



PEDESTRIAN PLAN



PEDESTRIAN PLAN



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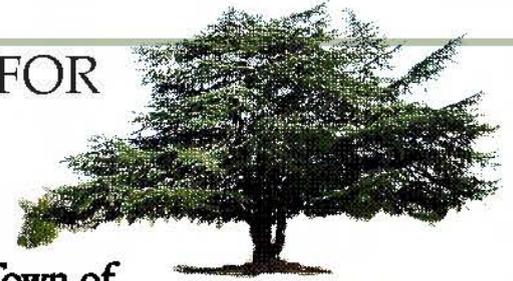
BY

FOR

GREENWAYS

INCORPORATED

Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning



Town of
Wake Forest
North Carolina



In Association
WITH

Wake Forest Pedestrian Plan Steering Committee

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Chapter 1

INTRODUCTION

1.1 Scope and Purpose

The purpose of the Pedestrian Plan is to make an accessible, safe, convenient, interconnected and functional pedestrian transportation system, ultimately contributing to a higher quality living environment. Walking is more than a means of getting from one place to another; walking facilitates healthful living habits, conserves energy while improving air quality, and builds strong communities by increasing social interaction.

The Town of Wake Forest contracted with Greenways Incorporated to prepare a pedestrian plan to guide the Town in creating a safe and convenient pedestrian network. The project was started and funded through the bicycle and pedestrian planning grant initiative of the North Carolina Department of Transportation (NCDOT). Wake Forest is located in one of the ten fastest growing counties in North Carolina and now is the time to plan for the future needs of pedestrians. The area is already experiencing tremendous growth. While there are areas where retrofit solutions will be necessary, it isn't too late to plan for a functional pedestrian system. Developing an effective plan now will reduce community costs overall as facilities can be put in place in the most effective manner, utilizing public investments in key areas and private investment as development occurs. The Wake Forest Pedestrian Plan will help Wake Forest keep its commitment to provide its citizens with a high quality living environment.

Greenways Incorporated collaborated with the Town of Wake Forest and conducted a series of meetings with the Pedestrian Plan Steering Committee, a public meeting with local citizens, and a walkability survey. Through the public involvement process, the needs of the citizens became clear. Utilizing information from fieldwork, and existing town and regional plans, Greenways Incorporated was able to assess current and

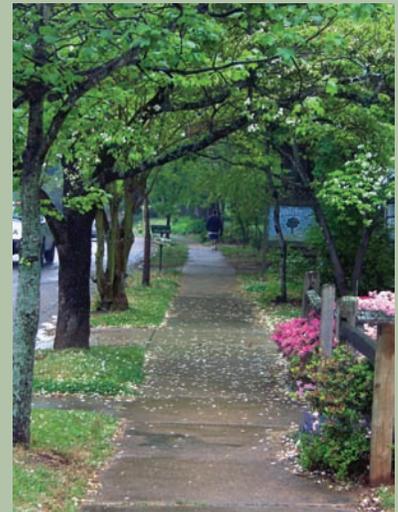


Figure 1(a):
North Main Street



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future transportation needs of the community and identify potential safety concerns.

The personal, environmental, and societal benefits of a pedestrian transportation system will only come to fruition when interconnected quality facilities are available. The Town of Wake Forest aims to achieve the goals above by improving existing facilities and identifying pedestrian corridors for future connections. The plan is organized into the following six elements:



Figure 1(b):
North Main Street

1. **Pedestrian Corridors:** Identify important pedestrian connections within the town.
2. **Improvement Projects:** Prioritize levels of improvements to the existing facilities based on community developed criteria: safety, connectivity, accessibility, proximity to key destinations, access to natural areas, and regional connections.
3. **Design Guidelines:** Provide design guidelines for future development and for retrofitting existing facilities and provide costs associated with both.
4. **Policy Recommendations:** Recommend changes in policy for future development.
5. **Funding Recommendations:** Quantify cost associated with desired facilities, alternative funding sources, and provide recommendations.
6. **Marketing:** Provide marketing strategies to promote the use of the pedestrian system.

1.2 Elements of the Plan

The first element of the plan is the identification of important pedestrian connections within the town. Town residents and Steering Committee members have expressed important destinations, such as the downtown, parks, and adjacent



neighborhoods to join via pedestrian corridors. Some existing facilities are adequate for current uses but need provisions for future growth. Most facilities have significant gaps, while others may have no connectivity at all to other areas of Wake Forest. There is a range of provisions from 'immediate fixes' to solutions ultimately achieving 'long-term connectivity' to areas within and surrounding the Town of Wake Forest.

The second element involves prioritizing implementation steps to improve existing pedestrian conditions. Priority is given to facilities lacking safe conditions or ADA accessibility and to improvements with a high amount of benefit in relation to their cost. Pedestrian facility improvements range from quick-fix projects such as maintenance or short additions to fill in gaps to large scale projects requiring coordinated public and private investment. Priorities established by the community are based on the following: safety, connectivity, accessibility, proximity to key destinations, access to natural areas and regional connections.

The third element of the plan is design guidelines for future pedestrian facilities and for retrofitting existing facilities to meet accessibility and safety standards that are consistent within the regulatory framework of AASHTO, ADA and the NCDOT. Adherence to these guidelines is a minimum. Efforts should be made to adhere to 'universal design' principles, where all products, buildings and exterior spaces are usable by all people.

The fourth element is the policy framework. To improve the aesthetics, function, and constructability of future sidewalks and trails, the plan will recommend changes to the policies regulating the location, design and construction of pedestrian facilities.

The fifth element is funding needed for desired facilities, alternative funding sources and feasible recommendations.

The sixth element is marketing strategies to promote the use of the pedestrian system. Residents and visitors will need



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to be educated about the location, safety considerations, and benefits of new and improved existing pedestrian facilities.

Throughout the production of the various elements of this plan, past planning efforts will be consulted as they provide valuable insight and background to the planning process. Various transportation plans, greenway plans, and local plans all represent important efforts and are summarized in Chapter Three: Existing Plans, Programs and Policies.

1.3 Benefits of Walking

1.3.1 Personal Health

It is well documented that an active community is a healthy community. There are numerous studies affirming that sedentary lives and prolonged periods of inactivity are major deterrents to health, sometimes doubling the risk of morbidity and mortality from coronary heart disease and stroke¹. One recent study showed that blood pressure is 25% lower in people who are physically active. With regular physical activity, people can lower their mortality rates, lower the risk for heart disease and stroke, decrease the risk for hypertension, diabetes, osteoporosis, and some cancers, reduce the symptoms of anxiety and depression, and much more².

Studies also stress the benefits of physical activity to children's health, particularly in the areas of childhood obesity and diabetes. Obesity has risen dramatically in recent years with the majority of U.S. states having obesity prevalence rates of 20% or greater³. Improving the connections between schools and neighborhoods in Wake Forest can positively influence children's health by providing opportunities to further incorporate exercise into their daily lives.

Asthma is another major concern in children's health that can be addressed through a successful pedestrian network. According to the EPA there is strong evidence that reducing air pollution from automobile use can protect children's health⁴.



*Figure 1(c):
South Avenue*



This suggests that while pedestrians are improving their own health through physical activity, they are also improving the health of those around them by not contributing to air pollution with their automobile trips.

Trends indicate a growing automobile dependency that reduces regular physical activity during daily routines. In a 2004 study, scientists at the RAND Corporation scored 38 metropolitan areas on the “sprawl index” - which was basically a measure of their dependence on cars. When researchers tallied disease rates for the same areas, people in densely populated places with sidewalks and shops had lower rates of diabetes, hypertension, heart disease and stroke, all with other risk factors aside⁵. Furthermore, the rates rose steadily as communities became more spread-out and less walkable. Opportunities exist for positive transportation reform that supports more active lifestyles. The Wake Forest Pedestrian Plan aims to guide this positive reformation.

1.3.2 Environmental Benefits

Replacing some car trips with alternative forms of transportation, such as walking, will reduce vehicle miles and associated pollutants. According to the Pedestrian and Bicycle Information Center of Chapel Hill, NC, “60% of the pollution created by automobile emissions happens in the first few minutes of operation, before pollution control devices can work effectively”. This makes short car trips as polluting as many long car trips. About 40% of all car trips are shorter than 2 miles, which equates to a 10-minute bike ride or a 30-minute walk⁶. A viable alternative transportation system can replace these short car trips, effectively reducing pollution.

1.3.3 Community Benefits

Pedestrian facility networks that link people from their neighborhoods to their daily destination points contribute to the overall livability of the region and help to create strong communities. Walking is a way for residents to regularly interact socially with other residents in the community. Whether someone is walking to work or walking the dog,



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pedestrians are more likely to interact with one another than with someone passing by in a car. In short, walking builds social capital.

Pedestrian facilities can also link people to parks, streams, and other open spaces. Having convenient pedestrian access to such green spaces is also a major benefit to the community.

1.3.4 Transportation Alternatives

Walking can also be a viable transportation option. Creating safe pedestrian systems enables those who do not drive to be active in society. People may not drive for many reasons, including but not limited to economic reasons, physical ability, or personal preference. According to the 2001 National Household Travel Survey conducted by the US Department of Transportation, 7% of U.S. households do not own an automobile. In light of this, designing the facilities to create the option of walking is important. A recent study indicated that “75% of adult respondents believe that their communities and the State (North Carolina) should spend more money to improve conditions for bicycling and walking”⁷. (*Statewide Survey on Bicycling and Walking, 2000*).

1.4 The Planning Process

The Town of Wake Forest obtained the services of Greenways Incorporated to assist the community in developing a Pedestrian Plan that will encourage the aforementioned benefits of a walkable community. The planning process for the Plan consists of the following tasks: 1) Project Kick-Off and Steering Committee Meetings, 2) Data Collection and Evaluation of Current Conditions, Existing Plans, Programs, and Policies, 3) Public Involvement, 4) Preparation of the Draft Plan Report and Map, 5) Client Review, and 6) Completion of the Final Plan Report and Maps. The last step of the planning process includes a presentation of the final plan to the Wake Forest Planning Board and the Town Council for adoption.



1.5 Goals and Objectives

The following goals and objectives for this Plan are a combination of ideas from the Steering Committee and general public.

- Provide more walking opportunities to promote healthy lifestyles
- Provide safer walking environments
- Build a sense of community
- Improve connectivity and fill gaps of sidewalk and greenway system to allow for viable alternative transportation options
- Improve pedestrian system for economic development and overall desirability of the Town
- Build a sense of community
- Improve accessibility for children, elderly, and the handicapped



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Additional Resources:

www.walkinginfo.org

The Pedestrian and Bicycle Information Center website.

http://www.ncdot.org/transit/bicycle/laws/laws_pedlaws.html

North Carolina Department of Transportation website with pedestrian laws.

<http://www.cdc.gov/diabetes/>

Centers for Disease Control and Prevention, Department of Health and Human Services.

<http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/index.htm>

Centers for Disease Control and Prevention, Department of Health and Human Services.

Footnotes

¹ Active Living by Design. (2005) *A Primer on Active Living by Design*. Robert Wood Johnson Foundation.

