8 greenways

EXECUTIVE SUMMARY

Greenway trails are bicycle and pedestrian facilities that allow people to make muscle powered trips for transportation and recreation. Greenway trails are recognized for their ability to connect people and places, working as a tool for health, transportation, economic development, environmental preservation and leisure activities. They serve an array of user needs and activities including commuting, recreation, daily exercise and connecting with nature. Greenway trails have become an increasingly important and highly sought-after facility that communities across the world are demanding.

The purpose of this chapter is to provide context in guiding principles, design standards, trail types and framework in which facilities are assessed and recommendations are developed. A review of the current conditions, related planning efforts and projects and comparing benchmarking of comparable size towns also provides important background to an inventory assessment. Throughout the planning process, a broad community engagement effort was coordinated to facilitate feedback from the general public, steering committee, Town of Holly Springs staff members, Town Council and neighboring jurisdictions. This all ultimately informed the project team's key findings, recommendations and implementation strategies.

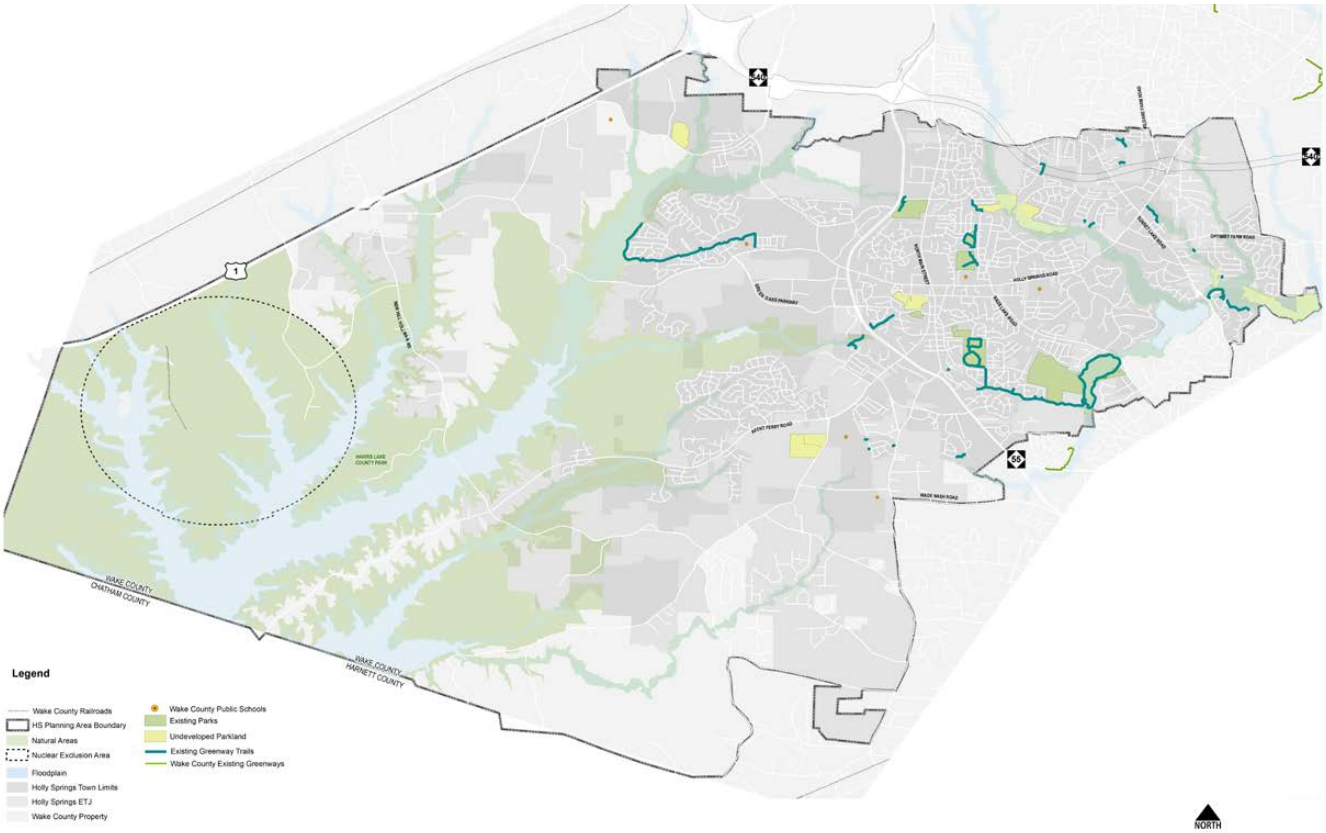


Figure 1 - Existing greenway trails map

BENEFITS OF GREENWAY TRAILS

Greenway trails contribute to a community's well-being by promoting individual and community health, environmental quality and economic impact. Greenway trails are one of the very few public investments that have such a wide impact on a community's quality of life. A dollar invested in a greenway project will yield return on that investment in transportation, health, environmental quality and economic vibrancy.

Figure 2 - Benefits of greenway trails

COMMUNITY HEALTH	ENVIRONMENT QUALITY	ECONOMIC IMPACT
HEALTH AND WELL-BEING facilitate active living and connecting with nature	**ENVIRONMENTAL STEWARDSHIP** protect air quality, water quality and wildlife habitat	**ECONOMIC IMPACT CATALYST** promote tourism and business through public investment
INCREASED MOBILITY OPTIONS expand residents' options for non-vehicular travel and commuting	**EDUCATIONAL OPPORTUNITIES** connect residents to information about the natural world	**WORKFORCE DEVLEOPMENT** attract new residents and businesses with high quality of life
CULTURAL AWARENESS define community identity through public art	**HAZARD MITIGATION** buffer hazard-prone areas such as floodplains	**HIGHER TAX REVENUE** increase tax revenue by increasing property values

Table 1 - Community, environmental and economic sustainability benefits of investing in greenway trails

Social Benefits

Simply being in nature and away from the stressors of everyday life promotes improved health and well-being. Greenway trails provide residents an opportunity to be away from driving, traffic, noise and dense development. Greenway trails promote a healthy, active lifestyle providing a safe and attractive environment for running, jogging, biking, walking and other forms of physical activity. Providing safe facilities for these activities away from areas of automobile traffic allows users to pursue these activities safely and comfortably.

Health benefits range from short to long-term effects on both physical and mental health. Evidence shows that greenway trails and parks provide an opportunity for residents to create long-term health habits and active lifestyles that improve health and reduce chances of cardiovascular, skeletal, or other health complications.

A 2005 study on the cost benefit analysis of physical activity on bike and pedestrian trails revealed that for every $ 1.00 in investment in trails for physical activity led to $ 2.94 in direct medical benefit, indicating that building trails is cost beneficial from a public health perspective.[1]

In North Carolina, 32.1 percent of adults and 15 percent of children are obese, with trends projected to increase. In 2019, 12.5 percent, or roughly 1.3 million North Carolinians were diabetic. That number has increased by 15% since 2012.

1 *Wang, Guijing, Caroline A. Macera, Barbara Scudder-Soucie, Tom Schmid, Michael Pratt, and David Buchner. "A Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails." Health Promotion Practice 6, no. 2 (April 2005): 174–79. doi:10.1177/1524839903260687*

Walking as a form of exercise becomes easier, safer, and more fun when people can use greenway trails for their exercise. Greenway trails have low barriers to entry; there is no entry fee and no special equipment is needed. Greenway trail users are more likely to interact with neighbors and community members, improving their own social health and the social connectedness of the community. This has been proven to reduce stress, diminish depression and promote overall positive health outcomes.

Greenway trails provide a critical opportunity to connect children with nature. Studies show that regular non-structured play in a natural setting reduces symptoms of attention-deficit/hyperactivity disorder (ADHD). Connecting with nature allows children and adults to release stress, engage in physical problem solving, and find space for contemplation and reflection.

Vehicular traffic congestion is often an issue in areas experiencing population growth. Robust greenway networks are a tool to mitigate congestion by providing residents transportation options other than driving a vehicle. When residents can choose cycling or walking to their destination, vehicular traffic is removed from the road, decreasing congestion.

Greenway trails can be constructed to comply with universal design standards that ensure accessibility to people who use mobility devices such as a wheelchair or crutches. Following design standards that comply with the Americans with Disabilities Act (ADA) will ensure that all residents can have expanded choices in their modes of transportation.

Nationally, about 836,569 Americans commuted by bike in 2017, an increase of 43 percent since year 2000. According to the U.S. Census Bureau, the average commute time nationally was 26 minutes, and the Town of Holly Springs' average commute time was 28 minutes.

The protection of sacred places with lasting identities set years ago allows a community to maintain a sense of place for not only residents, but also for tourism and economic purposes.

Redevelopment of formerly neglected community resources with walking and biking infrastructure brings a new sense of identity, as observed at the American Tobacco Trail in Durham, North Carolina and The High Line in the New York City, New York. In both cases, industrial uses prohibited public use until the installation of trails and active public/private destinations. Greenway trails are a catalyst for urban revitalization and restoration of economic vitality in derelict industrial centers. The incorporation of historic monumentation, interpretive signage and public art have the potential to capture and celebrate the past, enhancing cultural awareness and connection to community identity.

Paired with economic benefits and community identity, greenway trails add and/or protect aesthetically pleasing aspects of a community. Not only is the natural environment portrayed in a raw state accessible to the public, but with the addition of artwork such as commissioned sculptures and murals an added aesthetic is achievable. This improves the user experience and potentially attracts new users who would otherwise not utilize a greenway trail system.

Environmental Benefits

Greenway trails are often located along stream corridors, utility easements and forested areas. This urban trail infrastructure protects water quality, air quality and wildlife habitat.

Greenway trails located along stream corridors preserve natural areas where stormwater can filtrate through soils naturally, rather than entering stormwater infrastructure. Once water enters a jurisdiction's stormwater infrastructure, it is either deposited into natural waterbodies without any treatment or filtration, or it is treated as wastewater at a cost to the area's water customers and utilities. Using greenway trails to create vegetated buffers along streams creates opportunities for stormwater to filter through soils before seeping into natural bodies of water. Greenway trails within these natural corridors protect water quality by allowing water to filter out pollution carried in storm water and reducing stormwater velocity to reduce erosion and sedimentation.
The positive impact greenway trails have on air quality is two-fold. First, greenway trails are often vegetated with trees or shrubs. These plants provide air filtration, carbon sequestration, and ecosystem services. Wildlife benefits from greenway trail networks. Greenway trails provide corridors between forested areas. These connections are critical to supporting wildlife populations that need safe routes for local migration, as well as bird species following much longer migration routes.

Additionally, greenway trails promote forms of transportation other than driving a car. The avoided car trips add up to reduce the amount of non-point source pollution in the form of fossil fuel exhaust released into the atmosphere.

Economic Benefits

Greenway trail networks bring new business and economic life to cities, towns and communities. Communities benefit both by creating a greenway trail network that provides important local connections and by extending local connections to larger regional trail networks.

Greenway trails benefit the surrounding area on a micro-economic scale by increasing adjacent property values and generating trail-user spending near trails. Proximity to a greenway trail is an important consideration for homebuyers and businesses looking to locate in a community. The value of homes and properties adjacent to a trail statistically are higher than comparable properties further away from a greenway trail corridor.
The East Coast Greenway is a regional trail project that runs through North Carolina with the goal of creating a continuous greenway connection between Maine and Florida. The Triangle is the most connected metro on the route with 74 miles of trail on the ground from Durham to Clayton. This greenway trail benefits the Triangle area of North Carolina by bringing in more than $90 million in related revenue and taxes per year. The greenway trail has also created nearly 800 temporary and permanent jobs[2].

