# Chapter 3. Project Recommendations

This chapter provides information on the location and basic cost estimates for recommended projects, and a prioritization scheme based on the goals of the Plan identified earlier. Prioritization is also based on factors that include safety, access, connectivity, proximity to schools and other major destinations, as well as public, staff, and stakeholder input. Using the basic cost estimates and other factors, projects are identified as short-term, mid-term, and long-term projects to help the Town determine which to address first as they begin to implement the Rolesville Comprehensive Bicycle Plan.

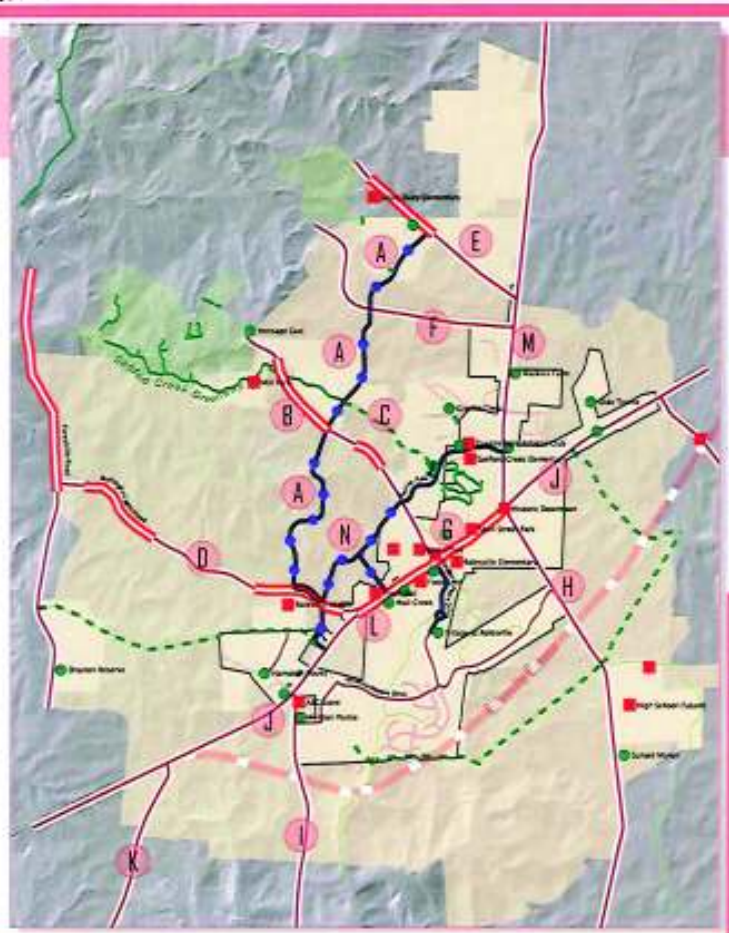
The project recommendations are shown on the following page (Figure 3-1). Many of these recommendations call for a standard four-foot, striped shoulder to provide ample space for cyclists on the several rural, two-lane roadways leading into the Town. A new, two-lane roadway (from the Town's Thoroughfare Plan with an updated alignment to respect existing homes) is shown that is crucial to providing a low-speed, safe alternative allowing movement between the major east-west roadways like Rogers, Burlington Mills, Chalk and Jones Dairy roads. This roadway would also interface with the extension of Sanford Creek Greenway, an important short-term project that, like the proposed collector street, would likely be constructed primarily with private development funds during the construction of new neighborhoods.

Figure 3-1. Project Recommendations

An important part of the project development process was to consider the origins and destinations of bicycle riders in the Town. The Steering Committee provided us with a number of locations, but many of them centered on Main Street.

- Post Office
- Town Hall
- Granite Crest Subdivision
- Main Street Park
- Hampton Pointe Subdivision
- Recreation Center
- Rolesville Elementary School
- Village at Rolesville
- Historic Downtown (Main and Young Streets)

Rolesville is still a very Main Street-centric community, with schools, shopping and several neighborhoods all connecting with or adjacent to Main Street. The following map (Figure 3-2) illustrates the origins (green circles) and destinations (red squares) that the Steering Committee identified during their working sessions.



## Origins and Destinations

Places to Bicycle To and From, and High-Priority Connections

- A Connector from Jones Dairy Rd. to Burlington Mills Rd.
- B Rogers Rd. from Main Street to Town limits
- C Greenway from New Collector street to Main St. Park
- D Burlington Mills Rd. Bike Lane or Sidepath
- E Jones Dairy Rd. Wide Striped Shoulder
- F Chalks Rd. Wide Striped Shoulder
- G HAWK Signal and Crosswalk at Rolesville Elementary School
- H Rolesville Road Wide Striped Shoulder
- I Jonesville Road Wide Striped Shoulder
- J Main Street (North and South) Wide Striped Shoulder
- K Louisbury Road Wide Striped Shoulder
- L Main Street (Downtown) Improvements
- M Young Street Wide Striped Shoulder
- N Granite Boulevard Extension/Burlington Mills Realignment

L E G E N D

- Schools
- Sidewalks
- Greenways Existing & Proposed
- Bicycle Lane
- Shared Lane w/Sharrow Markings
- Wide Striped Shoulder
- Adjacent Sidepath
- High Priority
- New Location Road
- Origin
- Destination

Figure 3-2. Origins & Destinations

Project cost factors are variable, rarely go down, and financing is usually obtained from more than one source

## Section 3.1: Project Cost Factors

The following graphic (Table 3-1) describes basic project cost estimates for each of the proposed projects in this chapter. Note that all cost estimates may increase or decrease depending on the cost of raw materials, labor, and inflation. Cost estimates do not take into account purchase of right-of-way or structure construction (i.e. bridges or tunnels) unless otherwise noted for the individual project.

Individual pricing estimates for bicycle lane projects were based on general estimates from Durham, Charlotte and Raleigh. Costs for smaller communities tend to be slightly higher since these places often have lower purchasing power. Bicycle lane projects do not include the cost of additional right-of-way purchase, additional lane width, resurfacing, or curb and gutter installation. New greenway/multi-use trail construction estimates assume a 10-foot-wide, multi-purpose trail with minor earthwork and minimal structures to cross drainage features, and do not include costs associated with the purchase of right-of-way unless otherwise noted.

Table 3-1. Basic Construction Cost Factors

| Cost Item | Unit Cost* | Notes |
|---|---|---|
| **On-Pavement Striping** | $1.50/linear foot | |
| **On-Pavement Symbols** | $350 ea. | *Typical spacing at 1,300 feet on route* |
| **Signs** | $300 ea. | |
| **10' Greenway, Paved** | $800,000/mile | *Not inclusive of structures, design or ROW* |
| **3' Soft Trail, Unpaved** | $1,000/mile | *Not inclusive of structures or ROW* |
| **Wood Boardwalk** | $250/linear foot | *Not inclusive of structures or ROW* |
| **Sidewalks** | $200/linear foot | *Incls. curb-and-gutter and design ($170 w/out)* |
| **Lighting** | $1,500 ea. | |
| **Landscaping** | $50 and $500 ea. | *Shrub and Tree* |
| **Pedestrian Signal Added to Existing Traffic Signal** | $15,000 ea. | *Includes retrofit costs* |
| **Pedestrian-Only Signal** | $75,000 ea. | |
| **Mid-Block Flashing Crosswalk** | $40,000 ea. | |
| **HAWK Flashing Signal** | $45,000 ea. | |
| **Bicycle Parking Rack (2-post)** | $350 | *Includes installation by Town* |
| **Prefabricated Pedestrian Bridge** | $1,200/linear foot | *Assumes 10' width* |
| **Pedestrian Culvert** | $100,000 ea. | *US 401 Bypass culverts are not shown in this Plan* |

**Note: With every project, the costs associated with design, right-of-way acquisition, and structures can vary considerably. A full design will be necessary to determine costs with accuracy.*

## Section 3.2: Project Prioritization

Greenway and roadway projects were prioritized based upon a number of factors including safety, access, connectivity, proximity to schools and other major destinations, as well as public, staff, and stakeholder input. The following tables divide projects into short-term, mid-term, and long-term projects. Short-term represents a project that should be addressed within the next five years dated from the Plan's adoption. Mid-term

projects should be addressed within six to ten years, and long-term projects are those that are most likely to happen beyond ten years of the Plan's adoption. Items that had the greatest priority were those that met an existing demand for facilities, or complete a necessary route to a destination. As a result, short-term projects are those that are along major, well-used thoroughfares in the center of Town. Long-term projects are those that are on less traveled roads or would connect fewer people.

### Priorities in the Real World

While the prioritization of capital projects is important due to scarce resources, the real-world experience of many places suggest that projects are constructed more often based on the timing of private development actions that contribute directly to the acquisition of right-of-way or construction. Roadways that are due for a major update and reconstruction may have bicycle facilities installed at the time that project is completed, even if they are a lower priority. Finally, "short-term" projects may not be the highest priority, but are simply those that are already programmed for construction through public or private actions.

Short-Term Projects (1 – 5 years)

Many of the projects in the following table will require substantive study, design, and possibly right-of-way acquisition that may prolong their implementation; however, they are the first projects that should be addressed due to need and demand not necessarily what we would assess as being the "easiest" projects to construct.

Mid-Term Projects (6 – 10 years)

Like the short-term projects, these projects may also require additional right-of-way acquisition and substantive design; however, they received a mid-term priority because they are located on less important roads and serve fewer people as major access points into and through the town. It is important to note that, although these projects are labeled "mid-term," many of them are located on roads which will most likely undergo improvements in the future by developers, NCDOT, or through Town-planned projects. The Town should require and coordinate future private and public improvements to ensure that these bicycle facility projects are constructed in conjunction with any improvements.

Long-Term Projects (11 or more years)

Although these projects are labeled "long-term", like the "mid-term" projects many of them are located on roads that will probably undergo improvements in the future by private developers, NCDOT, or through Town-planned projects. The Town should require and coordinate future private and public improvements to ensure that these bicycle facility projects are constructed in conjunction with any improvements.

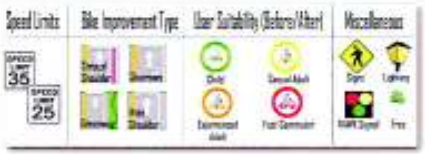
Table 3-2. Project Priorities and Basic Cost Estimates

| Project ID | Location or Street Segment | Recommendations and Users (1) | Basic Cost Estimate (2) | Term/Priority |
|---|---|---|---|---|
| A | East-West Connector<br>*Phase I: Rogers Rd. to Burlington Mills Rd.*<br>*Phase II: Chalk Rd. to Rogers Rd.*<br>*Phase III: Jones Dairy Rd. to Chalk Rd.* | *Construct new collector street with 12' lanes, sidewalks, and sharrow markings.*<br>SPEED LIMIT 25 | *Ph. I Cost: $9.9m*<br>*Ph. II Cost: $6.5m*<br>*Ph. III Cost: $4.7m* | *Long-Term/1* |
| B | Rogers Rd. from Main Street to Town limits | *Construct wide outside lane with stripe delineation (consider bike lane near downtown)*<br>SPEED LIMIT 35 | *Length: 1.8miles*<br>*Cost: $354,000* | *Mid-Term/1* |
| C | Greenway from new collector street to Main St. Park | *Greenway completion from Main St. Park to new collector road and Heritage South subdivision* | *Length: 0.7miles*<br>*Cost: $680,000* | *Short-Term/2* |
| D | Burlington Mills Rd. Adjacent Sidepath (school area) and Wide Striped Shoulder | *Construct wide outside lane with stripe delineation (consider bike lane near downtown to school)*<br>SPEED LIMIT 35 | *Length: 2.1miles*<br>*Cost: $367,000* | *Mid-Term/4* |
| E | Jones Dairy Rd. Wide Striped Shoulder | *Construct wide outside lane with stripe delineation*<br>SPEED LIMIT 45 | *Length: 1.3miles*<br>*Cost: $196,000* | *Mid-Term/3* |
| F | Chalks Rd. Wide Striped Shoulder | *Construct wide outside lane with stripe delineation*<br>SPEED LIMIT 35 | *Length: 1.5miles*<br>*Cost: $237,000* | *Long-Term/7* |
| G | HAWK Signal and Crosswalk at Rolesville Elementary School | *HAWK Signal and embedded sign at Rolesville Elementary School and Park*<br>SPEED LIMIT 15 | *Cost: $45,500* | *Short-Term/1* |

**Notes: (1) Legend for symbols included in project shown at right. (2) The opinion of probable costs of design, right-of-way acquisition, and structures vary considerably. A full design will be necessary to determine costs with accuracy. Costs shown do NOT include cost of constructing roadway on new location, but do include sidewalks, bicycle treatments, signs, and lighting/landscaping unless otherwise noted.*

(Table 3-2. Continued)

| Project ID | Location or Street Segment | Recommendations and Users (1) | Basic Cost Estimate (2) | Term/Priority |
|---|---|---|---|---|
| H | Rolesville Road Wide Striped Shoulder | Construct new collector street with 12' lanes, sidewalks, and sharrow markings. SPEED LIMIT 35 | Length: 2.2miles<br>Cost: $339,000 | Long-Term/2 |
| I | Jonesville Road Wide Striped Shoulder | Construct wide outside lane with stripe delineation (consider bike lane near downtown) SPEED LIMIT 35 | Length: 1.2miles<br>Cost: $187,000 | Long-Term/6 |
| J | Main Street (North & South) Wide Striped Shoulders | Greenway completion from Main St. Park to new collector road and Heritage South subdivision SPEED LIMIT 35 | Length: 3.8miles<br>Cost: $570,000 | Long-Term/3 |
| K | Louisbury Road Wide Striped Shoulder | Construct wide outside lane with stripe delineation (consider bike lane near downtown to school) SPEED LIMIT 35 | Length: 1.3miles<br>Cost: $193,000 | Long-Term/4 |
| L | Main Street (Downtown) Improvements | The Main Street Improvement Project will require additional public engagement with property owners to help define how Main Street will attract new growth, improve the beauty and character of the Heart of Rolesville, and be a premier cycling destination. See the following page for details. | | Mid-Term/2 |
| M | Young Street Wide Striped Shoulder | Construct wide outside lane with stripe delineation SPEED LIMIT 45 | Length: 3.3miles<br>Cost: $503,000 | Long-Term/5 |
| N | Granite Boulevard Extension / Burlington Mills Realignment | Construct new, two-lane roadway (private development) and realign intersection with Main Street and Burlington Mills Road. SPEED LIMIT 25 | Length: 1.1miles<br>Cost: $8.7m | Short-Term/3 |




*Notes: (1) Legend for symbols included in project shown at right. (2) The opinion of probable costs of design, right-of-way acquisition, and structures vary considerably. A full design will be necessary to determine costs with accuracy. Costs shown do NOT include cost of constructing roadway on new location, but do include sidewalks, bicycle treatments, signs, and lighting/landscaping unless otherwise noted.