² Ibid.

³ Centers for Disease Control and Prevention, Department of Health and Human Services.

⁴ U.S. Environmental Protection Agency (EPA). (2003). *Travel and Environmental Implications of School Siting*. Regarding air pollution and children's health: During the 1996 Atlanta Olympic Games, when driving was reduced and ambient ozone levels fell by 27.9 percent, emergency room visits for asthma dropped by 41.6 percent.

⁵ Sturm, Roland and Deborah Cohen. (2004). *Suburban Sprawl and Physical and Mental Health*. The RAND Corporation.

⁶ National Personal Transportation Survey (1995).

⁷ North Carolina Statewide Survey on Bicycling and Walking (2000).



Chapter 2

EXISTING CONDITIONS

2.1 General Overview

The Town of Wake Forest is situated among gently rolling hills and moderately forested land, just north of Raleigh, the state capital of North Carolina. Wake Forest encompasses approximately 12 square miles, extending from the Neuse River north to Franklin County and generally from US-1 east to the Rolesville Urban Services Area. Wake Forest first developed around Wake Forest College, the current home of the Southeast Baptist Theological Seminary and linearly along the railroad rights-of-way. This generally linear development continues along US-1 and along transportation corridors linking Wake Forest to Raleigh. The pedestrian system study area is comprised of the extra territorial jurisdiction (ETJ), the urban service area (USA) and the geographical area of Wake Forest. Pedestrian facilities within this study area include sidewalks, greenway trails and crossings.

With the Town's close proximity to Raleigh and with the expansion of Interstate 540 to Capital Boulevard, Wake Forest has experienced rapid growth over the last few years. Most residents enjoy the small town quality of life that Wake Forest offers, while still having convenient access to downtown Raleigh and the Research Triangle Park. The central core of Wake Forest is the downtown business district, which contains an array of local businesses, homes and the campus of the Southeastern Baptist Theological Seminary. This quaint area of town is filled with tree-lined streets, historical residences and businesses dating back to the 19th century, producing the small town feel to which most of Wake Forest's residents are drawn.

However, moving away from the central core of the Town, rapid suburban growth has created numerous distinct subdivisions that isolate pedestrians from downtown Wake Forest. Examples include Fair Lake and Country Club Downs to the north, west of US-1; Crenshaw Hall Plantation, Prestwicke, and St.Ives, also west of US-1; Caddell Woods, Moss Creek, Summerwoods, Carriage Run, St. Andrews Plantation, Parkside at St. Andrews, and Stonegate on the southern edge of the USA; and Bowling



Figure 2(a):
*Unsuitable Pedestrian Facilities along
Durham Road at US 1*



EXISTING CONDITIONS



Figure 2(c):
Inconsistent sidewalk
along Stadium Drive

Green, Austin Creek, and Bishops Grant east of downtown (See *Map 1: Existing Pedestrian Facilities*). One significant goal of the Wake Forest Pedestrian Plan is to modify and provide pedestrian facilities in order to link these subdivisions to one another and to Downtown, providing greater overall pedestrian connectivity.

Numerous efforts by the Town of Wake Forest have already contributed to this goal. For example, the Town proactively planned and helped to pay for two pedestrian underpasses to be built with the NC 98 Bypass, to keep it from cutting off the north to south flow of pedestrian travel. Also, newer neighborhoods, such as Heritage in the southeastern edge of Town, offer places to live, work, shop, and play, as opposed to strictly residential subdivisions that often require automobiles for fulfilling daily needs. Furthermore, efforts such as the Renaissance Plan for the Heart of Wake Forest (see *Chapter 3: Existing Plans, Programs, and Policies*) will ensure the continued development of a strong core destination for users of the future pedestrian network.

2.2 User Demographics/Current Usage

Wake Forest's rapidly growing population is primarily working, middle-upper class and young (with a town average age of 33). According to the Capitol Area Metropolitan Planning Organization (CAMPO), population projections for the Town of Wake Forest are as follows:

Population Totals: Town vs. County

	2002	2010	2020	2030
Wake Forest	17,642	25,922	35,393	37,543
Wake Co. Total	735,243	880,865	1,168,295	1,381,645

Source: CAMPO (2004). 2030 Long Range Transportation Plan: Socioeconomic Data.



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Pedestrians in Wake Forest range from children to seminary students to individuals who do not have access to a motorized vehicle. Additionally there is a significant portion of the Town's population that engages in walking for recreation. This is based largely on consultant fieldwork, public input and steering committee input.

These projections suggest that the percent change in population from 2002 to 2030 for the Town of Wake forest will be 112.8%, compared to 87.9% for the County as a whole. The Town's projected growth is primarily attributed to the close proximity of Raleigh and the Research Triangle Park, making it an ideal location for families to enjoy the benefits of being near a city while living in a small town.

The growing population will add to the many pedestrians already relying on existing facilities in the Town of Wake Forest. A pedestrian traveling any substantial distance will frequently encounter obstacles such as sidewalk gaps or inadequate crossings (missing ramps and lights without



*Figure 2(d):
Unsuitable Pedestrian Facilities along
Durham Road at US 1*



*Figure 2(e):
Smith Creek Greenway access
at Burlington Mills Road*



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pedestrian signalization). Well-worn footpaths indicate that able walkers overcome some obstacles, but when accessibility is limited, those people who are dependant on walking as a means of transportation and those with limited mobility are most greatly affected. It is clear that improvements are needed to bring existing facilities up to a level of accessibility, and that new facilities are needed to make important connections.

2.3 Community Concerns, Needs and Priorities

Greenways Incorporated gathered public concerns, needs, and priorities through the process of public meetings, steering committee meetings and walkability survey responses. These are the major concerns culled from the public involvement process:



Figure 2(f):
Accessibility issues in
Downtown Wake Forest

1. Connectivity and Convenience
 - a. Connect subdivisions to areas of interest (shopping, schools, recreational areas, transit hubs, other neighborhoods, downtown for cultural events)
 - b. Connect parks and recreation areas
 - c. Ease of access to facilities
 - d. Connect Town system to other transportation systems and modes
 - e. Make regional connections to Rolesville and Raleigh
2. Design Parameters
 - a. Require sidewalks on both sides of streets unless circumstances deem otherwise
 - b. Require sidewalks to be built with road so they connect people with destinations earlier than later



3. Pedestrian Facilities as Amenities
 - a. Create points of interest, such as resting places with benches or performance stations
 - b. Multipurpose trails for jogging, walking, bicycling, roller blading, horseback riding, etc.

2.4 Pedestrian Friendliness of Local Transportation System

The existing pedestrian system is sometimes a hostile environment with significant gaps, lack of proper separation from vehicular traffic, and poor accessibility. Although downtown sidewalks are in poor condition, this is currently the most pedestrian friendly area of town. The downtown was developed under a pedestrian oriented design model, resulting in an abundance of sidewalks, a concentration of local businesses, and slow traffic speeds.

1. Positives
 - a. Ample sidewalks inside neighborhoods
 - b. Picturesque historic downtown
 - c. Long term policy of requiring sidewalks with new development
 - d. Open space and greenway planning and development
 - e. Public investment and grantsmanship
2. Negatives
 - a. Lack of connectivity between communities, due to railroad tracks, highways, insufficient connecting sidewalks, creek crossings, and undeveloped areas
 - b. Poor sidewalk conditions
 - c. Non-compliant ADA pedestrian facilities
 - d. Crossings at street intersections
 - e. Lack of “buffer zones”



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2.5 Street and Highway System Access

Pedestrians interact with vehicular traffic at street intersections and mid-block crossings. These areas should provide for safe crossing with good visibility, clear crosswalk delineation, ramps, refuge islands, and signs and signals where appropriate to alert drivers to the presence of pedestrians. In Wake Forest, some existing intersections at thoroughfares have ample signage and pedestrian signaling, however, some crossings can be very difficult for children, the elderly, and the disabled. Capital Boulevard, a primary-major thoroughfare, is an excellent example of this condition and is lacking in all necessities of safe crossing.

2.6 Pedestrian System Access

Since the pedestrian system is designed to provide a transportation option for people, it should conveniently connect commuters and short-trip users to their destinations. Similarly, pedestrian commuters and recreational users are more likely to use the greenways and off-road trails if they are conveniently connected to work and recreation destinations.

In Wake Forest, it is fairly easy to access sidewalks within the confines of new residential developments, however, these subdivision systems do not connect with other subdivision systems nor do they join to a larger network in most cases. In some cases, there are minimal gaps between subdivision systems and greenway trails, offering opportunities for relatively simple and inexpensive fixes.

Citizens have stressed the desire to have convenient connections to key destinations such as the downtown area. For cultural events many would prefer to walk from their homes, rather than drive downtown and find parking. Stronger connections to downtown could boost business simply by improving pedestrian traffic.



Figure 2(g):
Problematic pedestrian crossing at
US 1 and South Main Street



2.7 Inventory and Assessment of Existing Facilities

The Town of Wake Forest has a significant inventory of existing pedestrian facilities, as shown in *Map 1: Existing Pedestrian Facilities*. Though Wake Forest currently has over 60 miles of sidewalks, there are many gaps that reduce overall efficiency as a network. The central business district is well connected by sidewalks, though some of the facilities are not ADA compliant and some are in poor condition due to lack of maintenance. Conversely, sidewalks in newer developments are in good condition due to their recent construction, but are poorly connected to the community at large. Finally, greenway trails are a critical component in the pedestrian system. Linkages are needed between greenways and nearby subdivisions to provide access to the larger community system.

Brief descriptions of some specific gaps, hazards, and other deficiencies in key areas of town are identified below. These specific areas were identified during the September 2005 Steering Committee meeting and were then investigated in more detail by Greenways Incorporated. The findings are as follows:

Capital Boulevard Area

Capital Boulevard runs south to north through the western side of Wake Forest. This major highway acts as a man-made barrier and hazard to pedestrians. It is flanked by intermittent shopping centers, auto dealerships and major intersections leading into Wake Forest. Two intersections on this road were investigated for their pedestrian accessibility: Capital Boulevard at South Main Street, and Capital Boulevard at Durham Road.

The intersection of Capital Boulevard and South Main Street was investigated for pedestrian access between the large commercial and retail center on the southwest corner and



Figure 2(h):
Insufficient sidewalk bordering
Wake Forest-Rolesville High School



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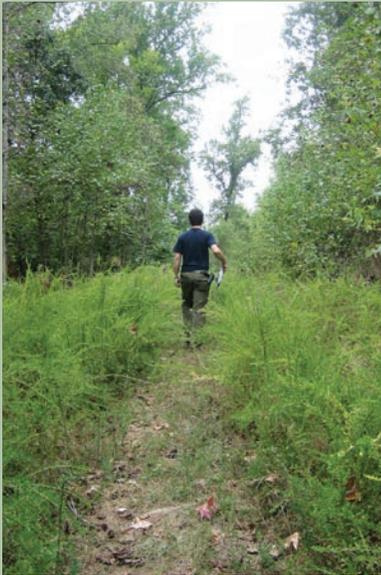


Figure 2(i):
Worn footpath through J.L. Warren Park
in Cimarron

South Main Street, which leads to downtown. Currently there are sidewalks leading to the intersection on both sides of New Falls of Neuse and on the south side of South Main Street, each of which terminates shortly before the intersection. With inadequate pedestrian facilities, the four-lane divided highway presents a highly dangerous area for pedestrian crossing. Providing safe pedestrian crossing at this intersection will require installation of multiple crosswalk facilities, such as pedestrian signalization, refuge islands, ramps, linkages, signage, and buffer zones.

