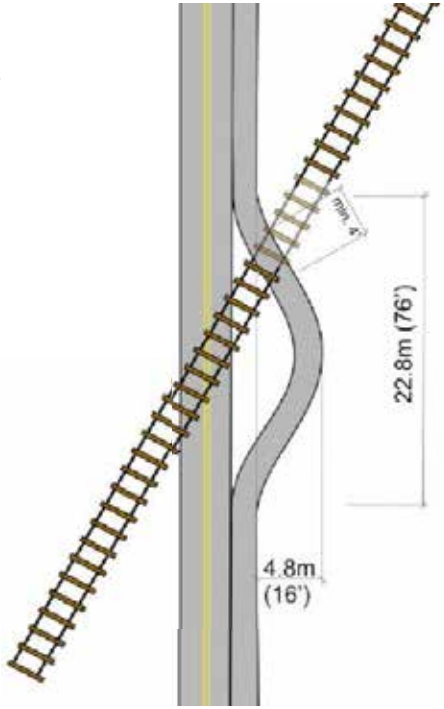
However, many of these designs neglect functionality. Even the popular "wave" rack style generally only supports a bicycle at one point, as does the comb rack, often seen at public schools. Regardless of the specific style, a thick (10") concrete base should be constructed for each bicycle parking station.

Generally, the basic rack styles are still a variant of the "post-and-loop" design. These styles are easily recognizable as usable bicycle racks instead of works of art and help prevent two bicycles rubbing up against each other.

Note also that bicycle parking areas should have minimum 6' horizontal clearances on all sides to ensure that each rack can be used properly, and at least a 7-foot vertical clearance. A shorter horizontal clearance with a minimum of 4 feet, may be used behind the rack. Note that bicycles are to park parallel to the rack, not through them for post-and-loop designs.

Crossing Railroad Tracks: Most railroad tracks and on-road bicycle paths will cross at a near-90 degree angle. Bicycles crossing tracks at a less than 45 degree angle should consider the treatment that calls for a realignment of the bicycle path to create a more perpendicular approach angle.

Some communities have begun using shared-lane markings, or sharrows, to indicate to bicyclists the most suitable way to cross a railroad track that is within an urban street where improvements are not feasible.



Drainage Grates & Utility Covers: Drainage grates can pose a serious hazard for bicyclists, particularly on older streets where the design and placement of drainage grates did not consider the potential use of bicyclists. Grates with openings that are parallel to the curb cause the wheels on bicycles , particularly those with narrow tires, to fall into the grates and result in a crash.

On new construction projects, grates should be placed only within the gutter pan of the street with grate openings that are perpendicular to the curb and direction of travel. On older streets, the jurisdiction in control of that street should be requested to retrofit the grates with new grates with openings that are perpendicular to the curb. Another retrofit treatment is the welding of straps across the grate perpendicular to the direction of travel, which narrows the opening of the grate to prevent the bicycle wheel from falling into the opening.

Grates and utility covers/manholes create different problems for bicyclists as roadways sink or are re-surfaced. Grates and utility covers should be flush with the roadway and should be replaced or reconfigured when NCDOT or a municipality resurfaces a street so they remain flush with the pavement.

Utility covers can pose problems on greenways as many of them are constructed along sewer easements. As with roadways, the utility covers should be flush with the trail surface and, where possible, outside of the travelway.

Rumble Strips: The addition of rumble strips along highways causes great concern among bicyclists due to the placing of rumble strips on high speed roadways. The placement is usually the only suitable location for bicyclists to travel due to the speed differential.

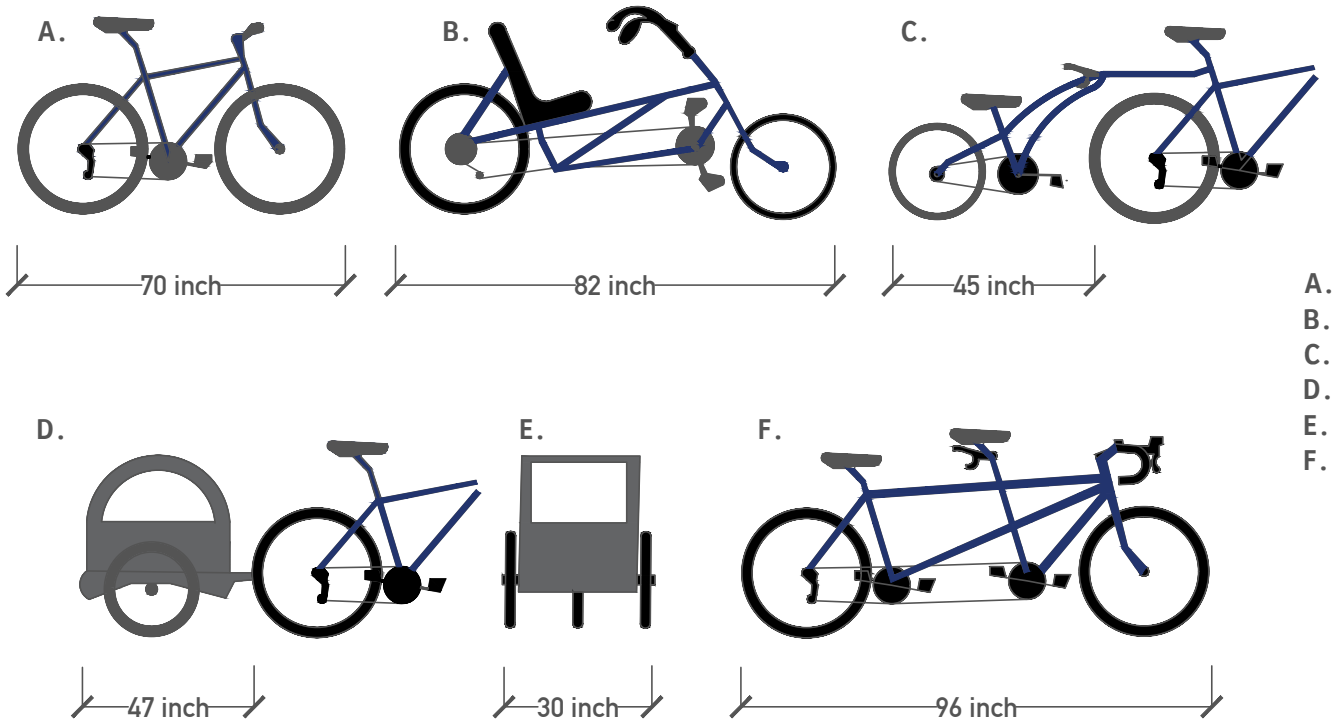
To account for the needs of bicyclists, rumble strips should be placed as close to the edge line or fog line of the highway to maximize the space available for the bicyclist along the highway. Design standards for most four-lane highways leave typically 5 feet or greater on the shoulder for bicyclists to operate outside the area of the rumble strips.

Bicyle Pull Outs. While not widely used, bicycle pull out lanes can be useful for allowing motor vehicles to safely pass bicyclists, especially on narrow roads or steep uphills where often cyclists are traveling much slower than normal.

These facilities are simply small sections of separated bicycle facilities that allow cyclists to temporarily leave the primary travel lane so that other vehicles may pass.

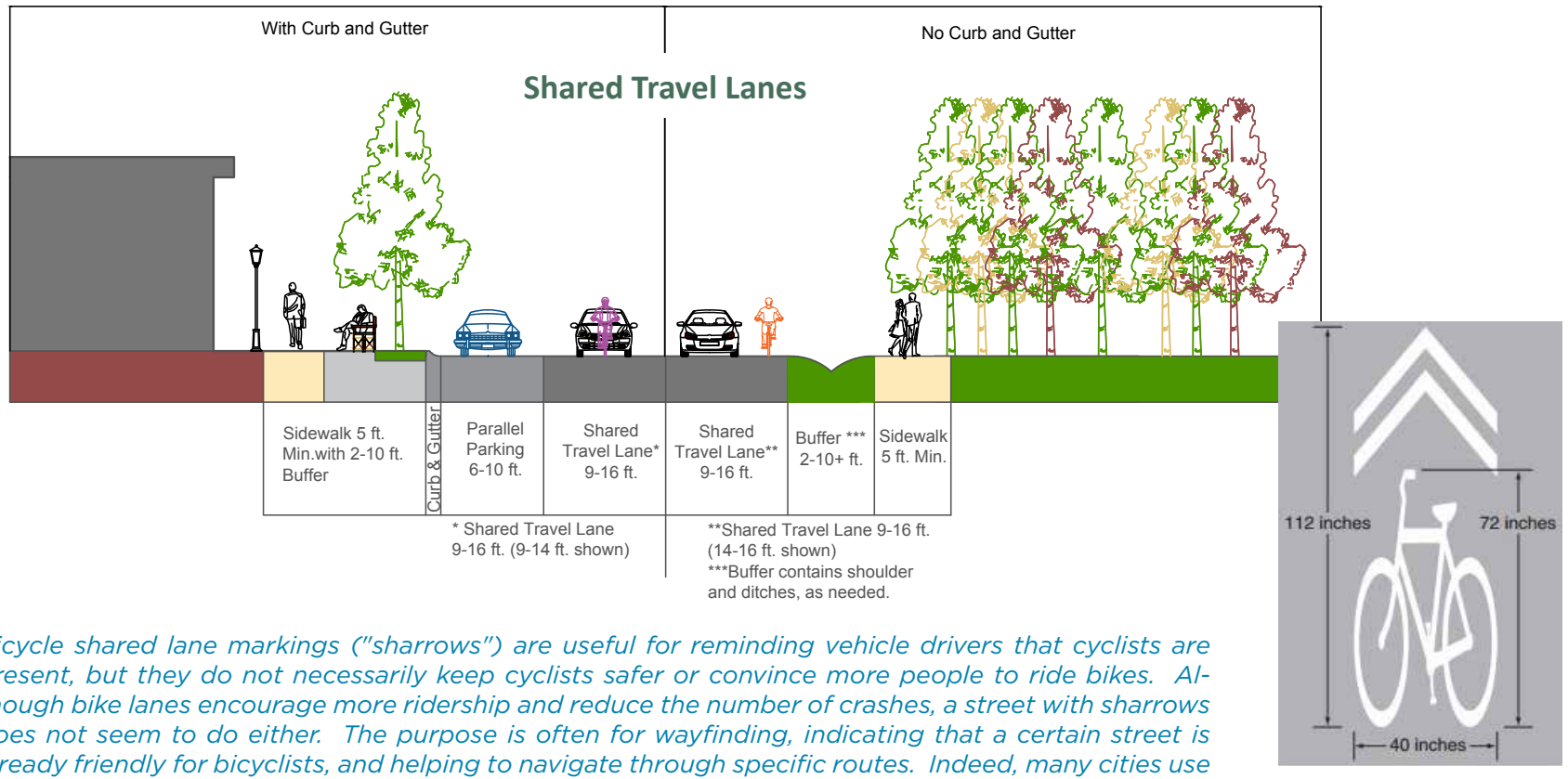
They are useful along roads that otherwise do not have the potential for full bike lanes or shoulders.