**Main Street Improvements**

Main Street (US 401) between Burlington Mills Road and Young Street is the heart of Rolesville. This one-mile stretch contains an elementary school, fronts Main Street Park, businesses, and the government center. As through-traffic volumes decrease with the completion of the Rolesville Bypass to the south, our proposal is to create a new vision for Main Street that will accommodate and encourage cyclists, pedestrians, and visitors to come to this area in an environment that is much friendlier to slower forms of traffic. In order to accomplish this objective without creating undue hardship on existing businesses along Main Street, the following recommendations were developed:

- Curb Extensions, to reduce turning speeds
- Young Street Intersection Redesign, including a roundabout recommended in the Imagine Rolesville Plan (2002), to improve safety
- Driveway and Curb Resets, to reduce the number of conflict points
- Signage, including reducing the speed limit to 25mph
- Gateway Signage, to increase the recognition of this important part of Town
- Pedestrian-Scale lighting south of Rodgers Road, to improve lighting conditions and the overall appearance of the roadway
- New Sidewalk in some locations, to fill in "gaps"
- Driveway Crosswalks, to reinforce the pedestrian nature of the new Main Street
- High Visibility Crossing near Main Street Park and Rolesville Elementary School, to create a better crossing environment.

While even more improvements could be done at a future time (see graphic at right), these recommendations are an important beginning. The graphic on the next page (Figure 3-3) illustrates the extent of the recommendations.

**Visualization of Main Street**

The visualization at bottom goes further than the recommendations proposed herein, using center landscaping and green bike lanes to warn motorists at driveway entranceways to watch for cyclists. To continue to draw people to shops and improve the safety of the corridor, a different perspective of Main Street – as a destination, and one that is scaled towards people, not cars – will be necessary.

# MAIN STREET BICYCLE IMPROVEMENTS

CREATING A BETTER ENVIRONMENT FOR CYCLISTS, BUSINESS, AND THE CORE OF THE TOWN

L E G E N D

- Pavement (curb extensions)
- Sidewalks (Existing)
- Sidewalks (Proposed)
- Crosswalks
- In-Street Sign (school crossing)
- Curbline Reset
- Driveway Closure
- Gateway Sign
- Pedestrian Lighting
- Roundabout
- Road Names
- Bicycle Destinations

n.t.s.

Realm in Roseville

SOLANE

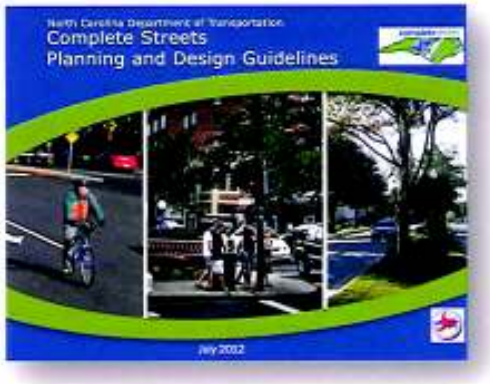
Figure 3-3. Main Street-Downtown Improvements *(see also enlarged version on enclosed map)*

# Chapter 4 Design and Operations

## Section 4.1: The importance of Maintenance and Operations

In many planning documents, even those that emphasize physical infrastructure, it is not uncommon for the engineering and physical operations and maintenance of facilities to be overlooked or, at best, underemphasized. In an era of fiscal austerity where lifecycle costs (the cost of what it takes to construct and maintain a piece of infrastructure over its full useful life) are coming under closer scrutiny, the way that a bikeway, greenway, or path is maintained and designed cannot and should not be ignored. A second issue is often that, in North Carolina at least, municipalities do not own or maintain their roads in many instances. Although the State is responsible for the maintenance and construction of major roads in the majority of cases, this fact does not preclude local governments from intervening in the design process so that their citizens and their travel needs can be met. While the recent (2012) promulgation of **"complete street" design standards** was an important, if overdue, step taken by NCDOT to ensure that their own streets can meet the needs of a variety of users, it is still incumbent on Rolesville to ensure that opportunities that the designs of new streets and even maintenance (e.g., repaving) of existing streets included bicycle facilities where practicable.

This chapter of the *Rolesville Bicycle Plan* provides specific design and maintenance/operations guidance for bicycle facilities. Nothing in this guidance should be construed as replacing state laws or standards; however, it is obvious that, even at the State level, our understanding of what comprises a "complete street" compatible with all kinds of travel and travelers is changing. Hence, this guide serves the purpose of describing how Rolesville should interface with the State (Department of Transportation, primarily) and other entities to create and maintain an excellent bicycling system.



## Section 4.2: Maintenance and Operations of Bicycle Facilities

Understanding the likely steps Rolesville must take to properly maintain and operate bicycle facilities is key to continued promotion and use by a range of bicyclists. Not all bicycle facilities are created equal; thus they have varying needs in terms of maintenance and operations. On bike lanes, the historic role NCDOT has played in managing the primary streets within cities and towns can leave a gap in regular maintenance as sweeping of bicycle lanes is not part of their typical maintenance and operations schedules. Greenways present both opportunities and challenges for upkeep, day-to-day operations and long-term evaluation as it relates to maintaining a system in a state of good repair.

Greenways provide an opportunity for operation and maintenance through partnerships with non-governmental entities such as homeowners associations, volunteer groups, garden clubs and local businesses. Bicycle lanes may require deployment of town equipment on NCDOT-managed routes or a special contract by the Town through an area sweeping company if debris is collecting on bicycle routes, whether it is lanes or shoulders.

Even in small towns the mobilization of resources, most notably people and small equipment, can be difficult for small tasks to maintain bicycle lanes or greenways. This is especially true in remote areas such as greenways behind a major subdivision when maintenance issues need to be addressed.

### Objectives of Maintenance & Operations Programs

Themes contained throughout the Rolesville Bicycle Plan promote safety, ensure access for persons of all abilities, and help connect destinations throughout the community. Keeping the bicycle system in a state of good repair is critical to ensuring these goals are met years after construction of the facilities. With that being said, the primary objectives of maintaining and operating a bicycle and greenway system should be to:

- **Preserve Existing Investment**: Greenways are one of many visible public investments that are assets to the Town in the same manner as the Town Hall, a major park, or a school. A well-maintained asset is fundamental to fiscal stewardship and ensuring usability of that asset over a long period of time. The outlay of resources for the initial construction of trails, pathways, amenities, access points, parking lots, signage and lighting requires consideration of how these investments will be preserved. Bicycle lanes are similar in that they link greenways and treasured destinations. Bike lanes clear of foliage that grows over the shoulder preserves pavement condition, ensures water does not pond long after a storm, and prevents grass from growing through the pavement. A clear bicycle lane also allows debris to wash away instead of settling in the lane.
- **Protect Habitat & Environment:** Greenways by their nature are desired in areas that promote or enhance natural environments, even in their most urban settings. A greenway in a state of good repair positively impacts the quality of the surrounding habitat and environment that it was meant to protect. Neglected routes can negatively impact public opinion on the benefits of greenways and can make future investments harder to sell.
- **Safeguard the Public:** Maintenance involves both the greenway or bike lane infrastructure and the environment around it, both of which can greatly impact the safety and the perception of safety for users. The humid climate in Rolesville lead to fast rates of growth for foliage, which can overtake greenways and bike lanes, block safety-related signage, and create an "enclosed" feeling where users may not feel safe. The environment also impacts the greenway surface as root heaves create tripping hazards for users while encroachment of trailside grasses and shrubs degrade the edge of pavement or shorten the effective width of the greenway and create user conflicts. Stormwater runoff can compromise the integrity of the greenway or bike lane base and natural surface trails can be washed away during major storms, both creating unexpected conditions for users.

Closing a bicycle lane involves plenty of advance notice so that cyclists can merge into the main roadway.

### Considering Context

Maintenance on a new bicycle facility begins soon after it is built and is directly tied to operations. Some of these maintenance needs can be anticipated while others require methods of reporting maintenance needs, response policies, and clearly defined roles for maintenance participants.

Proactively incorporating maintenance activities for bicycle routes preserves the community's investment. Without it, a cycle of degradation can quickly result in the need to completely repave or rebuild a trail. Trimming foliage on and around greenways and bike lanes, sweeping sediment from routes, and fixing cracks before they become safety hazards are the equivalent of applying lube to a bicycle chain, putting air in the tires, and adjusting brake cables.

Making the case to funding partners and elected officials on the importance of preventive maintenance is very important. Fixing cracks may not warrant a ribbon cutting. Sweeping a trail once a month probably won't win any awards. And some volunteers have to be convinced that sweeping a trail or trimming shrubs is a great way to spend a weekend morning.

**Importance of Design.** Even when economic conditions are very strong, the financial needs of public agencies were not always being met by existing resources. This situation inevitably led to investment decisions in many communities that looked at the cost of the project while making tradeoffs in design to reflect revenues. This is a part of doing business and building a bicycle route system—whether on- or off-street; however, the design and construction of bikeways is a critical facet of protecting the asset well into the future.

The pavement base of a greenway or bike lanes is fundamental to maintaining its long-term viability, as it was with railroads and as it is with other road building techniques. Asphalt is a material that performs best when its pliability is maximized. Asphalt can withstand freeze and thaw

cycles better than concrete. It is also cheaper to build than concrete and easier to replace or repair. The pliability of asphalt is best preserved through weight transfer, which roadways gets from heavy traffic volumes and large vehicles—neither of which are functions that greenways or bike lanes serve or promote.

The design features related to base and materials, as well as some type of shoulder treatment are intended to bolster the strength of the asphalt and offset the negative effects that come with a lack of weight loads on the pavement. Over the life of a bikeway this reduces maintenance costs and lessens the need to completely repave or overlay the trail as frequently.

**Different Settings.** There was usually strong support among citizens for greenways and trails in natural settings to be built with natural surfaces (e.g. soft trails), such as crushed gravel (gravel fines), mulch, or dirt. Joggers prefer them. Bicyclists not using skinny road tires can navigate them with some ease if it is a gravel fines surface. There are several maintenance advantages that come with soft trails, most notably replacement costs and less influence of tree roots on the trail surface. There are also several challenges, such as erosion, encroachment of trailside vegetation, muddy or poorly draining sites and concerns over user conflicts and accessibility in high use areas.

Communities that want to protect or enhance a natural feel through soft trails should be aware of the potential challenges that come with being able to maintain those trails, particularly in remote settings. This does not and should not mean that a default position should be to pave the trail. Rather, a different set of expectations should be established for how the Town and other partners can address maintenance needs if a soft trail is desired.

In some settings, stream and river buffer requirements may require a soft trail. More reliance may need to be placed on volunteers to inspect the trails, report major problems and conduct maintenance activities than with trails in more urban or transitional settings.

The Triangle's long growing season can introduce a variety of hazards.

**Access & Detours.** It can be frustrating for greenway or bicycle route users to come upon maintenance activities that restrict their use of the bikeway. New development in a growing community oftentimes causes the need to temporarily close a nearby greenway, road or sidewalk. Suitable alternative routes should be identified as part of the construction plans for such projects. The Manual on Uniform Traffic Controls Devices has clear standards for Temporary Traffic Controls (TTCs) for sidewalks. These standards should be followed for greenways and it is advisable to consider signing a detour route for bikes if an on-street bike route is being impacted or repaved. Identifying and assigning detour routes are difficult with greenway trails, particularly in rural areas where on-street bike routes or sidewalk alternatives do not exist.

Luckily, most pedestrians can walk around a maintenance impediment and bicyclists may be able to walk their bike around a temporary obstacle. Individuals with mobility impairments are not as fortunate and attempts should be made to erect advance warnings for all users so they can choose whether or not to use that route during the time of maintenance activities. Users can also be alerted via text messages, social media, and web site announcements.

**Materials, Supplies & Equipment.** Relying upon a diverse set of partners and agencies to properly maintain greenways requires consideration of access to materials and supplies needed for maintenance, as well as reliability of equipment. Labor may be easy to come by but continued support from volunteers and partners is best sustained by consistent access to the supplies needed to perform various maintenance duties. A Town staff person or a contracted service is also needed to coordinate and manage volunteer efforts. With its proximity to Wake Forest, perhaps Rolesville can work with Wake Forest or Wake County to partner on such endeavors.

For many regular maintenance activities, Rolesville may be able to keep enough inventory on-hand to address most needs. Equipment such as

small earthmovers, mowers and large trimming equipment may be used sporadically and may already be owned by other town departments, nearby towns, or Wake County. Finding a way to achieve economies of scale in the purchase and maintenance of such equipment will help maximize efficiency and allow resources to be focused on greenway system expansion, encouragement programs or other maintenance activities.

**Planning for Maintenance.** Maintenance must be standard business practice for a town. This is difficult when historical roles for street maintenance have been heavily managed by NCDOT. It can take time to build capacity, both personnel and budget, within a municipality to undertake wholesale management of a bike route system. As the greenway system grows it will become increasingly important to define maintenance roles for the many entities involved. This could mean setting aside specific funding amounts in the Town's annual budget, examining maintenance and life-cycle costs in the specific design of trail segments, understanding maintenance expectations when new developments construct a public use greenway, and incorporating a maintenance element into future corridor planning in coordination with NCDOT.