The intersection of Capital Boulevard at Durham Road was investigated for pedestrian access across US-1. The Durham Road underpass creates a series of intersections at each exit ramp. At present, pedestrians are forced into the travel lane beside guardrail where barriers line the underpass. Access at this point would link non-residential development areas located at three of the four quadrants of the intersection and has the potential of connecting with Raleigh's facilities when Falls of Neuse Road intersects with Durham Road.

School Areas

Currently nine schools and one proposed school site lie within the ETJ of Wake Forest. These schools include the following:

- **Southeastern Baptist Theological Seminary**, 120 South Wingate St.
- **Forest Pines Elementary at the Dubois Center**, 530 E. Perry Ave. (temporary commuter school).
- **Heritage Elementary School**, 3500 Rogers Rd.
- **Heritage Middle School**, 3400 Rogers Rd.
- **Heritage High School**, Forestville Rd (proposed).
- **Jones Dairy Elementary**, 1100 Jones Dairy Rd.
- **Wake Forest Elementary Magnet**, 136 W. Sycamore Ave.
- **Wake Forest-Rolesville High School**, 420 W. Stadium Dr.
- **Wake Forest-Rolesville Middle School**, 1800 S. Main St.
- **Franklin Academy Elementary**, 604 S. Franklin St.
- **Franklin Academy Middle & High School**, 1127 Chalk Rd.



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Most of the schools in the ETJ have sufficient sidewalks servicing their immediate areas, with Wake Forest-Rolesville High School, on Stadium Drive and Franklin Academy on Chalk Road as exceptions.

Wake Forest-Rolesville High School is lined by Stadium Drive, which possesses short and disconnected stretches of sidewalks between Rock Spring Road and US 1. The high school backs up to an older residential subdivision without curb, gutter and sidewalk and was developed prior to adoption of current requirements for pedestrian facilities. While sidewalks generally border the other schools, their deficiencies lie in the fact that they are isolated from nearby subdivisions by a lack of connectivity. Ensuring safe routes to schools for children from nearby subdivisions is a top priority of the Wake Forest Pedestrian Plan.

Isolated Peripheral Areas

A large percentage of the subdivisions in Wake Forest have sidewalks on both sides of collector streets and on one side of local streets. However, in many instances these subdivisions are not linked to other subdivisions or other nearby destinations. This isolation discourages pedestrian travel from one place to another. One of the primary goals of the Wake Forest Pedestrian Plan is to develop a program to connect these isolated subdivisions by creating pedestrian corridors.

Cimarron is a subdivision with sidewalks on one side of most streets except for the southern length of Cimarron Parkway from Amherst Creek Drive to South Main Street. This disconnect in the pedestrian system makes it difficult for hundreds of residents to walk safely through the subdivision.

Land around Half Moon Pond was dedicated to the Town of Wake Forest in lieu of recreation facility fees when the Cimarron subdivision was approved. The Town does not plan to develop active recreation facilities at this site. The Cimarron and Forest Pointe Home Owners Associations own additional open space and common areas extending from



Figure 2(j):
Pedestrians navigating White Street

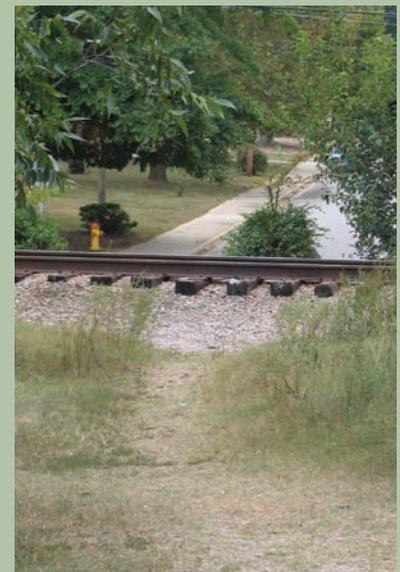


Figure 2(k):
Worn footpath over railroad tracks connecting White Street to Cedar Street



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Half Moon Pond south to South Main Street. Worn footpaths around the pond are an indication that this may be a good area to consider a public and private effort for developing connecting greenway trails to create a pedestrian corridor extending from South Main Street to NC 98 Bypass.

Another example of an isolated peripheral area is the subdivision of Crenshaw Hall Plantation. Crenshaw Hall borders the new Capital Plaza Shopping Center, however there are no established links for pedestrians to gain access from the residences to the shopping center. Crenshaw Hall Plantation is separated from Capital Plaza Shopping Center by steep slopes and a tributary creek of Richland Creek. Sidewalks along Durham Road and along the future alignment of Warmoven Street will be needed for safe pedestrian travel from Crenshaw Hall to the shops. Development currently under review includes extending Warmoven Street from the current end to Retail Drive with sidewalks on the north side of the street.



Figure 2(l):
Accessibility and safety issues in Downtown Wake Forest

The Market of Wake Forest is located on the north side of Durham road, north of Capital Plaza Shopping Center. St. Ives, Prestwicke, and Tarlton Park subdivisions are located on the north side of Wake Union Church Road in close proximity to the neighborhood shopping center. With only intermittent sidewalk sections along Wake Union Church Road and Kearny Road, and no signalized crossing, there is not an adequate pedestrian route from the residences to the shopping services.

A final example is the Dubois Center. A long, uninterrupted stretch of railroad tracks currently prevents a convenient pedestrian link between the Dubois Center and areas west of White Street. Pedestrians navigate White Street in this area in the absence of sidewalks with numerous footpaths indicating where they are crossing the railroad tracks.

Downtown

Wake Forest possesses a charming, small town feel in its downtown business district. More individuals can be drawn to the area for business and pleasure by expanding and improving the existing pedestrian facilities. Currently most of the central



EXISTING CONDITIONS

downtown business district's streets are lined with sidewalks, many of which have been painted to mimic brick walkways. The sidewalks along White Street are dramatically elevated above the street and intersected by numerous staircases. These staircases, high curbs, and lack of curb cuts pose severe accessibility problems for the mobility impaired. Careful attention needs to be taken when updating the sidewalks of downtown Wake Forest to honor the historical integrity of the area while providing access for all according to ADA guidelines and the principles of universal design.

Wake Forest is divided from north to south by a CSX railroad line. This railroad corridor has created a man-made barrier affecting pedestrian routes between the surrounding residences, the Southeast Baptist Theological Seminary and downtown Wake Forest. A precariously placed, steep and ill kept staircase rises to South Avenue from the railroad tracks adjacent to a municipal parking lot on White Street. In its current condition this staircase poses serious pedestrian safety and accessibility issues. This serves as an example of existing pedestrian railroad crossings that are in need of upgrading.

NC 98 bisects downtown Wake Forest, skimming the edge of the Southeastern Baptist Theological Seminary's campus, crossing under the CSX railroad line and exiting town along Roosevelt and Wait Avenue. This is a local-major thoroughfare that carries traffic from east to west across town and creates several dangerous pedestrian crossings near the seminary. The intersection of Durham Road and Wingate Street is especially deficient in effective pedestrian facilities. It lacks sidewalks on the northeastern corner and pedestrian signals at all corners. Crosswalks are painted to curbs with no connectivity to sidewalks, and there is a lack of ramps and curb cuts for accessibility. One block to the east, at the intersection of Durham Road and South Main Street, the Town of Wake Forest has constructed a roundabout with a full range of pedestrian facilities to address numerous safety issues and pedestrian crossing difficulties. Educating the local community on navigation through the roundabout will be undertaken upon completion of the project. Wake Forest



EXISTING CONDITIONS

can anticipate a learning curve as motorists and pedestrians learn to negotiate the new facilities.

Farther east on Front Street near the CSX railroad tracks, there are no pedestrian signals or crosswalks for pedestrians to cross Front Street when walking to and from the seminary campus and downtown. These three busy and confusing intersections pose some dangerous hurdles for pedestrians.

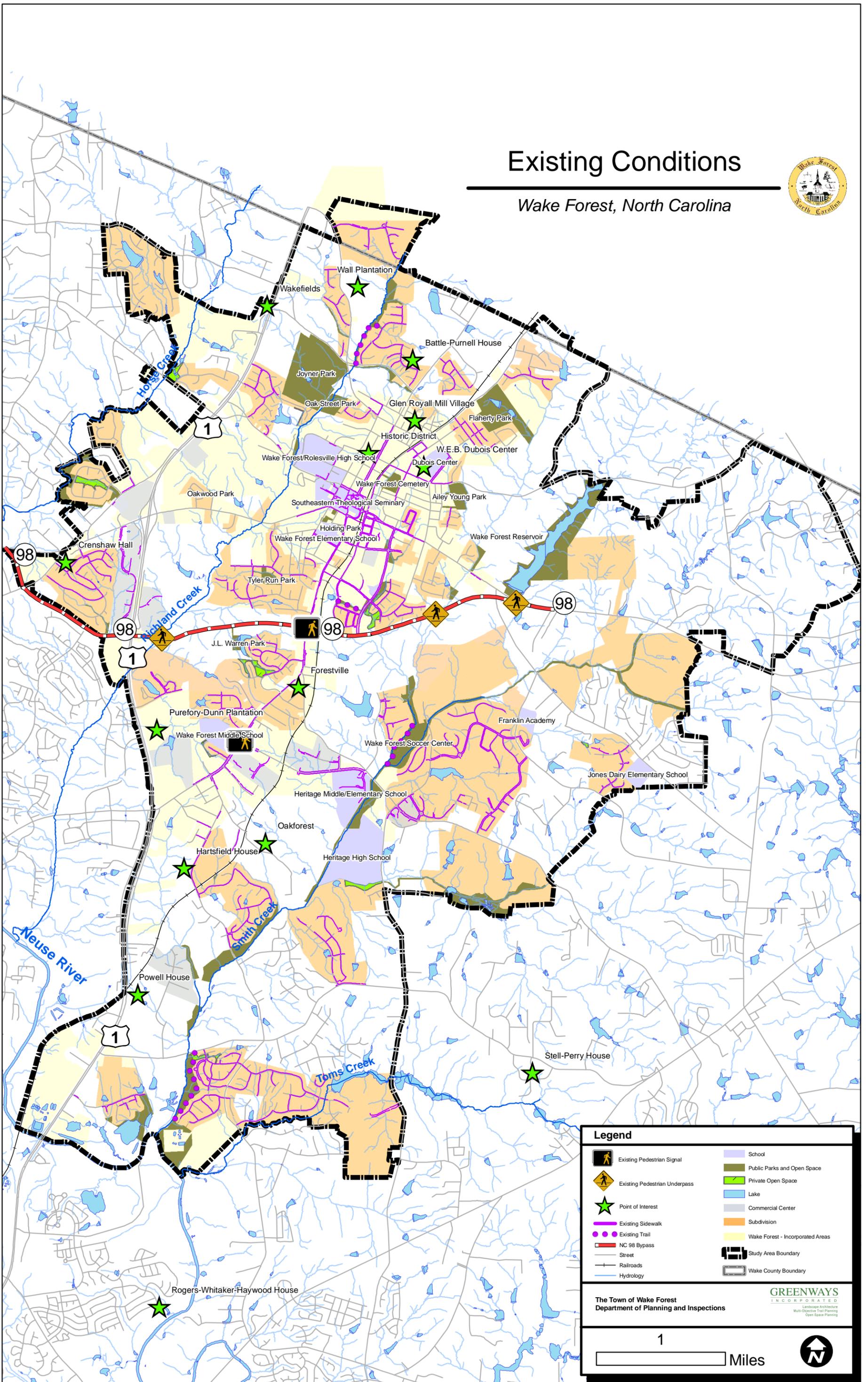


*Figure 2(l):
Insufficient existing pedestrian crosswalk near at the intersection of Wingate
Street and Durham Road*



