

Town of Wake Forest

Bicycle Plan

Executive Summary

Town of Wake Forest • November 18, 2008

Executive Summary



Recognizable Sights that recall the Town's history: the Southeastern Baptist Seminary (top) and downtown are familiar images. New residential subdivisions and shopping centers have not diminished their importance as cycling destinations.

In October of 2006, the Town of Wake Forest commenced the development of a comprehensive bicycle plan, the first in the Town's 126-year history. Wake Forest is an historic education center, shaped partly by the Raleigh and Gaston Railroad (and the students that had to walk from the closest station in Forestville to reach the boys' school in Wake Forest). Walking and bicycling were and should be popular activities. Short distances between destinations, conveniently located public schools, climate, and topography are all favorable factors for riding bicycles in Wake Forest. The Bicycle Plan ("Plan") provides a framework for making bicycling better and more popular for residents, businesses and visitors.

This Executive Summary briefly outlines the main activities, findings, and recommendations from the Plan's eight sections. Additional material is found in each section, as well as the appendices. Each section is prefaced with a brief thumbnail sketch of its contents, as well as a slightly more detailed introduction. The Town of Wake Forest Planning and Zoning Department encourages the reader to contact them for additional information about the Plan and its recommendations.

Section 1. Introduction and Goals

Wake Forest began its efforts by initially contracting with a consulting team chosen by a stakeholder committee representing local advocates, town staff, NCDOT staff, local police, public health officials and other bicycling interests. This group met for the first time in the plan development process on November 20, 2006 to identify goals and objectives for the Bicycle Plan. The success of the Bicycle Plan can be measured by how well it addresses the following goals (*refer to Section 1 for the complete description of each goal*):

1. Regional connections – The Plan will identify on-road and off-road bike routes that provide family-friendly, regional connections between attractions (parks, schools, greenways) in Wake Forest and the rest of the Triangle area, especially Raleigh.

2. Safety for all skills and purposes – The Plan will ensure safety for users of all skill levels on existing and proposed bicycle facilities through infrastructure improvements, education programs and other measures necessary to create an environment where children, adults and seniors can ride safely in town.

3. An attitude of acceptance – The recommendations of the Bicycle Plan will help to foster a community of respectful cyclists and motorists, obeying laws communicated by educational programs, enforcement measures and signage.

4. Improvements to existing facilities – Roadways and greenways will be maintained and enhanced to accommodate cyclists

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through resurfacing, re-striping, bike lane installations, signed bicycle routes and appropriate lane widths.

5. Construction of new projects – Recommendations include on-road and off-road facilities such as greenways, bike lanes, rail-trails, and mountain biking facilities that serve and interconnect major destinations.

Section 2. Current Conditions

Most bicycling, and almost all *safe* bicycling, occurs on roads and well-designed trails. Section 2 relates the types of roadways in Wake Forest by street classification; illustrates the various levels of “design cyclists” and how they operate at different skill levels; and links existing and proposed bicycle facilities contained in the *Wake Forest Transportation Plan (2003)* and *Open Space and Greenways Plan (2004)* with primary destinations and corridors in the Town.

Section 2 also represents the key demographic characteristics of Wake Forest that may significantly affect bicycling considerations. Some of the significant findings are that Wake Forest, like most North Carolina and southeastern towns and cities, is dominated by automobile travel, even for short distances. All of this driving in cars – usually done alone – results in a significant cost in travel time delay. Wake Forest commuters spend considerably more time in their cars than do their counterparts in other North Carolina communities (on average, 30 minutes for a one-way commute). Although part of this longer commute can be explained by the high number of commuters with destinations outside of the town limits, there are many other destinations – shopping, schools, parks, the library, and their accompanying job opportunities – that can be reached easily by bicycle.

A survey of 193 respondents revealed a number of interesting facts about bicycling and bicyclists’ perceptions of the Town.

Survey Respondents Ride Bicycles. Eighty-one percent (81%) of respondents noted that they had ridden a bicycle in the past six months; nearly 12% cited that they had ridden to work but most stayed within their own neighborhoods.

Some Don’t Because It’s Not Safe. Of the 19% that stated they hadn’t ridden a bicycle recently, the majority cited “unsafe conditions” as the primary reason (see chart at right).

Need for More Facilities. Respondents indicated a near-universal desire (only one dissenting vote out of 157 responses) for more greenways; nearly as many (95%) indicated a desire for more on-road bicycle lanes.

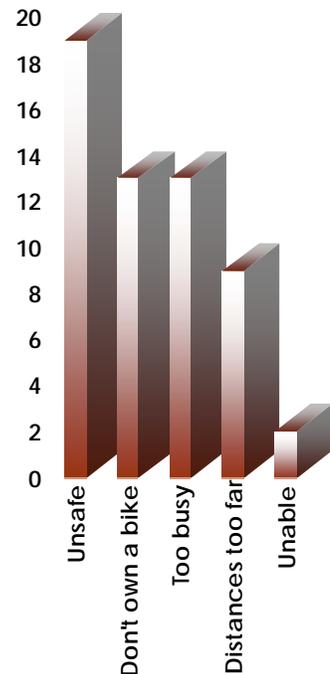
Most People Think Bicycling Conditions Could Be Safer. Two-thirds of the respondents said that they felt riding a bicycle in Wake Forest was not safe; the most popular stated reason why is that the lanes are too narrow.

About the Survey Respondents. Most (60%) of the respondents were male, and most (67%) were in the age range of 30 to 49 years – but 18% were over 50 years old.