**Using Technology.** Communication between bicyclists and greenway users and those in charge of maintenance is greatly enhanced by the use of established and emerging technologies. Social media outlets will allow Rolesville and its partners to report maintenance activities that can disrupt travel or recreational plans for greenway users. Interpretive GIS software can also be used. Cities and counties are developing mobile phone applications that allow citizens to report maintenance problems such as potholes, street light outages, and clogged storm drains. A similar effort could be incorporated into bicycle route maintenance issues if the Town pursues such technology in the future.

**Maintenance & Operations Participants**

Maintenance of Rolesville's greenways and bicycle route system could (and should) have many partners playing a role to help maximize limited

resources. Some maintenance can be conducted by volunteer organizations, some by the town, and some may require contract with local companies. Table 4-1 on the following page characterizes various maintenance activities by typology and the most likely responsible party for conducting the activity. The typologies identified are:

- **Spot or Incident Maintenance** activities are un-planned and occur in response to a particular reported problem, event or incident. In most greenway or bike lane settings these will be the resulting impacts or damage from storms, floods or nearby construction activities.
- **Regular Maintenance** consists of programmed or continuous activities that occur at logical intervals based on the characteristics of the greenway or bike lane. Trail inspection, trimming, sweeping, and clean-up activities are examples of regular maintenance activities.
- **Long-Term Maintenance** requires major planning and budgeting for what are oftentimes very specific projects such as major pavement repair, re-building, erecting new signage or replacing major structures such as bridges or culverts.

| Types of Maintenance & Operations Activities | Parks & Recreation, Contractors | Volunteers, Other Contract Organizations | Facilities Maintenance, Municipal Public Works, Transportation Departments, Contractors |
|---|---|---|---|
| **Spot / Incident:** Occurs as necessary or warranted. | • Citizen Response<br>• Low Water Crossing / Warning Signs<br>• Major Debris Removal<br>• Securing Temporary Signage<br>• Identify Detours<br>• Information Dissemination<br>• Special Events Policies & Permitting<br>• Lighting Replacement | • Citizen Response<br>• Spot Improvement & Incident Reporting<br>• Water New Vegetation<br>• Minor Debris Removal<br>• Placing Temporary Signage<br>• Information Dissemination<br>• Special Event Monitoring / Support | • Asphalt Spot Patches<br>• Major Debris Removal<br>• Graffiti Control<br>• Parking Lot Repair<br>• Major Debris Removal |
| **Regular:** Programmed or continuous at logical intervals based on features and their needs. | • Scheduling Major Maintenance Tasks<br>• Trail Edge / Path Weed Treatment<br>• Major Mowing & Trimming<br>• Trash Disposal<br>• Plant & Trim Trees<br>• Stock, Clean Amenities<br>• Rotary/Machine Sweeping<br>• Bollards / Bollard Locks<br>• Sign Replacement<br>• Mapping<br>• Volunteer Training<br>• Accident & Incident Tracking<br>• Pest Management | • Trail Inspection & Condition Surveys<br>• Scheduling Minor Maintenance Tasks<br>• Minor Mowing & Trimming<br>• Removing noxious weeds<br>• Trail Shoulder / Borrow Ditch Clean-up<br>• Trash Collection<br>• Planting Shrubs, Grasses & Flowers; Mulch Planting Beds<br>• Locking / Securing Trailheads & Access Points<br>• Hand Tool Sweeping<br>• Volunteer Training Support<br>• Accident & Incident Monitoring | • Asphalt Crack Sealing / Seal & Cover<br>• Shoulder Protection & Maintenance<br>• Large Scale Vegetation Removal<br>• Dust Management<br>• On-Street Sidewalk & Connecting Route Maintenance |
| **Long-Term:** Requires major planning, budgeting and coordination for anticipated investments or major initiatives. | • Fence & Structure Paint / Maintenance<br>• Trail Location Signage / Wayfinding<br>• Major Amenities Procurement & Replacement<br>• Habitat / Environmental Maintenance & Control<br>• Secure Funding | • Benches & Table Paint / Maintenance<br>• Support / Pursue Funding | • Asphalt Seal & Cover / Overlay<br>• Centerline Striping / Crosswalk Markings<br>• Street Location Signage & Lighting<br>• Bridge Inspections & Maintenance<br>• Fencing & Railing<br>• Drainage / Borrow Ditches, Culverts |

Table 4-1. Types of Maintenance Actions and Implementing Agents

Table 4-2 illustrates a sample maintenance schedule that considers these typologies and the type of maintenance activities to help Rolesville plan for maintenance of the greenways and multi-use paths.

| Tasks | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Basic Maintenance** | | | | | | | | | | | | |
| Inspection & conditions survey | | | | ✓ | | | | | | ✓ | | |
| Graffiti removal | As needed throughout the year | | | | | | | | | | | |
| Hand box sweeping | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Major mowing & trimming | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Machine Sweeping | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| Planting shrubs, grasses & flowers | | | | ✓ | ✓ | | | | | ✓ | | |
| Plant, trim trees | | | | ✓ | ✓ | | | | | ✓ | | |
| Shoulder / borrow ditch clean-up | As needed or annually | | | | | | | | | | | |
| Trail edge, shoulder, gravel path weed control | | | ✓ | | | ✓ | | | ✓ | | | |
| Trash collection & disposal | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Water new vegetation | | | | ✓ | ✓ | ✓ | | | | ✓ | | |
| Weed control & pest management | | | | ✓ | | ✓ | | ✓ | | ✓ | | |
| | | | | | | | | | | | | |
| **Substantial Maintenance** | | | | | | | | | | | | |
| Asphalt patching | As needed, fall and spring | | | | | | | | | | | |
| Asphalt crack sealing | | | | ✓ | | | | | | | | |
| Painting | As needed year around. Every 10 years for major structures & amenities | | | | | | | | | | | |
| Overlay | Once every 20 years | | | | | | | | | | | |
| Shoulder / borrow ditch protection & maintenance | | | | | ✓ | | | | | | | |

Table 4-2. Sample Maintenance Schedule for Greenways & Multi-Use Paths

**Facility Inventory**

A critical component of any maintenance plan is to know the condition and location of various items such as signs, benches, and markers. The trail condition record of activity is also helpful in planning future maintenance and monitoring schedule requirements. It is recommended that Rolesville incorporate the growth of its bicycle facilities into other inventory duties of the Town.

A database can be updated as maintenance tasks are complete, used to project budgetary needs, and inform volunteers of what types of activities are short-term needs. The database can also be used to assess performance of the greenway system and provide feedback for planning, design and construction of new trails. Emerging smartphone, GPS and GIS technologies offer an efficient means toward developing such an inventory and volunteers can be used to conduct certain functions of the inventory.

This facilities inventory should include:

- **Design characteristics**, such as length, width, pavement type, and year constructed;
- **Surface condition**, including pavement condition, date of last inspection and photo at last inspection;
- **Usage by mode and characteristics**, such as pedestrians, bicyclists, joggers, etc.;
- **Sign inventory**, including type of sign, location, and date installed;
- **Amenities and their location**, such as benches, bicycle racks, and trail markers; and
- **Bridge and culvert database**, including location, date of last inspection and condition.

**Complete Streets**

"...A complete streets philosophy means that NDDOT and its partners will provide a network of streets that safely and comfortably accommodate all users, including bicycles, pedestrians, and transit users. Typical elements that make up a complete street include sidewalks, bicycle lanes, appropriate street widths and speeds...."

*NCDOT Draft Complete Streets Planning and Design Guidelines*

## 4.3 Design and the Design User

How we design greenways and trails impacts the experience and, ultimately, the safety of the diverse set of users that take to greenways and trails for a variety of recreational, utilitarian, health and transportation purposes. This chapter illustrates aspects of facility design to help guide future actions by Wake County and its partners in planning for, designing, constructing and maintaining greenways that connects to a variety of destinations, promotes a diverse user experience, and is built to a maintainable scale.

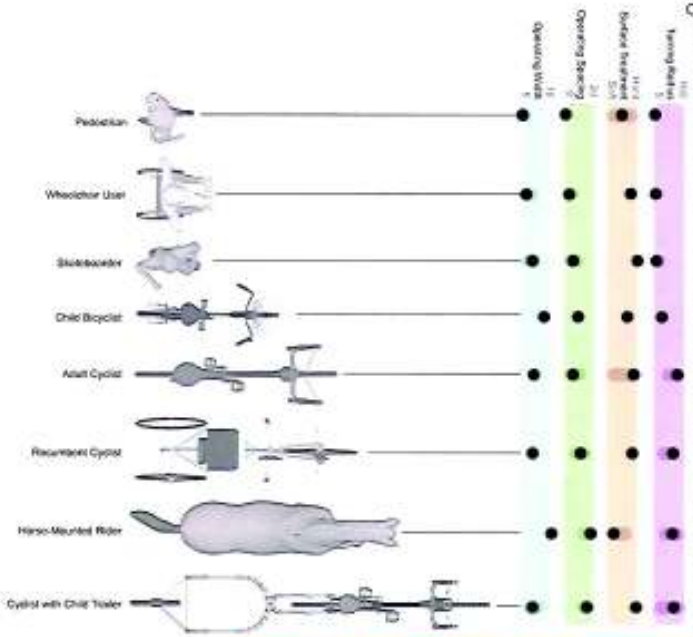



Figure 4-1. Active Modes and Design Parameters

### The Design User

A discussion on the design of bicycle facilities should not begin with the dimensional aspects of the trail; rather it begins with understanding the different user types, how their needs are unique, and how those differences are accommodated into trail design and construction.

A well-connected bicycle system is often conflated with the idea of a well-connected greenway system, which is one the most diverse facets of our built environment in terms of how people interact. When compared to traditional walking trails or paved walkways within parks, their function transcends a recreational or experiential purpose to include a transportation element. When compared to other transportation facilities, greenways have a much more diverse set of user capabilities, "vehicles," and speeds occupying and traveling through the same space.

A family walking the dog along a trail has different needs than the bicyclist using the greenway as a link between two roadways. The needs of a person in a wheelchair vary greatly from members of a running club, the romantic couple walking arm-in-arm or a child learning to ride a bike. How we accommodate a multitude of functions depends on understanding the context of the greenway and what user types are most likely to interact. Figure 4-1 illustrates the various functional widths required for the largest share of greenway users. Each type of user has a unique requirement in terms of operating width and clear space

required for comfort and safety. These characteristics ultimately drive our design standards, design exceptions and location-based design decisions.

As we establish design standards and practices, it is important that they not conform to a "one-size-fits-all" approach. Such an approach detracts from aesthetics of the overall bicycle transportation system, thus negating the potential positive aspects of the experience. It can have negative safety impacts if applied universally without consideration of user characteristics.

A greenway near an elementary school is likely to have students using the trail during the school day as an outdoor classroom. Children in groups tend to spread across the length of the trail, which creates conflicts with faster walkers, joggers, and bicyclists. Places where terrain and resulting grades lead to faster speeds for bicyclists creates conflicts with pedestrians due to a greater speed differential as well as uphill bicyclists who need more space to climb. Downhill road cycling implies that sight distance from the rear of the cyclist is less than optimal and that a wider shoulder to provide refuge to the cyclist is desirable to avoid conflicts from motorists broaching a hill behind them.

**Facility Types for Various Design Users**

Figure 4-2 on the following page illustrates the range of facilities and their characteristics.

**Bike Lane**

**Bicycle Boulevard**

**Shared Curb Lane (with sharrow markings shown)**

**Wide Curb Lane Paved Shoulders/Wide Striped Shoulders**

**Shared Use/Multi-Purpose Path / Multi-Use Trail**

**Single Track Trail**

| Facility Type | Category | Width | Surface | Treatment | Function |
|---|---|---|---|---|---|
| **Bike Lane** | On-Street | 4'-6' | Asphalt (same as street surface) | On-street lane striped and signed to NCDOT standards; design should ensure a limited number of commercial driveways and turning movements | For bicyclists on roadways |
| **Signed Shared Roadways** | On-Street | varies | Asphalt | May either be a low-volume roadway with traffic calming and signage to create a safe shared use environment, OR a higher volume roadway with wide (14' – 16') outside lanes | Used for designated bicycle routes; can include signage and pavement markings, including "sharrows" |
| **Bicycle Boulevard** | On-Street | varies | Asphalt | Multiple traffic calming treatments combined with bike lanes and or signed shared roadways to create priority streets for bicyclists | Provides a continuous facility on streets with varying widths, volumes and speeds |
| **Shared Curb Lane** | On-Street | 9'-12' | Asphalt | Common facility type in low-speed and low-volume street types; can include signage and treatment markings, including sharrows | Utilitarian cycling on streets which are not otherwise designated as elements of the bicycle network |
| **Wide Curb Lane** | On-Street | 12'-14' | Asphalt | Smooth pavement, bicycle compatible storm grates; can include signage and treatment markings, including sharrows | For skilled bicyclists who are capable of sharing the road with motor vehicles |
| **Paved Shoulders/Wide Striped Shoulders** | On-Street | varies (min. 2') | Asphalt | The outside lane (in each direction of travel) is widened behind the white edge delineator stripe | For utilitarian bicyclists depending on condition, width, speed of adjacent traffic, and frequency of driveways |
| **Shared Use/Multi-Purpose Path / Multi-Use Trail** | Off-Street | 10'-14' | Asphalt, concrete or other smooth firm surface | Designed to NCDOT standards. Separated from roadway by planting strip or vertical curbing | Typical application for regional trail and some community pathways and bikeways. Accommodates bicycles, pedestrians, and wheelchairs. Minimizes potential trail crossing conflicts with autos |
| **Single Track Trail** | Off-Street | 3'-8' | Natural Surface | Designed to meet International Mountain Biking Association (IMBA) guidelines | Designed for mountain bicyclists; can include a variety of off-road bicycling trail types |