2 *https://www.greenway.org/uploads/attachments/cj8ahwk7d0flaagqiv9ieamat-triangle-ecg-impact-report-min.pdf*

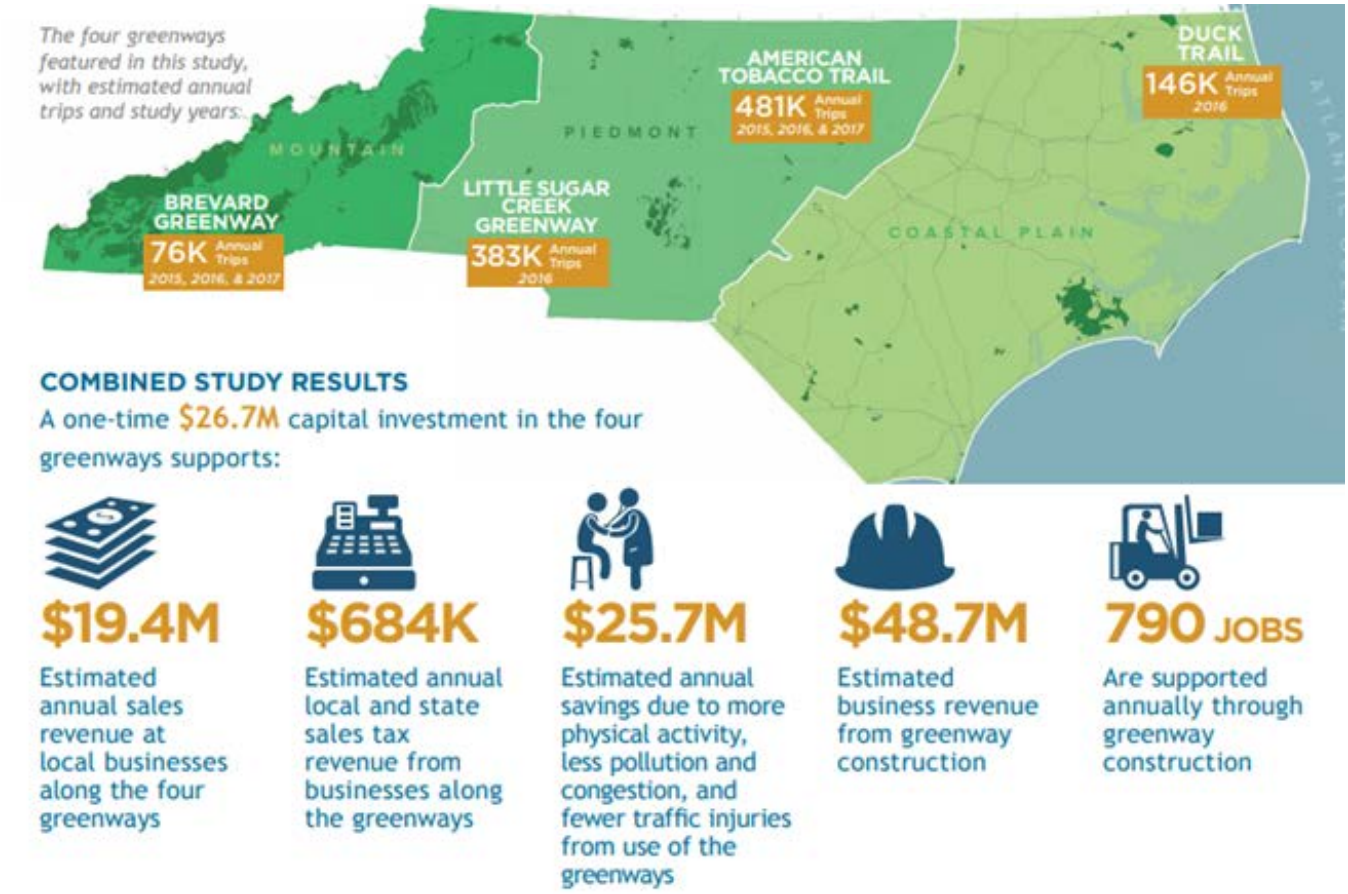


Figure 3 - Economic impact of shared use paths in North Carolina3

COVID-19

The multiple benefits of greenway trails have never been more apparent than during the coronavirus pandemic. With most fitness centers closed and people confined to their homes, parks and greenway trails have become an even more valuable public amenity for physical and mental health. Across the country and world, greenway trails have seen a huge uptick in users, requiring municipalities to find creative solutions to maintain social distancing and follow safety protocols. The increased demand on greenway trails have led some municipalities to temporarily close streets and designate them for walking, biking, roller blading and other forms of exercise.

Greenway trails that collect user data are seeing double and triple the volume of usage in comparison to the same period last year. In North Carolina, many of the popular greenway trails collect data and are seeing a significant increase in bicycle and pedestrian users. For instance, the following trails have experienced nearly double or triple user count: the American Tobacco Trail (179%), Neuse River Greenway (278%) and Black Creek Greenway (277%).[3] Another study looking at Strava data reported that in Houston and Los Angeles, two sprawling metropolises infamous for driving, there was a significant increase in total volume of cycling trips in May 2020 (138% higher in Houston, 93% higher in Los Angeles).[4]

It is more obvious than ever that more greenway trails are needed, with more public funding and increased support for greenway investment. There is hope from bicycle advocates, transportation planners and the public that this will lead to increased government spending and stimulus packages for greenway trails and bicycle facilities. It could, in fact, contribute to economic growth.

Greenway Trail Network Guiding Principles

Proper long-range planning is essential to ensure that greenway trails can be planned, designed and constructed to fully meet the benefits they can provide.
Guiding principles of a greenway trail system represent the broad philosophy that guides greenway trails planning and design. Consistent across the industry, the following guiding principles were considered when authoring the recommendations contained herein.

GREENWAY TRAILS SHOULD BE			
ACCESSIBLE	**EQUITABLE**	**EXPERIENTIAL**	**SAFE**

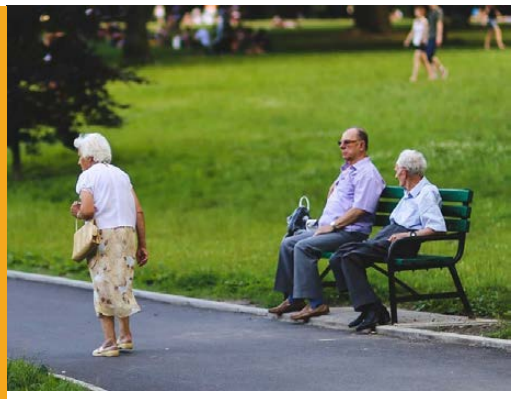
3 The Institute for Transportation Research and Education and Alta Planning + Design for the North Carolina Division of Bicycle and Pedestrian Transportation.

4 https://itre.ncsu.edu/focus/bike-ped/nc-nmvdp/

5 https://www.bloomberg.com/news/articles/2020-09-23/how-the-coronavirus-affected-biking-in-u-s-cities?cmpid=BBD102220_CITYLAB&utm_medium=email&utm_source=newsletter&utm_term=201022&utm_campaign=citylabdaily

Accessible

Accessible greenway trails can be enjoyed by all people of all ages and ability levels. Accessibility is regulated through technical design standards outlined in the Americans with Disabilities Act (ADA), but more communities are recognizing the benefit of Universal Design, which considers accessibility comprehensively, beyond ADA requirements. Universal Design is defined as the "design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability." Aspects of the built environment contribute to universal accessibility of greenway trails, such as trail width, surface material and longitudinal and horizontal slopes.



Equitable

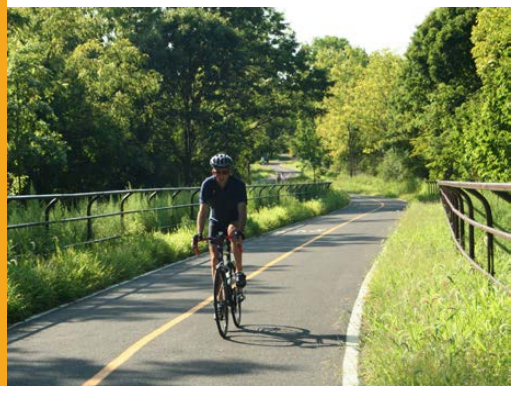
The result of equitable greenway trail planning is that all people have access to greenway trails regardless of race, class, location and other factors. Greenway trails should support all residents, and equity recognizes that equally providing infrastructure may not equitably meet the needs of neighborhoods and individuals. For example, individuals who use greenway trails to achieve fitness goals will have different needs than individuals who use greenway trails to commute to a workplace. Investment in greenway trail infrastructure should happen in a way that provides more vulnerable populations with equitable greenway trail infrastructure, access and experiences.

Experiential

Experience is the sensory feedback an individual receives while engaging in a task or activity. Sensory feedback forms an experience, one that is positive or negative. Creating greenway trails to generate positive experiences includes considering the natural views, a comfortable environment and safety. Greenway trails should contribute to an overall quality-of-life and become a regular part of everyday life for short trips, exercise and connecting with nature and socializing.

Safe

Safety refers to greenway trail elements that minimize the risk of injury, danger and crime. Safe greenway trail networks are comfortable for users of all ages and ability levels as a safe means of alternative transportation making it easier to walk or ride a bike. The application of relevant design standards ensures that grades, curves and intersections with roadways and driveways are as safe as possible. Greenway trails are as safe as the neighborhoods they traverse through. Communities should develop appropriate



policing and volunteer ambassador programs as their network expands.

The McAdams project team has developed a framework to assist decision makers in how to prioritize greenway trail implementation in Holly Springs. This framework, or trail hierarchy, emphasizes the importance of considering the network as a system when making decisions. The trail hierarchy is separated into three categories, as described below:

- Community Connector - greenway trails that form the main structure of Holly Springs' greenway trail network. These greenway trails form the main connections with adjacent communities, to and from downtown, across challenging obstacles and to other greenway trails. Community Connectors provide strong North/South and East/West routes on which to build a highly functional greenway trail network.
- Destination Connector - greenway trails that link Holly Springs destinations such as schools, parks, employment centers and others to the Community Connector network.
- Neighborhood Connector - greenway trails that connect residential neighborhoods to the larger greenway trial network.

Based on this framework, a comprehensive network map is developed that helps municipal agencies to efficiently plan, design and fund projects. These priority greenway trails also take into consideration major obstacles that could hinder the success of certain corridors.

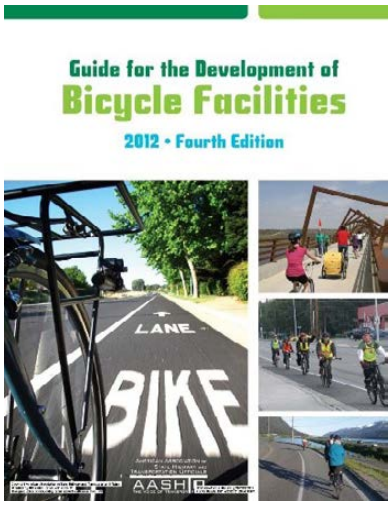
Design Standards

There are several resources available that provide guidance on design standards and specifications for greenway trails. Below is a brief description of those resources and a table that highlights the recommended specifications that the Town of Holly Springs should consider when developing new or modifying existing greenway trails.

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

Published by the American Association of State Highway and Transportation Officials (AASHTO), this guide provides the basis for both planning and designing bicycle facilities. Information covered includes planning, bicycle operation and safety, on-road bicycle facility design, side path design, bicycle parking, and maintenance and operations. The purpose of the guide is to present sound planning and design guidelines by referencing a recommended range of design values and describing alternative design approaches. The guide also allows for the incorporation of pedestrians and motorists along with bicyclists for dynamic designs that are sensitive to local context.

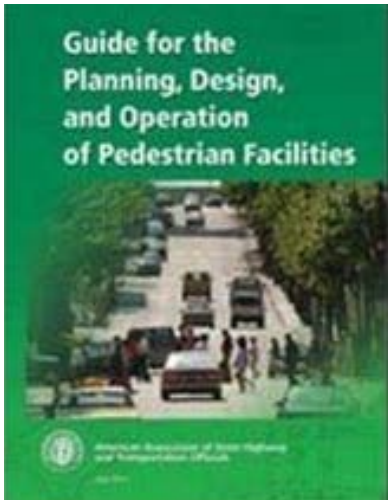
(link: Guide for the Development of Bicycle Facilities, 4th Edition)



AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities, 1st Edition

Much like the AASHTO's Guide for the Development of Bicycle Facilities, this guide provides instruction on planning, design and operation of pedestrian facilities along streets and highways, focusing on effective ways to accommodate pedestrians within public rights-of-way. Methods to accommodate pedestrians vary depending on the roadway and facility type, and those practices are described in this guide. It also addresses land use planning and site design, as these topics have a profound effect on pedestrian mobility.