GREENWAY PRIORITIES

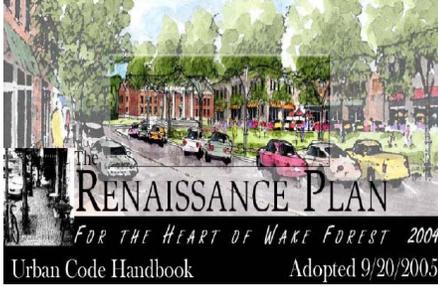
- ♦ Smith Creek
- ♦ Neuse River Trail
- ♦ Richland Creek
- ♦ Horse Creek
- ♦ Tom’s Creek
- ♦ Sanford Creek

Figure S-1: Selected Survey Results



Thirty-six (19%) survey respondents hadn't ridden a bicycle in the past six months, most of whom said conditions were not safe.





The Renaissance Plan for the Heart of Wake Forest, winner of the 2005 Marvin Collins Outstanding Planning Award, provided a number of key recommendations for downtown Wake Forest, including intersection improvements, street realignments/re-design, and aesthetic enhancements that would affect the bicycling environment.

Section 3. Existing Policies, Plans, and Programs

The purpose of Section 3 was to conduct a review of the plans, policies and programs sponsored by Wake Forest, the State of North Carolina, and other entities that affect the bicycling related policy recommendations of the Bicycle Plan. This section addresses any potential conflicts and areas where policies and plans could be strengthened in future updates. The documents reviewed and commented upon included the following:

- ◆ North Carolina State laws and regulations;
- ◆ Wake Forest *Manual of Specifications, Standards, and Design* (2000);
- ◆ Wake Forest *Code of Ordinances*, especially those dealing with transportation provisions;
- ◆ *Open Space and Greenway Plan* (2002);
- ◆ *NC 98 Master Plan* (2003);
- ◆ *Wake Forest Transportation Plan* (2003);
- ◆ *Renaissance Plan for the Heart of Wake Forest* (2005);
- ◆ *Master Parks and Recreation Plan* (2005);
- ◆ *CAMPO Bicycle and Pedestrian Plan*; and
- ◆ *Pedestrian Plan* (2006).

Specific suggestions stemming from this policy review especially noted that greenway facilities and connections, like sidewalks, should be provided in new developments. Long-term maintenance arrangements should also be pursued. Stronger, more frequent coordination between the State (NCDOT) and Town would help to focus attention on the maintenance of critical on-road bicycle facilities.

Section 4. Project Development

Bicycle projects can be funded in many different ways, and this section focuses primarily on the public funding venues available to Wake Forest. Funding is generally not adequate to meet state and local needs, so it is especially critical that the recommendations and design of the Bicycle Plan recognize those limitations and maximize the Town’s potential for both acquiring project funding and integrating bikeways into ongoing projects.

For larger on- and off-road bicycle facilities, the North Carolina Department of Transportation is the primary funding entity. The following table illustrates bicycle-related projects shown currently on the State’s Transportation Improvement Program (TIP).

Table S-1: Major Transportation Improvement Projects (TIP)

TIP No.	Incidental	Bicycle Related Improvements
None Assigned	E. Juniper Ave: N. White St to Town Limits	Bicycle Safety Improvements
None Assigned	N. Allen Road	Wide Paved Shoulders
None Assigned	S. Franklin St. Ext: E. Holding Ave to Forestville Rd./Rogers Rd.	Bicycle Safety Improvements
R-2809	NC 98 Bypass west of Thompson Mill Rd. to east of Jones Dairy Rd.	Pedestrian/Bike Path
R-3600	US 1A: Capital Blvd to NC 98 Bypass	Widen - Include Bike Lanes
None Assigned	Stadium Dr: US 1 to Central Business District	Bicycle Safety Improvements
E-4756*	Old Mill Stream Greenway (0.5 miles) - COMPLETE	Pedestrian/Bike Path



TIP No.	Independent	Bicycle Related Improvements
E-4708	Wake Forest Bypass Greenway	Scheduled for Feasibility Study
Bridge Projects		Bicycle Related Improvements
NC Moving Ahead	Replace Bridge on Stadium Drive over Richland Creek	Include Bike Facilities / Design
B-3705	Replace Bridge on Burlington Mills over Smiths Creek	Include Bike Facilities / Design
B-3919	Replace Two Bridges on Jones Dairy Road over Austin Creek and Smiths Creek	Include Bike Facilities / Design