Figure 4-2. Types of Bicycling Facilities

All of these bicycle facilities are commonly grouped into three categories: 1) Off-Street Facilities that include Shared Use Paths, Greenways and Trails, 2) On-Street Bikeways, and 3) Bicycle Parking and Support facilities. The following sections are based on definitions established by AASHTO (Association of American State Highway and Transportation Officials), NCDOT, the MUTCD (*Manual on Uniform Traffic Control Devices*) and innovative design concepts from other communities in the U.S. Due to the

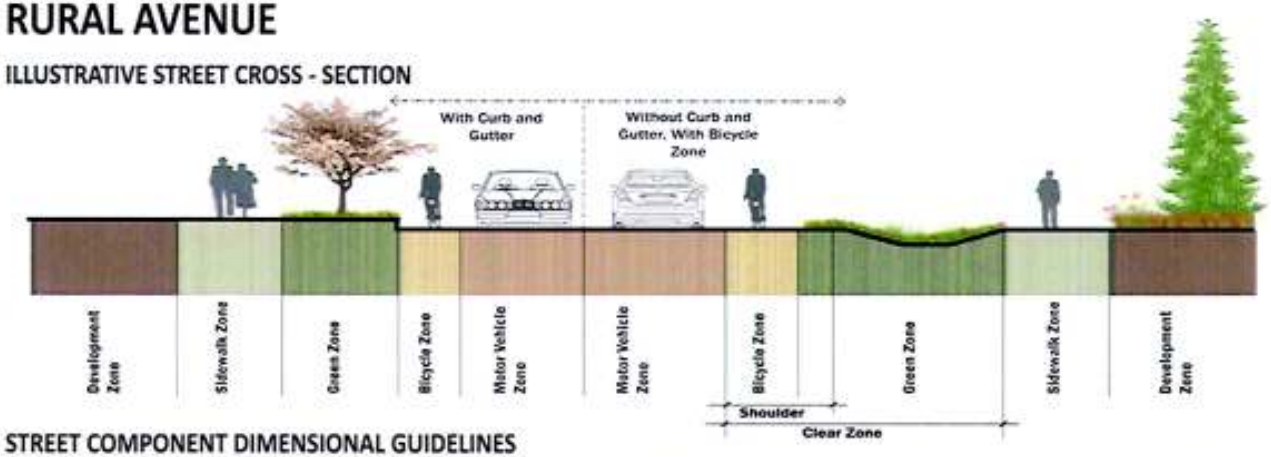
inter-related town boundaries between Wake Forest and Rolesville, the former's Comprehensive Bicycle Plan was also used to coordinate recommendations. Similarly, the draft *Final Complete Streets Planning and Design Guidelines* was also reviewed to take advantage of the flexibility that this guidance offers designers. To facilitate easier reading, the design components are broken out into three main sub-sections: on-road, intersection treatments, and off-road recommendations.

**Preferred Design for Rural Avenues**

The Town of Rolesville is confronted with a number of streets that are currently or are "evolving" out of what the NCDOT Complete Streets Guidance suggests is a "Rural Avenue." Rural Avenues are typically narrow streets that once served remote, sparsely populated regions of our State and that are now being placed under stress due to abundant growth, particularly from residential development. As traffic volumes on these streets increase, the maintenance, available capacity for all kinds of traffic, and propensity for accidents are likely to change negatively. The NCDOT Complete Streets guide for these types of streets is shown on the following page (Figure 4-3). A footnote in this guidance suggests that outside lanes should accommodate cyclists with a 5' bicycle lane. Bicycle lanes are typically located in areas where there are few driveways or street intersections, since these locations tend to introduce more conflicts from turning vehicles that may or may not see a cyclist traveling alone. In the case of Rolesville, this Plan proposes that a wide outside lane with a preferred width of 16' be used instead to promote (a) safe passing accommodations for motorists overtaking cyclists; (b) better "sweeping" of the streets by passing cars to provide a better riding surface; and (c) safer conditions for motorists that have to use the shoulder in the event of a vehicular breakdown or other emergency. Note that that a 16'-wide lane would require the same amount of pavement (and therefore less costly to maintain and with a smaller environmental footprint) than an 11' travel lane coupled with a 5' bicycle lane, and actually reduce costs associated with striping and maintaining bicycle symbol pavement markings.

# RURAL AVENUE

## ILLUSTRATIVE STREET CROSS - SECTION




## STREET COMPONENT DIMENSIONAL GUIDELINES

| | Sidewalk Zone (feet) | Green Zone (feet) | Shoulder Zone (feet) | Bicycle Zone (feet) | Motor Vehicle Zone (lane width-feet) |
|---|---|---|---|---|---|
| Rural Village | 6' - 8' | 4'- 12' (see notes 2 and 3) | 8' - 10' | 4'-6' bicycle lanes (see notes 6 and 7) | 10' - 12' lanes |
| Rural Developed | 5' - 8' | 4'- 12' (see notes 2 and 3) | 8' - 10' | 4'-6' bicycle lanes (see notes 6 and 7) | 10' - 12' lanes |

1. Sidewalk zone should typically be a minimum unobstructed width of 6'. In areas that are currently or are planned to be pedestrian-oriented or mixed-use development, 8' wide unobstructed sidewalks can be provided.
2. Green zone may include landscaping, street trees, lighting, street furniture, hardscaping in some circumstances and related pedestrian/bike/transit amenities. 8' minimum green zone is preferred, to allow for separation between pedestrians and vehicles, and space for street trees.
3. For areas outside of towns and communities, wider green zones of 10' to 12' are preferred where street trees are provided.
4. Parking is an option on avenues. Parking zone dimensions vary depending upon the type of parking provided. Angle parking will require a wider dimension than shown.
5. Bicycle lanes are the preferred treatment. If bicycle lanes are not possible, shared lanes may be allowed. For a shared lane, the outside lane should be a minimum of 14' wide. Sharrows can be used on streets < 35mph, with either shared lane or standard lane dimensions.
6. In the shared vehicle zone and the bicycle zone, the gutter pan is not considered part of the lane width or the bicycle lane width.
7. Bicycle lanes located next to on-street parking should be a minimum of 5' wide (generally, the combined dimension for parking and a bicycle lane should be at least 13' from the face of the curb).
8. Avenues may or may not include a center turn lane with intermittent landscaped islands. Avenues typically do not include a continuous median, but it may be allowed in some circumstances.
9. Pedestrian lighting should be considered adjacent to development.

Figure 4-3. NCDOT Complete Streets Guidance for Rural Avenues

An important advantage of shared car-bicycle facilities is the treatment of cyclists at intersections: there is no "merging over" maneuver required of bicyclists at any intersection, which also means that transitions between sections of roadway would be easier to accommodate as discontinuous lengths of street are widened due to development actions or reconstruction/repaving.

**Preferred Design for Collector and Low-Volume Residential Streets**

Collector Streets fall between local residential streets and major arterials in the street hierarchy, with this hierarchy reflecting the balance between mobility and accessibility. Local streets service driveways that lead to homes or low-intensity commercial development (rare). The goal for the designer of these streets should be to reduce traffic speeds while still supporting a variety of users. This goal turns the paradigm of calling for wider facilities to accommodate bicycles completely around: cyclists are safer sharing spaces with slow-moving traffic, especially under conditions where there are many driveways and curb cuts.

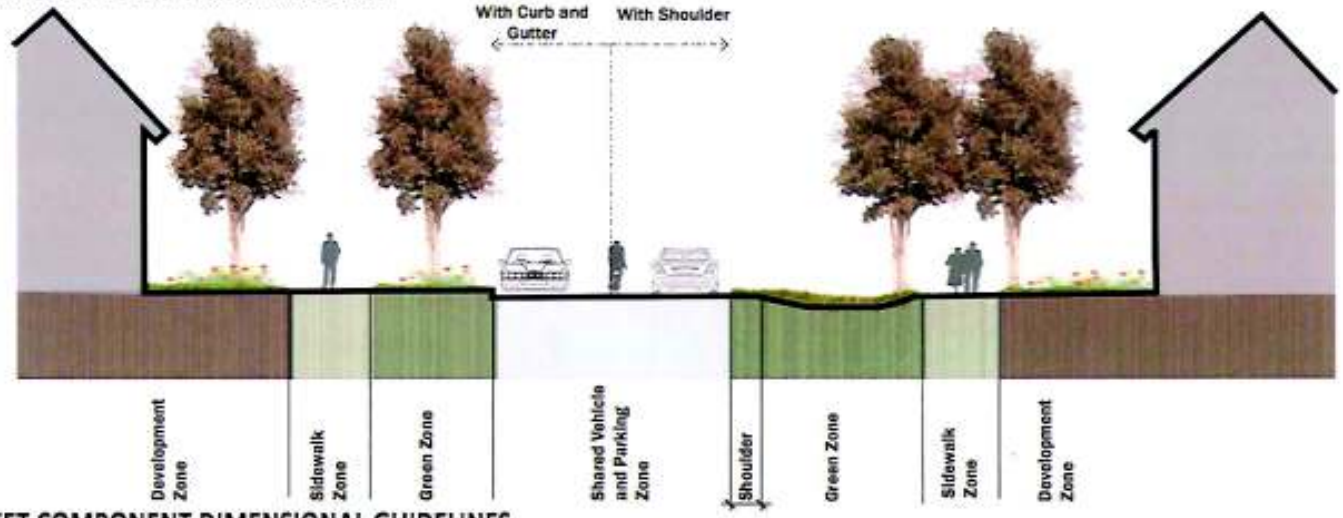
Collector streets may have a center turn lane or have speed limits up to 35mph, but 25mph or less is preferred. Note that IF the lane widths are minimized in accordance with this guidance (Figure 4-4), then shared spaces for cyclists are appropriate. Once lane widths become larger, the costs to the developer and the traffic speeds go up – as do complaints about speeding traffic from concerned parents. Additionally, many neighborhood traffic calming countermeasures such as speed humps are not conducive to bicycle travel unless they are carefully designed and sparingly used. As these neighborhood traffic complaints are usually associated with too-wide residential streets, keeping the street widths down fosters a more relaxed residential "feel" that translates to lower vehicular speeds and a safer environment for everyone. In situations where the street has higher traffic volumes (e.g., at least 2,000 vehicles per day) and on-street parking is used often, the use of sharrows markings would provide an additional warning and guidance to cyclists and motorists alike.

Redford Place Drive is at the upper limit of a typical low-volume collector or residential street. The particular design and infrequent curb cuts of this road might suggest dedicated bicycle lanes; such a prescription would probably preclude a center turn lane due to the costs of relocating utilities, curbing and landscaping that would be necessary were the center turn lane retained. Sharrows markings would be a good intermediate step.

Sharrow Dimensions:
A=Distance from Driver Side Door to Face of Curb
B=Door Swing Distance
C=Distance from Open Door To Centerline of Sharrow Pavement Marking
D=Distance from Face of Curb to Centerline of Sharrow Pavement Marking

# LOCAL / SUBDIVISION STREET: RESIDENTIAL

## ILLUSTRATIVE STREET CROSS-SECTION




## STREET COMPONENT DIMENSIONAL GUIDELINES

| | Minimum Travelway F.O.C. to F.O.C. (feet) | Sidewalk Zone (feet) | Green Zone (feet) | Parking Zone (feet) | Lane Width (includes bikes) (feet) | Number of Vehicles Provided For (parking and moving) (lanes) | Shoulder (feet) |
|---|---|---|---|---|---|---|---|
| Local / Subdivision (Traditional Neighborhood Guidelines - Lane) | 18' | 5' - 6' | 4' - 8' | very low demand | 9' with no parking | 2 | 4' - 6' |
| Local / Subdivision (Low Parking Demand) | 24' | 5' - 6' | 4' - 8' | low demand | 10' with low demand parking | 2 | 4' - 6' |
| Local / Subdivision (Parking On 1 Side) | 26' | 5' - 6' | 4' - 8' | 7' on one side unmarked | 9' with parking/ 13' with no parking | up to 3 | 4' - 6' |
| Local / Subdivision (Parking On 2 Sides) | 34' | 5' - 8' | 4' - 8' | 7' on both sides unmarked | 10' with one parked vehicle / 9' with two parked vehicles | 4 | 4' - 6' |

Figure 4-4. NCDOT Complete Street Guidance for Local Streets

**Signs and Pavement Markings**

Signs and pavement markings provide information, warnings of potentially hazardous conditions, and regulatory messages to drivers of cars and bicycles alike. Signage includes post- or pole-mounted signs and pavement striping. Signage and pavement markings should conform to the *Manual on Uniform Traffic Control Devices* (especially Chapter 9) and the American Association of State Highway Transportation Official's *Guide for the Development of Bicycle Facilities*, as well as NCDOT's own *Roadway Design Manual*. The following categories of signage and markings are described in general terms; specific signage recommendations are contained in this Plan, notably Share the Road signs at several locations.

*Warning Signs*

The purpose of warning signs is to provide the driver with information about upcoming conditions that may be hazardous under certain conditions or if certain actions are not taken. Roadway warning signs are often diamond-shaped with black lettering on a yellow background.

*Regulatory Signs*

Regulatory signs are classified into six basic groupings: the right-of-way series, the speed series, the movement series, the parking series, the pedestrian series, and the miscellaneous series. Regulatory signs are generally rectangular with white and black coloring; an example of a bicycle-specific regulatory sign is a Bike Lane sign.

*Informational Signs*

There are a variety of signs that provide supplemental information to cyclists, motorists, and other travelers. The following is not a comprehensive listing, and new designs can be utilized on an experimental basis with the prior written approval of NCDOT.

- Temporary Conditions, usually related to construction activities. These signs are important to cyclists, since they may indicate a roadway condition that, while not threatening to an automobile, may create a roadway surface conditions that is extremely

Commonplace Bicycle Regulatory Signs (*MUTCD* 2009, Figure 9B-2)

hazardous to cyclists. Temporary signage is frequently black on an orange background.