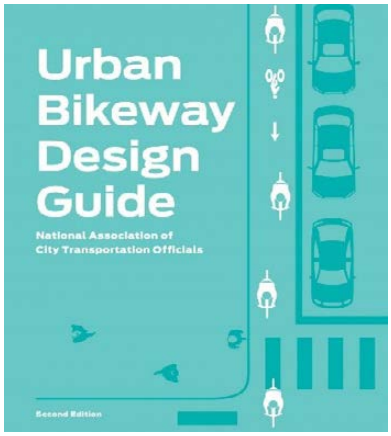
(link: Guide for the Planning, Design and Operation of Pedestrian Facilities, 1st Edition)



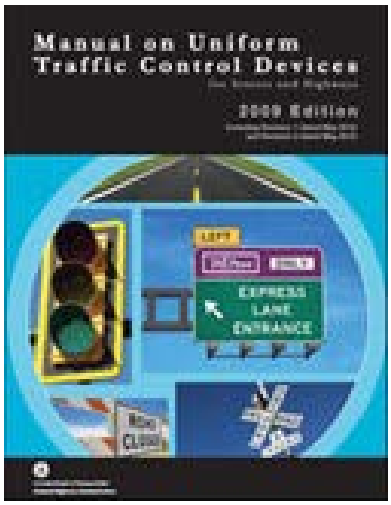
NACTO Urban Bikeway Design Guide

The NACTO Urban Bikeway Design Guide is based on experience and recommendations from prominent cycling cities from around the world. The target of this guide is cities seeking to improve bicycle transportation where unique challenges like high interaction with traffic, decreased right of way and increased conflict points are present. These challenges demand innovative solutions and the NACTO guide showcases how other cities have conquered these challenges. The AASHTO Guide is not referenced in most of NACTO design solutions. However, virtually all treatments are permitted under the Manual on Uniform Traffic Control Devices (MUTCD).

(link: NACTO Urban Bikeway Design Guide)



Manual on Uniform Traffic Control Devices (MUTCD)



The Federal Highway Administration's MUTCD is the foremost source for guidance on lane striping requirements, signal warrants, recommended signage, and recommended pavement markings for greenway trails and roadway crossings. If desired design treatments are not covered in the MUTCD manual, they may be offered to FHWA for interpretation and official ruling. The FHWA provides an online database where past official rulings can be found (https://mutcd.fhwa.dot.gov/orsearch.asp) which may provide useful when progressing through the design process.
(link: Manual on Uniform Traffic Control Devices)

The North Carolina Department of Transportation Complete Streets Planning and Design Guidelines

This publication, released in 2012, includes detailed information on the processes, street types, and recommendations for designing complete streets in North Carolina. The guidelines are meant to help both NCDOT and municipalities with thinking through planning and designing new streets or improving existing infrastructure that all modes of transportation can use, be they pedestrians, bicyclists or motor vehicles. While all design standards referenced are valuable to planning and designing Holly Springs' pedestrian and bicycle network, special attention should be paid to AASHTO, MUTCD and ADA guidelines.
(link: NCDOT Complete Streets Planning and Design Guidelines)

American with Disabilities Act (ADA)

While elements such as curb ramps, slopes, and railings that are referenced in AASHTO or MUTCD guides, these guides do not explicitly reference compliance with ADA standards. There are several manuals listed below that provide standards for the construction of accessible facilities to comply with the American with Disabilities Act.

- 2010 ADA Standards for Accessible Design
- ABA Accessibility Guidelines for Outdoor Developed Areas
- Public Rights-of-Way Accessibility Guidelines (PROWAG)
  - Proposed guidelines have been developed but are not yet adopted by the Department of Justice
- 2017 ICC/ ANSI A117.1 Accessible and Usable Buildings and Facilities
- US Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG)

Meeting the requirements outlined in the aforementioned planning documents is important for any bicycle and pedestrian network to do such that the most users can participate. Other Valuable Resources include:

- U.S. Department of Transportation FHWA – Separated Bike Lane Planning and Design Guide
- 10 Techniques for Making Cities More Walkable
- Center for Disease Control and Prevention – Parks and Trails Health Impact Assessment Toolkit
- National Association of City Transportation Officials (NACTO) – Design Guide Archives
- Small Town and Rural Design Guide – Facilities for Walking and Biking
- American Trails
- Pedestrian and Bicycle Information Center
- Rails-to-Trails Conservancy
- America Walks – Learning Center
- International Mountain Biking Association
- FHWA Course on Bicycle and Pedestrian Transportation

TRAIL TYPES

When planning and building pedestrian and bicycle facilities, there are several options that a municipality can choose from. There are also many factors that influence that decision, such as available right-of-way, interaction with vehicular traffic, terrain, intersections, roadway conditions, community preferences and comfort levels, etc. Below is a brief description of the most common options available when building pedestrian and bicycle facilities.

Greenway Trails

As the most common type, greenway trails can be defined as linear open space areas, often associated with wildlife corridors or valuable vegetative buffers. Most often located within a dedicated easement or public utility right-of-way, greenway trails usually include a developed (hard) surface to allow ease of usage for bicycles and other wheeled vehicles. Developed surfaces are most commonly asphalt, concrete or crushed stone. The width of the trail can vary from ten to fourteen feet, with ten feet being the most common. Communities around North Carolina including Raleigh, Charlotte and Wilmington have recently updated their standard width to 12 feet due to the high usage seen on built greenway trails.

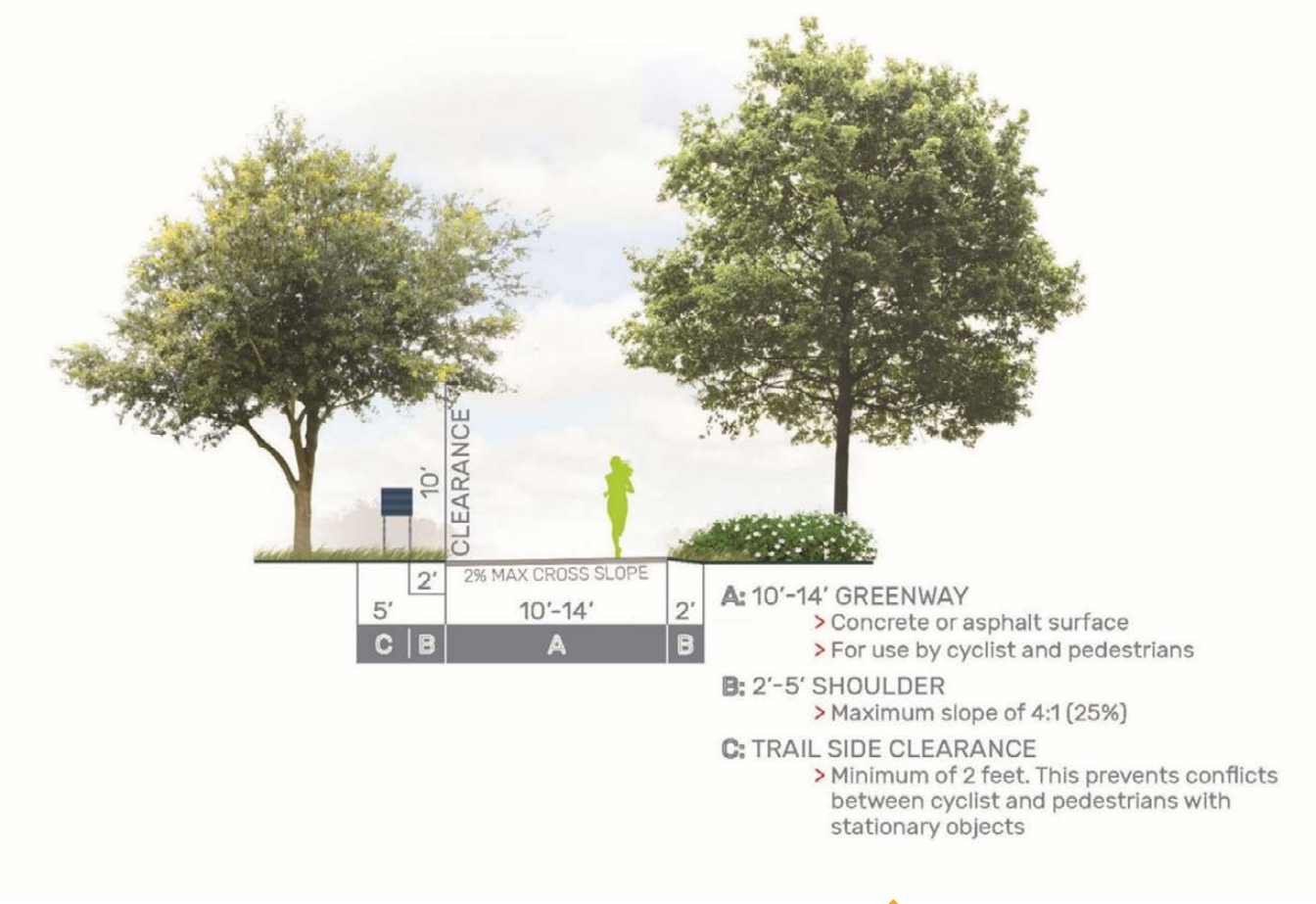


Figure 4 - Paved greenway trail illustration

Side Paths

Usually located immediately adjacent and parallel to a roadway, side paths are 10-14 feet in width for two-way traffic flow and are physically separated from vehicular travel through vegetated landscape strips, rumble strips or site furnishings (streetlights, wayfinding signage or benches). Side paths often share the right-of-way (ROW) with collector and highway roads with higher volumes and moderate-to-high speeds (15 – 55 MPH)[5]. As roadway speed increases so should the separation width between the vehicular path of travel and the side path facility. Specific details regarding path width, separation width, landscape material, maintenance, crossing design or intersection width and connection to other multi-modal facilities should be considered during a detailed corridor study.

Side paths should be located with consideration to a safe clear zone. Highway design manuals specify the distance from the edge of roadway to the side path based on the posted speed of the road and average daily trips. This distance can be mitigated by installing curb and gutter or a vertical barrier to protect users from vehicles. The clear zone distance should be considered at the planning stage to determine the adequate right-of-way width required and possible increase in costs for the installation of curb and a closed drainage system. Side paths can offer a more comfortable experience for cyclists as compared to on-road facilities such as bike lanes or wide outside shoulders located in heavy traffic environments and their inclusion within a network allows for reduced roadway crossing distances.