Existing Conditions

Wake Forest, North Carolina



Legend

	Existing Pedestrian Signal		School
	Existing Pedestrian Underpass		Public Parks and Open Space
	Point of Interest		Private Open Space
	Existing Sidewalk		Lake
	Existing Trail		Commercial Center
	NC 98 Bypass		Subdivision
	Street		Wake Forest - Incorporated Areas
	Railroads		Study Area Boundary
	Hydrology		Wake County Boundary

The Town of Wake Forest
Department of Planning and Inspections

GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

1 Miles

Chapter 3

EXISTING PLANS AND POLICIES

3.1 Overview

Numerous studies and recommendations have addressed issues related to the current and future pedestrian environment of the Town of Wake Forest. Plans and overviews have addressed transportation issues, greenspace development, downtown revitalization, and land use regulations. All of these documents represent important efforts, provide valuable insight and background, and have influenced the development of this plan. Some of the key studies are summarized below. For further information, please consult the reviewed document in its entirety.

3.2 Transportation Plans

3.2.1 Wake Forest Transportation Plan (2003)

The transportation plan includes a Pedestrian and Bicycle Element. The document recognizes that transportation planning no longer focuses solely on roadway solutions. The pedestrian section covers an existing and planned sidewalk network and is generally optimistic about existing conditions, specifically citing improvements in the downtown area.

Three steps are outlined for improving the non-vehicular environment: 1) Integrating land use and transportation to create a community of neighborhoods that is designed for walking and cycling, 2) Adopting pedestrian- and bicycle-friendly development standards, policies, and guidelines, and 3) Having a proactive attitude toward change. This attitude will be necessary for fulfilling the plan's ambitious goal of eventually having sidewalks on all town center area streets, collector streets, and thoroughfares throughout Wake Forest (except in unusual situations).

Specifically, the plan calls for five-foot wide sidewalks located to create a minimum five-foot verge between the sidewalk and the street curb. In practice, five-foot wide sidewalks are

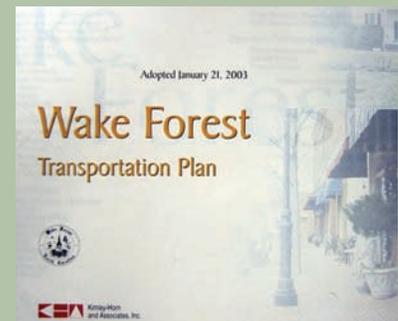


Figure 3(a):
Wake Forest Transportation Plan



EXISTING PLANS AND POLICIES

installed one foot inside the right-of-way line. For sidewalk placement on 1) Thoroughfares – sidewalks are required on both sides of the street, unless otherwise specified, 2) Residential Collectors – sidewalks are required on both sides of the street, and 3) Non-Residential Collectors – sidewalks are required on both sides of the street unless otherwise specified. Finally the plan stresses the importance of coordinating pedestrian improvements with other roadway improvements, including the necessary installation of curb ramps to satisfy the Americans with Disabilities Act of 1991.

http://www.wakeforestnc.gov/transportation_plan.aspx

3.2.2 Master Plan for the NC 98 Bypass Corridor (2003)

The NC 98 Bypass Corridor Plan was developed by the Town of Wake Forest to outline design guidelines and circulation plans associated with the NC 98 Bypass. One of the four main goals of the plan is “To create an east-west pedestrian and bike route on each side of the corridor, with connections across the highway to trail and sidewalk networks north and south of the corridor.” The Wake Forest Planning Department notes that the plan does not call for pedestrian and bike routes on both sides for the full length of the corridor. The Pedestrian and Bicycle Circulation chapter details trails and trail crossings, providing specific trail locations, widths, setbacks, and connections. Some examples noted include the provision of a 10-foot wide paved trail along each side of the Bypass, frequent connections to sidewalk systems in adjacent subdivisions, and connections to the Richland Creek and Neuse River greenways. However, the chapter lacks a plan for pedestrian crossings.

http://www.wakeforestnc.gov/client_resources/Residents/Planning/NC98_Bypass_Corridor_Plan.pdf

3.2.3 NCDOT Transportation Improvement Program (TIP)

Transportation projects in North Carolina involving state maintained roads go through a standard process of planning, design, and construction. A list of priority projects from a seven year forecasted list throughout the State is updated each year. Within Wake Forest, TIP# E-4527 calls for the construction of sidewalks along Front Street, Stadium Avenue, Durham Road



EXISTING PLANS AND POLICIES

and Tyler Run. These programmed projects were folded into the proposed pedestrian network recommendations of this plan. TIP# E-4928 calls for streetscaping projects along both sides of South White Street from Roosevelt Avenue to Wait Avenue and on the west side from Wait Avenue to Jones Street. Ideas for streetscaping and landscaping are discussed in Chapter 5, Design Guidelines. Additionally, the Wake Forest Bypass Greenways discussed in 3.2.2 is TIP# E-4708.

3.3 Local Plans

3.3.1 Wake Forest Parks and Recreation Master Plan (2005)

The Wake Forest Parks and Recreation Master Plan was updated to “review, refresh and expand the framework for Town leaders and the Parks and Recreation staff to use as they chart the course for programming, maintenance and development of the park system over the next 10 years.” One goal of the plan is to work with Wake County and adjacent municipalities to identify lands that can provide open space linkages. These linkages may provide connections for the residents of Wake Forest to walk to surrounding destinations, specifically to area park facilities. Furthermore, the plan seeks to provide accessible trails that form loops or link to other trails in order to provide long segments that are accessible to a variety of users and abilities.

www.wakeforestnc.gov/residentsparks_masterplan.aspx

3.3.2 Wake Forest Open Space and Greenway Plan (2002)

The Town of Wake Forest developed this plan in order to protect the natural and cultural resources that community residents value the most. One of three principle goals of the plan is to “establish a comprehensive approach that will link greenspace lands and corridors to residential, commercial, institutional and central business areas of the community”. While the key recommendations of the plan focus on park development, the plan’s proposed greenway corridors may serve as a framework for connectivity throughout Wake Forest. The corridors described in the plan include but are not limited to the Smith Creek Corridor, the Richland Creek Corridor, and the Sanford Creek Corridor. The proposed



Figure 3(b):
Wake Forest Open Space and
Greenway Plan



EXISTING PLANS AND POLICIES



Figure 3(c):
Wake Forest Renaissance Plan

greenway linkages are located along natural and human-made linear corridors that generally follow streams and roadways within Wake Forest. Each corridor is described in detail in the plan's section on Greenway System Recommendations.

http://www.wakeforestnc.gov/client_resources/Residents/Planning/WF%20OS&G%20Plan.pdf

3.3.3 Renaissance Plan for the Heart of Wake Forest (2004)

This plan was developed by the Town of Wake Forest through a process of intensive public input to provide a clear framework for revitalization of the Downtown Wake Forest as well as for future developments in the surrounding area. The plan provides policy and programmatic recommendations followed by specific development opportunities within three main districts to present a conceptual build-out of the area. Overall, the plan is promoting a livable Downtown with a mix of uses contributing to the development of multiple destinations in a core area. This revitalization effort will ultimately create increased connectivity for Downtown Wake Forest, improving the walkability of the Town's core. The last section of the document outlines specific improvements and identifies the entity for implementation, the level of priority, and provides detailed comments for each project, many of which are directly pedestrian related.

Additionally, the Renaissance Plan for the Heart of Wake Forest addresses the issues of aesthetics and land use as a method of drawing more pedestrians into Downtown. Specifically, the plan encourages a Façade Improvements Grant Program to facilitate the rehabilitation of building facades. The program will promote 1) storefront improvements, 2) the preservation of historic buildings, 3) compatibility for improvements to facades of non-historic structures, and 4) the use of quality materials in the rehabilitation of downtown properties. The appendix of the Renaissance Plan provides examples of how the program could be implemented, including suggested marketing strategies to complement the façade improvements. Programs such as these will augment the efforts of the Town of Wake Forest Pedestrian Plan by providing aesthetic



considerations to improvements within the pedestrian environment.

Other specific pedestrian-related recommendations in the Renaissance Plan include the following: 1) Install pedestrian crossings along East Holding Avenue, 2) Provide streetscape treatments and directional signage to the Arts & Entertainment District along the South Franklin Street extension, 3) Replace existing light poles throughout the Arts & Entertainment District when feasible to provide for more appropriately-scaled pedestrian street lighting, 4) Link the Kiwanis Park Greenway Section to the Adam's Pond property along South White Street, 5) Implement the Downtown portion of the greenway plan, and 6) Hire a wayfinding consultant to assist with developing specialized directional signage for the Town of Wake Forest. The list above represents only the most directly pedestrian-related recommendations; many other recommendations are included in the plan that will enhance the pedestrian environment of Wake Forest, such as those related to the principles of urban design, in-fill development, special district promotion, and logistical items such as parking and maintenance.

www.wakeforestnc.gov/residents/planning_renaissancemasterplan.aspx

3.3.4 Downtown Master Plan: Economic and Market Analysis (2003)

This report was developed to incorporate market conditions into the process and design of a Master Plan for Downtown Wake Forest. While the body of the report focuses primarily upon current and potential future market conditions, the strategies and development guidelines offered at the end of the report provide a framework with which the pedestrian plan can incorporate its marketing element. Additionally, the number one priority identified in the plan calls for the re-establishment of a committee for the Main Street program – a program that promotes, among other things, a lively Downtown pedestrian environment.



3.4 Regional Plans

3.4.1 Wake County Consolidated and Open Space Plan (2003)

This plan was developed by Wake County with the purpose of protecting and conserving county land and water for current residents and future generations. While the primary focus of the plan is on open space, there are themes of connectivity and public purpose that relate to pedestrian planning. The framework of the Open Space Plan is based on the concept of “Hubs and Spokes,” under which residential, commercial, and business landscapes are linked to parks, preserves, and open spaces via greenway corridors. Examples of such linkages are identified for each municipality in the County. For the Town of Wake Forest, the following proposed greenways are identified: the Smith Creek Greenway, Richland Creek Greenway, Horse Creek Greenway, Sanford Creek Greenway, Tom’s Creek Greenway, Wait Avenue Greenway, Purnell Road Greenway, and Jenkins Road Greenway. Additionally, the plan emphasizes the importance of conserving and protecting the small town character of Wake Forest by enhancing the main community thoroughfares (US 1/Capital Boulevard, Durham Road/Wait Avenue, and the new 98 Bypass). Greenway corridors identified in the County plan could also serve as critical connections for the Wake Forest Pedestrian Plan.