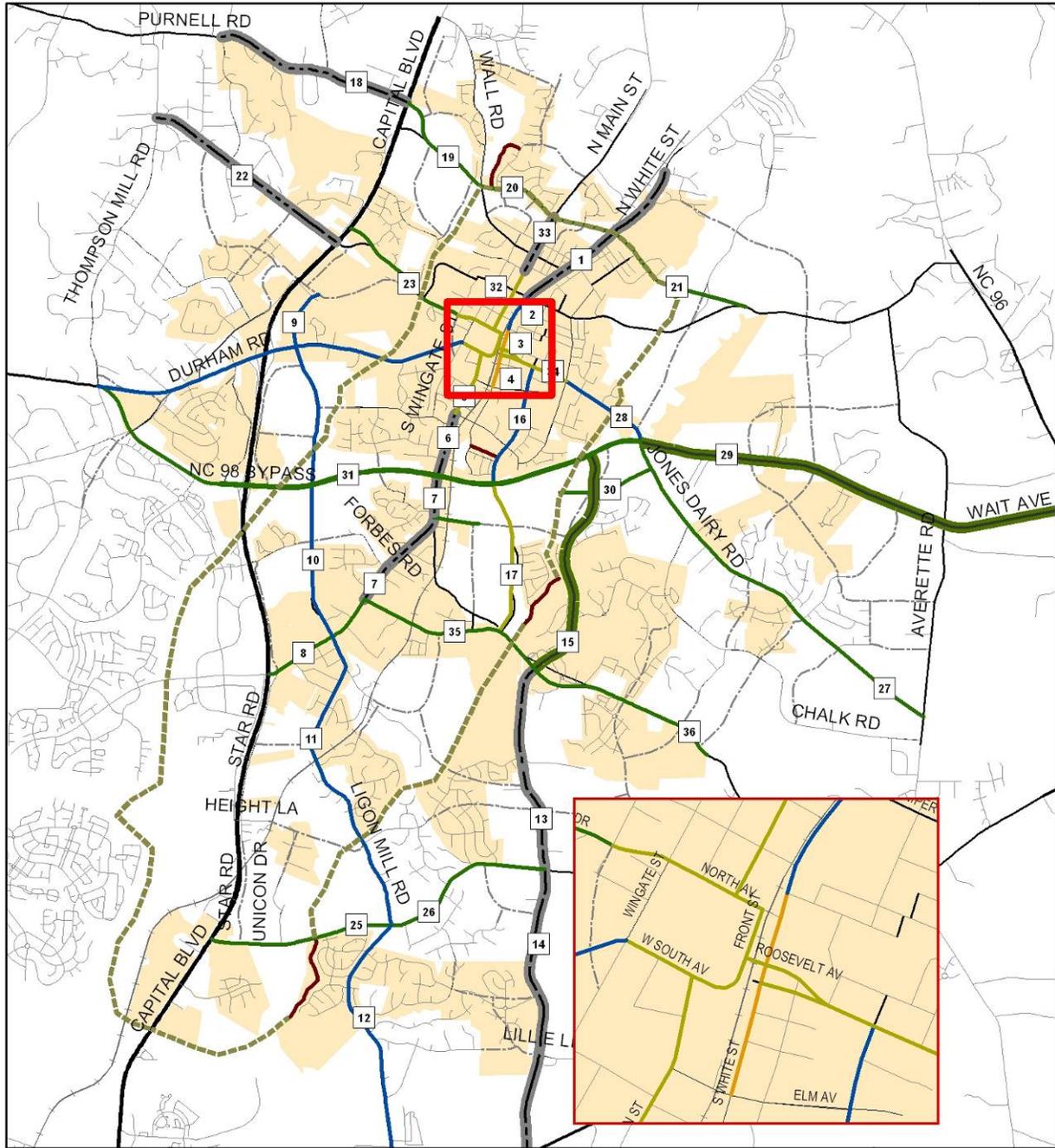
Incidental projects are those that occur as part of a roadway improvement; Independent projects are bicycle projects constructed without any accompanying improvements to a roadway or roadway capacity. The Town of Wake Forest has also identified a number of greenway and bicycle/pedestrian corridor priorities not yet on the TIP or otherwise funded.

As a part of the Bicycle Plan, a number of recommendations have been made for project construction and facility improvements; these are shown in Table S-2, below. A separate phasing plan was also developed to facilitate the more timely construction of these priority projects as shown in the following table.

Table S-2. Top Bicycle Facility Priorities.

Location	Length (mi.)	Purpose/Connections
<i>Off-road</i>		
Inner Greenway Loop	5.79	<i>Greenway loop around downtown area, connecting to commercial, residential, recreational areas</i>
Outer Greenway Loop	9.47	<i>Greenway loop extending from downtown area out to southern Wake Forest and the Raleigh greenway system</i>
Greenway along NC 98	4.24	<i>Greenway extending along the new NC 98 bypass to connect from Jones Dairy Road intersection to Main Street</i>
Neuse River Trail Connection	1.23	<i>Regional greenway connection from US-1 to Smith Creek, bridge connection to the Smith Creek trail and trailhead parking with kiosk.</i>
<i>On-Road</i>		
Main Street: Capital to Downtown	3.8	<i>Connections to commercial development along Main Street from residential development leading into downtown. Also connection to Wake Forest High School.</i>
Rogers Road: Main Street to Forestville Road	2.98	<i>Connections from residential development to commercial development along Rogers Road and also to Heritage School</i>
Wait/Roosevelt Avenue: Main Street to NC 98	1.25	<i>Connections from proposed Smith Creek Greenway to downtown, Wake Forest Public Library, and residential development</i>
White Street: Elm Avenue to Town Limits	2.26	<i>Connections from residential development to J.B. Flaherty Park, the DuBois Center and Forest Pines School, downtown, and Wake Forest Seminary School</i>
Harris Road: Capital Blvd. to Oak Street	0.82	<i>Connections between proposed Joyner Park, proposed greenway to Richland Creek Greenway area, downtown, and nearby residential development</i>
Ligon Mill Extension: Main Street to Durham Road	2.59	<i>Opportunity for an off-Capital Blvd/US 1 connection between commercial development on Main Street, nearby residential development, and Wake Forest High School</i>
Ligon Mill: Louisburg Road to Main Street	4.05	<i>Connections to residential development, proposed Smith Creek greenway, commercial development along Main Street, downtown, and Raleigh Greenways system</i>
<i>Intersection</i>		
Intersection of Main Street and US 1/Capital Blvd.	n/a	<i>Connection from Wakefield to commercial area along Capital Blvd and Main Street, as well as into downtown Wake Forest</i>





Legend

Ultimate Treatment

- Bike Lanes
- Wide Striped Shoulder
- Sharrows
- Shared Lanes
- Multi-Purpose Path
- Multi-Purpose Path, Wide Striped Shoulder
- Greenway (new location)

- Existing Greenway
- Future Road on New Location
- Town Limits



Figure S-2. Recommended Bicycle Projects.