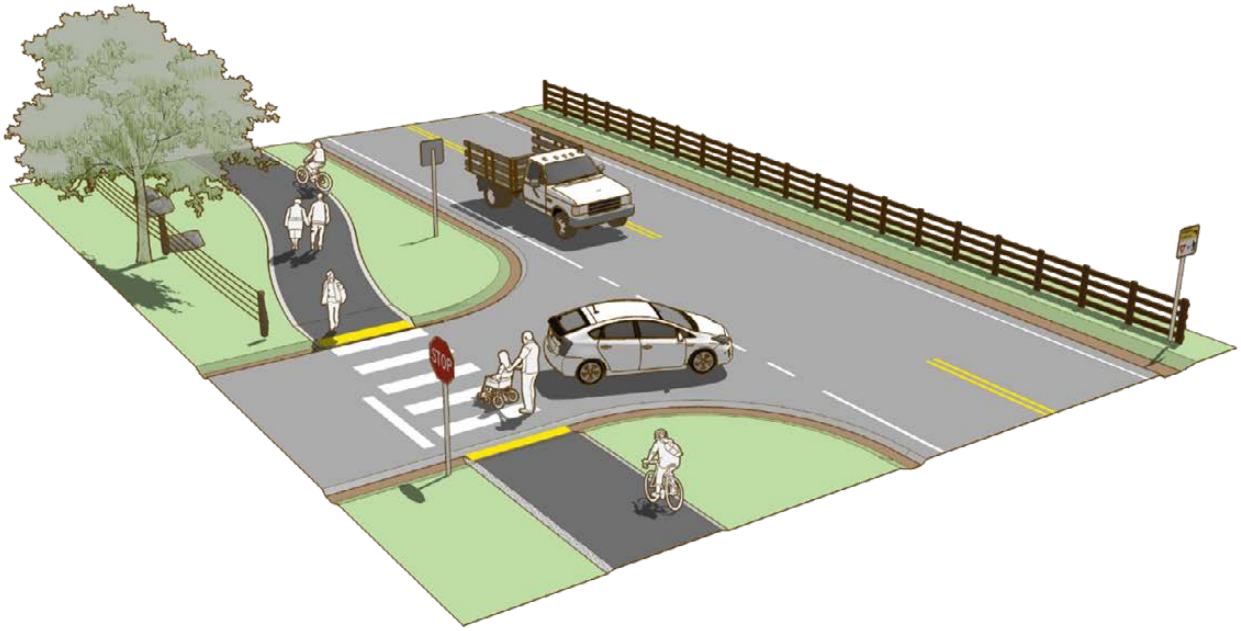


Figure 5 - Side path illustration5

5 *U.S. Department of Transportation, Federal Highway Administration. Small Town and Rural Multimodal Networks, 2016.*

Side paths are designed to be part of a transportation system, providing off-road routes for a variety of users. The primary users of side paths are bicyclists and pedestrians, including pedestrians using mobility devices such as manual or motorized wheelchairs. While they may coincidently provide a recreational experience, side paths differ from other types of trails with their transportation focus and serving as a supplement to on-road bike lanes, shared roadways, bike boulevards and paved shoulders. They may extend or complement a roadway network. Side path design is similar to roadway design but on a smaller scale and for lower speeds. Whether located within a highway right-of-way, provided along a riverbank or established over natural terrain within an independent right-of-way, side paths differ from sidewalks and greenway trails in that they are primarily designed for bicyclists and others for transportation purposes such as commuting to work.[6]

For this plan, side paths are paved facilities, connecting users from residential, civic, social and employment areas to the greenway trail network. They can be either parallel to the road or meander slightly, creating a more comfortable and aesthetically pleasing experience for the trail user.

Sidewalks

Sidewalks are dedicated to and designed for use by pedestrians. They should be safe, comfortable and accessible to all. Sidewalks are paved facilities, physically separated from the roadway by either a curb or unpaved road verge or combination of both. Like side paths, sidewalks are typically parallel to a roadway but are designed for pedestrians only, not for bicycles or other recreational purposes.

Figure 6 - Sidewalk Illustration9

6 http://www.fhwa.dot.gov/environment/bikeped/framework.htm and
https://www.fhwa.dot.gov/publications/research/safety/pedbike/05137/05137.pdf
8 U.S. Department of Transportation, Federal Highway Administration. Small Town and Rural Multimodal Networks, 2016.
9 U.S. Department of Transportation, Federal Highway Administration. Small Town and Rural Multimodal Networks, 2016.

Stream Corridor Trails

For purposes of this plan, stream corridor trails are defined as greenway trails adjacent to a stream or river corridors that are typically located within the floodway or floodplain. It should be noted that there are challenges when including stream corridor trails into the transportation network. Coordination with North Carolina Department of Transportation (NCDOT) is required in order to provide access under the road bridges where the body of water crosses. United States Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) approvals are required on projects where environmental impact, wetlands impact or floodplain impacts are inevitable.

In general, trails located along streams are typically asphalt or concrete. Often, an undisturbed vegetated buffer is located between the stream bank and the trail to help stabilize streambanks, moderate stream flow and filter pollutants. Located within the floodway, the materiality of trail cross sections should be carefully considered to provide an adequate foundation, stabilization and non-slip surface depending on the frequency and velocity of flood events. Greenway trails adjacent to streams pose a variety of design challenges that should be considered during planning and project selection, including:

- **Urban Streams -** Dense urban conditions restrict trails to the floodway and may require installation of railings, and/or retaining walls to stabilize stream banks.

- **Regular Flooding –** Trail surface within the floodway that are regularly inundated should be carefully selected. Often concrete is the best solution for these areas. While there is a higher construction cost, maintenance savings for repairs quickly balance the initial investment.

- **Bench Modifications Beneath Vehicular Bridges –** These greenway trails stay at the stream elevation when crossing beneath vehicular bridges. Special design considerations and materials are recommended at these locations. Common materials include concrete trail surfaces, retaining walls (segmental block, cast-in place, pile and panel are often required to protect the trail from erosion) and safety rails. Connections up to the surface street network are desirable at most locations.

- **FEMA Regulated Streams -** When working within the regulatory floodway, trail design (regardless of surface type) should minimize any change in ground elevation where possible. Any construction or increase in ground elevation within the floodway triggers detailed hydraulic modeling and required approvals through the Local Floodplain Administrator and possibly Federal Emergency Management Agency (FEMA).

- **Isolated Asphalt –** Many stream corridors include areas of jurisdictional wetlands. Care should be taken to locate boardwalks that cross these wetlands with future maintenance in mind. Asphalt should be avoided if a trail section is located between boardwalks and cannot be accessed by paving equipment for resurfacing. Concrete is the best surface type in this condition as it provides a longer surface life and can be repaired in batches using the adjacent boardwalks.

Shared Lane Markings

Figure 7 - Shared lane marking illustration

Shared Lane Markings, or "sharrows," are road markings used to indicate a shared traffic lane for bicycles and automobiles. The shared lane marking is a pavement marking that supports a complete bicycle network, however, it is not a facility type and should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments where these facility types are otherwise more appropriate.

Benefits of "sharrows" include:

- Encourages bicyclists to position themselves safely in lanes too narrow for a motor vehicle and a bicycle to comfortably travel side by side within the same traffic lane.
- Alerts all road users to the presence of bikeway routes.
- Indicates a proper path for bicyclists through difficult or potentially hazardous situations, such as railroad tracks.
- Provides a wayfinding element along bike routes.
- Encourages safe passing by motorists.
- Reduces improper bicyclist behavior (e.g., sidewalk riding, wrong-way bicycling, etc.)

Sharrows are most conducive on streets with:

- Low volume of vehicle traffic (≤ 3,000 motor vehicle average daily).
- Low traffic speed (≤ 35 mph).
- Frequent, visible lane markings.

Bike Lanes

Figure 8 - Bike lane illustration

Bike lanes allocate an exclusive space for bicyclists with a designated 5-foot striped lane, pavement markings, and signage and enable bicyclists to ride at their chosen speed without interference from traffic. Conventional bike lanes are located directly adjacent to motor vehicle travel lanes and run curbside when no parking is present or adjacent to parked cars on the right side of the street. They typically follow the same direction as motor vehicle traffic and have no physical barriers (bollards, medians, raised curbs, etc.) that restrict vehicular encroachment into the bike lane.

Benefits of conventional bike lanes include:

- Increases use comfort and confidence on busy streets.
- Creates separation between bicyclists and automobiles.
- Increases predictability of bicyclist and motorist movement and interaction.
- Increases streets' carrying capacity.
- A visual reinforcement of the bicyclists' right to the street.

Bike lanes are most conducive on streets with:

- ≥ 3,000 motor vehicle average daily traffic.
- A posted speed ≥ 25 mph.
- High transit vehicle volume.

Buffered Bike Lanes

Figure 9 - Buffered Bike Lane Illustration – Travel Side Buffer

A buffered bike lane is a conventional bike lane paired with additional buffer space to separate the motor vehicle traffic lane and/or parking lane from the bicyclists. Multiple pavement markings are typically used to delineate the

Benefits of buffered bike lanes include:

- Provides greater shy distance between vehicles and bicyclists.
- Provides space for bicyclists to pass other bicyclists without encroaching into adjacent vehicle traffic.
- Encourages bicyclists to ride outside of the door zone when buffer is located between parked cars and the bike lane.
- Provides a greater space for bicycling, but not so great that the bike lane is mistaken for a travel or parking lane.
- Appeals to a wider cross-section of bicycle users.
- Encourages bicycling by contributing to the perception of safety among bicycle network users.

Buffered bike lanes can be incorporated:

- Anywhere a standard bike lane is being considered.
- On streets with high travel speeds, high travel volumes, and/or high amounts of truck traffic.
- On streets with extra lanes or extra lane width.

Protected Bike Lanes (Cycle Tracks)

A protected bike lane or cycle track is an exclusive bike facility, physically separated from motor traffic and distinct from the sidewalk, that combines the experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks have several different forms, but all provide space that is primarily used for bicycles and are separated from motor vehicle travel lanes, parking lanes and sidewalks. In contrast to bike lanes, where on-street parking exists, cycle tracks are located on the curb-side of the parking lane.

Cycle tracks can be one-way or two-way and can be at street level, sidewalk level, or an intermediate level. When located at street level, cycle tracks can be separated from motor traffic by raised medians, on-street parking or bollards. When a cycle track is located at sidewalk level, a curb or median separates it from motor traffic, while pavement markings such as color/texture separates the cycle track from the sidewalk. Separating cyclists from motor traffic offers a higher level of safety than other bike lane facilities and are attractive to a wider array of users.

Figure 10 - One-Way Protected Cycle Track Illustration – Parking Buffer

One-Way Protected Cycle Track

One-way protected cycle tracks are bikeways at street level and use a variety of methods for physical separation from the motor vehicle travel lane such as a raised curb, planters or a parking buffer.

Benefits of one-way protected cycle tracks include:

- Dedicates and protects space for bicyclists in order to improve comfort and safety.
- Eliminates risk and fear of collisions with vehicles.
- Reduces risk of 'dooring' compared to a bike lane
- Eliminates the risk of a doored bicyclist being run over by a motor vehicle.
- Prevents double-parking, unlike a bike lane.
- Low implementation cost by using existing pavement and drainage and by using the parking lane as a barrier.
- More attractive for bicyclists of all levels and ages.

One-way protected cycle tracks can be incorporated:

- On streets with parking lanes.
- On streets where conventional bike lanes would be stressful to bicyclists due to multiple lanes, high traffic volumes, high speed traffic, high demand for double parking and high parking turnover. While there are no US standards for bicyclist and motor vehicle volumes that warrant the implementation of cycle tracks, several international documents provide basic guidance (refer to the NACTO website for such references).
- On streets where intersection conflicts can be effectively alleviated using parking lane setbacks, bicycle markings through the intersection and other signalized intersection treatments.
- Along streets with high bicycle volumes and/or high motor vehicle volumes/speeds.

PLANNING CONTEXT

The Town of Holly Springs is a consistently growing suburban community in the middle of one of the state's most growing counties. As an important component to all planning efforts, public engagement has demonstrated strong support for greenway planning in the Town. The plans highlighted below are not a comprehensive list of all the Town's planning efforts but are instead, the ones that speak most directly to greenway trail planning.

Vision Holly Springs Section 3- Beyond the Green Parks and Recreation Master Plan (2007)

This Plan, considered as the section 3 of the Vision Holly Springs Comprehensive Plan, is a predecessor to the new section 3 - Comprehensive Parks, Recreation and Greenways Master Plan. The Plan includes a chapter entitled 'Greenway and Park System' which provides a conceptual plan for the integration of a greenway system into the park land, open space and 'recreational nodes' in Holly Springs. A community survey completed during this planning process indicates that 71% of residents were interested in the Town developing a network of multi-use recreational and connective trails. The recommended greenway system would include a system of "Community Central Parks," a primary parkway system, a primary greenway system, a secondary greenway system and connections with proposed bike lanes and trails of adjacent municipalities.

Greenway Trail Recommendations

- Central "Loop" connects downtown, neighborhoods, Parrish Womble Park, Bass Lake and Sunset Lake.
- Western Greenway Trail connects future westside development to Harris Lake and Central "Loop."
- Southern Greenway Trail connects Harris Lake to neighborhoods in the south and to the greater system.
- Secondary Greenway Trail system to complete shorter segments on Town connections.

Vision Holly Springs Section 2- Comprehensive Transportation Plan (2011, update-2013, 2017)

This Plan (adopted 2011, updated 2013 & 2017) focuses on recommendations for building a comprehensive transportation system for growing Holly Springs and unincorporated areas in Wake County. It includes a chapter dedicated to bicycle and pedestrian infrastructure. The 'Bicycle and Pedestrian Element' chapter recognizes the previous planning efforts and seeks ways to enhance safety and mobility for all. The Bicycle Plan recommendations involve numerous on-street and off-street bicycle facilities that aim to connect people and neighborhoods to local destinations. Based on the Bicycle Recommendations Map (Figure 4.3), the key greenway trail recommendations are below.