Figure 7-2—Variations in Bicycle Types & Lengths



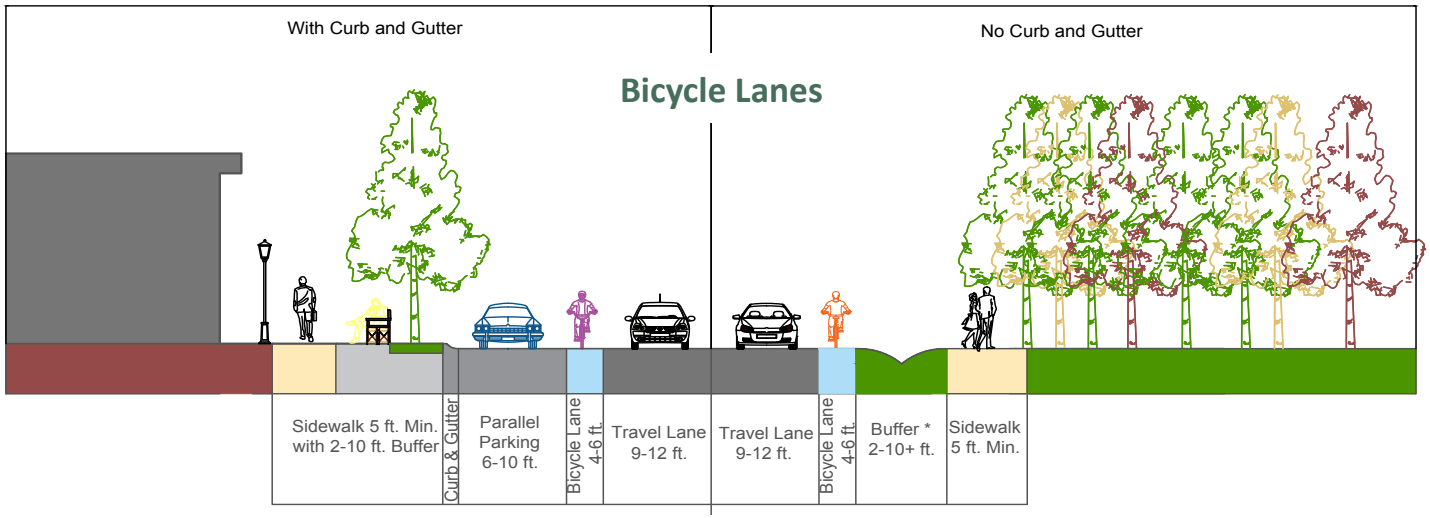
A. Adult Typical Bicycle
B. Adult Single Recumbent Bicycle
C. Additional Length for Trailer Bike
D. Additional Length for Child Trailer
E. Width for Child Trailer
F. Adult Tandem Bicycle

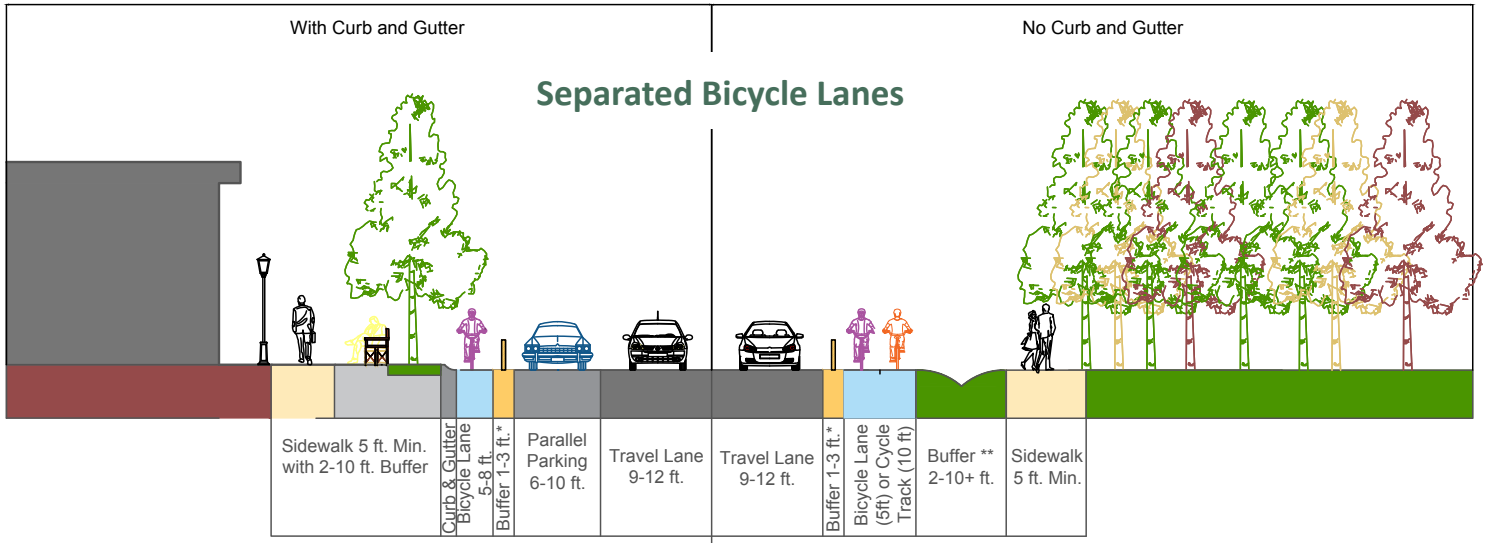
Figure 7-3—Bicycle Facility Type Variations



Bicycle shared lane markings ("sharrows") are useful for reminding vehicle drivers that cyclists are present, but they do not necessarily keep cyclists safer or convince more people to ride bikes. Although bike lanes encourage more ridership and reduce the number of crashes, a street with sharrows does not seem to do either. The purpose is often for wayfinding, indicating that a certain street is already friendly for bicyclists, and helping to navigate through specific routes. Indeed, many cities use them on narrow roads where additional lane width cannot be accommodated to transition between segments of full bicycle lanes along a route. But when sharrows are added to streets that aren't already bicycle-friendly, it does not make them any safer. It is important that city and town officials understand that covering their streets in sharrows does not help create a safer environment for bicyclists, unless the network also consists of designated lanes and bikable shoulders.