Section 5: Project Priorities

In order to implement bicycle improvement projects, the Town must have basic priorities and cost estimates. Section 5 provides a table of cost estimates for each of the phases of the projects discussed in Section 4, and also organizes the projects into short-term, mid-term, and long-term priorities. Table S-3 through Table S-5 below provide short-, mid-, and long-term priorities for the projects, along with basic cost estimates.

Generally, itemized cost assumptions are shown as follows:

Bicycle Lanes (on existing road) are assumed to include the following items:

- ◆ Existing Striping removal and re-application: \$3 per linear foot
- ◆ Signage, which is placed every mile and at the start end of a route: \$250 per sign
- ◆ On-pavement symbols, placed every 1300 feet: \$250 per symbol

Sharrow Pavement Markings: \$250 each (sharrows should be placed every 250-500 feet)

Share the Road Signage: \$250 per sign

New Greenway/Multi-Use Trail Construction: \$700,000 per mile

Table S-3. Short-term on-road project priorities in Wake Forest.

Map ID	Segment	Bicycle Plan Recommendation	Cost Estimate
1	N White Street – County line to Juniper Ave (1.35 Miles)	35 mph; 50’ back-to-back, two-lane street with center turn lane and Wide Striped Shoulder to accommodate Fast Commuter Cyclists.	Cost (including signage) incidental to roadway widening as recommended in Transportation Plan.
		    	
2	N White Street – Juniper Ave. to Spring St. (0.27 Miles)	Bike Lanes to accommodate Leisure Cyclists.	Cost (including signage) incidental to roadway widening as recommended in Transportation Plan.
		 	
3	N White Street – Spring St. to Roosevelt Ave (0.15 Miles)	Wide striped shoulders; sharrow markings adjacent to on-street parking. White Street Streetscape Plan to accommodate Utility Cyclists.	No additional cost. Shared lane part of Streetscape Plan.
		   	
4	S White Street – Roosevelt Ave to Elm Ave (0.28 Miles)	Sharrow markings. White Street Streetscape Plan to accommodate Utility Cyclists.	No additional cost. Shared lane part of Streetscape Plan.
		  	
5	S. Main Street – South Ave to Holding Ave (0.47 Miles)	Shared lanes with sharrow markings adjacent to on-street parking.	Portion of cost will be incidental to Transportation Plan project to reconfigure striping without parking. Estimated cost of 20 sharrows (\$250 each, placed every 250 ft and at intersections): \$5,000.
		   	
6	S. Main Street – Holding Ave to 98 Bypass (0.46 Miles)	Reconfigure center turn lane for consistent Wide Striped Shoulder to accommodate Utility Cyclists.	Cost (including signage) incidental to roadway restriping as recommended in Transportation Plan.
		   	
7	S. Main Street – 98 Bypass to Rogers Rd (1.07 Miles)	Construction Plans are being prepared for a three-lane configuration to provide a 48’ back-to-back section with 11’ center turn lane and Wide Striped Shoulders to accommodate Utility Cyclists.	Cost (including signage) incidental to roadway widening as recommended in Transportation Plan.
		    	

Table S-3. Short-term on-road project priorities in Wake Forest.

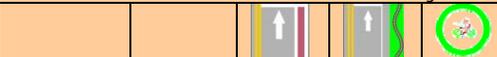
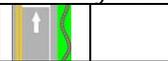
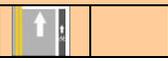
Map ID	Segment	Bicycle Plan Recommendation	Cost Estimate
8	S Main Street – Rogers Rd to Capital Blvd (0.89 Miles)	Bike Lanes with transition at Rogers Road intersection to dual adjacent multi-purpose trails to accommodate Leisure Cyclists and pedestrians. Driveway treatments including colored aprons and signage as well. 	Construction (material and labor) cost of two, 0.89 mile long, multi-purpose paths: \$623,000. Additional ROW purchase may also be necessary.
11	Ligon Mill Road – S Main St to Burlington Mills Rd (2.3 Miles)	Reconfigure lanes to provide bike lanes in 46-52' back-to-back cross section to accommodate Utility / Leisure Cyclists. 	Cost (including signage) incidental to roadway widening as recommended in Transportation Plan.
23	Stadium Drive – Capital Blvd to Rock Springs Rd (1.00 Miles)	Provide a 46' - 52' cross-section to accommodate Wide Striped Shoulders for Utility Cyclists. Provide 10' multi-purpose path on south side for Leisure Cyclists. 	Portion of cost (including signage) will be incidental to the Transportation Plan widening project. Estimated cost of one additional, 1 mile long multi-purpose path: \$700,000.
24	Stadium Drive – Rock Springs Rd to Wingate St (0.12 Miles)	Sharrow markings to accommodate Leisure Cyclists; reduce speed to 25 mph, 3 lanes at 11' wide, with angle parking on one side or on street parking on both sides. 	Differs from Transportation Plan. Some cost will be incidental to restriping & widening. Estimated cost of 6 additional sharrow markings: \$1,500 (\$250 each, placed every 250 ft and at intersections).
35	Rogers Road – Main Street to Heritage Lake Road (3500' east of Forestville Road) (1.39 Miles)	Amend to provide 73' back-to-back cross section with Wide Striped Shoulders to accommodate Utility and Fast Commuter Cyclists. Provide 10' multi-use path to accommodate Child / Leisure Cyclists. 	Construction (material and labor) cost of one, 1.39 mile long, multi-purpose path: \$973,000. Additional ROW purchase may also be necessary.