Greenway Trail Recommendations

- Middle Creek Greenway from Apex to Sunset Lake and beyond to Camp Branch in Cary.
- Little Branch Creek Greenway from Twelve Oaks to Ting Park and Middle Creek Greenway.
- Rocky Branch Creek Greenway to Sunset Lake to Bass Lake to Basal Creek to Fuquay Varina.
- Utley Creek Greenway from Holly Springs Cultural Center to Harris Lake.

*An update to this Plan was launched late 2020 and will utilize this Parks, Recreation and Greenways Master Plan during the drafting of future vehicular, pedestrian and bicycle elements. Where suggested changes to future roadway alignments impact those shown on the Parks Master Plan Greenway Map, and update to the Greenway Map will be performed by staff or by third party consultant to rectify the changes and align the vision of both sections within the Town's Comprehensive Plan.

Bicycle Transportation Plan (2011)

This Plan pursues the vision of the Town becoming a "bicycle friendly community by developing a combination of infrastructure, education programs, and policies that support bicycling." It provides recommendations on

how to create a bicycle network that will allow transportation and recreation-based bicycle travel throughout Holly Springs. It includes both on-street and off-street bicycle facilities. The recommendations have been divided into two groups: (1) low-cost, near-term solutions, and 2) longer-term solutions to coincide with roadway reconstruction or widening. Key multi-use paved greenway trails that were recommended as part of the overall network are discussed below.

Greenway Trail Recommendations

- Arbor Creek greenway: extend existing greenway south to Holly Springs Rd.
- Crossway – Veterans Park – Jones Park greenway: formalize existing and extend south through Holly Springs Elementary to Holly Springs Rd.
- Ballentine – NC 55 greenway: extend existing greenway north to Earp St. and south to Holly Glen.
- Stinson connection to Bass Lake Park greenway: would connect Bass Lake to neighborhoods directly to the north and west, allowing for safe travel to Bass Lake.
- Grigsby connection to Bass Lake Park greenway: connect Bass Lake to neighborhoods to the south and west and to Parrish Womble Park.
- Optimist Farm connection to Sunset Lake shopping center: connect existing greenway at Sunset Lake shopping center to Optimist Farm road as an alternate to travel along Sunset Lake Rd.

Wake County Greenway System Plan (2017)

The vision for this Plan is to create a connected and comprehensive system of greenway trails that enhances quality-oflife throughout Wake County. This Plan serves as a clear guideline for trail planning and development, providing a framework for local governments and project partners to create a connected system of cross-county greenway trails. While this is a county-level plan and not all proposed greenways would intersect the Town of Holly Springs, it does provide good regional context and highlights potential interjurisdictional connections.

Greenway Trail Recommendations

- Holly Springs Southwest Greenway (Utley Creek Greenway to Holly Glen Greenway).
- Holly Springs Central Greenway (along W. Ballentine St. which is one-way).
- Holly Springs North/South Greenway (on road - Raleigh St).
- Bass Lake – Basal Creek Greenway (connection to Fuquay-Varina).
- Fuquay-Varina Greenway (side path from Town Hall to Honeycutt Road Park).
- Middle Creek Greenway (connection to downtown Apex).
- Potential connection to Camp Branch Greenway in Cary.
- Future Land Use and Community Character Plan (2019)

Vision Holly Springs, the Town's Comprehensive Plan, serves as a policy guide on future land use & character; transportation; parks, recreation and open space; community character; business development; community facilities; infrastructure and utilities; and natural resources. The vision of the Plan includes several greenway related elements such as: establishing a community-wide "green infrastructure" that provides all residents with convenient access to trails and open space; provide walkability; physically unite the Town by connecting existing trails, sidewalks and open spaces; and to preserve and protect, where appropriate, agricultural land, green space, woodland and the natural environment.

EXISTING CONDITIONS

Long range greenway trail planning is a relatively new undertaking in the Town of Holly Springs. Many communities are investing in greenway trail planning as they recognize the importance of creating a network of greenway trails that create community connections and expand opportunities for recreation and alternative modes of transportation. The Town of Holly Springs currently offers some options for walking and biking on existing greenway trails and side paths. Most existing greenway trail segments are concentrated in the central core of Town or within residential subdivisions.

Inventory + Benchmarking

The Town of Holly Springs has 12.83 of greenway trails. Of those, 9.23 miles are hard surface trails (asphalt and boardwalk) and 3.60 miles are soft surface trails (mulch). Most of that mileage is walking and biking trails, with a smaller mileage of natural surface trails. The Town has two new segments in or near the design phase, which will further expand the network (Utley Creek Greenway Phase 2 and Arbor Creek Greenway Extension).

GREENWAY TRAIL	LENGTH (MILES)	SURFACE TYPE
Womble Loop	1.0	asphalt
Carl Dean	1.3	asphalt
Main Street Square Boardwalks (2)	0.12	boardwalk
12 Oaks (School to Duke Land)	1.85	asphalt
Hensley Subdivision	0.5	asphalt
Morgan Park	0.32	asphalt
Creekside at Sunset Lake	0.3	asphalt
Woodcreek (3)	0.31	asphalt
Ting Park	0.25	asphalt
Wildwood Farms	0.13	asphalt
Arbor Creek Boardwalk	0.28	boardwalk
Bridgewater North	0.04	asphalt
Bridgewater South	0.22	asphalt
Veterans Park	0.66	asphalt
Jones Park	0.28	asphalt
Ballentine	0.31	asphalt
Harris Teeter	0.25	asphalt
Tuscany	0.07	asphalt
Scots Laurel	0.12	asphalt
Sunset Pointe	0.1	asphalt
Brackenridge - Carrington	0.39	asphalt
Wescott - Wescott Ridge	0.05	asphalt
Wescott - Eden Glen	0.03	asphalt
Garrison (3 small)	0.11	asphalt
Market 2018 connection to Jones Park	0.05	asphalt
Oakview Elementary	0.19	asphalt
TOTAL HARD SURFACE	**9.23**	

Table 2 - Town of Holly Springs current hard surface trail mileage inventory

TRAILS	LENGTH (MILES)	SURFACE TYPE
Bass Lake Loop	2	mulch
Arbor Creek	0.3	dirt/hard pack
Holly Glen	1	dirt/hard pack
Mims Property	0.3	dirt/hard pack
TOTAL SOFT SURFACE	**3.6**	

Table 3 - Town of Holly Springs current soft surface trail mileage inventory

Current trail mileage in Holly Springs is equivalent of 0.31 miles per 1,000 residents, which is about average among peer communities. Peer towns offer the following miles per 1,000 residents: Westerville (1.38), Coppell (0.46), Apex (0.30) and Wake Forest (0.30). Further detail and analysis are provided in Benchmarking.

Facilities Assessment

On April 8, 2020, McAdams staff conducted a greenway trail site tour on several of the Town's greenway trails. McAdams staff visited Jones Park, Veterans Park, Bridgewater Pond, Arbor Creek Greenway, Morgan Park Greenway, Utley Creek Greenway, Downtown, Parrish Womble Park, Carl Dean Greenway, Bass Lake, Sugg Farm, Grisby Ave., Sunset Lake Rd., Bass Lake Rd., Holly Springs Rd. and Ting Park. The majority of these were reviewed on bicycle, while the more heavily trafficked streets were reviewed from a car. Another site visit was conducted on July 13, 2020 to visit the downtown area and connection to Main Street, barriers along highway 55 for safe crossing, and some of the existing gaps in the system.

Based on both site visits, some general observations about the existing greenway trail system include: disjointed network with many small disconnected greenway trails;

- no universal greenway trail design standards;
- limited to non-existent wayfinding system; and
- limited connections to desired destinations.

It is important to address these challenges in order to accomplish the aforementioned guiding principles – greenways should be equitably distributed, accessible, provide high quality experiences and be safe overall. A few specific safety concerns that were discovered during field observations of the greenway trail system are discussed below.

Asphalt Edging

In many of the Town's parks, there are newly paved asphalt trails that provide a pleasant walking and biking experience. While the trail width is adequate and the surface is smooth, the trail design did not include stone shoulders. This creates an abrupt edge to the trail that poses a safety risk to both pedestrians and cyclists who unexpectedly leave the trail with no transition area. Stone shoulders also protect the edge of the asphalt trail and greatly extend the life of the facility. There is also a steep slope in some areas along side of the trail without safety railing.

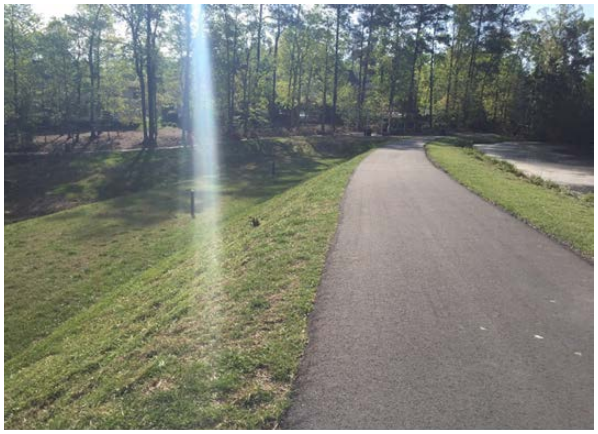


Figure 11 - Asphalt greenway

Grade

As greenway trails often are built in low-lying areas, there is typically a change in elevation and grade when connecting these low-lying greenways to biking and walking facilities in neighborhoods and parks. There are at least two places in the Town of Holly Springs where this has resulted in an extremely steep grade. (Figure 12).

Figure 12 - Steep greenway slope

Bridges

Throughout the Town's greenway trail system, there are several bridges that appear to be repurposed loading dock ramps (Figure 13). While the structural integrity of these bridges may be good (this should be confirmed), the bridges themselves are too narrow (should be the same width or greater than the trail), create an abrupt grade transition that is not ADA compliant, and often do not provide much clearance from the water feature they are intending to cross.

Figure 13 - Greenway bridge

Boardwalks

Boardwalks are commonly built in areas that receive and retain high levels of water, such as in wetlands and floodplains. Given that greenway trails are often built in these environments, boardwalks serve an important purpose for a town's greenway trial system. The Town of Holly Springs has several areas in which boardwalks have been inappropriately designed. These structures may present safety concerns for trail users. There are several areas in which the boardwalk is nearly three feet high and does not include a safety railing. This condition could create a fall hazard. There are also several sections of boardwalk in which the deck boards have been installed in a longitudinal direction. This construction method also creates a safety hazard for cyclists, as wheels can easily get caught between gaps in deck boards (Figure 14). After initial feedback in Spring 2020, the Town of Holly Springs has already addressed this concern by installing safety railings on boardwalks with height concerns.

Figure 14 - Greenway boardwalk

Figure 15 - Greenway trail marker

Wayfinding

As greenway trail systems often include a variety of different bicycle and pedestrian facilities (sidewalks, side paths, greenway trails, on road facilities, etc.), it is important to provide good directional signage or wayfinding for trail users to easily navigate the system of trails. The Town's greenway trail system currently lacks signage and creates a significant challenge for trail users attempting to navigate the system. There are some limited markings in the pavement (Figure 15), although they are easy to miss and not consistent throughout town.