Figure 7-3—Bicycle Facility Type Variations, Cont'd

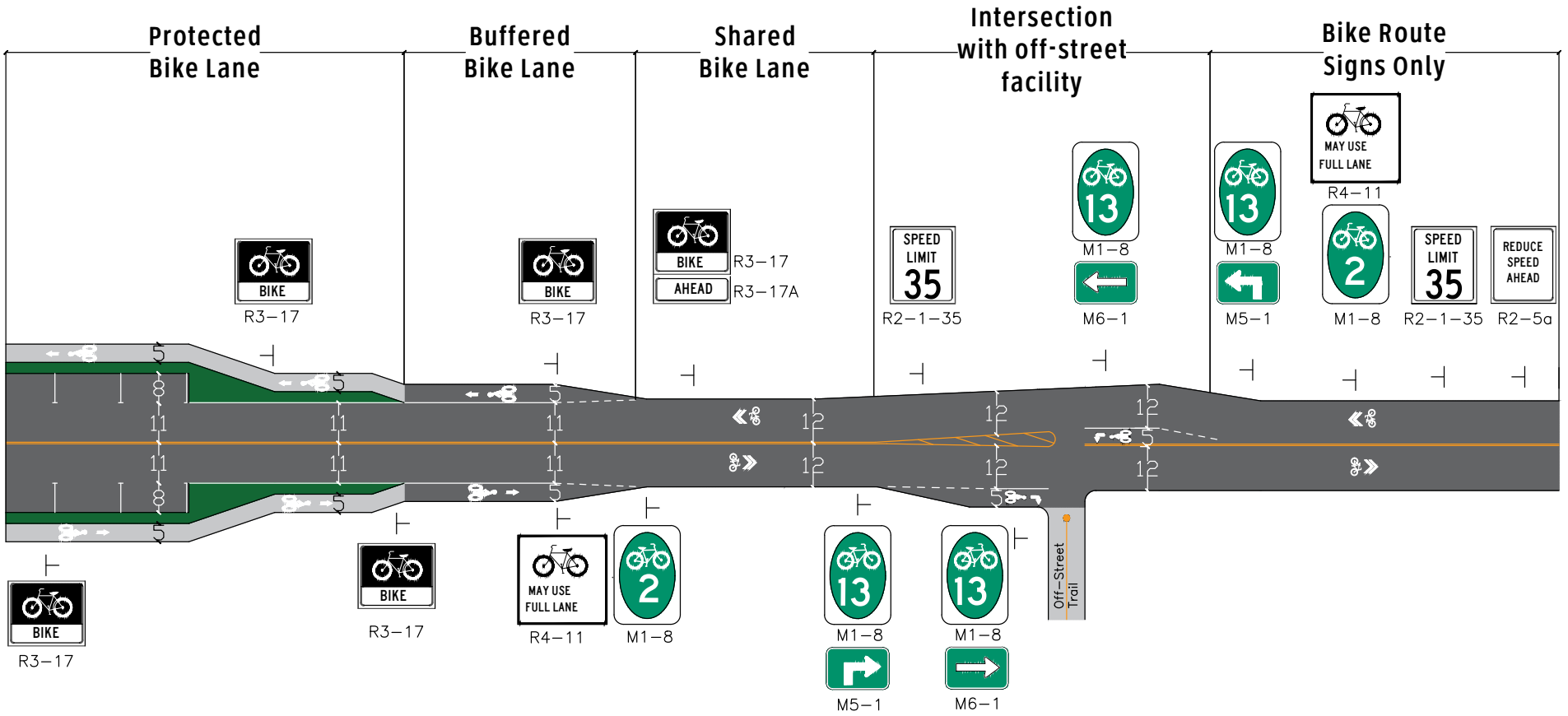




* Separation buffers vary from1-3 ft. minimum based on type of buffer used, proximity to parking. 3 ft. is minimum for use with delineator post next to parking as shown.

** Buffer contains shoulder and ditches, as needed.

Figure 7-4—Bicycle Facility Types & Appropriate Signs



The Potential of Greenways

Greenways are becoming a popular transportation and recreation feature in communities across North Carolina.

There are more than a thousand such trails snaking their way across America turning old canals, abandoned rail beds and forgotten riverbanks into green recreational corridors. The greenway represents a voluntary local and regional strategy to preserve scenic, natural, historic, cultural, and recreational resources and promote increased public access to the rivers and open spaces through the creation of parks, trails, and gathering places. The mountains and waterways of this region will continue to provide the likely course for greenway corridors to connect cities, schools, downtown areas and natural features. The routes to connect our communities will become popular destinations in and of themselves and provide opportunities for a fully integrated system of primary greenway facilities.

The Southern Blue Ridge Bike Plan recommends several greenway project ideas, including the creation of pathways connecting tourist destinations, downtowns, schools, and cultural assets. The sidewalk and bike path systems could ultimately connect to far-reaching regional greenway corridors, providing a comprehensive bicycle network throughout the four-county area. This will allow many residents the ability to travel throughout to key destinations. Visitors will be attracted to the area and the system will be a key recruiting and retention tool to businesses and residents.

PARTNERSHIPS

Engaging different organizations in fundraising efforts can be challenging, as some will desire short-term marketing-based partnerships while others may become longterm contributors to volunteer, land acquisition, or construction efforts. It's important to cultivate these relationships among a diverse set of partners to maintain and create momentum for greenways and trails.

Other communities across the United States have built partnerships that diversify the foundation of support for greenways and trails. Places such as Greenville, SC, have found willing partners in the health sector. Chattanooga, TN, and the Trust for Public Land partnered to preserve properties as places to construct greenways or connect via greenways. Pittsburgh, PA, engaged a multi-faceted team of partners and landowners to fund long-distance trail construction and rails-to-trails conversions. During the Greenways Please campaign, Buncombe County found willing partners in a local ice cream shop and local coffee roaster, showing that partners can come from many different business sectors.

The number of landowners that are likely to be engaged as the County plans for and implements the Priority Corridor identified in this plan will require, as detailed in Chapter 5, a focused, well-orchestrated and well-managed landowner outreach effort. This effort will require a long-term commitment and potentially a partnership with the real estate community. Six elements can help create a landowner outreach program:

- **Research & Education.** This element addresses the need to demonstrate to landowners that a cohesive vision is in place, is supported by a wide constituency, and how the project can benefit the landowner.
- **Ownership.** A listing of landowner contacts along the greenway corridors will be necessary for communication and outreach work. It is also valuable to identify properties along Priority Corridors when they go on the market for sale and create a right-of-way account to acquire properties as they come up for sale.
- **Prioritization.** Acquisition ranking criteria can be applied to identify the highest priority properties within the focus corridor areas.

- **Coordination with County Leaders.** This element addresses the need to make sure that feasible alternatives with land/easement acquisition issues and project design have been identified and analyzed for their ability to benefit the most citizens at acceptable costs.
- **Conduct Outreach and Education.** The information gained from previous tasks can be presented to landowners within the greenway corridor. During outreach efforts it will be important to enhance dialogue with landowners.
- **Encouraging Participation.** Engaging landowners early and offering regular dialogue with them can help when the acquisition process begins and allay fears about how greenways are designed and constructed.

INVESTMENTS & FUNDING

The creation of a system of greenways and trails will require a significant investment from various sources, whether it be the private contributions of land or construction from private development actions, local capital improvement programs (CIP), or state and federal tax dollars procured from locally collected sales taxes. The communities that have undertaken these types of programs have had varied reasons for doing so: creation of a healthier lifestyle, attraction of businesses to the area, or to improve the transportation system by increasing options for users making short or moderate trips.

Since greenways serve both a recreational and transportation function, as well as provide access to rural areas, natural areas, schools, parks and neighborhoods, this diversity makes greenways and programs that support them an eligible expenditure through a variety of sources. Non-profit organizations, foundations, state grants and federal funding are available for a variety of program and project investments. Many require some level of local contribution, or match, to leverage the grant.

While greenways present many opportunities, it is important to be strategic in how funding is pursued. Some sources of funding have application and reporting requirements that necessitate many hours of staff time to organize an application. This can equate to thousands of dollar of personnel resources just to pursue the grant. Projects funded through federal sources have less dollar-for-dollar buying power due to more stringent design requirements, reporting standards, environmental analysis and administrative fees applied to the grant from state agencies responsible for overseeing the grant program. To strategically identify and pursue the best grants for the best projects and programs, the four far west counties should work together to build a common vision for a connected region, and jointly pursue funding sources from as varied a portfolio as possible. Making the case for a successful regional greenway network will entail a strategic fundraising plan:

- Seek input from non-profits, cities and towns, state agencies, and other partners on which funding sources best fit the project or program being pursued.
- Organize annual funding meetings with cities, towns and non-profits to avoid having several communities or agencies compete for the same funding source.
- Identify organizations, individuals or companies that can provide “soft match”— typically through human resources or land dedication— where allowable through funding sources. Recognize that partnerships and volunteers are not free and not always easy to manage.
- Take advantage of funding sources for programs and marketing.

GREENWAY DESIGN

How we design greenways and trails impacts the experience and, ultimately, the safety of the diverse set of citizens who use greenways and trails for a variety of recreational, health and transportation purposes. Greenways should not be planned or built unless consideration is given to how they are designed, funded, operated, and maintained.

Some guiding principles for greenways include:

- Think long-term and have a vision for a connected, paved system for transportation and recreation
- Use on-road and sidewalk connections until a complete system is built
- Do not use eminent domain
- Be creative with the routing, don’t get stuck on one route if barriers exist
- Always be building and have an active project each year until finished
- Consider using natural surface trails as an interim until more money is raised or for areas in sensitive areas such as along a lake or a creek

- Incorporate Best Management Practices for storm water management and sedimentation.
- Maintain the system by building maintenance funding into the town budget and cultivating volunteers and adopt-a-greenway efforts

In addition to serving as a transportation function, greenways should include aesthetic and recreational amenities. Consider integrating cultural and historic themes in creative ways to reinforce a sense of place along the greenway. The greenway system should contain cohesive elements to unify the design.

GREENWAY SURFACES

One major design decision is the selection of the surface material. There are two general categories: hard and soft surfaces. While hard surfaces such as asphalt and concrete are more accessible and accommodating for wheeled vehicles and require less maintenance, the initial cost for installation can be high. Soft surfaces such as crushed stone, mulch, or natural earth are less expensive but are not as accessible, can require more maintenance, and can be impacted by adverse weather and drainage conditions.

The cost of surfacing a trail with asphalt or concrete may be prohibitive in the beginning stages of trail building. However, you may be able to upgrade from a softer surface like dirt or crushed stone to a harder surface like asphalt or concrete once you have secured funding. When selecting a surface, the main factors to consider include cost to purchase and install materials, accessibility, cost of maintaining the surface, life expectancy and ease of use.