- Wayfinding, either standard or special case. Wayfinding (sometimes called directional signing) signs help designate bicycle routes, for example, or provide information on destinations (usually, name, direction of travel and distance). Wayfinding signs are frequently white on a green background, although some communities have developed their own color scheme and logos to promote certain destinations or serve as "branding" to market their community to visitors. Since cyclists are especially interested in understanding how much physical effort is going to be required to reach their destination, wayfinding signs are particularly important.
- Test Case, as allowed by state (and sometimes federal) transportation agencies. In some cases, signs are not addressed in the MUTCD or local guidance, but may be permitted on a trial basis. A current example is the HAWK signal, which may be used on a trial condition if allowed by NCDOT to warn motorists of high-volume pedestrian crossings. When these trials are allowed, careful observation of their performance should be undertaken so that later editions of the MUTCD can be modified to allow their widespread use or eliminated from consideration. Other, recent examples of trial bicycle-related signage include the allowance of green paint to designate a bicycle lane, alternative U.S. bicycle route signs, and shared lane ("sharrow") markings.

A few considerations should be kept in mind when locating signs and developing an overall signage strategy.

- First, signs and pavement markings can be overused, or used in places where they are not warranted. When either of these conditions occur, motorists, cyclists, and other travelers have a tendency to pay less attention to regulatory and warning signs, thus defeating an important part of their purpose. An excessive use of four-way STOP-controls on low-volume, residential streets has been practiced in some areas, for example, to reduce vehicular speeds – not the purpose of a STOP sign. In fact, STOP

signs and other regulatory signs should not even share a pole with (most) other signs that might dilute the level of their interaction with drivers.

- Second, signs are now required to have a retroreflective coating to increase their visibility, especially at night or in other poor lighting conditions. Improving visibility of warning and regulatory signs at night is important since the rate of crashes nationwide is about three times greater in the evening hours than during the daytime. This benefit is weighed against the fact that the retroreflective material degrades over time, indicating that signs have to be replaced by the agency responsible for their installation.
- Pavement markings improve the awareness level of motorists and cyclists alike, and they serve to reinforce vertical signage, such as a stop "bar" showing where a vehicle should stop before encroaching into a pedestrian crosswalk area. However, like signs, pavement markings can be overused or used in an inappropriate circumstance. A special concern with the overuse of pavement markings is that many of them are created with thermoplastic, which becomes slippery and hazardous to cyclists when the markings get wet.

**Intersection Treatments**

Many guides on riding bicycles safely stress the importance of lane positioning: maneuvering to the correct place in the travel lane to go straight, right, or left. While the designer's job is made somewhat easier at intersections when sharrow treatments or joint-use lanes are in place, bicycle lanes have to make a transition, which is further complicated in the presence of right-turn lanes, lanes being dropped, or on-street parking. Figure 4-5 shows common ways of signing and marking travel lanes to accommodate these conditions.

### Handling Intersections

The presence of turning lanes and on-street parking can create special design needs at intersections.

❶ *Right-Turn Only Lane.* Use mini-skips to denote the "weave" movement between bicycles going straight and cars crossing into a right-turn-only lane.

❷ *On-Street Parking.* Again, the use of mini-skips helps mark the bike lane for drivers wishing to turn right.

❸ *Through-Right with Right-Turn Only Lane.* Here, the bicycle lane disappears as the cyclist must negotiate a route to the right-center position of the through-right lane.

*Source: AASHTO Guide for the Development of Bicycle Facilities (1999)*

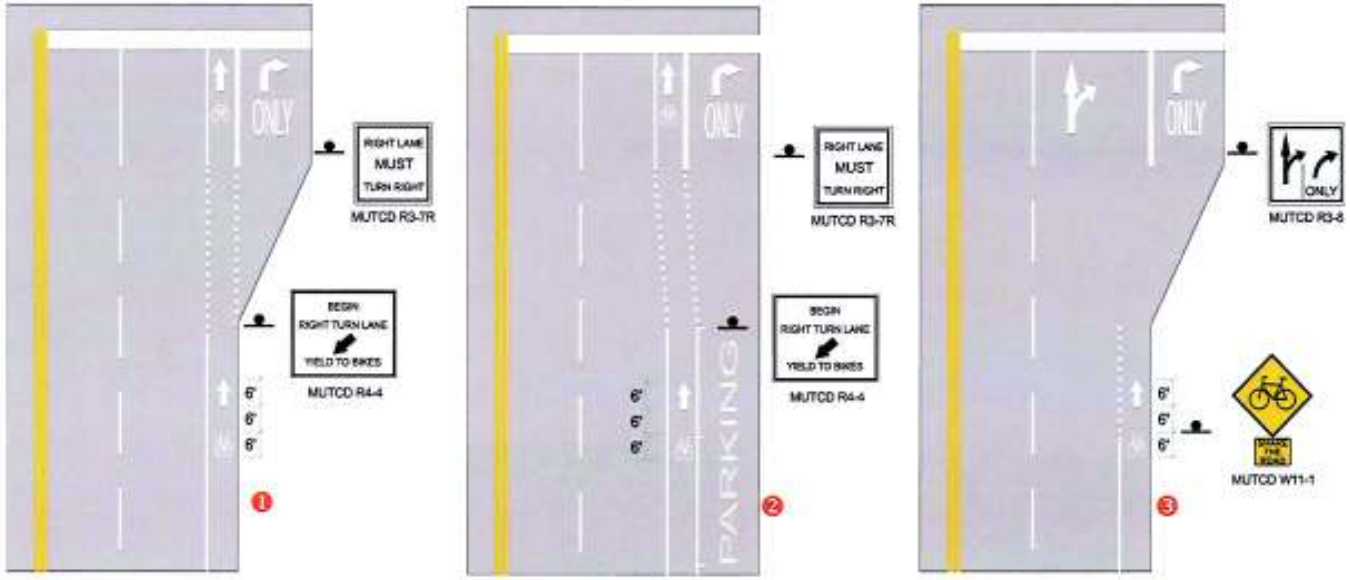



Figure 4-5. Intersection Treatments for Bicycle Lanes

A stencil is often helpful to indicate where cyclists are supposed to position their bicycles for maximum potential to activate a traffic signal or be most visible to upcoming automobile drivers. Figure 4-6 illustrates the design as well as the placement of a bicycle stencil and accompanying signage.

Additional intersection treatments such as specialized warning or advisory signs may also be warranted, such as the *Push Button for Green Light* sign recognized in the MUTCD (see image on this page).

Note that the use of special guidance or crossing mechanisms outlined in this chapter does NOT indicate that traffic signal detectors shouldn't be set to a level of sensitivity that can "pick up" the ferrous metal content of even modern road bicycles. The delay from occasional false detections is inconsequential to the delays and potential for encouraging "dart out" maneuvers from young or inexperienced cyclists.

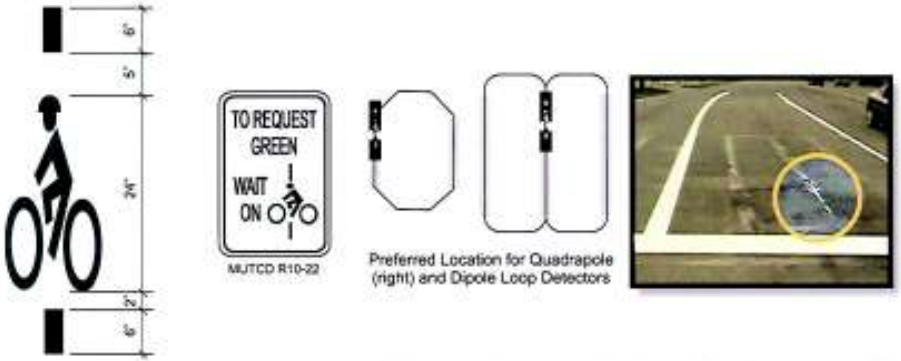



Figure 4-6. Bicycle Position Stencil for Signal Loop Detector

**Bicycle Parking and Ancillary Facilities**

Bicycle parking is not widespread in Rolesville, but new commercial developments and multi-family residential developments should provide minimum parking for cyclists.

Bicycle parking at parks and schools should be covered and near the entrances to shelters or buildings; this location is preferred even for commercial properties but if that is not possible then the parking should at least be clearly visible from the street and the front entrance (i.e., not in the rear of the building). Figure 4-7 illustrates the minimum space requirements for bicycle parking.

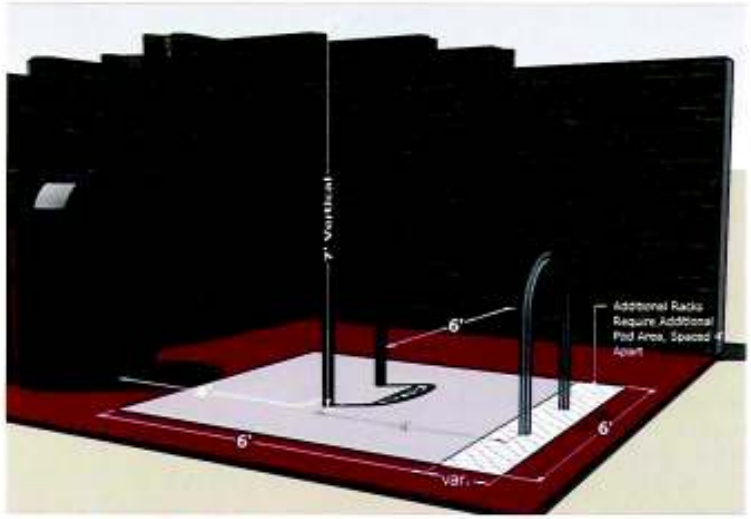



Figure 4-7. Bicycle Parking Space Needs

### Greenways and Paths

A greenway is defined as a paved or unpaved strip of land that connects people to the places they want to be. Greenways are often thought of as a minimum 10'-wide (the preferred minimum is 12') asphalt-surfaced pathway with a variety of amenities like benches, trashcans, trash bags (for pet waste) and information kiosks, trail markers/signage, and edging. While all of this can be used successfully for higher-use trails and attract a broader range of users, "soft" trails can also be constructed through volunteer labor that are no more than about three feet in width and have a natural dirt surface.

The following paragraphs describe the major design features of greenways as well as some of the more important amenities that Rolesville's citizens may expect to see on their own greenways. The purpose is not to create a comprehensive greenway construction guide that is beyond the scope or interest of our Plan, but instead to highlight best practices where we can do so.

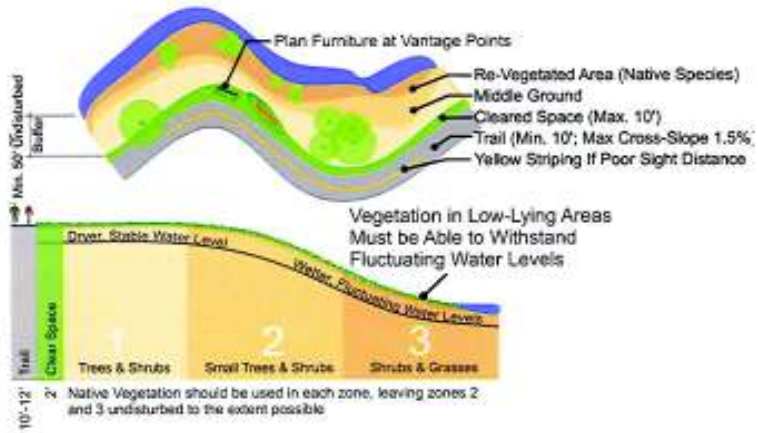



Figure 4-8. Greenway Plan View (top) and Cross-Section (bottom)

*Greenway Cross-Sections.* Greenways are typically at least 10' in width to accommodate the variety of design users, with (posted) speed limits of 10mph and typical widths of 12' or more to allow safer two-way passage of pedestrians, skateboarders, cyclists, and dog-walkers (this last is a notorious user of greenway width).

The use of natural vegetation close to the trail, which is bordered by a two-foot-wide open swath on each side of the greenway to allow errant vehicles room to safely maneuver back onto the trail surface, is important in terms of reducing maintenance as well as keeping a small environmental footprint on the landscape. Most important, if the greenway or even simple footpath borders a stream, a minimum 50' undisturbed zone is important to keeping stream sedimentation levels and bank erosion to a minimum.

Nothing fancy, but this soft trail at Heritage High School was constructed with volunteer labor and works fine for cross-country runners from the school as well as for off-road cyclists.

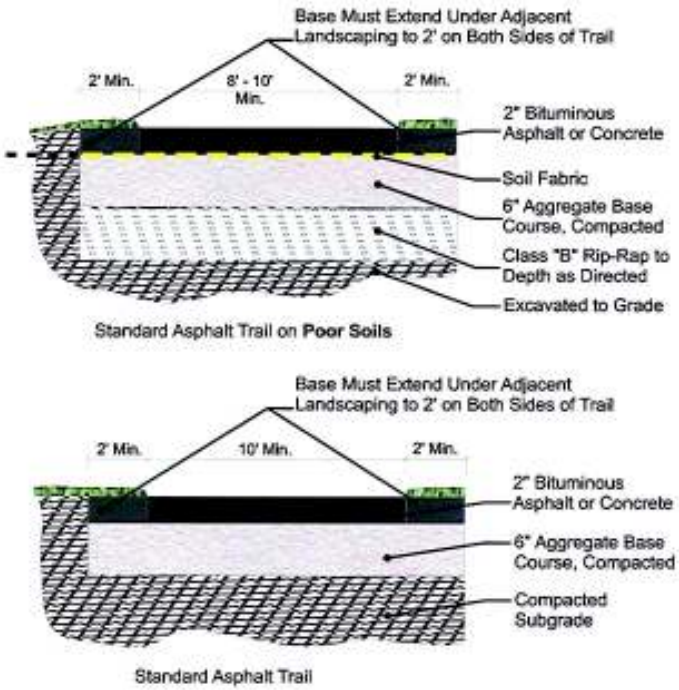



Figure 4-9. Greenway Construction Diagram

*Constructing on Poor Soils.* Greenways are often constructed on soft or poor soils since development typically avoids these same areas – and for the same reasons: it's harder to construct a permanent structure on poor soils whether it be a house or a greenway. While the typical greenway construction may be two inches of asphalt or concrete on top of a 6" base, another 6" or more of compacted rip-rap stone may be required to stabilize the greenway on poor soils. The results of improper grading, excavation and base development are the premier causes of greenways becoming unstable, cracked, and eventually unusable. While the additional materials and excavation increase costs during construction, the long-term maintenance benefits will more than compensate for the initial outlay.