3.4.2 CAMPO Bicycle and Pedestrian Plan (2003, updated 2005)

The Capital Area Metropolitan Planning Organization (CAMPO) developed the 2003 Bicycle and Pedestrian Plan with the vision of convenient, efficient, viable, and safe bicycle and pedestrian travel throughout the metropolitan area. The purpose of the plan is to enable citizens to reach their destinations and recreate safely by walking and biking anywhere in the CAMPO system. The plan also stresses the importance of enabling children to safely walk and bike to school.



The plan presents seven specific policies to achieve CAMPO's goals, each followed by a set of policy strategies. The plan outlines detailed performance measures for engineering, enforcement, educational, and encouragement programs to ensure that improvements will be made as necessary for those citizens who utilize bicycle and/or pedestrian transportation as their primary mode.

http://www.campo-nc.us/BPSG/BPSG_Home.htm

3.5 Land Use Plans

3.5.1 Land Use Management Plan (1997)

This plan was originally approved by the Town of Wake Forest in 1987, and was later updated and approved in 1997. The purpose of the plan is to assess the "characteristics of change" that the Town faces now and in the future in order to influence a pattern and system of land use that is manageable and conducive to the immediate needs and benefits of the Town's citizens. The scope of the plan is broad, but there are elements that relate to pedestrian planning. The "Connections" section focuses on physical and visual links that encourage and accommodate movement through and around Town. Greenway trails, sidewalks, and frequent links to trails from neighborhoods and roads are encouraged in both new and existing sections of Town. Additionally, the plan states that sidewalks or pedestrian ways should be built along all collectors and thoroughfares, along the US-1 service road, and along the 98 Bypass. Finally, the plan recommends that a wayfinding system should be developed and implemented to direct people to interesting destinations throughout the town.

http://www.wakeforestnc.gov/client_resources/Residents/Planning/Land_Use_Management_Plan.pdf



3.6 Pedestrian Statutes and Local Ordinances

Most existing facilities were designed and constructed using the following as guidelines:

- Wake Forest Transportation Plan
- Subdivision Regulations
- North Carolina Department of Transportation (NCDOT) and North Carolina Division of Highways (NCDOH) design manuals
- Americans with Disabilities Act (ADA) Guidelines, and the Guidelines for Curb Ramps for Disabled Persons
- Town of Wake Forest Municipal Code, Chapter 28, Locational Guidelines

The Wake Forest Transportation Plan (see section 3.2.1) recommends 5' wide concrete sidewalks set back 5' from the back of curb. These sidewalks are required on both sides of the street for thoroughfares, residential collectors, and non-residential collectors. The Transportation Plan also recommends sidewalks on all town center area streets, and discusses multi-use paths as being typically 10' wide, typically setback from the street a minimum of 5' and located such that there is minimal conflict with curb cuts and intersections.

The Subdivision Regulations require sidewalks to be constructed on one side of the street for single-family residences on 10,000 sq. ft. lots or smaller, and on both sides of the streets for multi-family groups. The Subdivision Regulations contradict the Transportation Plan by requiring sidewalks on only one side of minor thoroughfares and all residential collector streets. Furthermore, since Municipal Code supersedes Subdivision Regulations, an amendment

to the Subdivision Regulations is recommended to remove the 'minor thoroughfare/sidewalk location' conflict. The



amendment should call for sidewalks on *both* sides of the street, as stated in the Wake Forest Municipal Code for Sidewalk Location (see chart on page 3-11).

Currently, developers are allowed to install sidewalk on a house-by-house or lot by lot basis within developments, resulting in the fragmented construction of sidewalks. In

- Pedestrians are required to obey street crossing signals, indicating when it is safe to “Walk” or “Don’t Walk”.
- Certain streets and highways contain traffic islands that are specifically placed for pedestrians to use in case they cannot fully cross a road before a “Don’t Walk” signal is displayed.
- When pedestrian signals are not present, pedestrians are required to follow normal traffic signals and signage.
- When sidewalks are present, pedestrians must use sidewalks and not travel on any part of the roadway that is established for vehicular traffic.
- If sidewalks are not present, pedestrians should walk at the extreme left of the roadway facing traffic.
- Pedestrians may not cross or pass through closed railroad barriers.
- Vehicles are required to yield to pedestrians using marked crossings.



EXISTING PLANS AND POLICIES

some circumstances, the Town of Wake Forest also offers a payment in lieu of construction for developments with the intention that the Town will install the required sidewalk at a later date. However, the payment in lieu is generally only used in circumstances where the developer cannot install the sidewalks due to barriers such as narrow bridge without room for crossing.

The State of North Carolina follows a standard set of basic pedestrian laws, outlined in a guidebook published by the North Carolina Department of Transportation.

The American Disability Act (ADA) states that cities and municipalities must construct, modify or adapt pedestrian facilities to accommodate individuals with disabilities and accessibility limitations. Below are some basic topics that must be addressed for sidewalks to comply with ADA requirements:

- Curb Ramps provide entry and exit to sidewalks
- Adequate width provides sufficient passing
- Slopes must be realistic to allow travel
- Cross or angled slopes provide unstable conditions
- Overgrown, broken, root laden, or otherwise rough conditions are not suitable
- Ramps provide access to buildings that are not ground level
- Ramps also provide alternative routes around staircases
- Cuts in medians at crosswalks allow travel across divided roadways
- Adjusted crossing times allow for safe travel across wide intersections
- Historic district exemptions should be taken into account



EXISTING PLANS AND POLICIES

In chapter 28 of the Town of Wake Forest Municipal Code, locational guidelines for sidewalks are stated as follows: “Sidewalks shall be included as a part of the construction of all streets included in the thoroughfare plan, collector street plan and other access roads. Sidewalks should link residential areas with employment, commercial and public areas and should interconnect the town greenway plan.” (Code 1985, § 16-42)

Wake Forest Municipal Code: Sidewalk Location

Street Type	Sidewalk Location
Major thoroughfare	Both sides of the street
Minor thoroughfare	Both sides of the street
Commercial	Both sides of the street
Frontage road	One side of the street
Collector (residential)	One side of the street
Residential	One side of the street
Collector cul-de-sac	One side if cul-de-sac exceeds 400 linear feet
Residential cul-de-sac	One side if cul-de-sac exceeds 400 linear feet

(Code 1985, § 16-42)

The sidewalk locational guidelines of the municipal code conclude by stating “multifamily and planned developments shall provide sidewalks for interior movement of pedestrians and for the interior to connect to the public sidewalk system”. (Code 1985, § 16-42)

3.7 Key Findings from the Existing Plans, Programs, and Policies

The key findings for the review of existing plans are as follows: 1) Existing transportation plans for Wake Forest clearly support a more pedestrian friendly environment for the Town and encourage the adoption of pedestrian-friendly development standards, policies, and guidelines; 2) Existing Parks, Greenway, and Open Space Plans identify and recommend various linkages, connections, and trails to serve as a framework for connectivity throughout Wake Forest; 3)



Figure 3(d):
Existing planning documents were thoroughly examined during the pedestrian planning process



EXISTING PLANS AND POLICIES

Existing Local plans have many recommendations in place that aim to support connectivity and enhance the aesthetic quality of the pedestrian environment, including specific recommendations for pedestrian-related improvements to Downtown Wake Forest; 4) The Land Use Plan recommends pedestrian connections in both new and existing sections of Town, including a wayfinding system to direct people to interesting destinations throughout the Wake Forest; and 5) Existing pedestrian statutes and ordinances offer a strong starting point upon which to base standards for a universally accessible pedestrian environment.



*Figure 3(e):
Unsuitable Pedestrian Crossing
at Wingate Road*



Chapter 4

PEDESTRIAN NETWORK PLAN

4.1 Overview

Based on an examination of the existing conditions in Chapter 2, a review of existing plans in Chapter 3 and an understanding of the community's vision and goals for improved pedestrian opportunities outlined in Chapter 1, Greenways, Incorporated has prepared a proposal for a new Pedestrian Plan for the Town of Wake Forest. Chapter 4 describes this new integrated pedestrian network of sidewalks and greenways.

Individual network components that are described include the types of facilities being recommended, the major corridors that shape the network, and a number of specific recommendations for needed individual changes. The methodology that was used to develop the network is briefly introduced in section 4.2.

Together, Chapters 4-7 provide a complete picture of the nature and design of the new pedestrian network as well as the steps that are necessary for turning the vision into a reality. Chapter 4 outlines the proposed pedestrian network and identifies opportunities, as well as difficulties. Chapter 5 illustrates design guidelines for specific pedestrian facilities. Chapter 6 describes programs and policy recommendations, while Chapter 7 discusses priorities, timelines and steps for implementing this plan.

4.2 Pedestrian Network Methodology

A variety of information sources were consulted during the development of the Pedestrian Plan, including previous plans and studies, recommended projects, the consultants' field work, public input, and noted pedestrian trip attractors, as shown on Map 4.1. A more complete list of information inputs is found in the box on page 4-2.



PEDESTRIAN NETWORK PLAN

Wake Forest Pedestrian Plan Inputs

- Public comments from community workshops
- Survey responses
- Recommendations of steering committee
- Field observations summer and fall 2005
- Existing trip attractors (schools, shopping centers, parks, commercial areas)
- Existing pedestrian facilities and gaps
- Inputs from previous plans (Master Plan of the NC 98 Bypass Corridor, Wake Forest Open Space and Greenway Plan, Wake Forest Transportation Plan, 2003)

Several concepts were developed as guides for the pedestrian network development process. These concepts represented the interests expressed by the Town, the steering committee, and the public. They also help achieve the goals articulated in other local planning documents. Some of the concepts that guided the development of the network included:

- 1) Pedestrians should be able to access Downtown Wake Forest from all parts of the community.
- 2) Improvements and expansion to pedestrian facilities in Downtown Wake Forest should be completed.
- 3) Sidewalks should provide safe access for children walking to and from school.
- 4) There should be increased connectivity between subdivisions and trip attractors.
- 5) Safe crossings should be constructed at busy and confusing intersections.
- 6) Future development of the area should be taken into consideration, when constructing new facilities.



4.3 Recommended Pedestrian Facilities

General projects spanning the entire study area will include improvements to existing infrastructure and addition of new facilities to promote a more enjoyable pedestrian environment. Marked crosswalks should be placed at all intersections where pedestrian traffic is present and pedestrian crossing signals should be placed at high volume intersections. Sidewalks should be constructed on both sides of the street along all future thoroughfares and residential collectors. Sidewalks should be constructed and gaps should be filled on all existing thoroughfares and residential collector streets in the study area as referenced in the Wake Forest Transportation Plan. Wider sidewalks, with curb cuts and improved surface conditions will correct sidewalks that currently do not satisfy the standards set forth by the American Disability Act of 1991. Traffic calming measures, such as curb extensions, traffic circles and medians should be used to create a more hospitable environment for pedestrians in neighborhoods and in dense pedestrian districts, such as Downtown Wake Forest.