Table S-4. Mid-term on-road project priorities in Wake Forest.

Map ID	Segment	Ultimate Recommendations	Cost Estimate
9	Ligon Mill Road – Agora Dr to Durham Rd (0.45 Miles)	Reconfigure lanes to provide bike lanes in 46-48' back-to-back cross-section for Utility Cyclists.	Cost (including signage) incidental to roadway construction as recommended in Transportation Plan. Additional 2 bike lane symbols: \$500 (\$250 per symbol, placed every 250 feet and at all intersections)
			
10	Ligon Mill Road – Durham Rd to S Main St (2.15 Miles)	Reconfigure lanes & median to provide bike lanes for Utility Cyclists.	Cost (including signage) incidental to roadway construction as recommended in Transportation Plan. Additional 18 bike lane pavement markings: \$4,500 (\$250 per symbol, placed every 1300 feet and at all intersections)
			
36	Rogers Road – Heritage Lake Road to Town Limits (1.43 Miles)	Provide 73' back-to-back cross-section with Wide Striped Shoulders to accommodate Utility and Fast Commuter Cyclists. Provide 10' multi-use path to accommodate Child / Leisure Cyclists.	No increase in Transportation Plan project cost.
			

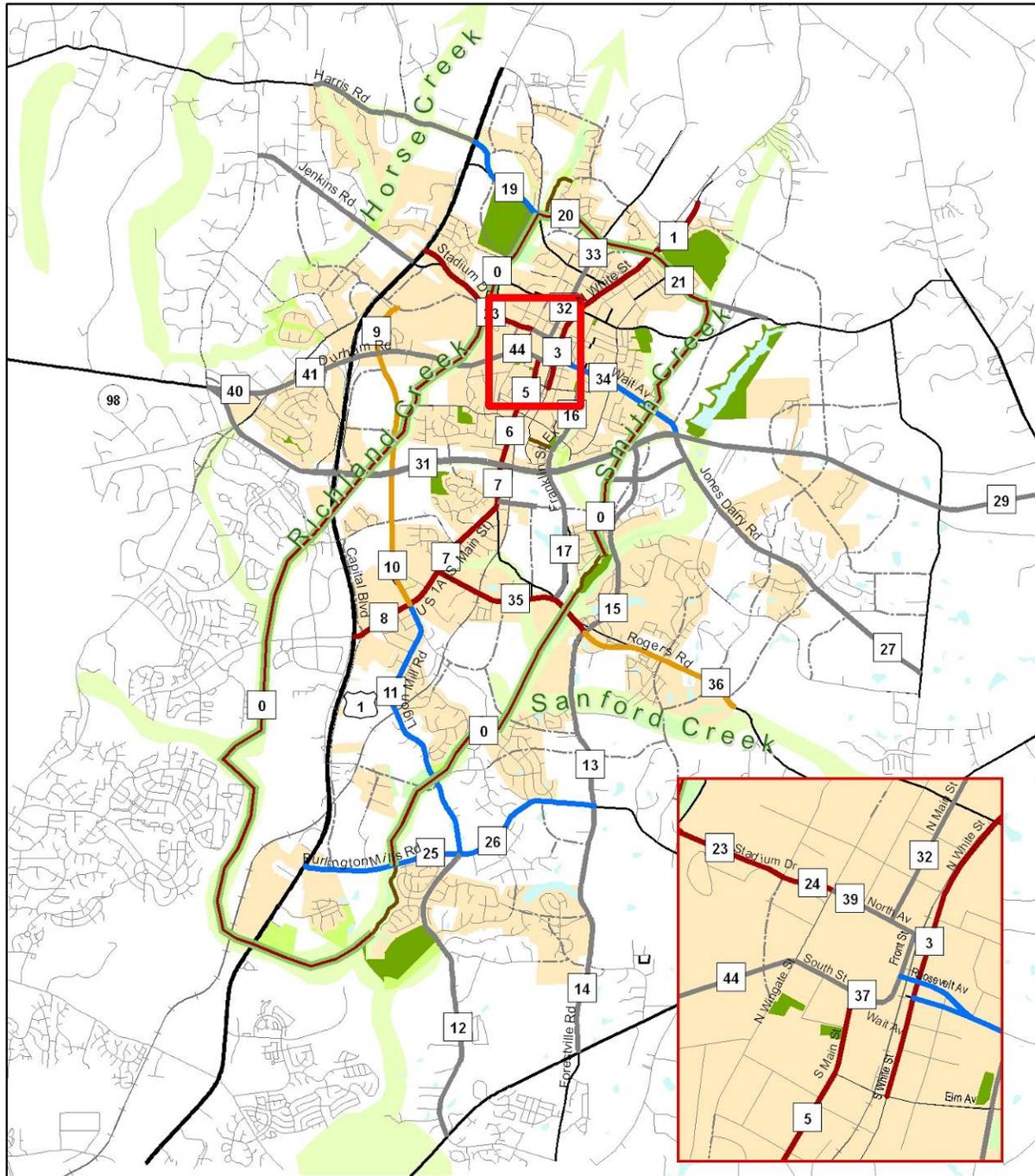
Table S-5. Long-term on-road project priorities in Wake Forest.