*Tunnels and Bridges.* It is often necessary and/or aesthetically desirable to carry people from one side of a roadway or waterway to the other. Pedestrian bridges can come in pre-fabricated varieties, but for "soft" trails, these have been constructed in high school carpentry classes (after having a design cleared by a qualified engineer). Keep in mind that crossing roadways at grade (the subject of the next section) must be carefully designed, the expense of constructing a tunnel or pedestrian bridge over a road only rarely justifies the amount of use it is likely to received: the shortest and most-used path across a roadway is straight across, not up-and-over or down-and-under. Consider the two tunnel visualizations at one of our favorite schools on the following page (Figure 4-10): under some conditions even the most well-lit tunnel or bridge can appear unsafe.

Figure 4-10. Visualization of Tunnel at Night (left) and Inside
Photo credit: Stantec Consulting Services Inc.

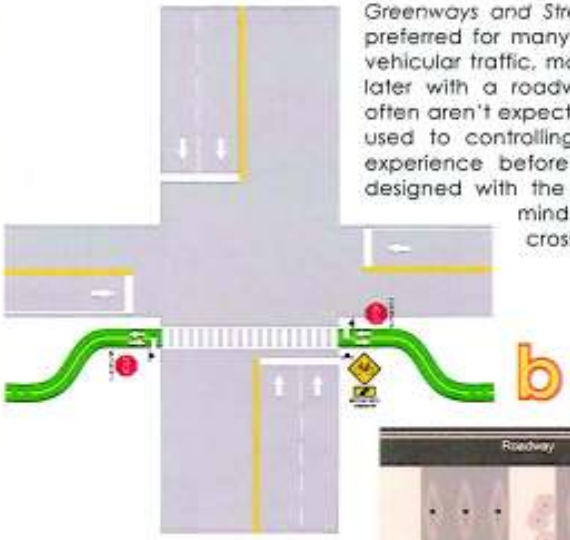
## Greenway-Street Intersections

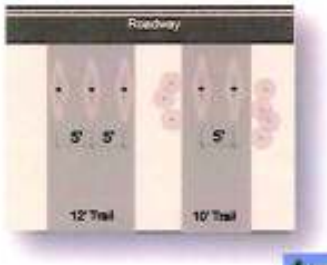
(a) Crossings are typically handled with a standard or "zebra" crosswalk or enhanced with in-pavement lighting activated by pedestrians crossing the street.

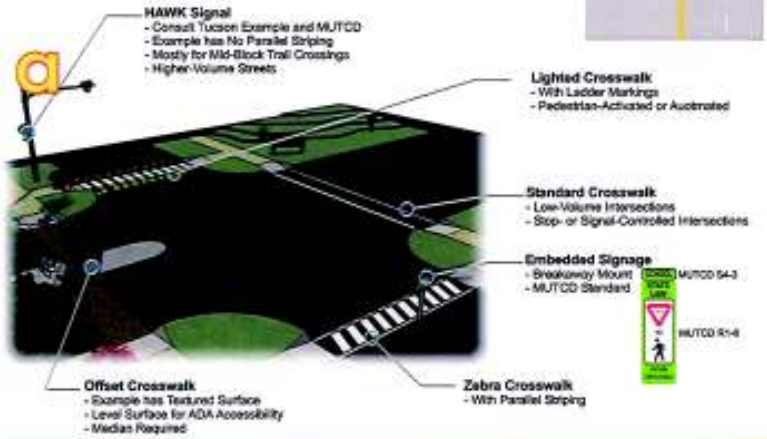
(b) but in cases where greenways do not meet cleanly at street intersections special measures may have to be taken (b) to ensure that users are aware of the upcoming crossing.

(c) The HAWK signal treatment is a relatively new device that gets driver's attention through a combination of high-visibility crosswalks and flashing, cyclist-activated lighting.

Greenways and Street Intersections. While greenways are preferred for many people precisely because they avoid vehicular traffic, most greenways must interface sooner or later with a roadway. Conflicts between motorists that often aren't expecting cyclists (who, in turn, have become used to controlling the right-of-way on their greenway experience before reaching a road crossing) must be designed with the safety of the pedestrian or cyclist in mind. These graphics illustrate how to make crossings safer.

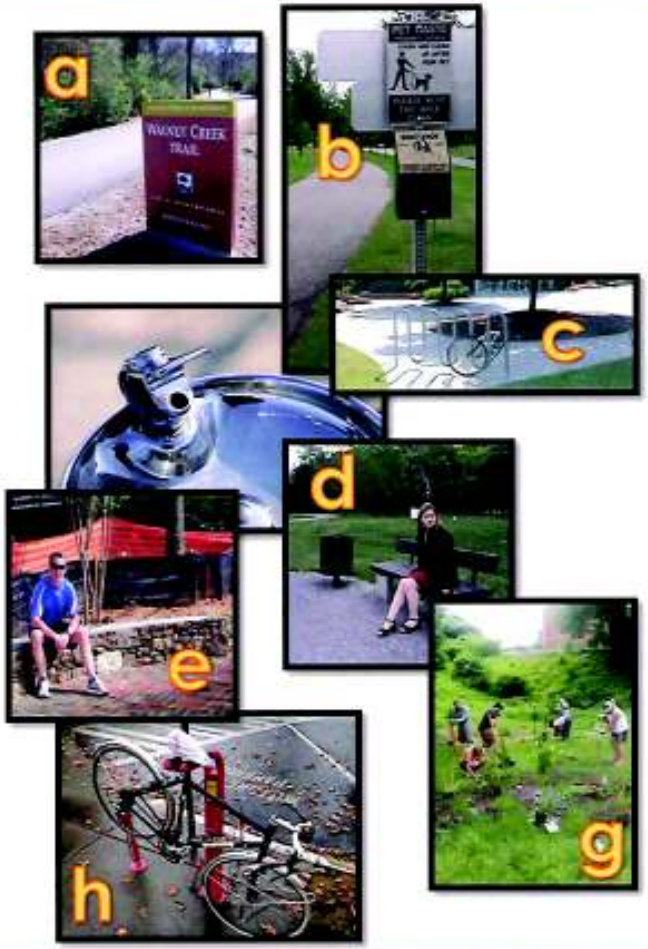


*Other Amenities and Provisions.* The following illustrates additional amenities that enhance the trail user's experience in Rolesville.

a. Park-n-Pedal Lots. Underused or dedicated parking areas where trail users can drive in with their bicycles then leave them to finish their journey by bicycle are becoming increasingly popular.
b. Bag Depositories. These dispense (and often collect) bags for disposing of pet waste, an essential item for a well-maintained trail.
c. Bicycle Parking. Bike parking racks are very important at trail heads and destinations, allowing the paths to reach their full multi-modal potential.
d. Benches, Water Fountains and Trash Receptacles. For higher-use trails, benches can provide a quiet resting place for seniors or families with small children. Trashcans are a necessity, as is daily emptying.
e. Decorative Walls and Retaining Walls. Decorative stone walls and fencing can greatly enhance the beauty of a greenway while separating other, adjacent land uses or keeping backfill away from the trail surface.
f. Kiosks and Signing. Directional signing at trail turning points and street intersections are helpful for out-of-town or infrequent users, as are trail distance markers that tell the user how far she has come since a trail head. Information kiosks can create an outdoor educational opportunity for school children and attract a different type of user.
g. Raingardens. Raingardens can be constructed through volunteer efforts and help manage stormwater runoff without expensive construction or maintenance.
h. Bicycle Fixit Stations. Bicycle "fixit" stations offer a range of tools and a stable platform to create a place for cyclists to repair their bicycles safely. One vendor even sells a vending machine with high-energy snacks as well as a variety of tubes and other parts.



## Resources

**Guide for the Development of Bicycle Facilities, 1999.**
American Association of State Highway and Transportation Officials, Washington, DC.

**Policy on Geometric Design of Streets and Highways, 2011.** American Association of State Highway and Transportation Officials, Washington, DC.

**The North Carolina Bicycle Facilities Planning and Design Guidelines, 1994**
NCDOT Division of Bicycle and Pedestrian Transportation.

**Manual on Uniform Traffic Control Devices, 2009.**

**Bicycle Facility Selection: A Comparison of Approaches.**
Michael King, for the Pedestrian and Bicycle Information Center Highway Safety Research Center, University of North Carolina – Chapel Hill, August 2002.

**North Carolina Department of Transportation**
Complete Streets Guidelines, July 2012. (www.completestreetsnc.org/resources/)

# Chapter 5 Implementation & Priorities

In order for Rolesville to move forward with the next steps in becoming a more bicycle-friendly Town, it must have the priorities and the funding available to proceed with implementation. This section addresses potential funding sources that the Town could consider for some of the proposed projects. An implementation plan is also provided which identifies potential partners for the recommendations, and a phased implementation schedule that considers priority and cost.

## 5.1 Implementation

The implementation of the recommendations contained in earlier sections of the Bicycle Plan will require a coordinated effort amongst Town officials, leaders, and citizen volunteers. The following tables summarize specific project, policy, and program recommendations that have been made in order of short-term, mid-term, and long-term time frames. The table should be used by the Town as a flexible framework for implementing the recommendations in the Plan – recognizing that it is important to capitalize on unexpected opportunities while also pursuing long-term goals. In general, the Town should consider working with a wide range of partners, such as those listed below, to implement various elements of the Plan and conduct periodic evaluations of projects, policies and programs after implementation.

Many of the education, encouragement and enforcement programs will be carried out by partnerships between Town departments, local non-profit and civic organizations, business owners, private developers and others. Creating strong partnerships in the Town-wide effort to improve bicycling safety and increase the "bikeability" of the community will help spread the word and awareness, as well as lead to programs that can withstand the test of time. Potential partners for implementation of the *Rolesville Bicycle Plan* include:

Volunteer efforts like this one to construct a rain garden require both government coordination and citizen involvement.

# The Best is the Enemy of the Good.

*Voltaire*

- Rolesville and Wake County Chambers of Commerce
- Wake County Health Department
- Advocates for Health in Action (WakeMed)
- Town of Rolesville Open Space and Greenways Committee
- Local Neighborhood Associations
- Wake County School System and Parent Teacher Associations (PTAs)
- Town of Rolesville Police Department
- Wake County Sheriff's Department
- Local Kiwanis, Lions and Roary Clubs
- Granite Falls Swim and Athletic Club

It is important to recognize that not every project has equal importance, and that many improvements in the realm of cycling can be done relatively inexpensively. The figure (Figure 5-1) on the following page illustrates signage, bicycle rack installations, and pavement markings that could be implemented at a fraction of the cost of the total bicycle improvement program outlined herein. Collectively, these improvements would make a noticeable difference in the overall perception of bicycle safety – and commitment to safety – in Rolesville. In short, a shortage of money to complete an important project shouldn't be viewed as a failure **– don't let the best be the enemy of the good.**