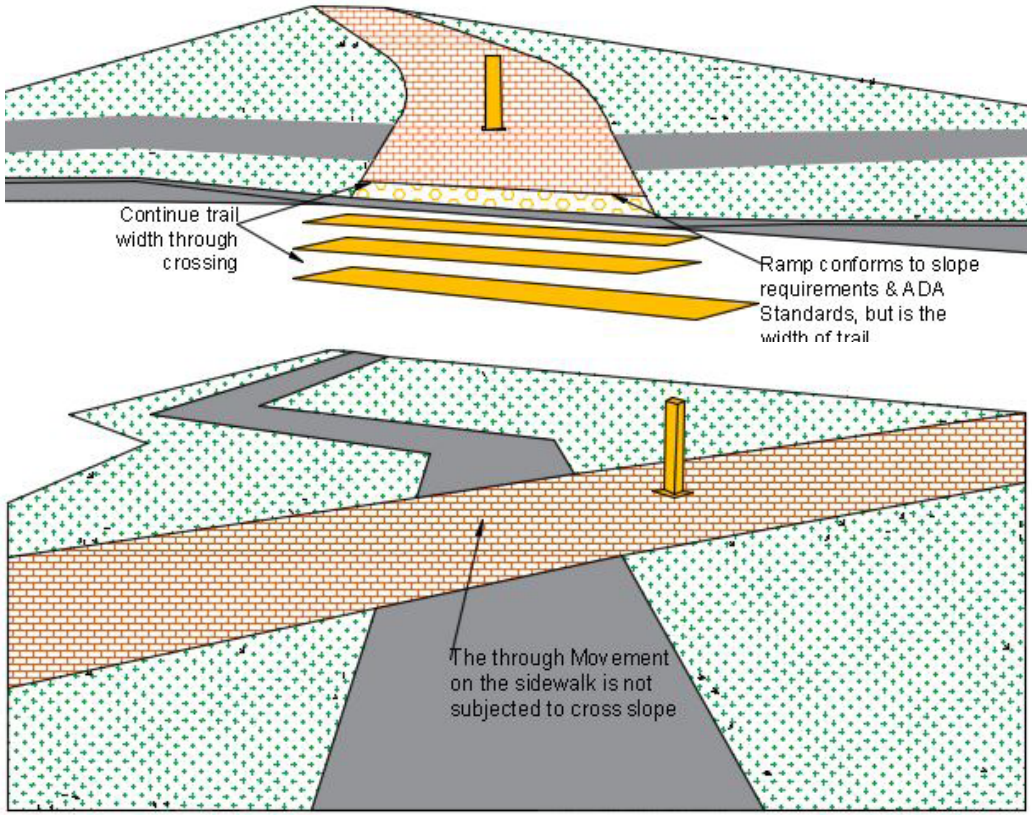
MAINTENANCE

A greenway system is only as good as the condition of its surfaces and adjacent amenities. Our climate requires special consideration for design and maintenance practices to ensure four seasons of use per year as greenways are not only recreational facilities, but provide key transportation connections.

The primary objectives of maintaining and operating a greenway system should be to:

- Preserve Existing Investment: Greenways are one of many visible public investments that should be viewed as an asset to the community. The outlay of resources for the initial construction of trails, pathways, amenities, access points, parking lots, signage and lighting also requires consideration of how investments are preserved.
- Protect Habitat & Environment: Greenways and trails are desired in areas that promote or enhance natural environments, even in their most urban settings. The degradation of a greenway or walking trail can adversely impact the quality of the surrounding habitat and environment that it was meant to protect.
- Keep it Safe: Maintenance involves the trail infrastructure and the en-

Figure 7-5—Greenway Crossings



vironment around it, both of which can greatly impact the safety and the perception of safety for users. Rapid growth of foliage can overtake trails, block safety-related signs and create an “enclosed” feeling where users may not feel safe. The environment also impacts the trail surface as root heaves create tripping hazards for users while encroachment of trailside grasses and shrubs can degrade the edge of pavement or shorten the effective width of the trail and create user conflicts. Storm water runoff can compromise the integrity of the trail base and natural surface trails can be washed away during major storms, both creating unexpected conditions for users.

Some maintenance needs include mowing, trimming foliage on and around greenways, sweeping sediment from the trail, removing fallen limbs, and fixing cracks before they become safety hazards. Delaying action on any or all of them seriously compromises the integrity of the trail and sets forth a cycle of degradation that can quickly result in the need to completely repave or rebuild a trail. Some of these maintenance needs can be planned for while others require methods of reporting maintenance needs, response policies and clearly defined roles for maintenance participants.

CROSSINGS FOR MULTI-USE TRAILS

Where multi-use trails meet the street is one of the most critical, yet overlooked, design elements. These locations are where a diverse set of users must cross a street or intersection and they travel at varying speeds.

Places where pathways cross at a mid-block location require design treatments that are very different than a common crosswalk/sidewalk/ramp combination. Crossings and curb ramps must be as wide as the trail. Exhibit 5-3 shows best practice treatments for these conditions.
It is important to work with designers and DOT on these crossings, as multi-use trail design standards are not included in current NCDOT standard drawings.

SETTING STANDARDS

Greenways are safer and require less maintenance when they are designed, not just built. The complexities in building greenways along rivers and streams, in areas with steep terrain, or through areas constrained by the built environment, necessitate the establishment of a set of design standards.

Greenways and trails in different settings require very different design considerations to account for the environment in which they are built and differing requirement for universal accessibility. Municipalities have standards and specifications that establish how streets, stormwater systems, water lines, sewer lines, culverts, bridges and other infrastructure is constructed. A similar set of standards and specification for greenways will help promote consistent design that is compliant with prevailing design standards and across jurisdictional boundaries.

It is recommended that the counties, along with cities and towns, partner to develop a set of greenway and trail-specific design standards. These standards would be adopted by each government agency to help guide how greenways and trails are constructed and ensure consistency in basic design parameters across jurisdictions. This should include:

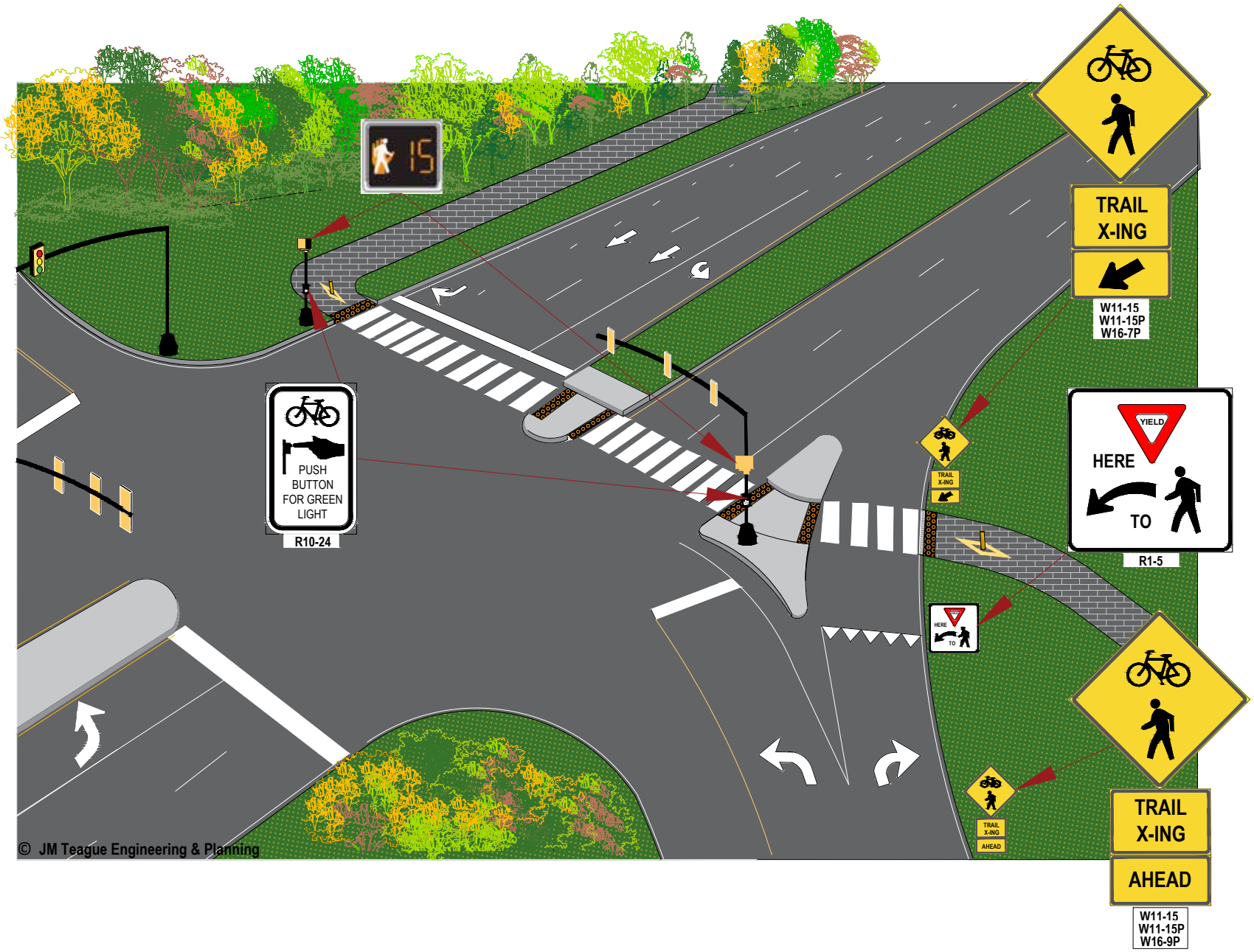
- Design specification for typologies, bridges, tunnels, railings, materials, amenities, parking areas, bicycle parking and signage;
- Accessibility standards to comply with the Americans with Disabilities Act (ADA) and associated Accessibility Guidelines;
- Common street interface / intersection designs;
- Crime Prevention Through Environmental Design (CPTED) principles; and
- Methods for documenting design exceptions when these design standards cannot be met due to constrains in the natural or built environment.