EXISTING CONDITIONS	RECOMMENDATIONS	GUIDANCE/CODE REFERENCE
Exposed asphalt edge with no shoulder transition	Create gravel/stone shoulders to minimize edge and protect asphalt	Gravel/stone shoulder to be part of minimum 2-feet grass shoulder on either side of trail per AASHTO
Steep slope adjacent to trail	Install 48-inch safety rail within 6 feet of trail in certain areas (see code reference)	Provide a safety rail when: Slope is greater than or equal to 3:1 and drop of 6-feet Slope is greater than or equal to 2:1 and drop of 4-feet Slope is greater than or equal to 1:1 and drop of 1-foot
Boardwalk over 30" above ground	Install a 42-inch guardrail	A 42-inch guardrail will be required if there is a 30-inch or greater grade change between the boardwalk surface and the ground A 6-inch curb rail is recommended for all boardwalks
Boardwalk decking running parallel to path of travel	Install deck boards perpendicular to path of travel	Morgan Creek Greenway serves as a template for good boardwalk construction.
Trail grade above 5%	Create switchbacks or stairs with railing to walk bike up and down	Comply with ADA regulations when possible
Loading ramp bridges that are narrower than trail and have too short of a span	Either replace with boardwalk or new bridge with appropriate width and span	AASHTO and FEMA requirements (if in floodplain)

Table 4 - Town of Holly Springs existing conditions

Opportunities & Constraints

The Town of Holly Springs is striving to improve its network of greenway trails and side paths to anticipate the needs and desires of a growing community. There are many opportunities to leverage existing infrastructure and other planning efforts to achieve these goals. There are also many challenges the Town is facing when creating a network to serve its population. Several of these opportunities and constraints have been highlighted below.

Opportunities

- Connections to greenway trail networks in neighboring jurisdictions: Town of Cary, Town of Fuquay-Varina, Town of Apex, Harnett County, Wake County and Chatham County for regional connectivity.
- Connections to regionally significant greenway trails (e.g. American Tobacco Trail).
- Connections to highly valued local destinations (e.g. Bass Lake, Harris Lake, Womble Park, etc.).
- Utilize existing corridors (low-lying creeks and utility easements) for greenway trail development.
- Leverage UDOs to expand upon developer-built greenway trails and improve long-term planning.
- Leverage small greenway segments within many subdivisions and extend these for greater connectivity.

Constraints

- Fragmented segments of greenway trails around Holly Springs.
- Busy arterial roads without pedestrian/ bike facilities (e.g. Holly Springs Rd, Sunset Lake Rd, etc.).
- Highway 55 is a major barrier between central Holly Springs and many neighborhoods, schools, commercial areas, and important destinations in other parts of town.
- Many greenway trails in subdivisions are 'private' and may not desire connectivity to the Town network.
- Lack of wide ROW on existing roadways to accommodate physically separated bike/ pedestrian facility.
- Once NC 540 loop is complete, connecting the northern and southern neighborhoods for pedestrian and biking facilities will be challenging.

Key Findings

- Existing network consists of many small, disjointed greenway trails that provide limited connections to other facilities and/or desired destinations across Town.
- Existing network does not follow universal design standards and many facilities included in this network are not technically greenway trails (e.g. sidewalks) yet are labeled so.
- Infrastructure (e.g. bridges and boardwalks) also lacks universal design standards and may present safety concerns.
- Safety concerns include asphalt edging, steep slope adjacent to trails, incorrect directional installation of boards on some boardwalks and lack of railings in areas with high clearance (ToHS has since addressed).
- Some greenway trails do not currently comply with ADA standards and exceed 5% grade.
- Existing network provides limited to non-existing wayfinding and designated trailheads, which presents difficulties in navigating the system.
- Community members rank greenway trails as the most important facility and as the facility with the highest unmet need.
- Community members are demanding more greenway trails and are willing to support with their tax dollars.

Community Engagement

This greenway trails plan is the result of collaborative efforts of the Holly Springs residents, steering committee members, focus groups, Town Council and the regional representatives from neighboring municipal and county agencies. Over a period of six months, the project team conducted virtual and in person meetings with these groups to gather input on existing conditions of greenway trails, key destinations and future priorities for Town wide and regional connections. In addition, the scientific public input survey as well as virtually conducted open house presentations and online surveys provided feedback from residents on the overall parks, recreation and greenways system.

Scientific Survey Results

A Scientific Survey was developed and distributed to community members in Spring 2020. A total of 351 households responded to the survey. While many of the questions were specific to parks and recreation, there were several questions that also referred to greenway trails. The main takeaways from the survey results that relate to greenway trails include:

- Greenway trails were selected as **the most important facility** by respondents (52%).
- Greenway trails were selected as the **highest unmet need facility** by respondents (43%).
- Greenway trails received the **highest Priority Investment Rating** at 200.
- *Developing greenway trails to connect to Town's existing greenway trail segments* received the **highest level of support** by respondents (88%).
- *Developing greenway trails to connect to Town's existing greenway trail segments* received the highest ranking from respondents **willing to support with tax dollars** (57%).
- Greenway trails are visited by 49% of respondents at least once a month.
- Greenway trails were selected as a facility responding households would like to visit more frequently (83% of respondents would like to visit greenway trails at least a few times a month).

Input on desired destinations is a key point of public input that helps shape a greenway network. Many of the destinations and routes identified include neighborhoods, natural areas, schools, parks, commercial areas, restaurants, recreation centers and libraries, and existing greenway trails. These results are consistent with feedback that has been received in the other community engagement activities.

To summarize, the survey results clearly convey a high value and level of importance of greenway trails to the community. Greenway trails are the most desired facility and the majority of households want more of them. Responding households enjoy and feel safe on the current greenways and would be willing to support the development of more greenway trails with their tax dollars because they believe in the value of greenway trails and realize that there is an unmet need for a more robust system of greenway trails.

Virtual Open House Mapping Activity Results

Residents had the opportunity to provide input on the greenways master plan during the virtual open house and online survey in March 2020. The survey participants indicated greenway trails as their stron preference for bike infrastructure and it also relates to the large segment of respondents who are interested but concerned about biking.

Participants indicated routes where they would like to begin and end greenway trips, such as their home, school, park or grocery shop. Participants also indicated what corridors they would like to use to reach these destinations. The map below shows the results of virtual community engagement.

Participants also indicated their preference for using greenway trails as desirable bike infrastructure. 46% of open house survey participants are interested but concerned about biking. This is encouraging as the Town starts to develop safer and physically seperated bike and pedestrian facilities, the number of residents using the same will also increase.

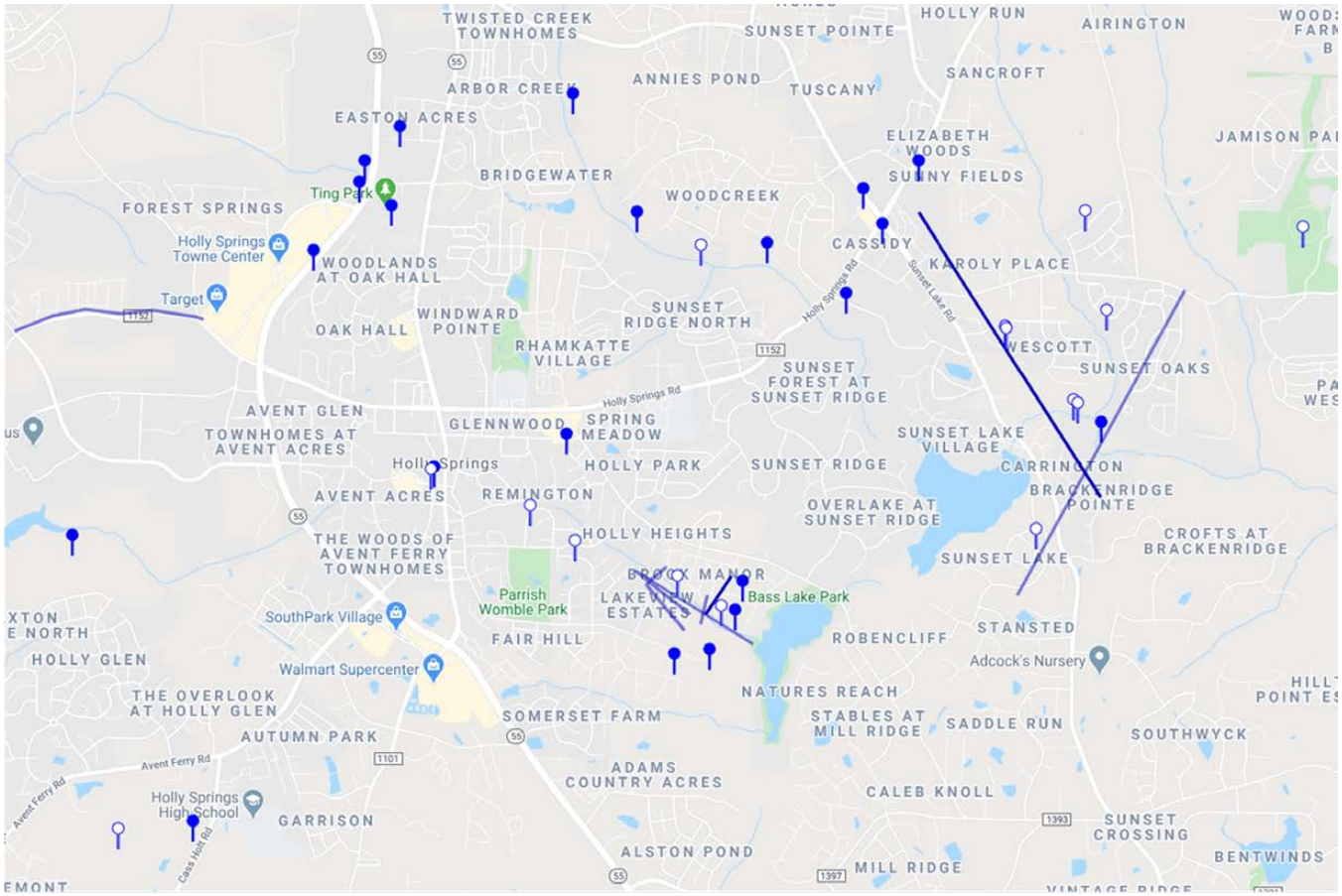


Figure 16- Town of Holly Springs existing conditions

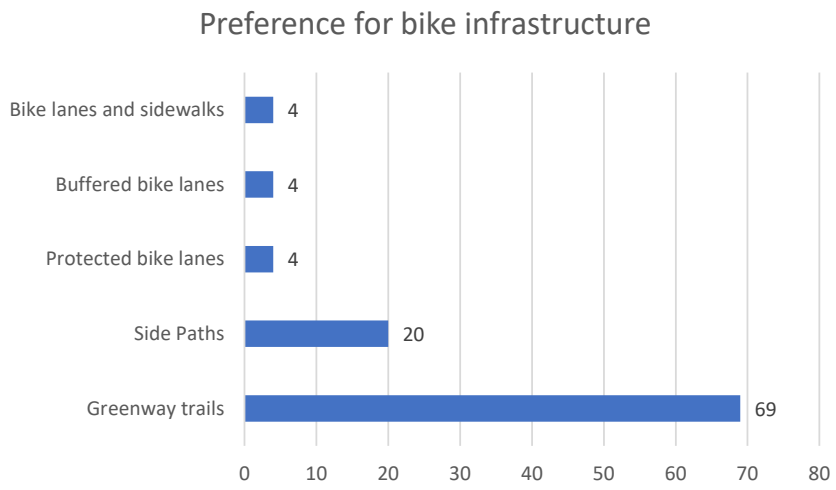


Figure 17- Preference for bike infrastructure

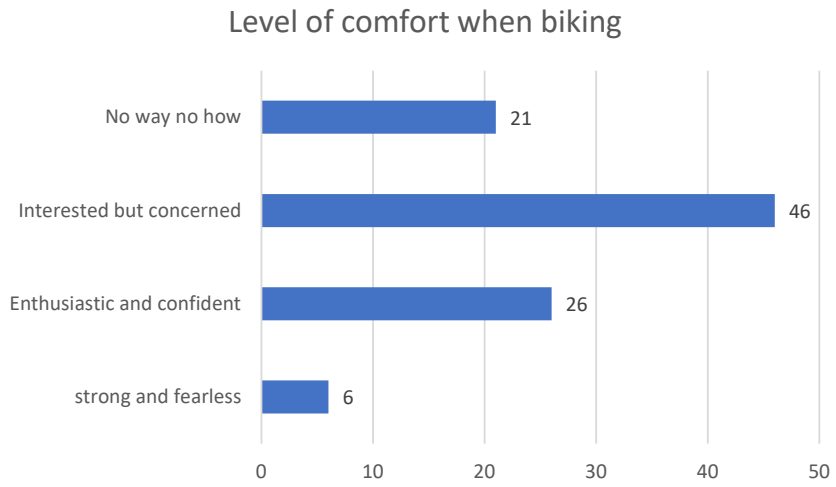


Figure 18- Level of comfort when biking

Focus Groups

Focus groups are an important step in community engagement as they target outreach to specific demographic groups that typically have more barriers to access the other types of engagement activities offered. The focus groups identified for this project included: Seniors, Special Needs and Youth. A questionnaire was distributed to community members of each focus group asking for their feedback on the parks, recreation and greenway trails facilities and programs in the Town of Holly Springs. The following themes emerged from that engagement:

- Transportation is a barrier for all groups.
- Lack of walkability (distance, limited network of greenway trails, etc.) is also an issue.
- Not all facilities are ADA compliant and therefore can pose risks.