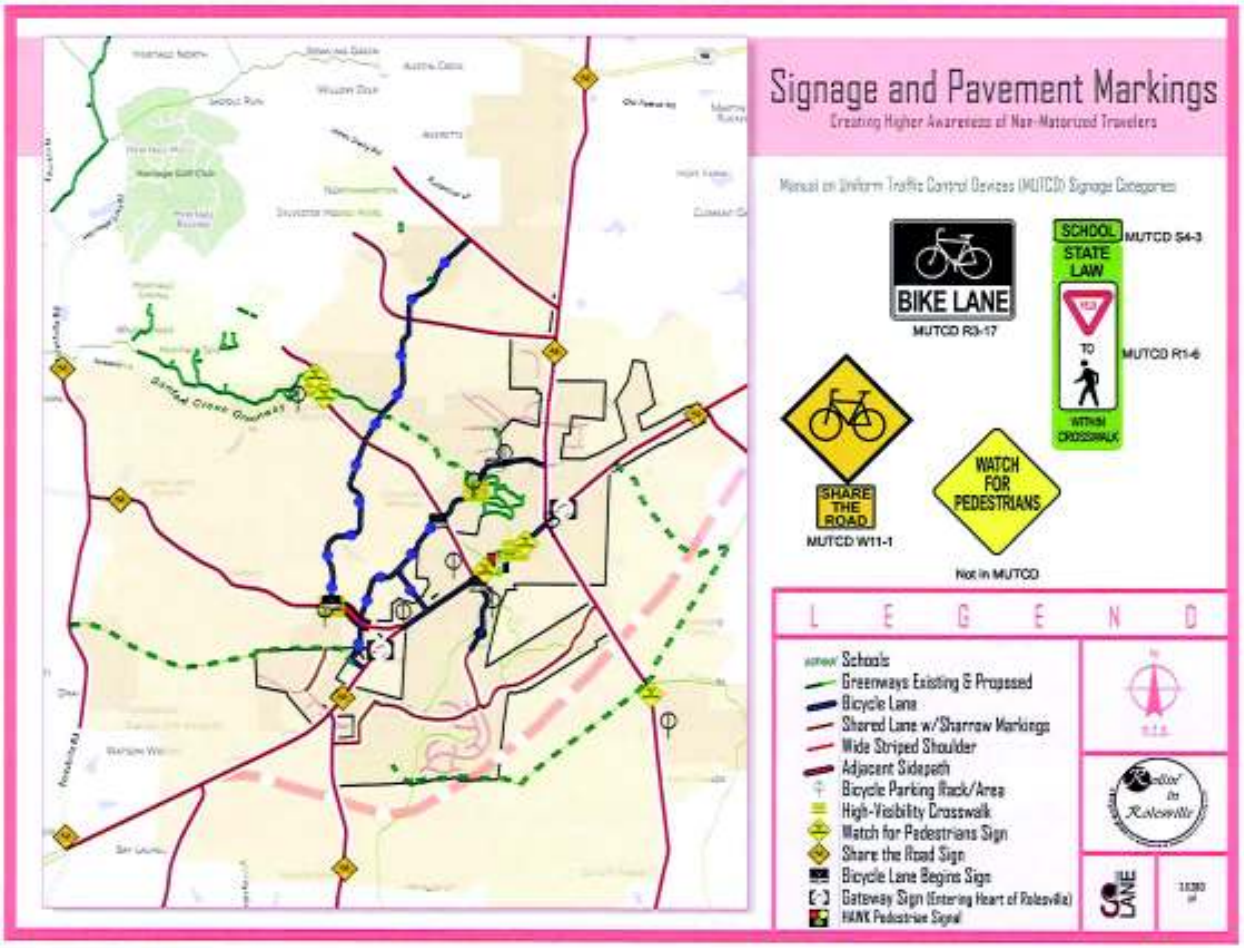



Figure 5-1. Signage and Pavement Marking Recommendations

## 5.2 Program Evaluation and Phased Schedule

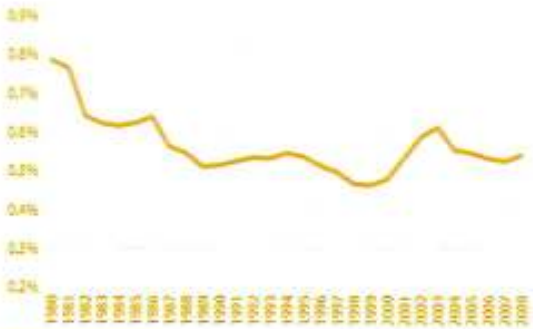
Evaluation is a useful tool for measuring local progress after the adoption of a Plan. Following up on program activities to verify successes and make changes as needed, and tracking key indicators such as crash statistics, can help provide a focus for future implementation and re-evaluate new needs. It is recommended that the Town of Rolesville consider working with the existing Open Space and Greenways Committee and, ultimately, a combined Bicycle/Pedestrian Advisory Committee in collaboration with the Town of Wake Forest, to help implement this Plan, track successes, re-evaluate needs, and help conduct future, joint Plan updates. Key indicators that Town staff, citizens and committee members might track include:

- Number of students walking or biking to school
- Records of pedestrian and bicycle crashes in Rolesville
- Accomplishments in terms of construction and program actions

The figure on the next page (Figure 5-2) shows a report card to help track Rolesville's progress in meeting its goals (*notes: 2013 is a sample evaluation; this image is captured from MS-Excel™ spreadsheet tool provided to the Town*).

| Evaluator (Staff)<br>Year of Evaluation | Description | (sample)<br>2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| **Projects** | | | | | | | | | |
| A | Connector from Jones Dairy Rd. to Burlington Mills Rd. | | | | | | | | |
| B | Rogers Rd. from Main Street to Town limits | | | | | | | | |
| C | Greenway from new collector street to Main St. Park | Yes | | | | | | | |
| D | Burlington Mills Rd. Bike Lane or Wide Striped Shoulder | | | | | | | | |
| E | Jones Dairy Rd. Wide Striped Shoulder | Yes | | | | | | | |
| F | Chalks Rd. Wide Striped Shoulder | | | | | | | | |
| G | High Visibility Crosswalk at Rolesville Elementary School | | | | | | | | |
| H | Rolesville Road Wide Striped Shoulder | | | | | | | | |
| I | Jonesville Road Wide Striped Shoulder | | | | | | | | |
| J | Main Street (North & South) Wide Striped Shoulders | | | | | | | | |
| K | Louisbury Road Wide Striped Shoulder | | | | | | | | |
| L | Main Street (Downtown) Improvements (short-term) | | | | | | | | |
| M | Young Street Wide Striped Shoulder | | | | | | | | |
| N | Granite Boulevard Extension / Burlington Mills Realignment | | | | | | | | |
| **Programs** | | | | | | | | | |
| Education: Safety Video Promotion | | | | | | | | | |
| Education: Expand the Bicycle Rodeo Program | | | | | | | | | |
| Enforcement: Warning Tickets and Follow-Up | | | | | | | | | |
| Enforcement: Traffic Calming in the Hands of the People | | | | | | | | | |
| Enforcement: Helping the Police | | Yes | | | | | | | |
| Encouragement: Get On Board the Bicycle Train | | Yes | | | | | | | |
| Encouragement: Continue to Develop the St. Patrick's Day Bicycle Parade | | | | | | | | | |
| Engineering: Plan Ahead to Participate in NCDOT Improvements | | | | | | | | | |
| Encouragement and Education: Collaboration Opportunities with Wake Forest | | Yes | | | | | | | |
| **Additional Elements** | | | | | | | | | |
| Signage | | 0 | | | | | | | |
| Pavement Markings | | 0 | | | | | | | |
| Bicycle-Related Crashes | | 0 | | | | | | | |
| **Letter Grade** | | 0- | | | | | | | |
| **Raw Score** | | 2.07 | | | | | | | |

Figure 5-2. Bicycle Plan Reporting (2013 as sample only)



Federal Funding for transportation projects as a share of compared to Gross Domestic Product (GDP) has been generally decreasing since 1980.
*(source: Schmitt, Angie. "American's Waning Commitment to Transportation Funding." Streetsblog Network. May 26, 2010)*

## 5.3 Program Financing

Greenway and trail facilities are constructed – and therefore funded – through a number of avenues. Funding can be divided into four categories: local, state, federal, and private funding. Rolesville should tap into all of these sources in order to take maximum advantage of the funds that are available. The following are general descriptions of three categories of financing available for greenway and trail construction.

**Local Funding Options.** Rolesville does not have a dedicated budget line item for greenway and trail construction that is available each and every year to known (minimum) amount. Programming projects in an uncertain financial environment makes prioritization of projects more challenging. More importantly, the budget item should be available to quickly match grant or other sources of funds that require a cash match, which frequently amounts to between 20% and 50% of the external funding source. Other locally-driven sources include benefit assessment districts, various bonding instruments, or work with private developers to either require or cost-share in various improvements including right-of-way dedication and construction costs. Greenway "trust funds" administered through local advocacy groups are another option that can help leverage multiple sources of funds to match locally-generated revenues. Purchase of development right programs have become somewhat common, and even transfer of development rights programs are getting a second look in some communities.

**State and Federal Funding Options.** The amount of state and federal funds available to local governments for all kinds of transportation improvements has generally shrunk in real dollar terms, as fuel taxes that are normally indexed have been frozen at the state level in recent years, with another attempt passing in the N.C. House of Representatives but failing to get through the Senate. Without indexing to inflation, the real value of fuel taxes will continue to drop. However, hazard elimination, Powell Bill, enhancements, and general fund revenues for both

independent (just the greenway or trail project) and incidental (the greenway, trail, sidewalk, or bicycle improvement is "incidental" to the main roadway project) are still available and an important source for many rural communities, in particular.

**Grants and Non-Profit Sources.** While grants have certainly taken similar hits generally as other revenue sources, most of the ones that were important five or ten years ago are still around. Many of these are used to protect property or stream buffers for environmental preservation purposes, but greenway and trail facilities are often still viable components of grant-related projects. Coordinating volunteer and non-profit groups, perhaps to help maintain and even construct "soft" trails, should not be overlooked as an increasingly important role for advocacy organizations. Cheyenne, Wyoming has created a volunteer manual for would-be greenway volunteers with release forms, guidelines for working in 100-year floodplains, and other actions including their "Adopt-a-Spot" program where volunteers not only pick up trash but can install landscaping, do pruning, and even install amenities. The City of Raleigh's Greenway Volunteer Program is another close-at-hand example. Volunteers must be at least 18 years old and possess a basic knowledge of the greenway system. Being imaginative and catering to the existing groups and their interests, as well as making sure that there is a stable, long-term presence in government that supports volunteer work, is crucial to successfully coordinating and maximizing volunteer efforts.

The following pages describe in more detail the specific financing sources that are the most likely to yield positive results for the Town (and Wake County, an important financing partner as well), although it is not all-inclusive and the "important" sources are coming, going, or changing on a near-constant basis. A list of additional funding sources and discussion is also provided after the main funding sources.

| Source | Eligibility | Description | Project Type | More information |
|---|---|---|---|---|
| **Municipal and County Bonds** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Revenue, general obligation, special assessment and GARVEE bonds are used by various government entities – after a public referendum approving the bond proposal – to construct a variety of transportation improvements.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>Other | NC G.S. 159-43 through 159-79 (GO Bonds) |
| **County Property Tax Increase** | ▪ County<br>Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Although any tax increase would be publicly and politically challenging, Wake's relatively low property tax rate of .534/$100 valuation (2012) might make this a more viable option. A number of the greenways in the Rolesville Bicycle Plan are county routes.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>Other | NC G.S. 150 § 161.7 |
| **County Sales Tax Increase** | ▪ County<br>Cities / Towns<br>Non-Profits<br>▪ Transit Operators<br>School Districts<br>Other: | *Any sales tax increase would require a popular referendum vote by the population of the County. Most counties (76) have the same 2% sales tax rate as Wake in 2012.* | Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>▪ Connectivity<br>Other | NC Department of Revenue |
| **Municipal or County Service (Business Improvement) District** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Cities can form special tax improvement districts for downtowns; counties may apply them anywhere. In both cases, infrastructure is the intended use, which may include transportation projects including sidewalks.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>Other | NC G.S. 160A-535 § 153A-300 |
| **Tax Increment Financing (TIF)** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Generally encouraging redevelopment, TIFs (and synthetic TIFs) use marginal property value increases to pay off debt from private infrastructure investment. Rolesville's downtown streetscape project might be a strong candidate for this source.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>Other | NC G.S. 159C-103 |

| Source | Eligibility | Description | Project Type | More info |
|---|---|---|---|---|
| **Occupancy Tax** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Wake has a relatively high hotel occupancy tax rate of 6%, in a range of 3% to 6% in almost every county. Uses are very broad as long as they are not applied to the construction of another hotel. In recent years, the hotel occupancy tax revenues are up.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>Connectivity<br>Other | NC G.S. 153A-155 § 160A-215 |
| **Spot Safety and Hazard Elimination (NCDOT)** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>▪ School Districts<br>Other: | *The NCDOT sponsors these three programs through the NC Highway Safety Improvement Program. The Spot Safety program focuses on smaller ($250,000 or less) projects and mentions pedestrian facilities by name. Small urban funds are a similar source, but not often used for trails projects.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>Amenities<br>▪ Connectivity<br>▪ Other:<br>Intersections | NCDOT Highway Safety Improvement Program |
| **Powell Bill Funds** | County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *This program is paid to municipalities for the purposes of maintaining or constructing local streets that are the responsibility of the municipalities or for planning, construction, and maintenance of bikeways and sidewalks.* | Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>Amenities<br>▪ Connectivity<br>Other: Grade Crossing Closures | NCDOT Powell Bill Program |
| **Conservation Tax Credits** | ▪ County<br>▪ Cities / Towns<br>▪ Non-Profits<br>Transit Operators<br>School Districts<br>▪ Other: State | *Persons donating their land through conservation easements for public trails (among other uses) can receive up to $250,000 or 25% of the fair market value of the land conserved. Credits are not transferable to new property owners.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>Other: | One North Carolina Naturally Conservation Tax Credit; NC G.S. 113A-231 |

| Source | Eligibility | Description | Project Type | More info |
|---|---|---|---|---|
| **Land and Water Conservation Fund** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>▪ Other: Tribal | *The LWCF program is managed by NCDENR for acquiring land at a single site with grants up to $250,000 for permanent outdoor recreation uses.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>▪ Other: Land | LWCF Overview by NC Division of Parks and Recreation |
| **North Carolina Recreational Trails Program Grant** | ▪ County<br>▪ Cities / Towns<br>▪ Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *NCDENR manages a trails grant program with amounts up to $75,000 with a 25% match requirement. All grants are matched 1:1 with cash, donated property value, or in-kind services.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>▪ Other: Land | North Carolina Recreational Trails Program Grant General Information |
| **Clean Water Management Trust Fund** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *The CWMTF can be used to plan and design greenways or acquire land (fee simple or conservation easement) for them in riparian areas ONLY. Construction costs are not eligible, but utilities are allowed in the corridor.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>▪ Other: Land | Clean Water Management Trust Fund |
| **Community Development Block Grant Program** | ▪ County<br>▪ Cities / Towns<br>▪ Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *CDBG funds have been used to construct trail projects, such as the Boulding Branch Greenway in High Point, NC. Amounts are typically between $50,000 and $200,000. Projects should benefit low- and moderate-income persons.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>Other: | CDBG Information Website |
| **Parks and Recreation Trust Fund** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: Public Authority | *NCDENR also matches the venerable PARTF grants, but these go to trail projects only infrequently (the focus being on parks). The matching requirement is 50/50 in cash (no in-kind services) but land value can be used in lieu of cash.* | ▪ Greenway<br>Bicycle<br>Pedestrian<br>Amenities<br>Connectivity<br>▪ Other: Land | NC Parks and Recreation Trust Fund Website |

| Source | Eligibility | Description | Project Type | More info |
|---|---|---|---|---|
| **State Transportation Improvement Program Projects (NCDOT)** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: Tribal | *NCDOT funds projects both incidental to highway construction / widening and independent bicycle/pedestrian projects based on established project selection criteria. Approval of metropolitan or rural planning organizations is required.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>▪ Other: Land | NCDOT Bicycle and Pedestrian Transportation Funding Information |
| **Payment-in-Lieu Fees** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *Communities may choose to allow developers to pay a fee for future improvements required by the government that the development is located within instead of constructing the improvement themselves. Note that private developers can often construct more for less money than their public sector counterparts.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>▪ Other: Land | |
| **Foundation Grants** | ▪ County<br>▪ Cities / Towns<br>▪ Non-Profits<br>Transit Operators<br>School Districts<br>Other: Non-Profit Organizations | *Like other grants, foundations issue funds for projects that meet specific requirements – and they are highly competitive. Deadlines, submission requirements, degree of interagency collaboration desired, and match characteristics vary greatly.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>Connectivity<br>▪ Other: Education | Bikes Belong<br>International Mountain Biking Association<br>Rails-to-Trails |
| **Safe Routes to Schools** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>▪ School Districts<br>Other: | *SRTS funding is distributed by NCDOT for the purpose of funding education programs, school-based audits that lead to infrastructure improvements within two miles of an elementary or middle school. However, recent federal transportation legislation has cast doubt about the security of federal funds for this popular program.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>▪ Connectivity<br>▪ Other: Education | SRTS National Center<br>and<br>FHWA Program Guidance<br>Safe Routes To School (SRTS) |

| Source | Eligibility | Description | Project Type | More info |
|---|---|---|---|---|
| **Federal Recreational Trails Program (FHWA)** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: Tribal | *NCDENR administers these funds for North Carolina, which received $796,000 in 2012. Funding typically falls into the $10,000 to $30,000 range, and has most often used for trail construction or supporting uses (e.g., parking, restrooms) in our State. See also NC Recreational Trails Program.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>Connectivity<br>▪ Other: | NC Recreational Trails Program (NC State Parks)<br><br>FHWA Recreational Trails Program |
| **Capital Area Metropolitan Planning Organization** | ▪ County<br>▪ Cities / Towns<br>Non-Profits<br>Transit Operators<br>School Districts<br>Other: | *CAMPO administers the LAP Program (LAPP) that can be used to finance 80% of bicycle projects. Scoring criteria include: connectivity, overcome obstacle to cyclists, and address safety concerns and existing demands. Not eligible for improving an existing facility.* | ▪ Greenway<br>▪ Bicycle<br>▪ Pedestrian<br>▪ Amenities<br>Connectivity<br>▪ Other: | Locally Administered Projects Program |

**More Funding Sources**

While perhaps less suitable than those listed previously, the following sources may also be of interest to the Town.