For a concise listing of national and North Carolina design guidelines, bicycle accommodation types, and bicycle route signing and mapping, please see NCDOT's resource for "Bicycle & Pedestrian Project Development & Design Guidance":

https://connect.ncdot.gov/projects/BikePed/Pages/Guidance.aspx

Figure 7-6—Greenway Crossing at a Two-Lane Street

Figure 7-7—Greenway Crossing at a Busy Intersection



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Chapter 8

Implementation Plan

Chapter 8 Implementation Plan

What Now?

Completing the action steps listed below helps guide development of the proposed bicycling and pedestrian network and creates a supportive program and policy environment for a more bicycle-friendly region. These steps will be crucial in moving forward with the overall recommendations of the Southern Blue Ridge Bike Plan.

Plans are by nature long-range and leave County leaders, staff, and partners with a lot of discretion to define how they implement the Plan. This plan is not prescriptive and its recommendations are advisory. It should be allowed to evolve over time. Priorities change and the findings of this regional bike plan in 2017 could require reconsideration as influences evolve, the region grows, new opportunities emerge, constraints arise, and policies change.

ADOPT THE PLAN

The Southwestern Commission should adopt the plan. Local agencies can hear a presentation and "receive" the document, issuing proclamations in support of and endorsing the plan. This is the first stage of implementation. Adoption of the Plan signifies an interest among the area's leaders to take the input generated by citizens, communities and organizations within the region and transfer it into meaningful action.

The Plan should be forwarded to regional and state decision-makers, such as the NCDOT Division office, for inclusion in other regional planning and development processes. The towns of Franklin, Robbinsville, Murphy, Andrews, and Hayesville, as well as neighboring counties (Jackson, Swain), should also receive a copy for consideration when their local plans are updated.

•Partners: NCDOT, Southwestern Commission Council-of-Government (COG), Cherokee County, Clay County, Graham County, Macon County.

•Time frame: Immediately

PUBLISH THE MAPS & PUBLICIZE MATERIALS

A major priority of the Southern Blue Ridge Bike Plan is advocacy for bicycling in the region and expanding on opportunities for bicycle tourism. Development of the bicycle routes for each of the four counties is an immediate and ongoing tool to use in that endeavor. Printing the maps and distributing them to as many locations as possible will help vocalize support for bicycling in the region and demonstrate that cyclists are welcome and wanted.

• Partners: NCDOT, Southwestern Commission COG, greenway advocacy groups, bicycle clubs, bicycle race organizers, regional business leaders, health advocates.

• Time frame: 2018-2019, Ongoing.

BUILD A REGIONAL BICYCLE COALITION

Keep the momentum going by developing a regional bicycling advisory committee (perhaps stemming from this Plan's steering committee), responsible for continuing to provide input to decision makers on projects, programs, and policies - focusing on action. The committee should make sure to receive and respond to citizen ideas and concerns, holding regular meetings to advise the regional stakeholders on all issues related to bicycling, including major projects (e.g. bridges, street repaving, new comprehensive plans). Bicycle advisory committees can help spur innovation by providing a community forum to work through complicated issues such as on-street bike facilities or stronger county school-siting policies. The agendas, meeting minutes, memos and other records can be used to track progress over time and revisit old ideas.

• Partners: Southern Blue Ridge Bike Plan Steering Committee, Southwestern Commission COG, County Schools, greenway advocacy groups, bicycle clubs, bicycle race organizers, regional business leaders, health advocates.

• Time frame: 2018-2019, Ongoing.

MEASURE PERFORMANCE

Active transportation performance measures enable comprehensive evaluations of walking and biking projects based on quantitative data. Figure 8-1 identifies several specific numbers that should be measured every year or every two years

by each of the four counties, the Southwestern Commission COG, interested towns in the area, and other volunteer groups. They can help a jurisdiction set quantifiable goals for bicycling and walking, guide a jurisdiction on how to achieve these goals, and help document when the goals have been met. Through the use of active transportation performance measures, a jurisdiction can evaluate and adopt customized policies and plans to implement projects that enhance active transportation safety, mobility, equity, and accessibility Tracking the change of these measures over time can help justify funding pursuits and strengthen the ability of the community to gain funding from various sources.

These efforts include regular surveys, counting users along popular bicycling routes and trails, and participation in Safe Routes to School events. For example, to measure the success of a wayfinding program included in a countywide plan, the extrapolation of bicycle volumes based on spot counts may be most appropriate. The success of a new bicycle facility on a downtown roadway, however, may be best quantified through turning movement counts conducted at every intersection along the corridor. Local jurisdictions may also use performance measures to document progress towards fully implementing a policy or achieving a benchmark. Many cities have now passed complete streets policies and are using performance measures to document progress towards implementing these policies and track the effectiveness of its policy over time. Local jurisdictions also use performance measures to better understand return on investment on pedestrian and bicycle facilities.

Regional planning agencies (like the Southwestern Commission) employ a wide range of methods to track performance. Most are required to provide for the establishment and use of a performance-based approach to transportation decisionmaking. Therefore, it is recommended that the Southwestern Commission develop performance measures, targets, and performance reporting for the regional bicycling network, enabling more effective coordination with NCDOT in developing performance targets. Relying on traditional measures, such as congestion, travel time, and vehicle delay, is insufficient in documenting multimodal use and should be supplemented with bicycle-specific metrics as well (see Figure 8-1).

The goal for each community is to select and evaluate appropriate performance measures to track the success of their bicycle projects and articulate the benefits of active transportation projects to skeptical funders or elected officials.

• Partners: Municipalities, Local Schools, County Health Departments, bicycle clubs and retail outlets, Active Routes to School.

• Time frame: Ongoing.

Figure 8-1—Performance Measures & Frequency

Performance Measure	Frequency
Percentage of Bicycle Facilities Addressed from Plan	2 years
Miles of Designated Routes, Shoulders, Bike Lanes, Greenways	2 years
Number of New Bicycle Racks	2 years
New Signs Added Along Bike Routes	2 years
Number of Participants in Bike-to-School or Bike-to-Work Programs	Yearly
Number of Participants in Themed Community Bike Rides	Yearly
Number of Bicycle Route Maps Printed and Distributed	Yearly
Number & Prevalence of Automobile Crashes with Bicyclists	Yearly
User Counts on Greenways & Trails	Yearly
Funding Amount Allocated for Bicycle Infrastructure Projects and Programs	Yearly
Percentage of Greenway & Trail Crossings with Painted Striping	2 years
Percentage of Bicycle Route Lengths with 4-foot minimum Shoulder	2 years
Citizen Physical Activity Level (Self-Reported)	2 years

Mode-specific infrastructure planning typically performed by local agencies suggests that performance measurement methodologies add value to the bicycle components of comprehensive transportation planning efforts at the local level.

COMPLETE BICYCLE-FRIENDLY APPLICATIONS

The four far western counties and their communities should complete and submit a Bicycle Friendly Community application to the League of American Bicyclists. The application requires input from a variety of data sources, many of which are included in this Plan. Even if every community does not receive official designation on its first attempt, the feedback from the League and potential for Honorable Mention status can inspire local leaders to implement other Plan recommendations. The League will reach out to local members to provide input and local bicycle clubs could help the community complete the application.

• Partners: Southwestern Commission COG, Cherokee County, Clay County, Graham County, Macon County, municipalities, local bicycle clubs.

• Time frame: 2019-2020.

ALIGN LOCAL & REGIONAL BICYCLE IMPROVEMENTS WITH NCDOT PLANNING EFFORTS

Although opportunities may be limited - due to topography and limited funding - the region should maintain familiarity with NCDOT's resurfacing schedule (and communication with Division 14) and STIP planning process. There are tremendous opportunities to align with future planned roadway projects and make sure that local and regional priorities are known by NCDOT staff and that a dialogue exists to ensure that those opportunities are not missed.

• Partners: Southwestern Commission COG, Cherokee County, Clay County, Graham County, Macon County, municipalities, NCDOT Division 14.

• Time frame: Ongoing.

CONTINUE TO RESEARCH THE ECONOMIC IMPACT OF BICYCLING IN THE REGION

The current focus on quantitative measurement of active transportation projects is fairly new, but there is a strong imperative to demonstrate that bicycling and greenways can mean big business. Elected officials and other leaders need to know what the benefits are to their communities in order to support new and recurring investments in bicycle infrastructure.

NCDOT already conducts studies to quantify the net economic benefit (both direct and indirect) of making North Carolina a better place to ride bicycles--lower health costs, less need for roadway repair, tourism and event revenue, etc. Continuing to measure the number of bicycle tourists, bicycle-related revenue, property values adjacent to greenways, and bicycle-related job creation and business entrepreneurship is important to demonstrate that investments in support for bicycling can result in strong yields.

The Southwestern Commission and its regional partners should fund additional research into the economic impact of bicycling in the region and partner with NCDOT on future and ongoing studies.

• Partners: Southwestern Commission COG, Cherokee County, Clay County, Graham County, Macon County, municipalities, NCDOT.

• Time frame: Ongoing.

WORK WITH NCDOT TO BETTER UNDERSTAND SAFETY ISSUES IN THE MOUNTAINS

Measuring the effectiveness of new bicycle projects includes data-driven research and analysis, but also surveys of users and user groups to identify safety perceptions and develop an ongoing list of improvements. These include the impact of pavement skid resistance, crosswinds, and the impact of age on a cyclist's risk of being involved or injured in a single bicycle crash. This knowledge can help inform future investment and policy decisions.