Map ID	Segment	Ultimate Recommendations	Cost Estimate
19	Harris Road – Capital Blvd to Oak St (0.83 Miles)	10' multi-purpose path on north side to accommodate Leisure Cyclists. 	Construction (material and labor) cost of one, 0.83 mile long, multi-purpose path: \$581,000.
25	Burlington Mills Road – Capital Blvd to Ligon Mill Rd (1.3 Miles)	Provide 73' - 77' back-to-back cross-section with Wide Striped Shoulders to accommodate Utility and Fast Commuter Cyclists. 10' multi-purpose path to accommodate Leisure Cyclists. 	Portion of cost will be incidental to the Transportation Plan widening project. Estimated cost of one additional, 1.3 miles long multi-purpose path: \$910,000.
26	Burlington Mills Road –Ligon Mill Rd to Forestville Rd (1.28 Miles)	Provide 73' - 77' back-to-back cross-section with Wide Striped Shoulders to accommodate Utility and Fast Commuter Cyclists. 10' multi-purpose path to accommodate Leisure Cyclists. 	Portion of cost will be incidental to the Transportation Plan widening project. Estimated cost of one additional, 1.28 miles long multi-purpose path: \$896,000.
28	East Wait Avenue (NC 98) – Allen Rd to Jones Dairy Rd (0.7 Miles)	Provide 46' – 49' back-to-back with Bike Lanes to accommodate Leisure Cyclists. 	Portion of cost (including signage) incidental to roadway widening as recommended in Transportation Plan. Additional 6 bike lane symbols: \$1,500.
34	Roosevelt Avenue/Wait Avenue – Front Street to Allen Road (0.51 Miles)	Sharrows and STR signage from Front St to Franklin St; Bike lanes from Franklin St to Allen Rd to accommodate Utility Cyclists. 	Some costs (including signage) incidental to roadway restriping as recommended in Transportation Plan. Estimated cost of 12 sharrows: \$5,500.

Recommended Treatments Legend:

-  Bike Lanes
-  10' Multi-Purpose Path
-  Sharrows (Shared lane markings)
-  Landscaping
-  Paved Shoulders
-  Wide Striped Shoulders
-  Share the Road Signage
-  Recommended Speed Limit





Legend

- | | |
|----------------------------------|-----------------------------|
| Proposed Project Priority | Existing Greenway |
| Short-Term | Future Road on New Location |
| Short-Term (Greenway) | Town Limits |
| Mid-Term | |
| Long-Term | |
| Unassigned | |

This map indicates the major project priorities that originated from the Wake Forest Bicycle Plan. The following are term descriptions suggested for these projects. Even for those projects labeled as "Unassigned," any roadway improvement should include the provisions recommended in the Bicycle Plan.

Short-Term: 0-5 Years
 Mid-Term: 6-10 Years
 Long-Term: Greater than 10 Years
 Unassigned: No Priority Provided

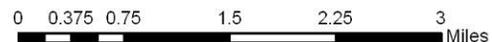


Figure S-3. Bicycle Project Priorities.



Section 6. Programs and Ancillary Facilities Recommendations

A bicycle-friendly community is not created overnight, nor is it created simply through constructing bicycle lanes. A bicycle-friendly community also has programs and policies which support and promote cycling. Section 6 outlines programs and opportunities which will greatly enhance those facilities that are present and those that are recommended for the future. Each program is characterized as serving one or more of the “Three E’s” of bicycle development: *Encouragement* of more people to ride bicycles more often; *Education* of bicyclists, pedestrians and drivers on safe, considerate behavior; and *Enforcement* of existing bicycle and motorist laws.



Great Places Can Be Made Even Better for cycling with enhancements like parking and landscaping.

Programs intended to educate, encourage, and/or enforce aspects of a safe bicycling environment.

Program Action: Establish a Safe Routes to School Program	Target E’s: Encouragement and Education
Program Action: Participate in Bike-to-Work Week	Target E’s: Encouragement and Education
Program Action: Establish Standing Bicycle and Pedestrian Advisory Committee	Target E’s: Encouragement, Education, and Enforcement.
Program Action: Wake Forest Bicycle-Friendly Signs	Target E’s: Encouragement and Education
Program Action: Create a Bike Rodeo Event	Target E’s: Education and Encouragement
Program Action: Create a Helmet-to-Go Program	Target E’s: Enforcement (and Education)
Program Action: Develop Pamphlets for Police to Distribute	Target E’s: Enforcement
Program Action: Monthly Bike Day	Target E’s: Encouragement
Program Action: Establish a Travel Demand Management (TDM) Program	Target E’s: Encouragement

Ancillary Facilities intended to enhance existing and future capital improvements like bicycle lanes and greenways.

Program Action: Develop a Local Bike Route System	Purpose: Formalize bicycle routes inside Wake Forest to preserve accessible routes for cyclists of all skill levels.
Program Action: Bicycle Facilities Map	Purpose: Identify bicycle facilities throughout town, such as bike rack locations, so that cyclists know which destinations and routes are most bicycle-friendly.
Program Action: Bicycle Parking Installation Program	Purpose: Provide bicycle parking at major public and private destinations in Wake Forest.
Program Action: Downtown “Green Streets” Program	Purpose: Create a series of “green streets” which are bicycle-friendly through downtown as a starter project for bicycle improvements in Town.