Steering Committee Input

The project team presented the comprehensive planning process to the steering committee in March 2020. The steering committee members strongly supported development of new greenway trails to connect Holly Spring through alternate modes of transportation. The key themes that emerged from the first meeting included Town-wide connectivity and healthful living opportunities by improving access to outdoors. The Steering Committee was also engaged as part of the Visioning Sessions and those themes are discussed on the next page.

Staff Meetings

The Town staff provided feedback on the destination priorities as follows:

- Connecting to existing parks and schools
- Connection to commercial connections
- Connecting to neighborhoods

Interjurisdictional Meeting

The project team and Town staff met with staff members of several neighboring jurisdictions (Harnett County, Wake County, Town of Apex, Town of Cary and Town of Fuquay-Varina) on June 26, 2020. The purpose of the meeting was to learn about proposed and planned greenway trails within neighboring jurisdictions to help determine potential connections to the Town of Holly Springs greenway trails network. Information gathered during this meeting helped influence the recommended connections and corridor alignments in the proposed greenway trail network map.

Interdepartamental Meetings

In August 2020, staff members from Development Services, Utilities & Infrastructure, Economic Development and Maintenance Departments were briefed on the project and offered an opportunity to provide feedback. The staff asked a lot of great questions regarding design standards, trail types, trail dimensions (width), tree preservation techniques, the pros and cons of on-street and off-street bicycle facilities, etc. The project team also got some valuable insight regarding upcoming transportation and road projects, maintenance and safety concerns, and intersection improvements being discussed in the draft Comprehensive Transportation Plan that is being updated now.

Visioning Sessions

In September 2020, several different visioning sessions were conducted that included Town staff, the steering committee and Town Council. In those meetings, the project team discussed research methodology, community engagement results, key findings, guiding principles and recommendations. An overall map of the recommended greenway trails network and design renderings of before and after photos of specific facilities improvements were also presented. Many of the participants of these various visioning sessions were impressed by the survey results that clearly indicated the high level of value and importance greenway trails hold in the community.

RECOMMENDATIONS

Introduction

The proposed greenway trail network traverses through differing development densities and connects various Town-wide destinations through a series of linked greenway trails and side paths strategically located to connect residential neighborhoods, commercial centers, schools, transit stops, existing parks and future recreation amenities.

The overall greenway trail network is focused on meaningful connections and opportunities to provide more mobility and access to users, to improve their health and wellbeing, and to enhance economic impact and environmental protection.

The overall parks, recreation and greenways plan recommendations are centered around seven overarching guiding principles. One of the guiding principles that relates to greenways is connectivity while also touching on the other guiding principles such as health and wellness, environmental awareness and financial sustainability.

This plan prioritizes connectivity by identifying corridors that consider:

- Minimal land / easement acquisition (utilizing otherwise undevelopable land)
- Strong support from the community
- The ability to improve access to priority destinations, especially public parks and schools
- Potential for land acquisition in danger of more immediate development
- Proximity to population growth centers
- Connection to or traversing across isolated areas
- Facilitation of regional connections

Methodology

Recommendations contained herein are based on data collection through desktop map analysis, on-site field visits, detailed coordination with Town of Holly Springs staff and public input. Existing bicycling and pedestrian facilities and proposed facilities from previous planning efforts were mapped to determine where gaps currently exist and to identify which previously planned corridors have yet to be integrated into the Town's transportation system. This exercise also helped inform which corridors have been the subject of previous planning efforts and may be key elements in advancement of the network.

The Town of Holly Springs desires a high functioning greenway trail network that serves not only the internal trip-making but also connecting to the vibrant and growing Triangle regional greenway trails. The Triangle region is home to many of the most highly visited greenway trails in the state like the American Tobacco Trail and the Neuse River Trail. Through interjurisdictional coordination, key connection nodes at the edges of Holly Springs were identified. Connections to these nodes within Cary, Apex, Fuquay-Varina, unincorporated parts of Wake County, Chatham County and Harnett County are important to a successful greenway trail network.

From these key steps, recommendations were developed in concert with Town of Holly Springs Staff, across Town departments and with the needs and desires of Holly Springs residents at the forefront.

Prioritization Matrix

The Town of Holly Springs has already begun developing its greenway trail network and is motivated to expand and improve the existing conditions. The adjacent municipalities have also made similar efforts with greenway trail networks at a variety of levels of maturity. In the interest of developing a more robust and connected system in town and in the region, it is important to analyze the existing and planned facilities and develop a framework to help guide decision making and investment. This framework, or trail hierarchy, is as follows:

- Community Connector - greenway trails that form the main structure of Holly Springs' greenway trail network. These greenway trails form the main connections with adjacent communities, to and from downtown, across challenging obstacles and to other greenway trails. Community Connectors provide strong North/South and East/West routes on which to build a highly functional greenway trail network.
- Destination Connector - greenway trails that link Holly Springs' destinations such as schools, parks, employment centers and others to the Community Connector network.
- Neighborhood Connector - greenway trails that connect residential neighborhoods to the larger greenway trial network.

Based on this framework, a comprehensive recommended network map has been developed that will help the Town of Holly Springs efficiently plan, design and fund projects. The recommended greenway trails take into consideration the major opportunities and challenges that were highlighted earlier in the chapter. For example, one of the greatest opportunities for developing new greenway trails and connecting to the larger network in Holly Springs exist in low-lying creek and major utility easement corridors and one of the greatest challenges is safely navigating the Hwy 55 and the future extension of Interstate 540. As a companion to the recommended network map, the narrative below helps highlight the major opportunities and recommendations in each section of town.

Recommended Corridors

Based on preliminary recommendations above and staff and public input.

Community Connectors

- Cary's Camp Branch Greenway to Apex (and ultimately to American Tobacco Trail) via utility and stream corridor to Sunset Lake, Arbor Creek Greenway, and Little Branch Creek.
- Bass Lake to Apex via Carl Dean Greenway, Pecan Grove Greenway, future Lowes greenway, future Ralph Stephens Rd side path, Morgan Park Greenway, Green Oak Pkwy side path, and Twelve Oaks.
- Harris Lake to Apex's Middle Creek Greenway via stream corridor north of Braxton Village and Holly Glen subdivisions, Utley Creek Greenway (future and existing), to existing Arbor Creek Greenway.
- North South connector through downtown that connects Apex on the North and Harnett County on the south via existing and proposed infrastructure in central Holly Springs to Buckhorn Creek corridor.

Destination Connectors

- Proposed side paths between Arbor Creek Greenway and Ting Park
- Proposed side path north-south route down Main St and safe crossing over Highway 55.
- Proposed side path on Earp St to connect Mims Property to Holly Springs Elementary School.
- Expand sidewalk to side path along Grisby Ave to connect downtown and Bass Lake.
- Proposed side path along Bass Lake Rd to connect neighborhoods to schools to Park.
- Expand sidewalk to side path along Avent Ferry Rd. to Holly Springs High School.

Neighborhood Connectors

- Potential neighborhood connection via Lockley Rd. to Arbor Creek Greenway.
- Connect existing greenways in Twelve Oaks and Carolina Springs subdivisions.
- Connection between Wescott subdivision and Sunset Lake Rd. utilizing utility corridor.
- Connect Palmeto Ct. boardwalk trail to existing greenway behind Harris Teeter for longer trail.
- Sugg Farm Park Master Plan indicates a planned greenway along creek that feeds into Bass Lake.
- Proposed Pecan-Grove Greenway connecting Pecan-Grove Apartments to Carl Dean Greenway.

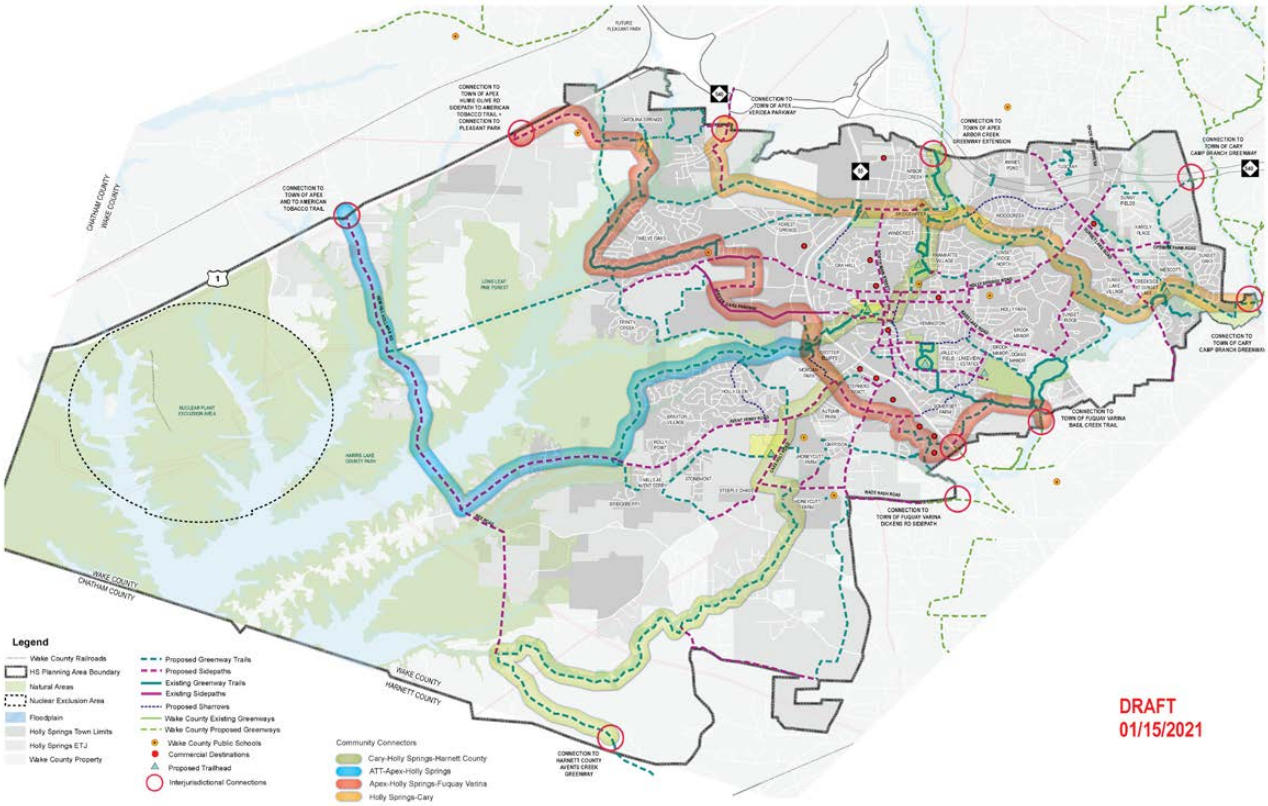


Figure 19- Proposed greenway network map

Downtown Connectivity

Holly Springs Downtwon Village District is an important destination and is central to the overall recommended network. There is a balance of commercial, employment and some residential areas. There are also more installations to encourage pedestrian activity, such as wider sidewalks, street trees, outdoor dining, curbside parking and slower vehicular traffic. Given these existing conditions and in an effort to minimize potential user conflicts, it is recommended that the bicycle network utilize parallel side streets with a variety of different trail types (e.g. Raleigh St., sharrow and Center St. side path) and also have a “dismount zone” for bicyclists on Main Street. Figures 20-22 help illustrate the recommended network in downtown as well as before and after images of each specific recommendation.

Figure 20- Existing conditions (left) and rendering of potential streetscape along Main Street (right).