Street lighting is recommended for any bicycle facilities near populous areas (greenways through town, a bike lane on Main Street),and several project recommendations reflect standard suggested treatments: Projects 4 and 5 recommend bicycle climbing lanes, so cars can pass slow-moving bikes on an uphill road; Project 12 recommends "cyclist ahead" actuated warning flashers so motorists will be aware of bicyclists around mountainous curves; Project 14 recommends rumble strip remediation to give bicyclists as much usable width as possible on shoulders and the ability to move between the travel lane and shoulder to allow cars to pass; Project 11 recommends widening all shoulders along bike routes to a 5-foot minimum width, enabling safer travel for all users on hills and curves. Most driver behavior problems arise when cars and bicycles are sharing a travel lane, so all of these recommendations will help separate motorists from bicyclists.

The Southwestern Commission and NCDOT should fund efforts to better assess public views on bicycle safety in the far western counties and ascertain proven methods to make bicyclists feel more comfortable on the roads.

• Partners: Southwestern Commission COG, Cherokee County, Clay County, Graham County, Macon County, municipalities, NCDOT.

• Time frame: Ongoing.

IMPLEMENT TACTICAL URBANISM

Tactical Urbanism is a good way to usher in a new age of improved bicycle facilities by taking baby steps. These types of projects can be led by municipalities or organized by concerned residents, but they focus on relatively easy, cost-effective changes that can easily be removed. A temporary bike lane could be installed along a key roadway over a weekend to indicate that there is support for bicycling in the community and it likely won't negatively affect vehicular traffic. NCDOT should be included in all planning efforts on State-maintained roadways.

The Southwestern Commission should recommend projects to municipalities reflective of the goals of this regional plan for short-term, low-cost, and scaleable bicycle projects. These can demonstrate the feasibility of permanent improvements to elected officials and NCDOT.

• Partners: Southwestern Commission COG, Cherokee County, Clay County, Graham County, Macon County, municipalities, NCDOT.

• Time frame: Ongoing (with new projects every year or two).

Figure 8-2—Implementation Plan

Action	Lead Agency *(Partners)*	Timetable	Cost Range
Adopt the Southern Blue Ridge Bicycle Plan The Southwestern Commission should lead the way by adopting this plan, with the four counties following. Municipalities should also consider adopting the plan, showing support for local and regional projects.	Southwestern Commission; *Towns and Counties.*	Immediately	--
Project #9 - Publish & Publicize the Bike Route Maps The Southwestern Commission and NCDOT should work together to print as many maps as possible for distribution to Visitor's Centers, bike shops, and other promotional opportunities.	Southwestern Commission; *Towns, Counties, TDAs, Chambers of Commerce, Parks & Recreation Departments, Trail Advocacy Groups, Bicycle Clubs, Health Advocates, NCDOT.*	Begin immediately (2018-2019); Ongoing	$
Build a Regional Bicycle Coalition A diverse group of bicycling advocates (like the Plan Steering Committee) can work together to expedite implementation of projects and make sure that no opportunity is overlooked. Towns should consider staffing a part-time Bicycle Coordinator.	Southwestern Commission; *Southern Blue Ridge Bike Plan Steering Committee Members, County Schools, Greenway Advocacy Groups, Health Advocates, Active Routes to School (ARTS), Bicycle Clubs.*	Form Immediately (2018-2019); Continue to meet on a regular basis (quarterly)	-- *(will require volunteer time for meetings)*
Collaborate on Bicycle Performance Measures & Share Results Between Agencies It's important to keep track of growth in the region as more infrastructure is planned and built. This is a perfect task for a Regional Bicycle Coalition to spearhead, along with data from NCDOT and funding from the Southwestern Commission.	Regional Bicycle Coalition; *Southwestern Commission, Towns, Counties, Health Departments, Bicycle Clus, ARTS.*	Ongoing; Metrics should be measured yearly or every two years *(see Figure 8-1)*	$
Complete "Bicycle-Friendly Community" Applications and Support Local Businesses To Do So The counties and towns in the study area should each apply for this designation and use the results and feedback to better plan for investment prioritization. This designation can be attributed to businesses and universities as well.	Southwestern Commission; *Counties, Towns, Businesses, Colleges, Citizen Volunteers.*	Immediately (Application Deadlines: Aug. 9, 2018 and Feb.5, 2019)	-- *(will require time to fill out 42-page application)*
Align with NCDOT's Roadway Resurfacing Schedule and STIP Prioritization Process The Regional Bicycle Coalition could also work to make sure all parties are aware of NCDOT's roadway resurfacing plans in the region.	Southwestern Commission; *Regional Bicycle Coalition, Towns, Counties.*	Ongoing	--

Figure 8-2—Implementation Plan, Cont'd

Action	Lead Agency *(Partners)*	Timetable	Cost Range
Research the Economic Impact of Bicycling in WNC One of the best motivators to induce spending on bicycle infrastructure is to demonstrate its economic benefit to the community. The local colleges should work on surveys and statistical analysis to assess the current and possible impact of bicycling in the region.	Southwestern Commission; *Towns, Counties, Greenway Advocacy Groups, Tri-County Community College, Southwestern Community College, NCDOT.*	Ongoing	$$
Research Roadway Safety Issues in WNC Bicycling in the mountains can be dangerous, so NCDOT and the Southwestern Commission should work with the local colleges on research for targeted and specific health and safety improvements.	Southwestern Commission, NCDOT; *Counties, Towns, Tri-County Community College, Southwestern Community College.*	Ongoing	$$
Project #1 - The Hiwassee River Greenway Clay County should support planning efforts to design a feasibility study for this project and establish a fundraising apparatus. A long-term funding approach could work to eventually connect this project to the proposed Valley River Trail.	Town of Hayesville, Clay County Parks & Recreation; *Southwestern Commission, Clay County Schools, Property Owners (along the Hiwassee River), Tennessee Valley Authority (TVA).*	Planning 2018-2019; Fundraising 2019-2026; Property Acquisition 2027; Construction 2030	$$$
Project #2 - The Valley River Trail Cherokee County should support planning efforts to design a feasibility study for this project and establish a fundraising apparatus. A long-term funding approach could work to eventually connect this project to the proposed Hiwassee River Greenway.	NCDOT Rail Division, Town of Murphy, Town of Andrews, Cherokee County, ; *Southwestern Commission, Cherokee County Center for Applied Technology, Property Owners (along Tomotla Road), Western Carolina Regional Airport, Harrah's Cherokee Valley River Casino, Team Industries, Inc., Perfect Fit Components, Andrews Housing Authority, United Community Bank, Andrews Chamber of Commerce, Great Smoky Mountain Railroad.*	Planning 2018-2019; Fundraising 2019-2026; Property Acquisition 2027; Construction 2030	$$$
Project #3 - Two-Way Cycle Track on Georgia Road This can be funded and constructed through NCDOT's resurfacing plans. Macon County should coordinate with the local Division to prioritize wide shoulders along this short corridor (perhaps with outside funding for additional design elements).	NCDOT, Macon County; *Southwestern Commission, Bicycle Clubs, Town of Franklin.*	Plannning 2020-2022; Construction 2024	$

Figure 8-2—Implementation Plan, Cont'd

Action	Lead Agency *(Partners)*	Timetable	Cost Range
Project #4 - Chunky Gal Gap Climbing Lane (US-64) Though perhaps too late to include in NCDOT's construction plans for this segment, a climbing lane should be added to future resurfacing projects.	NCDOT, Southwestern Commission; *Clay County.*	Immediate (2018, if included in R-4416); 10+ years (if aligned with NCDOT repaving schedule)	$$
Project #5 - Winding Stair Climbing Lane (US-64) The Southwestern Commission should make sure to include bicycle climbing lane in NCDOT's future roadway resurfacing projects in this corridor.	NCDOT, Southwestern Commission; *Clay County.*	2+ years (if incorporated into a NCDOT TIP project)	$$
Project #6 - Georgia Road Bicycle Improvements The Town of Franklin should continue to monitor these NCDOT projects and make sure that bicycle infrastructure designs are included and do not get abandoned.	NCDOT, Town of Franklin, Macon County*; Southwestern Commission*	U-5603 ROW 2018, Construction 2019; R-5734 A ROW 2018, Construction 2019; R-5734 B ROW 2022, Construction 2024	$$$
Project #7 - Bicycle Lanes on NC-175 Though perhaps too late to include bicycle lanes in NCDOT's construction plans for this segment, this is an important strategic corridor and lanes should be added to future resurfacing projects.	NCDOT; *Clay County, Southwestern Commission, Town of Hayesville, Georgia DOT.*	R-5742 ROW 2018, Construction 2019	$$$
Advocate for Paved Shoulders The Southwestern Commission should continually monitor NCDOT's STIP investments and advocate for bikeable shoulders on all projects that feature heavily in this Plan's bicycle route system.	**Southwestern Commission, NCDOT;** *Counties and Towns.*	Ongoing	--
Project #8 - Little Tennessee River Greenway Ext. This popular greenway could provide a crucial link for bicyclists if extended to Georgia Road and the Parks and Recreation facilities there. The County should spearhead this effort to design and fund the project.	Town of Franklin, Macon County Parks & Recreation; *Southwestern Commission, Smoky Mountain Center for the Performing Arts, Cecil L Groves Center, Macon Early College High School, Macon County Public Library,Property Owners (along Cartoogechaye Creek).*	Planning 2018-2019; Fundraising 2019-2026; Property Acquisition 2027; Construction 2030	$$