DESIGN PHILOSOPHIES

Greenways and On-Street Bikeways: Wake Forest will have both a complete network of greenways and trails, and a complementary network of on-street bicycling facilities....

Bicycling is "Street Legal:" All roads in Wake Forest are legal for the use of bicyclists, except those roads designated as limited access or freeway facilities....

Design for All Bicyclists: Bicyclists have a range of skill levels, from inexperienced / recreational bicyclists (especially children and seniors) to experienced cyclists....

Bicycle Accommodations: At a minimum, facilities will be designed for the use of experienced cyclists, with a goal of providing for less-experienced cyclists to the greatest extent possible....

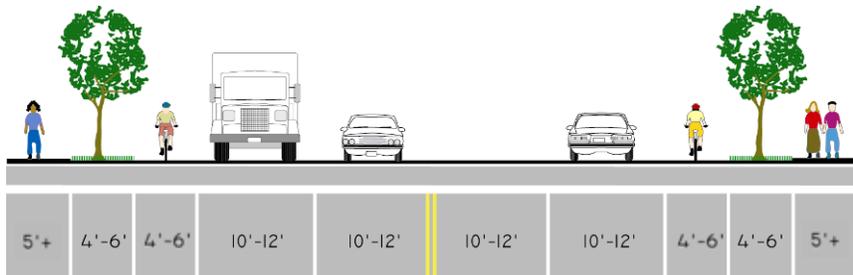
Flexibility: These guidelines are intended to be flexible and can be applied with professional judgment by project designers....

Section 7. Facility Design Guidelines

Section 7 provides guidance and illustrations for the types of facilities proposed for Wake Forest, based on five core design philosophies highlighted in the text box at left.

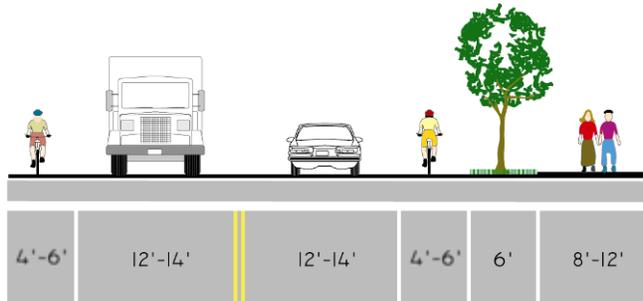
On-Street Design Guidelines

The following graphics illustrate some of the design concepts for various street types. Section 7 describes when these various designs should be applied and under what conditions.



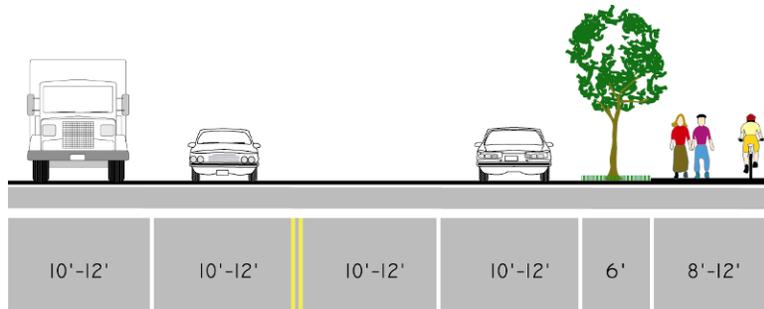
High-Volume, High-Speed Roadway

Graphic: Alta Planning + Design



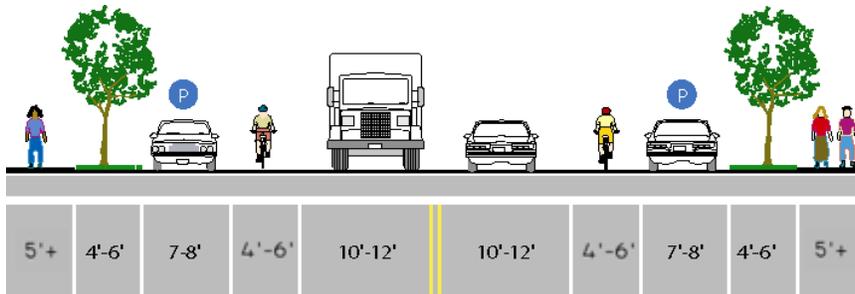
Side Path with Bike Lanes on a High-Volume, High-Speed Roadway

Graphic: Alta Planning + Design



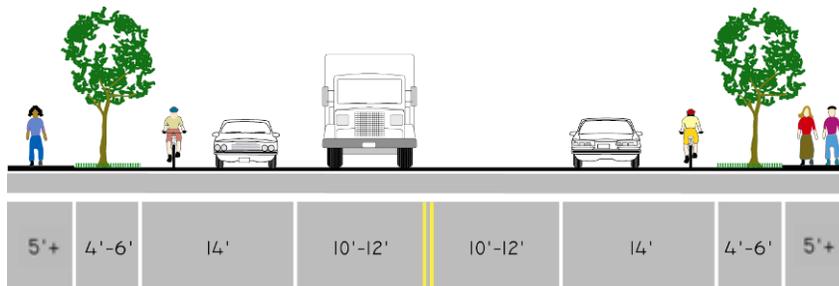
Shared Use Path on a High-Volume, High-Speed Roadway