Four distinct types of pedestrian projects have been identified for The Town of Wake Forest and are outlined below:

4.3.1 Pedestrian Crossing Projects

Numerous hazardous pedestrian crossings have been identified in Wake Forest. Currently pedestrians in Wake Forest are faced with significant barriers to travel, created by linear highway corridors and confusing, high volume intersections. Pedestrian Crossing Projects range from striping crosswalks in subdivisions to building pedestrian overpasses across major highways and railroad tracks. Correcting dangerous crossings will encourage pedestrian travel and safely connect isolated portions of town. Several intersections have been identified as problem spots through field research, public input and the Wake Forest Transportation Plan, 2003.



PEDESTRIAN NETWORK PLAN

It should be noted that the CSX railroad line that extends across the study area, is being considered as a high speed rail corridor connecting Charlotte, NC to Washington DC. Appropriate pedestrian grade separated crossing facilities should be provided along the corridor, such as elevated pedestrian bridges, pedestrian tunnels, and appropriate pedestrian accommodations on all roadway bridges. Additionally, adequate grade separated pedestrian crossings should be installed at all greenway corridor intersections. Future roadway grade separated railroad crossings within the study area are outlined below:

- US 1 (Capital Boulevard)
- Cliff Lane at South Forest Business Park
- Ligon Mill Road
- Seawell Road
- Rogers Road
- Friendship Chapel Road
- NC 98 Bypass
- Holding Avenue
- Elm Avenue
- Roosevelt Avenue
- North Loop

4.3.2 Sidewalk Projects

Sidewalk Projects are aimed at providing and encouraging pedestrian accessibility and transportation between areas of Wake Forest that are currently isolated from one another. Sidewalk Projects are designed to connect areas of high pedestrian density to surrounding local attractors, such as bordering residential subdivisions, parks, commercial areas, greenways and additional sidewalk corridors. Improvements in these corridors will include linking existing sidewalks to form continuous routes and improving crossing facilities. All sidewalk projects should possess curb cuts with ramps at all driveways and intersections. Additionally, all intersections should have marked crosswalks and pedestrian crossing



signals should be installed at all major intersections. Sidewalks and pedestrian crossings should be incorporated in all improvements, widening projects and new roadway construction in the Wake Forest jurisdiction.

Sidewalk Projects should include the following pedestrian facilities:

- Sidewalks on both sides of the roadway, unless substantial physical obstacles exist.
- ADA compliant curb cuts and ramps at all driveways and intersections
- Marked crosswalks at all intersections
- Pedestrian crossing signals at all intersections

4.3.3 Greenway Corridor Projects

Greenway Corridor Projects include off-road pedestrian facilities, typically taking advantage of linear stream corridors, easements, and other tracts of open space. Greenways can provide excellent alternative transportation and recreation options through a more natural setting and also serve an environmental purpose, to protect forests and enhance water quality. The focus of these corridors will be to provide access and connectivity between residential and commercial pedestrian environments. These corridors were chosen based on existing and design-phase Town greenways, the Wake Forest Open Space and Greenway Plan, the Master Plan for NC 98 Bypass Corridor, and the potential to connect resident populations to destinations.

4.3.4 Residential Pedestrian Projects

Residential Pedestrian Projects will expand and complete existing sidewalk networks within established subdivisions. While many of Wake Forest's subdivisions have sidewalks already, they are either disconnected or do not cover the entire subdivision. By connecting and in-filling each subdivision's individual sidewalk networks, residents will be able to safely travel by foot within their respective subdivisions and



link up to pedestrian corridors. Establishing a consistent and complete network of sidewalks in all of Wake Forest's residential subdivisions is the first step to getting residents out of their homes, onto their feet and into the community. The Town of Wake Forest should continue to expand residential sidewalks as new development occurs and seek opportunities to in-fill existing subdivisions with respect to safety concerns and connection to Pedestrian Corridors throughout the study area. Residential Sidewalk Projects are not displayed in the mapping contained in this document, because they apply to all residential roadways in Wake Forest.

4.4 Pedestrian Facility Improvement Areas

The Wake Forest study area has been divided into four smaller geographical areas based on field research and map analysis conducted by Greenways Inc. The complete study area is quite expansive and can be better analyzed by splitting it into these smaller areas. Proposed pedestrian facilities and guidelines are outlined for each of the four study areas in Wake Forest, while still maintaining a careful consideration to community connectivity as a whole. Greenway Corridors are generally expansive and usually cover multiple study areas. Descriptions of Wake Forest's Greenway Corridors are detailed in their study area of most prominence. Pedestrian Crossing and Connection Projects are outlined and described under their respective study areas. Residential Pedestrian Projects are numerous and are illustrated on their respective study area maps.

Considerable overlap has been incorporated in the creation of the study areas, especially in the areas surrounding downtown Wake Forest. This is to emphasize and illustrate the importance of connectivity in pedestrian facilities. Study area boundaries are outlined on Map 4.2.

Pedestrian Corridors contain numerous sidewalk projects that span multiple study areas. Their roadway components are outlined on the following page.



Sidewalk Project Roadway Components

Alfalfa Lane	Marshall Farm Road
Allen Road	McDowell Drive
Amherst Creek Drive	Mockingbird Lane
Biscay Lane	Moultonboro Avenue
Buck Run Trail	NC 98 Bypass
Burlington Mills Road	Night Herron Drive
Capital Boulevard (US-1)	North Avenue
Cardinal Drive	North Main Street
Carroll Street	North White Street
Caveness Farms Avenue	North Wingate Street
Cedar Avenue	Oak Avenue
Centaur Road	Oak Grove Church Road
Chalk Road	Perry Street
Chestnut Avenue	Pine Avenue
Chimney Swift Drive	Pine Ridge Court
Cimarron Parkway	Pine Valley
Clear Springs	Pineview Drive
Coach Lantern Avenue	Purnell Road
College Street	Rock Spring Road
Dansforeshire Way	Rogers Road
Deer Chase Trail	Roosevelt Avenue
Deer Lake Trail	Seawell Drive
Donner Trail	Seventh Street
Durham Road (Old NC 98)	Shearon Farms Avenue
Falcon Hurst Drive	Siena Drive
Flaherty Avenue	Song Sparrow Drive
Forbes Road	South Avenue
Forestville Road	South Main Street
Forgotten Pond	South White Street
Franklin Street	South Wingate Street
Front Street	Spring Street
Galaxy Drive	Stadium Drive
Greenville Loop Road	Star Road
Hampton Way Drive	Sweet Clover Drive
Harris Road	Tansley Street
Heritage Lake Road	Taylor Street
Holding Avenue	Ten Point Trail
Jenkins Road	Tillamook Drive
Jones Dairy Road	Tyler Run
Juniper Avenue	Wait Avenue
Kearny Road	Wake Union Church Road
Kemble Ridge Drive	Wall Road
Lakeview Avenue	Winter Spring Drive
Ligon Mill Road	Woodland Drive
Linslade	



4.4.1 Northern Study Area

The Northern Study Area contains numerous peripheral neighborhoods that flank downtown Wake Forest to the north, northwest and west. The primary objectives in this study area are to insure adequate connectivity between these outlying neighborhoods and the central core of Wake Forest. Proposed pedestrian facility recommendations are illustrated on Map 4.3.

Intersection Improvement Projects:

- Durham Road and US 1/Capital Boulevard
- Stadium Drive and US 1/Capital Boulevard
- Purnell Road and US 1/Capital Boulevard

It should be noted that pedestrian crossings of US 1/Capital Boulevard do not necessarily have to be collocated with automobile crossings. Pedestrian overpasses and underpasses should be located at points of opportunity, such as greenway corridor junctions.

4.4.2 Downtown Study Area

The Downtown Study Area of Wake Forest is the central core of the Town's pedestrian activities. This area contains the Downtown Business District, the Historic District and the Southeastern Baptist Theological Seminary, which produces the highest pedestrian densities of all of the study areas. Projects in this area should attend to safety issues and connectivity within the core of Wake Forest. Proposed pedestrian facility recommendations are illustrated on Map 4.4.

Downtown Wake Forest is the most walkable and pedestrian friendly area of town, but still needs improvements. This area has a dense network of sidewalks, despite gaps and numerous unsafe pedestrian facilities. White Street, between Elm Ave and Roosevelt Avenue, is lined with numerous noncompliant ADA sidewalks. Steep staircases, narrow sidewalks, high curbs, and nonexistent curb ramps provide an inaccessible



and dangerous pedestrian environment. Reconstruction of sidewalks in downtown Wake Forest is essential to attracting more pedestrians and to ensure safe accessibility for all.

Sidewalks run along the southern end of North Main Street in Wake Forest’s Historic District, but are absent throughout much of the remainder of the area. The existing sidewalks flanking North Main Street, are in need of surface improvement and network expansion. Sidewalks should continue on North Main Street from Cedar Street north to the ETJ boundary, linking the Historic Glen Royall Mill Village to the remainder of Wake Forest’s Historic District. Connector sidewalks from bordering historic neighborhoods to North Main Street should be considered, with respect to the area’s historic nature.

Schools

There are three schools in central core of Wake Forest. While sidewalks line a majority of each school’s perimeter, emphasis should be placed on filling any remaining gaps or connections to bordering neighborhoods. Sidewalks should flank all edges of school property, and along local roads leading to schools from surrounding homes.

- Wake Forest/Rolesville High School
- Wake Forest Elementary School
- Forest Pines Elementary School at the W.E.B. Dubois Center (temporary commuter school)
- Southeastern Theological Baptist Theological Seminary

The Southeastern Baptist Theological Seminary campus is situated between the Wake Forest Historic District and the downtown business district, creating a vital link between these two dense pedestrian zones. Thousands of students traverse this area daily, augmenting the need for expanded pedestrian facilities. Currently this link relies on several dangerous pedestrian crossings which are outlined on the following page.



Intersection Improvement Projects:

- South Avenue and South Wingate Street
- Roosevelt Street and Front Street
- Roosevelt Street and White Street
- North Main Street and North Avenue
- North Avenue and North Wingate Street

The traffic circle installed at the intersection of South Avenue and South Main Street is an excellent example of a viable solution to the problematic intersections listed above.

Community input has highlighted the need for a safe pedestrian connection between homes west of the railroad tracks, the Dubois Center and downtown Wake Forest. Currently, a worn footpath links the disconnected ends of Cedar Street which is split by the railroad tracks west of White Street. Establishing a permanent pedestrian grade separated crossing, such as a pedestrian bridge over the railroad tracks would allow pedestrians to safely navigate this crossing to gain access to the Dubois Center and surrounding neighborhoods from the Historic District.