Figure 8-2—Implementation Plan, Cont'd

Action	Lead Agency *(Partners)*	Timetable	Cost Range
Project #10 - Bicycle Route Signs Once the route maps are printed and promoted, it would serve the region's tourism industry to design a sign branding and implementation system for routes.	NCDOT, Southwestern Commission; *Towns and Counties.*	Planning/Design 2019-2020; Installation 2022-2024	$$
Municipal Policies Towns in the 4-county regions should consider making policy decisions to support bicycling in the region. Each town should explore Vision Zero and Complete Streets policies, take decisive action on lowering speed limits, and make decisions about bicycle-friendly language in their ordinances. These policies should be continually reviewed and revised in accordance with State and Federal law and best practices.	Towns; *Southwestern Commission, Counties.*	Immediately (2019-2020); Policy Adoption 2020 and later; Ongoing Review (every 2-4 years)	--
Prioritize Bicycle Infrastructure Downtown Municipalities should use this Plan to determine which roads through their towns should be prioritized for shared lane markings and bike lanes. Each town should develop a prioritized implementation schedule.	Towns and Counties.	Immediately (2019-2020)	--
Fund Bicycle Infrastructure Downtown Municipalities should work with the Counties and the Southwestern Commission to allocate fundings for prioritized bicycle infrastructure in their downtown areas to support the regional routes. A bond referendum is an option for continued funding.	Towns, Counties; *Southwestern Commission.*	Fiscal Year 2019-2020; Ongoing	$-$$
Develop & Implement Tactical Urbanism Projects The Southwestern Commission should recommend projects to municipalities reflective of the goals of this regional plan for short-term, low-cost, and scaleable bicycle projects. These can demonstrate the feasibility of permanent improvements to elected officials and NCDOT.	Towns, Bicycling Advocacy Groups, Southwestern Commission, Bicycle Clubs; *Neighborhood Associations.*	Short-term (2020); Ongoing on an annual basis (i.e. one new project per year)	$

Figure 8-2—Implementation Plan, Cont'd

Action	Lead Agency *(Partners)*	Timetable	Cost Range
Project #13 - Bike Racks & Fix-It Stations Each county should invest in funding for these minor bicycle improvements at all public parks, rec centers, libraries, and town/county offices.	Counties, Towns; *Southwestern Commission.*	Fiscal Year 2019-2020; Ongoing	$
Project #14 - Rumble Strip Remediation The Southwestern Commission and NCDOT should work together to devise a policy for rumble strip implementation in the region and work to incorporate gaps in future resurfacing projects.	NCDOT, Southwestern Commission.	Ongoing	$$
Safe Routes to School NCDOT and the Department of Health should continue to fund these programs in the rural counties of WNC. The Southwestern Commission should support these efforts with advocacy and promotion.	NCDOT, NC Department of Health; *Southwestern Commission, County Schools, Police Departments, Fire Departments.*	Ongoing	$
Open Streets Events Municipalities with Main Streets should organize annual Open Streets events, where the aim is to allow nonmotorized transportation to enjoy full use of the downtown core.	Town of Murphy, Town of Franklin, Town of Andrews, Town of Highlands, Town of Robbinsville, Town of Hayesville; *Southwestern Commission, Chambers of Commerce, TDAs.*	Begin Planning Immediately for 2020; Ongoing on an annual basis	$
Main Street Parking Towns should explore replacing angled parking with back-in angled parking or parallel parking to improve safety for bicyclists along their Main Streets. Temporary measures and response surveys should assuage negative concerns.	Towns.	Planning 2019; Implementation 2022	$

Funding

Facilities for people who bike are constructed – and therefore funded – through a number of avenues and there are even more funding sources to pursue for programmatic implementation measures. Funding is generally divided into five categories of sources: local, state, federal, non-profit, and private funding. The following sections describe some of the more prominent sources in each category. As described in this Plan, there is a strong economic/job creation argument to be made.

This section highlights common sources of funding, however, these are in a constant state of flux due to transportation funding discussions occurring at the state and federal levels. The Southwestern Commission COG and NCDOT are able to provide the latest information on these funding options.

LOCAL FUNDING

Municipalities can establish an annual budget line item specifically for bicycling improvements. A specific budget item is the most direct way to ensure that funding for such facilities is available, but sometimes a municipality's budget may be too limited to finance this work. Bicycling facilities can also be built as an "incidental" with any new projects or improvements, such as parks and recreation facilities, libraries, schools, and new roads. In addition, future private development should be reviewed for adequate bicycling access and parking.

Municipalities often plan for the funding of bicycling and greenway facilities or pedestrian improvements through development of Capital Improvement Programs (CIP). Typical capital funding mechanisms include the following: capital reserve fund, capital protection ordinances, municipal service districts, tax increment financing, taxes, fees, and bonds.

STATE, REGIONAL, & FEDERAL FUNDING

NCDOT is restricted from expending state funds on standalone bicycling or pedestrian projects, even when those projects or upgrades are essential along state-managed roads. This limitation makes it difficult for implementation of North Carolina's Complete Streets policy to occur without local contributions. Multimodal upgrades may occur along state-maintained roads when major investments are made, such as highway or intersection widening.

It is important to track changes or adjustments in these programs through the COG as funding allocations and programs are in flux on a regular basis and partially driven by the status of the Federal government's transportation funding acts that are intended to be updated on a semi-regular basis.

Appalachian Regional Commission (ARC): The Appalachian Regional Commission (ARC) is a regional economic development agency that represents a partnership of federal, state, and local government. Established by an act of Congress in 1965, ARC is composed of the governors of the 13 Appalachian states and a federal co-chair, who is appointed by the president. Local participation is provided through multi-county local development districts. ARC invests in activities that address the five goals identified in the Commission's strategic plan:

- Goal 1: Economic Opportunities: Invest in entrepreneurial and business development strategies that strengthen Appalachia's economy.
- Goal 2: Ready Workforce: Increase the education, knowledge, skills, and health of residents to work and succeed in Appalachia.
- Goal 3: Critical Infrastructure: Invest in critical infrastructure—especially broadband; transportation, including the Appalachian Development Highway System; and water/wastewater systems.
- Goal 4: Natural and Cultural Assets: Strengthen Appalachia's community and economic development potential by leveraging the Region's natural and cultural heritage assets.
- Goal 5: Leadership and Community Capacity: Build the capacity and skills of current and next-generation leaders and organizations to innovate, collaborate, and advance community and economic development.

Each year ARC provides funding for several hundred investments in the Appalachian Region, in areas such as business development, education and job training, telecommunications, infrastructure, community development, housing, and transportation. These projects create thousands of new jobs; improve local water and sewer systems; increase school readiness; expand access to health care; assist local communities with strategic planning; and provide technical and managerial assistance to emerging businesses.

For additional information, please visit
https://www.arc.gov/funding/GrantsandFunding.asp

NCDOT Strategic Transportation Improvement Program (STIP): The STIP is the overall document outlining funding programs and projects for study, design, and construction of major transportation facilities in the state. The MPOs and RPOs have input for project identification and adoption of the STIP. Every two years, MPOs, RPOs, Division offices, and other NCDOT departments can submit projects for prioritization. NCDOT will allocate federal dollars using the Strategic Mobility Formula, which allocates available revenues based on data-driven scoring and local input, reflecting NCDOT Division needs, regional impact, and statewide mobility. It is used

to develop NCDOT's STIP, which identifies the transportation projects that will receive funding during a specified 10-year period.

Local government members (cities and counties) can apply and submit their projects. Projects have more weight if they are identified on a local or regional adopted plan, such as a CTP (Comprehensive Transportation Plan), LRTP (MPO Long Range Transportation Plan), regional bicycle plan such as the Southern Blue Ridge Bike Plan, or a local bicycle/pedestrian plan.

Powell Bill Funds: In addition to local funding sources, municipalities receive some financial assistance from the State to help pay for the construction, maintenance and repair of municipal streets. North Carolina levies motor fuel taxes pursuant to a formula that increases taxes when the wholesale price of motor fuels increases. G.S. 136-41.1 appropriates a certain percentage of this revenue, plus an additional percentage of the net proceeds of the North Carolina Highway Trust Fund, to eligible municipalities across the state. The total FY 2010 allocation to municipalities was $134,299,711.21. (Note that counties do not receive this assistance because their authority to construct or maintain streets is significantly more limited.) The legislation that first established this distribution is known as the Powell Bill (after its principal sponsor in the North Carolina Senate), and the moneys distributed to the municipalities are referred to as Powell Bill funds. Annually, state street-aid (Powell Bill) allocations are also available for planning, construction, and maintenance of bikeways or sidewalks along public streets and highways. New sidewalks or replacement of existing sidewalks are an eligible expense for these funds.

Street maintenance includes street cleaning and snow removal. Permitted construction expenditures include all phases of construction: right-of-way acquisitions; legal and engineering expenses; salaries, wages, and fringe benefits; materials for construction; payments to contractors, and so forth. Municipalities also may use gasoline tax money for traffic control devices and signs, and debt service on street bonds. They may not use it for street lighting, on- or off-street parking, traffic police, or thoroughfare planning.

Recreational Trails Program: The Recreational Trails Program (RTP) is a grant program funded by Congress with money from the federal gas taxes paid on fuel used by off-highway vehicles. This program's intent is to meet the trail and trail-related recreational needs identified by the Statewide Comprehensive Outdoor Recreation Plan. The program requires a 25% match and is a reimbursement grant system, funding amounts between $10,000 and $100,000.

North Carolina Parks and Recreation Trust Fund (PARTF): The fund was established in 1994 by the North Carolina General Assembly and is administered by the Parks and Recreation Authority. Through this program, several million dollars each year are available to local governments to fund the acquisition, development and renovation of recreational areas. PARTF funds are allocated through the North Carolina Trails Program to help fund beach accesses, state trail systems, and local trail construction efforts. The projects in this plan that create connections to parks are a good match for PARTF funds.