Graphic: Alta Planning + Design



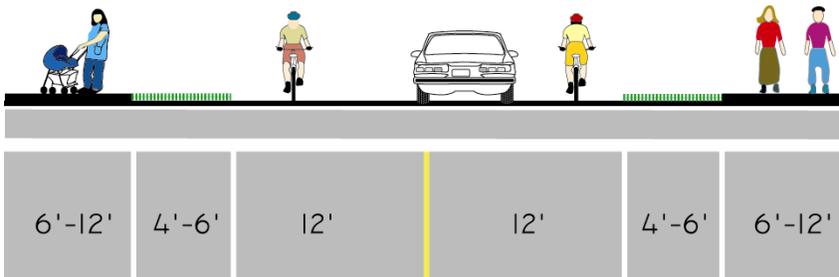
Bike Lane with On-Street Parking

Graphic: Alta Planning + Design



Wide Outside Curb Lane

Graphic: Alta Planning + Design



Neighborhood Street

Graphic: Alta Planning + Design

Additional Design Guidelines

In addition to on-road facilities, the Bicycle Plan includes off-road trails, bicycle parking and support facilities. Recommendations for the type and amount of bicycle parking, appropriate signage treatments and pavement markings are provided. Several experimental treatments are included in the set of recommendations including shared lane markings called “sharrows.” The placement of sharrows can help cyclists ride in a straight line, approximately 3ft from the curb, while also alerting motorists to expect bicyclists to be riding along the roadway. All project recommendations for “sharrows” are subject to NCDOT approval of pilot treatment or incorporation into national MUTCD design standards if used on State roads.

1. THE RACK ELEMENT

Definition: the rack element is the part of the bike rack that supports one bicycle.

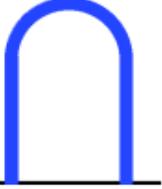
The rack element should:

- Support the bicycle upright by its frame in two places
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured
- Support bicycles without a diamond-shaped frame with a horizontal top tube (e.g. a mixte frame)
- Allow front-in parking: a U-lock should be able to lock the front wheel and the down tube of an upright bicycle
- Allow back-in parking: a U-lock should be able to lock the rear wheel and seat tube of the bicycle



Comb, toast, school-yard, and other wheel-bending racks that provide no support for the bicycle frame are NOT recommended.

The rack element should resist being cut or detached using common hand tools, especially those that can be concealed in a backpack. Such tools include bolt cutters, pipe cutters, wrenches, and pry bars.



INVERTED "U"
One rack element supports two bikes.



"A"
One rack element supports two bikes.



POST AND LOOP
One rack element supports two bikes.



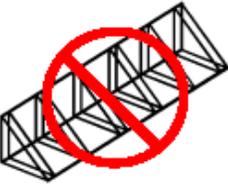
COMB
One rack element is a vertical segment of the rack.



Not recommended



WAVE
One rack element is a vertical segment of the rack.
(see additional discussion on page 3)



TOAST
One rack element holds one wheel of a bike.

Figure S-4. APBP's Recommendations for bicycle parking facilities

Section 8. Implementation

Policy, project and program recommendations of the Bicycle Plan can be implemented by a sponsoring agency or agencies. For large projects such as new greenways and on-road bike lanes, the capital expense is such that the public sector, usually NCDOT, is required to fund the project. Smaller projects and connections can be provided during the implementation of private development

projects; examples include bicycle parking installations at shopping centers and greenway connections from residential subdivisions. Section 8 describes the various funding mechanisms and how they apply to the project and program recommendations from preceding sections. This section also provides a priority listing of all projects, programs, and policies, and lists potential partners for each.

Public Sector Funding

Typical public sector funding sources include the following:

- ◆ State Transportation Improvement Program;
 - Incidental Projects
 - Independent Projects
- ◆ NCDOT Transportation Enhancement Program;
- ◆ NCDOT Spot Improvement Program;
- ◆ NCDOT Small Urban Funds;
- ◆ NCDOT Hazard Elimination Program;
- ◆ Governor's Highway Safety Program;
- ◆ Federal Statewide Discretionary Funds (STP-DA); and
- ◆ Federal Congestion Mitigation for Air Quality (CMAQ) Program

The Safe Routes to School Program also offers funding for planning and small construction efforts to make cycling near schools safer. The Capital Area Metropolitan Planning Organization (CAMPO) is an important partner on many of the state public funding sources, since CAMPO is responsible for identifying and assigning federal funding priorities for its planning region.

Private Sector Funding

Private sector funding consists mainly of grant opportunities, fundraising and new land development projects, such as shopping centers, office parks, and large residential subdivisions. The Blue Cross / Blue Shield Fit Together program and the Bikes Belong Coalition are examples of private grant opportunities. While some resources will not directly fund new projects or programs, they nevertheless represent an important opportunity to provide recognition to those people and organizations that can make a difference. Examples of recognition programs include the Robert Wood Johnson Foundation Active Living By Design Awards and the League of American Bicyclists (LAB) Bicycle-Friendly Community Program. The Town of Wake Forest could also sponsor a private development recognition program applied during the site review process to recognize those developers that go beyond minimum standards for bicycle accessibility and apply best practices in their designs. An example of such a certificate is shown at right, which encourages innovative design solutions rather than regulating best practice.



Figure S-5. Sample Access Certificate.