Greenway Corridor Projects:

Richland Creek Greenway

Richland Creek extends from the northern edge of the study area through the western portions of downtown Wake Forest southward across Capital Boulevard to the Neuse River. There are no existing greenways along the creek despite its potential to connect numerous subdivisions to the downtown pedestrian environment. The Olde Mill Stream Greenway, a half mile long greenway trail is located at the northern end of Wake Forest and is set for completion by the close of 2006.

In the long term, the Richland Creek Greenway should extend from the Olde Mill Stream subdivision southward through Joyner Park and Wake Forest/Rolesville High School. Spur trails to commercial areas along Capital Boulevard and to adjacent subdivisions will be necessary to provide multiple



points of access and achievable destinations. An excellent underpass opportunity exists under the NC 98 Bypass extending the greenway to Capital Boulevard and Caveness Farms. Capital Boulevard poses a significant barrier to the Richland Creek Greenway and appropriate pedestrian facilities, such as a pedestrian underpass or bridge should be incorporated in any and all future roadway projects along this corridor. Establishing a connection across Capital Boulevard will link the Richland Creek Greenway to the greenway network proposed by the City of Raleigh to the south and west. The Richland Creek Greenway should be multi-use and paved to support the potential large number of users.

Additional local greenway corridors and subdivision connection opportunities are illustrated on Map 4.4.

4.4.3 Central Study Area

The Central Study Area is comprised of established subdivisions to the west and widespread suburban expansion to the east, in the area south of the NC 98 Bypass Corridor. Expanding existing sidewalk networks, linking isolated subdivisions and establishing new facilities are the primary goals of pedestrian projects in the Central Study Area. Proposed pedestrian facility recommendations are illustrated on Map 4.5.

Schools

There are three schools and one proposed school site in Central Wake Forest. While sidewalks line a majority of each school's perimeter, significant gaps and connections to bordering subdivisions and beyond are lacking. Sidewalks should flank all edges of school property, and along local roads leading to schools from surrounding subdivisions.

- Wake Forest Middle School
- Heritage Elementary School
- Heritage Middle School
- Heritage High School (proposed)



PEDESTRIAN NETWORK PLAN

Intersection Improvement Projects:

- South Main Street and US 1/Capital Boulevard
- All South Main Street crossings, due to high pedestrian potential.
- Mid-block crossings along road segments that possess significant distances between intersections, such as Rogers Road and Heritage Lake Road.

It should be noted that pedestrian crossings do not necessarily have to be collocated with automobile crossings. Pedestrian overpasses and underpasses should be located at points of opportunity, such as greenway corridor junctions and mid-block crossings.

Greenway Corridor Projects:

Wake Forest Bypass Greenway

The NC 98 Bypass Corridor Plan (State TIP Project E-4708) proposes a 10-foot wide paved trail through the corridor between Durham Road to the west and the Wake Forest Reservoir to the east. A setback of 25 to 30 feet is recommended with streetscape plantings between the trail and the road. There should also be connections to sidewalk systems in adjacent neighborhoods. The proposed Smith Creek Greenway (described on the following page) will connect to the Wake Forest Bypass Greenway via the pedestrian underpass that parallels Smith Creek under the NC 98 Bypass. The Richland Creek Greenway will connect to the Wake Forest Bypass Greenway via the pedestrian underpass created by the expansive NC 98 Bypass bridge over Richland Creek. By linking these facilities together, a system of greenway trails is established, thereby creating regional pedestrian connections. This Plan is consistent with the recommendations for pedestrian facilities addressed in the NC 98 Bypass Corridor Plan. A study to assess the feasibility of the Wake Forest Bypass Greenway has been scheduled.



Cimarron Greenway

Public land, homeowner association land and public easements in an area with foot-worn paths presents a unique opportunity to establish a trail connecting South Main Street to the NC 98 Bypass Greenway. A storm sewer easement intersects Amherst Creek Drive near Cedar Branch Court in Cimarron and would be an excellent starting point for a greenway. Continuing the path through J.L. Warren Park would provide the final link between Cimarron and a proposed greenway flanking the NC 98 Bypass. The Cimarron Greenway is recommended to be constructed as a paved multipurpose trail.

Sanford Creek Greenway

Sanford Creek runs east to west from the Heritage South area into Smith Creek at Heritage High School. A greenway should be installed along Sanford Creek from Rogers Road to Smith Creek to provide off-road access from Heritage subdivisions to the school sites and future Smith Creek Greenway. Multi-use paved trails should be developed here to support residents and children.

Smith Creek Greenway

Smith Creek is one of the major stream corridors in Wake Forest, running northeast to southwest through the eastern portion of town and is the feature greenway corridor of the Open Space and Greenways Plan. Currently, the Smith Creek Greenway has approximately two miles of paved trails located between the Neuse River and Burlington Mills Road and between Rogers Road and the Wake Forest Soccer Complex in the Heritage subdivision.

The greenway is recommend to be extended from the Soccer Center southward along Smith Creek past Heritage Elementary School, Heritage Middle School, and Heritage High School, the subdivisions of Smith Creek, Margots Pond, and Dansforth subdivisions, to the Burlington Mills Greenway. Sidewalk and trail spurs are recommended to link the greenway to nearby subdivisions for greater access.



This greenway is planned to extend northward from the Soccer Center, utilizing an underpass at the new NC 98 Bypass, to provide linkage to downtown Wake Forest. This greenway is planned to be a paved multi-use trail with the potential to serve a large number of users.

Additional local greenway corridors and subdivision connection opportunities are illustrated on Map 4.5.

4.4.4 Southern Study Area

The Southern Study Area occupies areas of Wake Forest that flank the Neuse River, Toms Creek and the southern reaches of Smith Creek. This study area contains a large share of Wake Forest's current and future residential expansion. Linking current pedestrian facilities is the primary goal of recommended pedestrian projects in the Southern Study Area. Pedestrian facilities recommendations are illustrated on Map 4.6.

Intersection Improvement Projects:

- Ligon Mill Road and Burlington Mills Road
- Forestville Road and Burlington Mills Road

Greenway Corridor Projects:

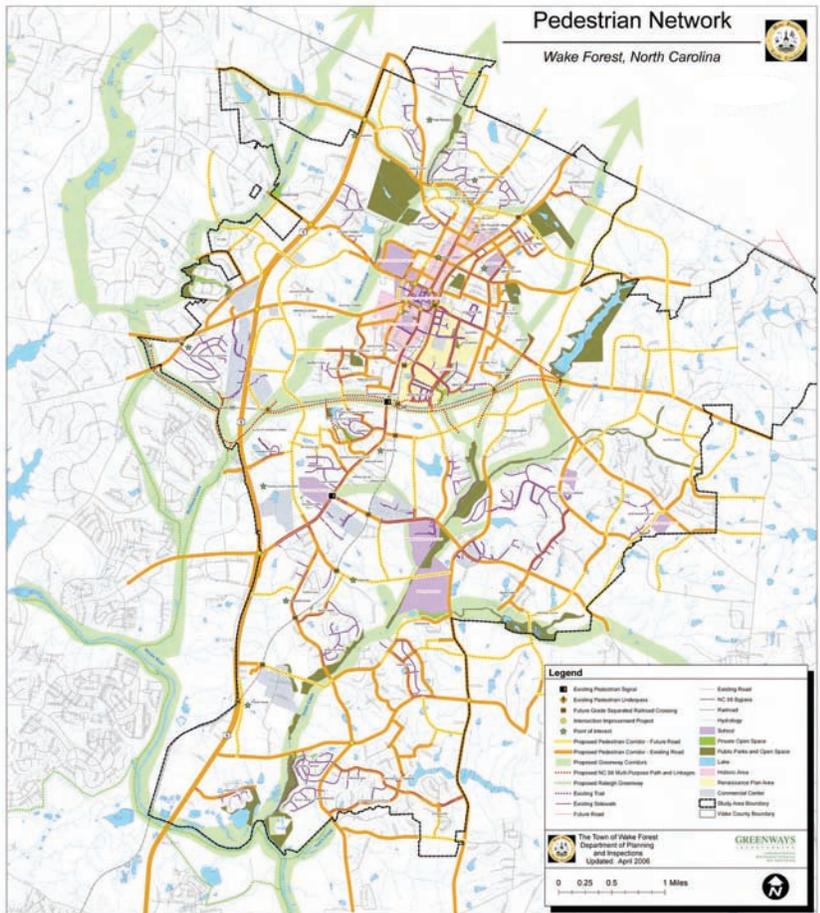
Tom's Creek

Tom's Creek runs from east to west along the southern end of Wake Forest. This greenway corridor has been designated as a conservation area and therefore it is not recommended that a paved path be established in this area.

Additional local greenway corridors and subdivision connection opportunities are illustrated on Map 4.6.