**Local Funding.** Currently, Rolesville does not have an annual budget line item specifically for pedestrian improvements. In the future, Rolesville should consider creating a specific annual budget item to set aside funds for improving pedestrian facilities, especially in cooperation with road repaving and improvement projects conducted by NCDOT. A specific budget item is the most direct way to ensure that funding for cycling facilities is available, but sometimes a Town's budget may be too limited to finance this work. Pedestrian facilities can also be built through "incidental" projects, by ensuring that such features are constructed 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 pedestrian access and connections.

Municipalities also often plan for the funding of pedestrian facilities or improvements through development of Capital Improvement Programs (CIP). Typical capital funding mechanisms include the following: capital reserve fund, capital protection ordinances, municipal service district, tax increment financing, taxes, fees, and bonds.

**Fees.** Three fee options that have been used by local governments to assist in funding pedestrian and bicycle facilities are listed here:

- *Stormwater Utility Fees.* Greenway sections may be purchased with stormwater fees, if the property in question is used to mitigate floodwater or filter pollutants. Stormwater charges are typically based on an estimate of the amount of impervious surface on a user's property. Impervious surfaces (such as rooftops and paved areas) increase both the amount and rate of stormwater runoff compared to natural conditions. Such surfaces cause runoff that directly or indirectly discharges into public storm drainage facilities and creates a need for stormwater management services. Thus, users with more impervious surface are charged more for stormwater service than users with less impervious surface. The rates, fees, and charges collected for stormwater management services may not exceed the costs incurred to provide these services. The costs that may be recovered through the stormwater rates, fees, and charges includes any costs necessary to assure that all aspects of stormwater quality and quantity are managed in accordance with federal and state laws, regulations, and rules.
- *Streetscape Utility Fees.* Streetscape Utility Fees could help support streetscape maintenance of the area between the curb and the property line through a flat monthly fee per residential dwelling unit. Discounts would be available for senior and disabled citizens. Non-residential customers would be charged a per foot fee based on the length of frontage on streetscape improvements. This amount could

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

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

**Facility Maintenance Districts.** Facility Maintenance Districts (FMDs) can be created to pay for the costs of on-going maintenance of public facilities and landscaping within the areas of the Town where improvements have been concentrated and where their benefits most directly benefit business and institutional property owners. An FMD is needed in order to assure a sustainable maintenance program. Fees may be based upon the length of lot frontage along streets where improvements have been installed, or upon other factors such as the size of the parcel. The program supported by the FMD should include regular maintenance of streetscape of off road trail improvements. The municipality can initiate public outreach efforts to merchants, the Chamber of Commerce, and property owners. In these meetings, Town staff will discuss the proposed apportionment and allocation methodology and will explore implementation strategies. The municipality can manage maintenance responsibilities either through its own staff or through private contractors.

**State Transportation Improvement Program (STIP).** This program is the overall funding source for study, design, and construction of major transportation projects, including pedestrian facilities, in the state. Frequently, projects funded by the STIP are also partly funded by other sources, including matching funds from local municipalities. Pedestrian facilities are eligible for funding from this program as independent projects separate from a roadway construction, widening, or some other sort of

roadway work, but one of the most cost-effective and efficient ways to gain funding for pedestrian facility construction is to incorporate them as incidental to a larger project. Overall, most pedestrian accommodations within the state are made as incidental improvements.

In North Carolina, the Department of Transportation, Division of Bicycle and Pedestrian Transportation (DBPT, or "Division") manages the Transportation Improvement Program (TIP) selection process for independent bicycle and pedestrian projects. Projects programmed into the TIP as "independent projects" are those that are not related to a scheduled highway project. "Incidental projects" – those related to a scheduled highway project – are bicycle and pedestrian accommodations, such as wide shoulders, included as incidental features of highway projects. In addition, pedestrian-safe railings are becoming a more standard feature of all highway construction – but should be expected only on designated routes. Most bicycle and pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of National Highway System funds and State Highway Trust Funds.

The DBPT has an annual budget of about $6 million. Eighty percent of these funds are from STP-Enhancement funds, while the State Highway Trust Fund provides the remaining 20 percent of the funding. Each year, the DBPT regularly sets aside a total of $200,000 of TIP funding for NCDOT to fund projects such as training workshops, pedestrian safety and research projects, and other pedestrian needs statewide. Those interested in learning about training workshops, research and other opportunities should contact the DBPT directly for information.

Below are other relevant state-guided programs and grants.

- **Governor's Highway Safety Program (GHSP)** – The mission of the GHSP is to promote highway safety awareness and reduce the number of traffic crashes in the state of North Carolina through the planning and execution of safety programs. GHSP funding is provided through an

annual program, upon approval of specific project requests. Amounts of GHSP funds vary from year to year, according to the specific amounts requested. Communities may apply for a GHSP grant to be used as seed money to start a program to enhance highway safety. Once a grant is awarded, funding is provided on a reimbursement basis. Evidence of reductions in crashes, injuries, and fatalities is required. For information on applying for GHSP funding, visit: www.ncdot.org/programs/ghsp/.

- **Community Development Block Grants (CDBG)** – CDBG funding is intended to help communities provide housing, create suitable living environments, and expand economic opportunities primarily in low- and medium-income areas. Rolesville could use these grant funds for recreation facilities and planning. It should be noted that CDBG Funds are highly competitive and the requirements are extensive. For more information, please see: www.hud.gov/offices/cpd/communitydevelopment/programs.
- **NC Adopt-A-Trail Grant Program.** This program, operated by the Trails Section of the NC Division of State Parks, offers annual grants to local governments to build, renovate, maintain, sign and map and create brochures for pedestrian trails. Grants are generally capped at about $5,000 per project and do not require a match. A total of $108,000 in Adopt-A-Trail money is awarded annually to government agencies. Applications are due during the month of February. For more information, visit: http://ils.unc.edu/parkproject/trails/grant.html.
- **Natural Heritage Trust Fund.** This trust fund, managed by the NC Natural Heritage Program, has contributed millions of dollars to support the conservation of North Carolina's most significant natural areas and cultural heritage sites. The NHTF is used to acquire and protect land that has significant habitat value. Some large wetland areas may also qualify, depending on their biological integrity and characteristics. Only certain state agencies are eligible to apply for this fund, including the Department of Environment and Natural Resources, the Wildlife Resources Commission, the Department of Cultural Resources and the Department of Agriculture and Consumer Services. As such, municipalities must work with State level partners to access this fund.

Additional information is available from the NC Natural Heritage Program. For more information and grant application information, visit www.ncnhtf.org/.

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

Water Conservation within the NC Department of Environment and Natural Resources administers this program through local Soil and Water Conservation Districts (SWCD). For more information, visit www.enr.state.nc.us/DSWC/pages/agcostshareprogram.html or call 919-733-2302.

- **North Carolina Health and Wellness Trust Fund.** The NC Health and Wellness Trust Fund was created by the General Assembly as one of 3 entities to invest North Carolina's portion of the Tobacco Master Settlement Agreement. HWTF receives one-fourth of the state's tobacco settlement funds, which are paid in annual installments over a 25-year period. Fit Together, a partnership of the NC Health and Wellness Trust Fund (HWTF) and Blue Cross and Blue Shield of North Carolina (BCBSNC) 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. Fit Community is one component of the jointly sponsored Fit Together initiative, a statewide prevention campaign designed to raise awareness about obesity and to equip individuals, families and communities with the tools they need to address this important issue. All North Carolina municipalities and counties are eligible to apply for a Fit Community designation, which will be awarded to those that have excelled in supporting physical activity, healthy eating and tobacco use prevention in communities, schools, and workplaces.

  Designations are valid for two years, and designated communities may have the opportunity to reapply for subsequent two-year extensions. The benefits of being a Fit Community include heightened statewide attention that can help bolster local community development and/or economic investment initiatives (highway signage and a plaque for the Mayor's or County Commission Chair's office will be provided), as well as the use of the Fit Community designation logo for promotional and communication purposes.

The application for Fit Community designation is available on the Fit Together Web site: http://www.fittogethernc.org/home.aspx. Fit Community grants are designed to support innovative strategies that help a community meet its goal to becoming a Fit Community. Eight to nine, two-year grants of up to $30,000 annually will be awarded to applicants that have a demonstrated need, proven capacity, and opportunity for positive change in addressing physical activity and/or healthy eating.

**Private Funding and Partnerships.** Another method of funding pedestrian systems and greenway trails is to partner with public agencies, private companies and/or not-for-profit organizations. Contrary to NCDOT and federal funding, most private funding sources offer limited grants. In addition, public-private partnerships engender a spirit of cooperation, civic pride and community participation. The key to the involvement of private partners is to make a compelling argument for their participation. Major employers and developers should be identified and provided with a "Benefits of Walking" handout for themselves and their employees. Very specific routes that make critical connections to place of business would be targeted for private partners' monetary support following a successful master planning effort. Potential partners include major employers that are located along or accessible to pedestrian facilities such as multi-use paths or greenways. Name recognition for corporate partnerships could be accomplished through trailhead signage or interpretive signage along greenway systems. Utilities often make good partners and many trails now share corridors with them. Money raised from providing an easement to utilities can help defray the costs of maintenance. It is important to have a lawyer review the legal agreement and verify ownership of the subsurface, surface or air rights in order to enter into an agreement. The following paragraph provides a description of some private funding sources that Rolesville might consider.

- **Local Trail Sponsors.** A sponsorship program for trail amenities allows smaller donations to be received from both individuals and businesses. Cash donations could be placed into a trust fund to be accessed for certain construction or acquisition projects associated with the

greenways and open space system. Some recognition of the donors is appropriate and can be accomplished through the placement of a plaque, the naming of a trail segment, and/or special recognition at an opening ceremony. Types of gifts other than cash could include donations of services, equipment, labor, or reduced costs for supplies.

- **Volunteer Work.** It is expected that many citizens will be excited about the development of a greenway corridor. Individual volunteers from the community can be brought together with groups of volunteers form church groups, civic groups, scout troops and environmental groups to work on greenway development on special community work days. Volunteers can also be used for fund-raising, maintenance, and programming needs.
- **Private Foundations and Organizations.** Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are a few examples of private funding opportunities available in North Carolina.
  - *Z. Smith Reynolds Foundation.* This Winston-Salem based Foundation has been assisting the environmental projects of local governments and non-profits in North Carolina for many years. The foundation has two grant cycles per year and generally does not fund land acquisition. However, the foundation may be able to support municipalities in other areas of greenways development. More information is available at www.zsr.org.
  - *North Carolina Community Foundation.* The North Carolina Community Foundation, established in 1988, is a statewide foundation seeking gifts from individuals, corporations, and other foundations to build endowments and ensure financial security for nonprofit organizations and institutions throughout the state. Based in Raleigh, North Carolina, the foundation also manages a number of community affiliates throughout North Carolina that make grants in the areas of human services, education, health, arts, religion, civic affairs, and the conservation and preservation of historical, cultural, and environmental resources. In addition, the foundation manages various scholarship programs statewide. Web site: http://nccommunityfoundation.org.

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

### 5.4 Conclusion

Using this Bicycle Plan as a guide, the Town of Rolesville should be able to create a better, safer network of sidewalks, greenway trails, paths, and crossings for pedestrians. The Town's next steps should begin to immediately address the short-term priority program, policy, and project recommendations. At the same time, the Town should also start to lay the groundwork for the longer-term recommendations by developing relationships with potential partners such as the Rolesville Chamber of Commerce, the Wake County Health Department, and by starting to budget for future projects. Most importantly, the Town should continue its efforts to raise awareness about the importance of making a community more "bikable" in order to continue to cultivate support for more pedestrian improvements and programs. Residents, visitors, and local

leaders should be familiar with the economic, health, and environmental benefits of a community in which there is less dependence on automobiles and more reliance on foot travel as not only a form of recreation, but also as a form of transportation.

As a small Town realizing significant growth and development, Rolesville is at a critical crossroads that has to be negotiated in order to develop a better, safer, and more encouraging bicycle community. The Town should capitalize on its location to reinforce its existing pedestrian infrastructure with new projects and improvements. With careful planning, deliberate steps and persistence, Rolesville can become a more bike-friendly community.