Figure 21- Existing conditions (left) and rendering of potential streetscape along Center Street (right).

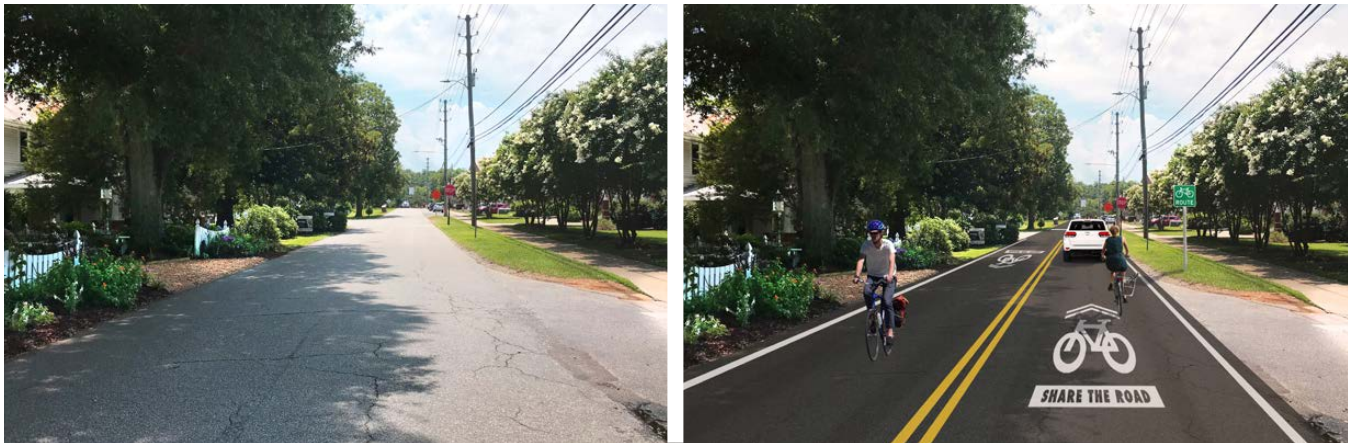


Figure 22- Existing conditions (left) and rendering of potential streetscape along Raleigh Street (right).

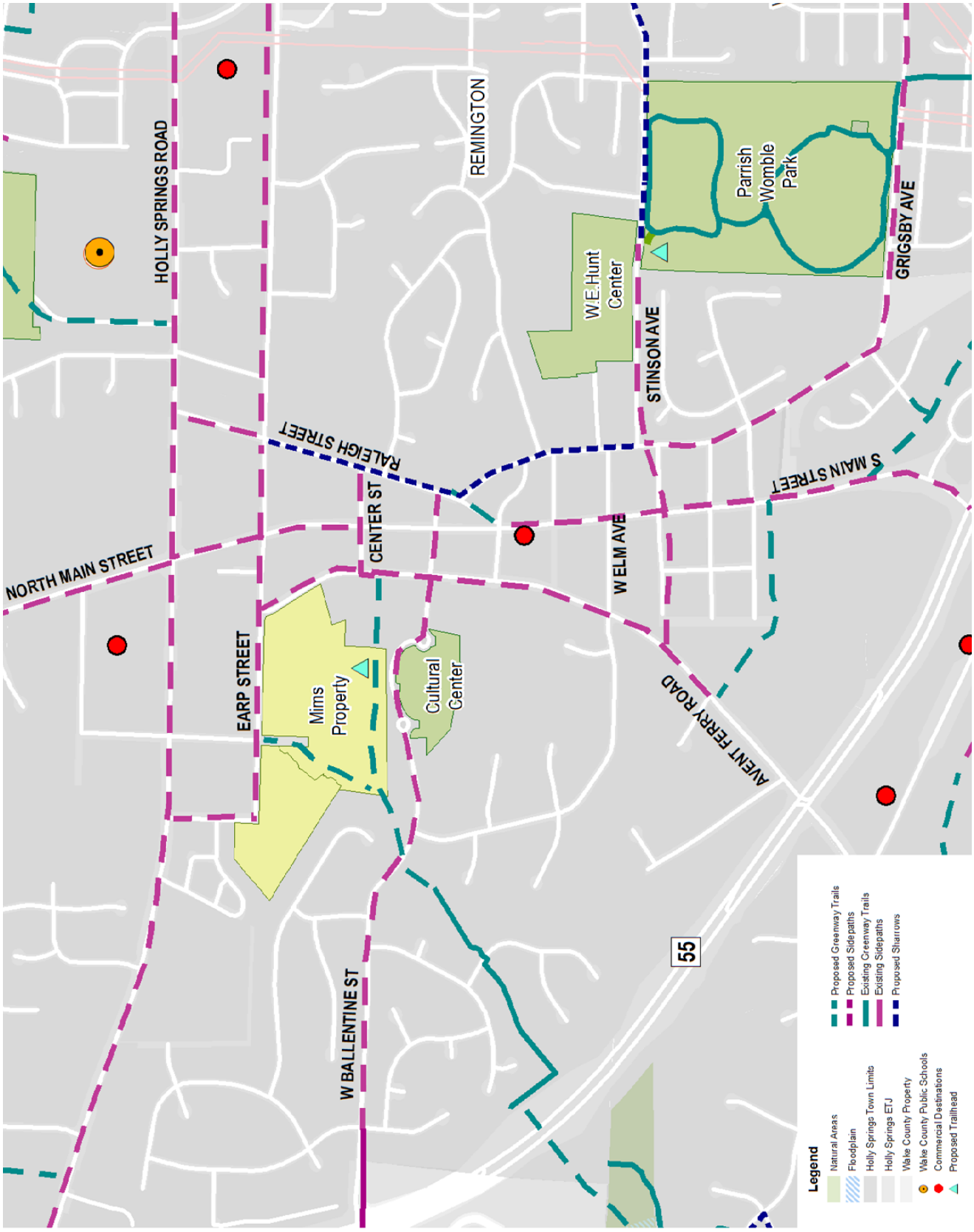


Figure 23- Proposed Downtown Greenway Map

Policy/Program Recommendations

The Town of Holly Springs' Unified Development Ordinance includes several references to pedestrian/bike paths in which requirements are made for new development.

Section 7.07.C2 Street Design and Right-of Way Reservation states that "under appropriate circumstances or when approved for use as part of a development plan approval, an alternative walkway or pedestrian/bike path may be proposed in addition to sidewalks."

Section 7.09 Pedestrian Circulation and Vehicular Area Design states that "the new development of private walkways or pedestrian/bikeway systems is required for all new developments and additional to existing developments."

Section 7.10.7 Open Space Regulations states that "all greenbelts may, in areas within a greenbelt which are located more than twenty (20) feet from a perimeter or the project, include a sidewalk, footpath, walkway or combined pedestrian/bikeway system."

Amended ordinance #07-16 states that "in any case in which a greenway is indicated on an adopted plan of the Town of Holly Springs as being located on lands proposed for development, such greenway shall be dedicated to the Town of Holly Springs and developed. The costs associated with the development of the greenway and value of the land dedicated shall not be credited toward the requirements of Section 7.06 F Recreational Facilities and Open Space."

Dedication of Public Greenway by Final Plat (added ordinance #12-11) states that when a greenway right of way is dedicated in connection with a project, the approval of a final plat shall include a notation that the greenway is a "proposed greenway" which may or may not be co-located on another easement.

While having these regulations in the Town's UDO are supportive of greenway development, there is also a waiver of Pedestrian Circulation and Vehicular Area Design Requirements available under the following:

- The proposed pedestrian circulation and vehicular area design will result in a development pattern which is equivalent to or superior to that achievable under the applicable requirements;
- The proposed development will be compatible with and will enhance the use of value of area properties;
- The proposed development is consistent with the intent of the Comprehensive Plan; and
- The proposed development is consistent with the intent and purpose of this UDO.

In order for the Town of Holly Springs to realize their vision of creating a robust greenway network that connects neighborhoods to community and regional destinations and provides the residents of Holly Springs with increased recreational opportunities and quality of life amenities, a stronger commitment from private developers and companies to this same vision is necessary. The Town of Cary, for instance, has successfully created a growing and robust greenway system of nearly 80 miles and nearly half (47%) of those greenway trails have been built by developers. They have successfully done this by providing developers with a few options that ultimately create opportunities for greenway trails. These options include park land dedication; payments in lieu of park land dedication; greenway easements; or payment in lieu credit for greenway construction.

The Town is undertaking an effort to rewrite the ordinances. It is recommended that the Department refer to the recommendations for greenway design standards and best practice guidelines to develop policies around increasing the greenway trail network within the Town by leveraging the option of developer-built trails. In addition to establishing the necessary ordinances, it is important to develop construction standard specifications and details and create standard operating procedures for greenway development.

IMPLEMENTATION OVERVIEW

While the network plan provides an overall framework for development of various types of trails and the approximate routes, it is only the first step in a larger process. As a living document, the network plan and priorities may evolve with changing development pressures, funding opportunities and demographic trends. Further, the Town will need to undertake more detailed feasibility studies to understand the challenges, cost and timeline of each trail corridor. This typically includes a detailed evaluation of land / easement acquisition potential, topography, stream or road crossings, grading and drainage patterns, safety, user experience, long-term maintenance and regulatory requirements. With this more detailed layer of information, design decisions such as trail surface and profile, width, markings, signage, furnishings and crossings can be finalized. Only after this detailed assessment can a final trail alignment be determined. The below diagram illustrates a typical greenway planning, design and construction process with key phases and individual tasks. Next steps will be for the Town to complete feasibility studies on priority corridors, which will speed up the design and construction process.

Figure 24- Greenway trail planning, design, and construction process and sequencing.

Successful implementation of the greenway trails systems plan will require a coordinated effort of many parties working together. These agencies include the County, local municipal agencies as well as NCDOT and Federal Affiliations. Private sector organizations may also prove beneficial, as they may have the influence and capacity to garner additional community support for the establishment of the bicycle/pedestrian network.

In the appendix, a detailed spreadsheet is included that describes specific implementation strategies and next steps for the community connectors. Each of the four community connectors is broken into smaller (1-3 miles) segments with specific details on recommended trail type, destinations, context, implementation considerations, property, or easement acquisition, and recommended next steps. This spreadsheet should assist Town staff in determining the most feasible segments and connectors to address key next steps in advancing all of the different recommended segments.

FUNDING OPPORTUNITIES

Federal Funding Sources

- US DOT Federal Highway Administration
- Better Utilizing Investments to Leverage Development Transportation Discretionary Grants (BUILD)
- Infrastructure for Rebuilding American Discretionary Grant Program (INFRA)
- Transportation Infrastructure Finance and Innovation Act (TIFIA)
- Federal Transit Administration Capital Funds (FTA)
- Associated Transit Improvement (ATI)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Highway Safety Improvement Program (HSIP)
- National Highway Performance program (NHPP)
- Surface Transportation Block Grant (STBG)
- Transportation Alternatives Set-Aside (formerly Transportation Alternatives Program)
- Recreational Trails Program (RTP)
- Safe Routes to School (SRTS)
- State and Community Highway Safety Grant Program (Section 402)
- US EDA Public Works/EAAP
- National Park Service: Rivers, Trails, and Conservation Assistance Program (RTCA)
- Federal Lands Access Program (FLAP)
- AARP Community Challenge Grants
- America Walks: Community Change Grants

State Funding Sources

- Clean Water Management Trust Fund
- Land and Water Conservation Fund (LWCF)
- Parks and Recreation Trust Fund (PARTF)
- NC Department of Commerce
- Main Street Solutions Fund
- Community Development Block Grants (CDBG)
- Economic Infrastructure Program
- Golden LEAF Foundation
- Strategic Mobility Formula
- NCDOT State Transportation Improvement Program
- MPO Planning Funds

Local Funding Sources

- Capital Improvement Program (CIP)
- Developer requirements and exactions
- General Obligation Bonds
- Tax Increment Financing (TIF) District
- Municipal Services District
- Blue Cross Blue Shield of North Carolina Foundation
- Alliance for Biking and Walking Advocacy Grants
- Duke Energy Foundation
- Private Donations

This page is intentionally left blank.

9 appendix