North Carolina Health & Wellness Trust Fund: The NC Health and Wellness Trust Fund was created by the General Assembly as one of three entities to invest North Carolina's portion of the Tobacco Master Settlement Agreement. Fit Together, a partnership of the NC Health and Wellness Trust Fund (HWTF) and Blue Cross and Blue Shield of North Carolina (BCBSNC) established the Fit Community designation and grant program to recognize and rewards North Carolina communities' efforts to support physical activity and healthy eating initiatives, as well as tobacco-free school environments.

Fixing America's Surface Transportation (FAST) Act: Passed in 2015, the FAST Act provides long-term funding certainty for surface transportation infrastructure planning and investment. Municipalities can submit projects for Surface Transportation Block Grant (STBG) funding, including roadways, transit, bike facilities, pedestrian facilities, truck parking areas, and intelligent transportation systems (ITS) improvements. Eligible projects for Transportation Alternatives (TA) funding include pedestrian and bicycle facilities, recreational trails, and Safe Routes to School projects. Planning studies can be funded through the Metropolitan Planning program. Due to state restrictions, the full 20% match required on these funds must be borne by the municipality. Towns in Cherokee, Clay, Graham, and Macon counties should work through the Southwestern Commission and with other regional municipalities to develop strategies to help the state utilize these funds.

For additional information, please visit:

https://www.transportation.gov/fastact/

NON-PROFIT & PRIVATE FUNDING

Another method of funding bike lanes and greenways is to partner with public agencies, private companies, hospitals or hospital foundations, and/or not-for-profit organizations. Most private funding sources offer limited grants and public-private partnerships engender a spirit of cooperation, civic pride, and community participation.

The key to the involvement of non-profit and private partners is to make a compelling argument for their participation. Major employers and developers could be identified and provided with a "Health Benefits of Bicycling and Greenways" handout for themselves and their employees. Specific, targeted routes that make critical connections to places of business would be targeted for private partners' monetary support following a successful master planning effort.

Elected Official Responsibilities

Elected officials (Mayor and Council), will be key to implementing the Southern Blue Ridge Bike Plan by providing the direct connection between the public, businesses, and staff. Elected officials serve as the leadership that enable staff to do their jobs and to make sure the plan is implemented as approved. There are numerous ways these officials are involved. Elected officials provide support through funding and giving direction for activities that range from addition of bikeways, to maintenance of infrastructure, to education programs carried out by the police department or parks and recreation department. Another key role of elected officials is to make sure the plan implementation results in expected outcomes by reviewing progress each year through a staff report on the plan. This report will promote fiscal responsibility of efforts and benefits from budget and staff time spent. This will result in public accountability and opportunities for elected officials to share the success of implementation efforts in all facets of the plan.

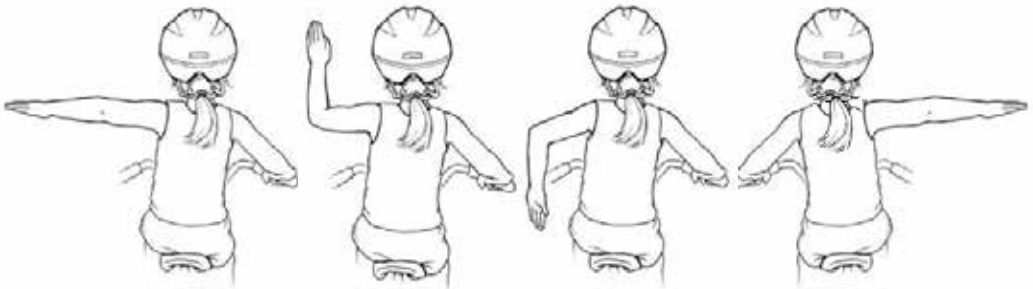
Additional Law & Policy Implications

BICYCLE LAWS IN NORTH CAROLINA

There are state and federal policies and guidelines that describe how bicycle improvements are to be developed.

Revisions to Bicycle Safety Ordinances: Signed into law on July 11, 2016, House Bill 959 (Session Law 2016-90) includes changes to portions of North Carolina's bicycle safety law:

- *§5.5.(a) General Statute 20-150(e)* allows a passing vehicle to pass a bicyclist in a no passing zone if the bicyclist is moving in the same direction, going straight and not turning left or signaling a left turn. When passing a bicyclist in a no passing zone, the operator of the passing vehicle either allows four feet of clearance to the left of the slower moving vehicle or move entirely into the left lane.
- *§5.5.(c) General Statute 20-154* provides new information on the penalty to a driver who either causes a bicyclist to leave the travel lane to avoid a collision or causes a crash or any severe injury while passing too closely to a bicyclist. A driver who causes a cyclist to change travel lanes or leave that portion of a travel lanes will be fined $200. If the motorist causes a cyclist to crash causing property damage or personal injury there will be a fine of $500 and if there is more than $5,000 in property damage or serious injury, the driver will be fined $750.
- *§5.5.(c) General Statute 20-154* also allows a bicyclist signaling to make a right turn to pointing to the right with the right hand, as an alternative to raising the left hand.



Left turn *Right turn* *Stop* *Right turn*

- *§5.1.(a) General Statute 20-129(e)* requires a bicycle to have a red rear light or the operator wear a bright and visible vest when riding a bicycle at night. Both the light and vest must be visible from 300 feet behind the bicycle.

House Bill 232 – Bicycle Safety Laws Study: Approved in June 2015, House Bill 232 required NCDOT to study North Carolina bicycle and traffic laws and make recommendations on how the laws could better ensure the safety of bicyclists and motorists. H 232 also required NCDOT to form and meet with a working group representing various industries and interests. NCDOT released its final report containing recommendations to the Joint Legislative Transportation Oversight Committee on January 8, 2016. The final report recommended:

- A rear lamp or bright clothing should be visible 300 feet to the rear (instead of 200ft).
- Cyclists should not be required to ride single file and should be able to use the full lane on higher speed roadways (over 35mph) in order to avoid unsafe conditions.
- An agency (local or state) should issue a permit to a large group of cyclists (30 or more) per the bicycle racing law (§ 20.171.2). Cyclists riding in smaller groups would not be subject to the recommendation.

Bicycle & Bikeway Act: With the passage of the Bicycle and Bikeway Act of 1974, North Carolina established the first state bicycle program in the country, which quickly became a national model. The legislation granted authority for the North Carolina Bicycle Program (now the Division of Bicycle and Pedestrian Transportation) to undertake comprehensive bicycle planning and programming.

North Carolina Bicycle Laws: The following chapters and sections are most applicable to bicycling in North Carolina, but do not include relevant local government ordinances:

- Except where referencing motor vehicles only, the North Carolina General Statutes (N.C. G.S.) define bicycles as vehicles, subject to vehicle traffic laws in N.C. G.S. § 20
- *N.C. G.S. § 20-129(e):* Lamps on bicycles
- *N.C. G.S. § 20-138.1:* Impaired driving (bicycling)
- *N.C. G.S. § 20-146:* Vehicle and bicycle operation on roadways
- *N.C. G.S. § 20-149:* Passing distances
- *N.C. G.S. § 20-171.1:* Definitions
- *N.C. G.S. § 20-171.2:* Bicycle racing
- *N.C. G.S. § 20-171.8:* Child Bicycle Safety Act

To research other state laws, please consult the North Carolina General Statutes:

http://www.ncga.state.nc.us/gascripts/statutes/Statutes.asp

POLICIES

Guidelines for Inclusion of Greenway Accommodations Underneath a Bridge as Part of an NCDOT Project: In 2015, NCDOT approved guidelines for the accommodation of future greenways under bridges. The guidelines include a decision-making approach and cost-sharing recommendations.

Complete Streets: In 2012, NCDOT adopted guidelines following the approval of the Complete Streets policy in 2009. The guidelines require planners and designers to include other modes of transportation, including bicycle and pedestrian, in all transportation projects in municipal areas under certain circumstances.

Bicycle Policy: In 1978, the North Carolina Board of Transportation adopted the nation's most comprehensive set of bicycle policies in response to the enabling legislation of 1974. Legislation in 1974 enabled the North Carolina Board of Transportation to adopt the nation's most comprehensive set of bicycle policies in 1978. The policy was updated in 1991, and details guidelines for the planning, design, construction, maintenance and operation of bicycle facilities and accommodations.

Administrative Action to Include Local Adopted Greenway Plans in the NCDOT Highway Planning Process and Guidelines: In 1994, the NCDOT adopted administrative guidelines to consider greenways and greenway crossings during the highway planning process. This policy was incorporated so that critical corridors, which have been adopted by localities for future greenways, will not be severed by highway construction.

Bridge Policy: NCDOT's Bridge Policy establishes design elements for new and reconstructed bridges on the state road system. It includes requirements for bicycle facilities on bridges, including minimum handrail heights.

Traffic Engineering: More information about NCDOT policies and federal design guidelines for specific bicycle safety accommodations are located on Connect NCDOT.

FWHA Bicycle and Pedestrian Program: The Federal Highway Administration (FHWA) also provides guidelines for accommodation of bicycle and

pedestrian improvements in transportation projects.

Additional resources and links to the aforementioned laws and policies related to bicycling in North Carolina are provided by the NCDOT:

https://www.ncdot.gov/bikeped/lawspolicies/

Another useful reference guide is provided by Anne Groninger with BikeLaw:

https://www.bikelaw.com/wp-content/uploads/2014/11/BIKELAW_RG_NC_Web.pdf

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