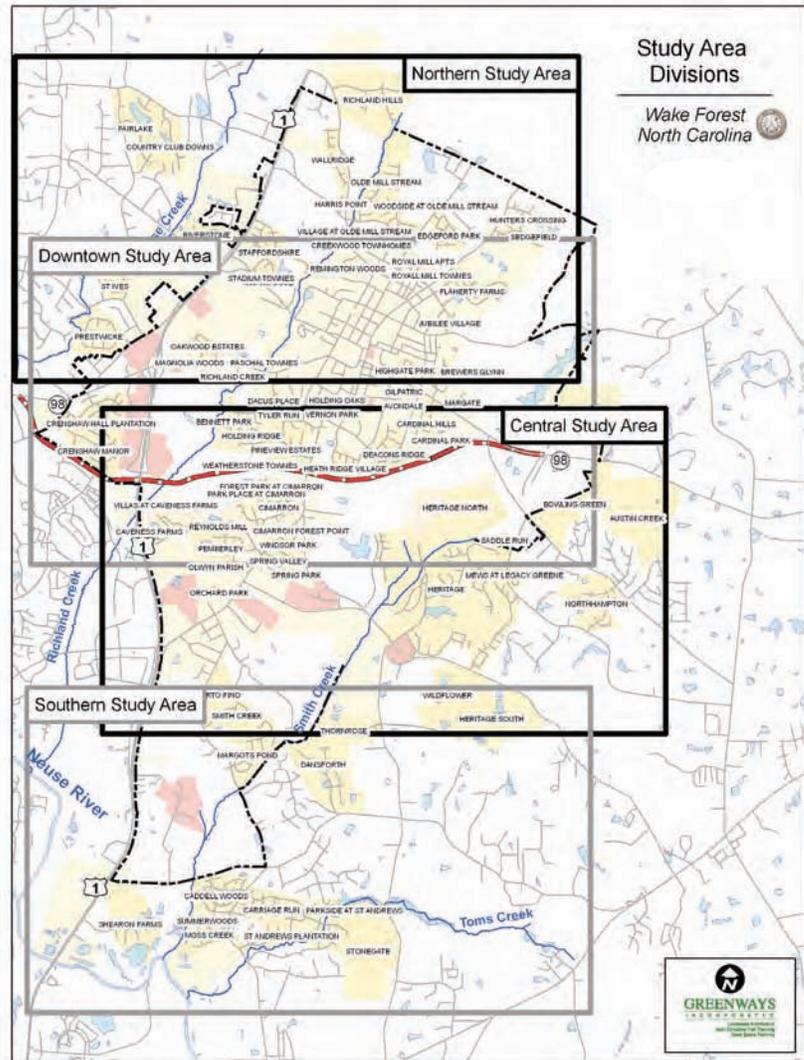
Proposed Pedestrian Network



Map 4.1 - Proposed Pedestrian Network



Study Area Divisions Guide



Map 4.2 - Study Area Divisions
Individual maps continue on following pages



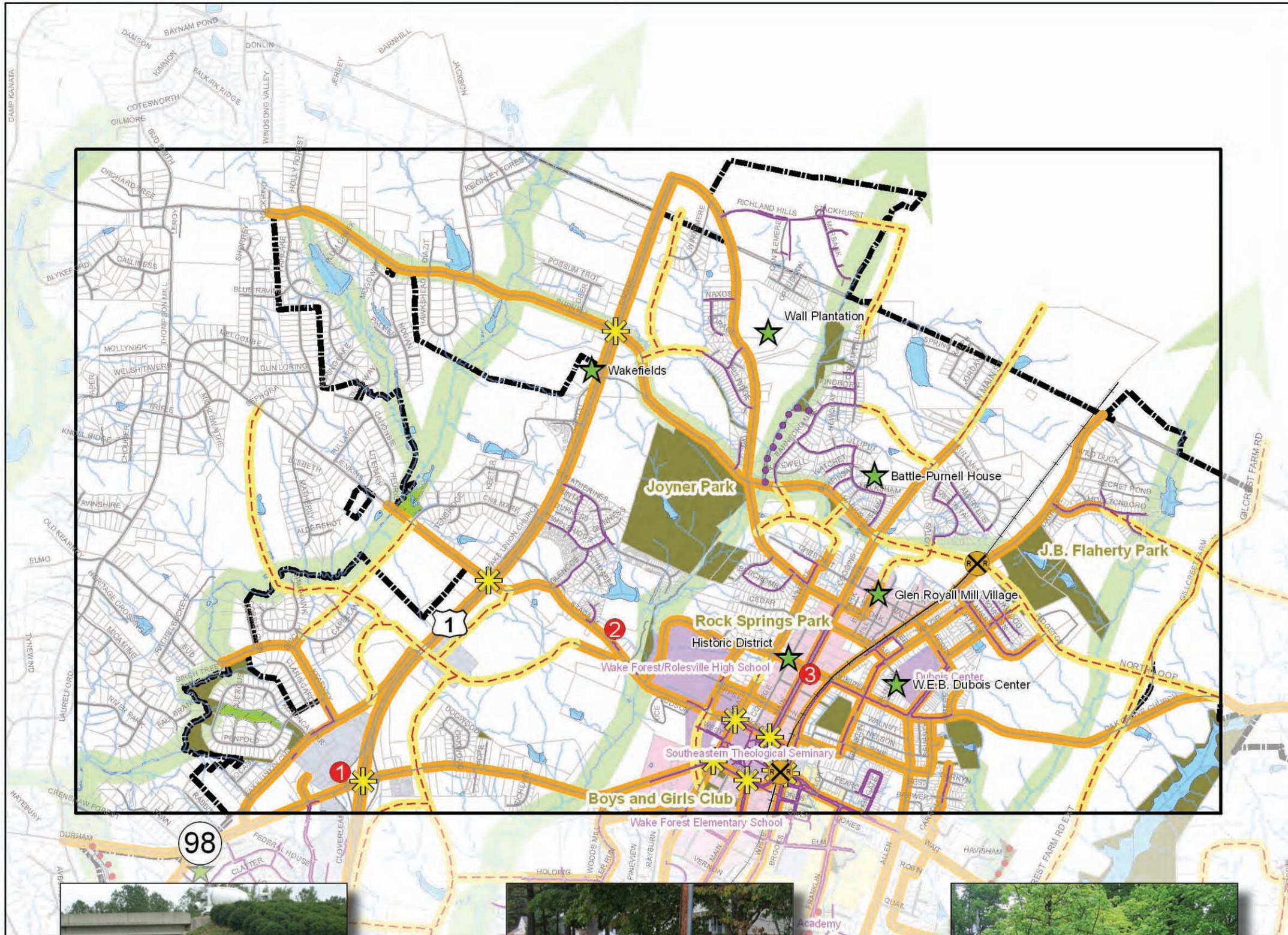
Proposed Network

Wake Forest
North Carolina



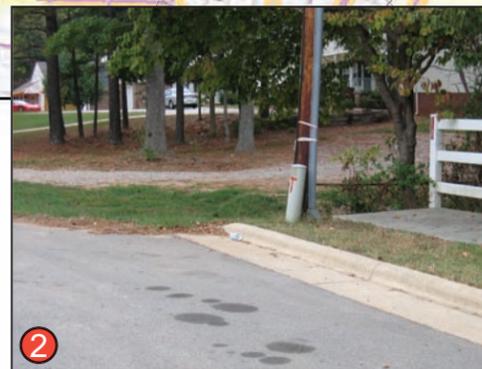
Northern Study Area

Map 4.3



Legend

- Existing Pedestrian Signal
- Existing Pedestrian Underpass
- Future Grade Separated Railroad Crossing
- Intersection Improvement Project
- Point of Interest
- Proposed Pedestrian Corridor - Existing Road
- Proposed Pedestrian Corridor - Future Road
- Proposed Greenway Corridor
- Proposed NC 98 Multi-Purpose Path and Linkages
- Proposed Raleigh Greenway
- Existing Trail
- Existing Sidewalk
- Future Road
- Existing Road
- NC 98 Bypass
- Railroad
- Hydrology
- School
- Private Open Space
- Public Parks and Open Space
- Lake
- Historic Area
- Renaissance Plan Area
- Commercial Center
- Study Area Boundary
- Wake County Boundary



0.5
Miles



GREENWAYS
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Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

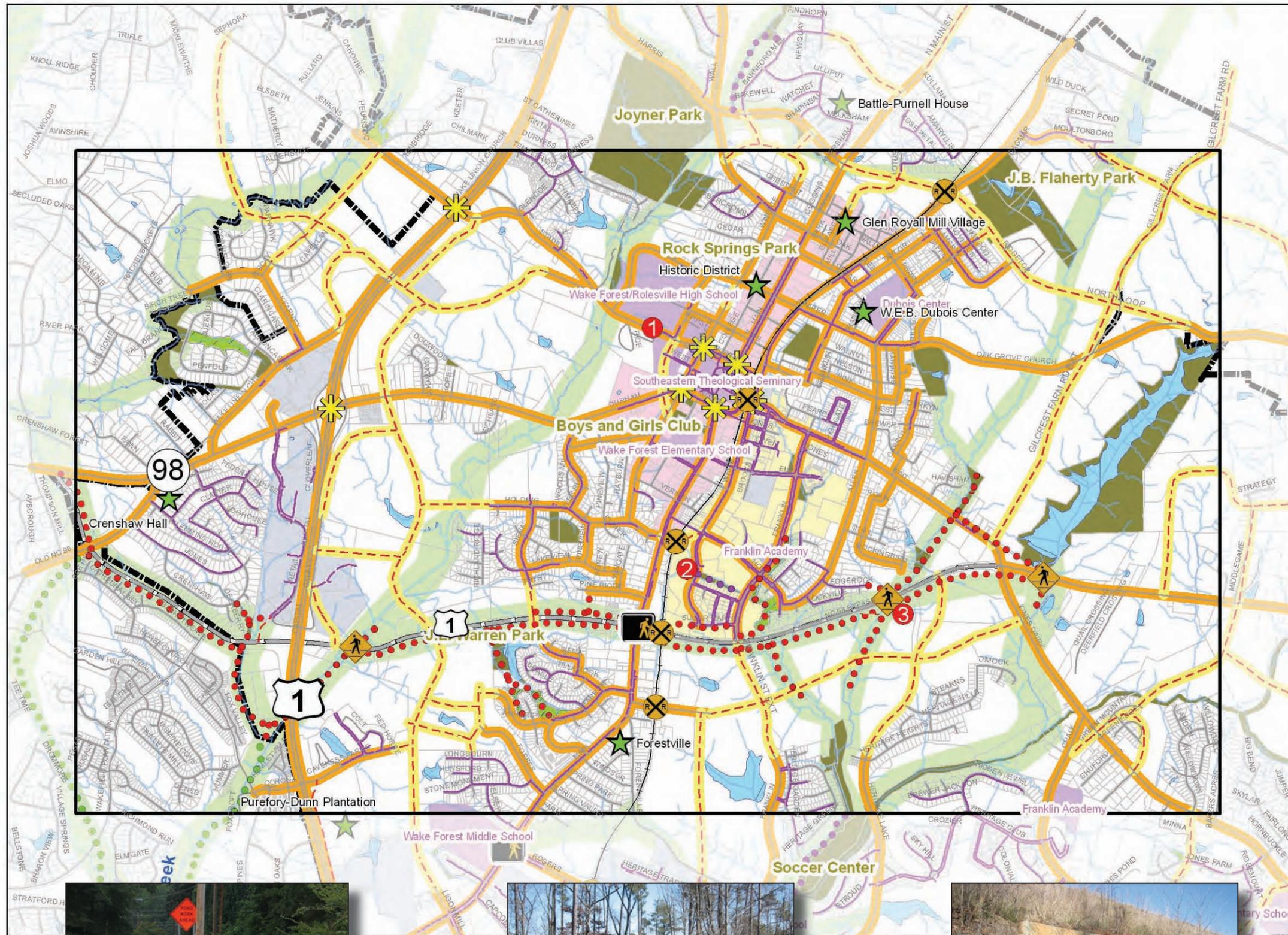
Proposed Network

Wake Forest North Carolina



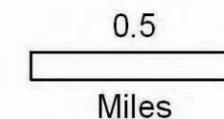
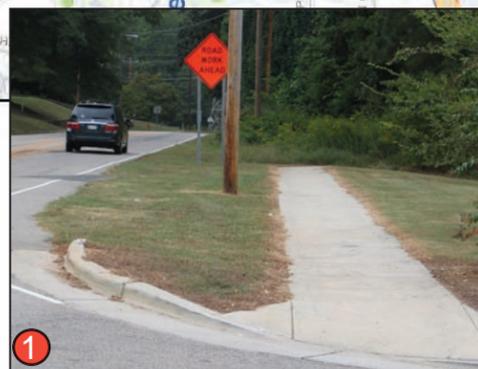
Downtown Study Area

Map 4.4



Legend

- Existing Pedestrian Signal
- Existing Pedestrian Underpass
- Future Grade Separated Railroad Crossing
- Intersection Improvement Project
- Point of Interest
- Proposed Pedestrian Corridor - Existing Road
- Proposed Pedestrian Corridor - Future Road
- Proposed Greenway Corridor
- Proposed NC 98 Multi-Purpose Path and Linkages
- Proposed Raleigh Greenway
- Existing Trail
- Existing Sidewalk
- Future Road
- Existing Road
- NC 98 Bypass
- Railroad
- Hydrology
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- Private Open Space
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- Study Area Boundary
- Wake County Boundary



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Open Space Planning

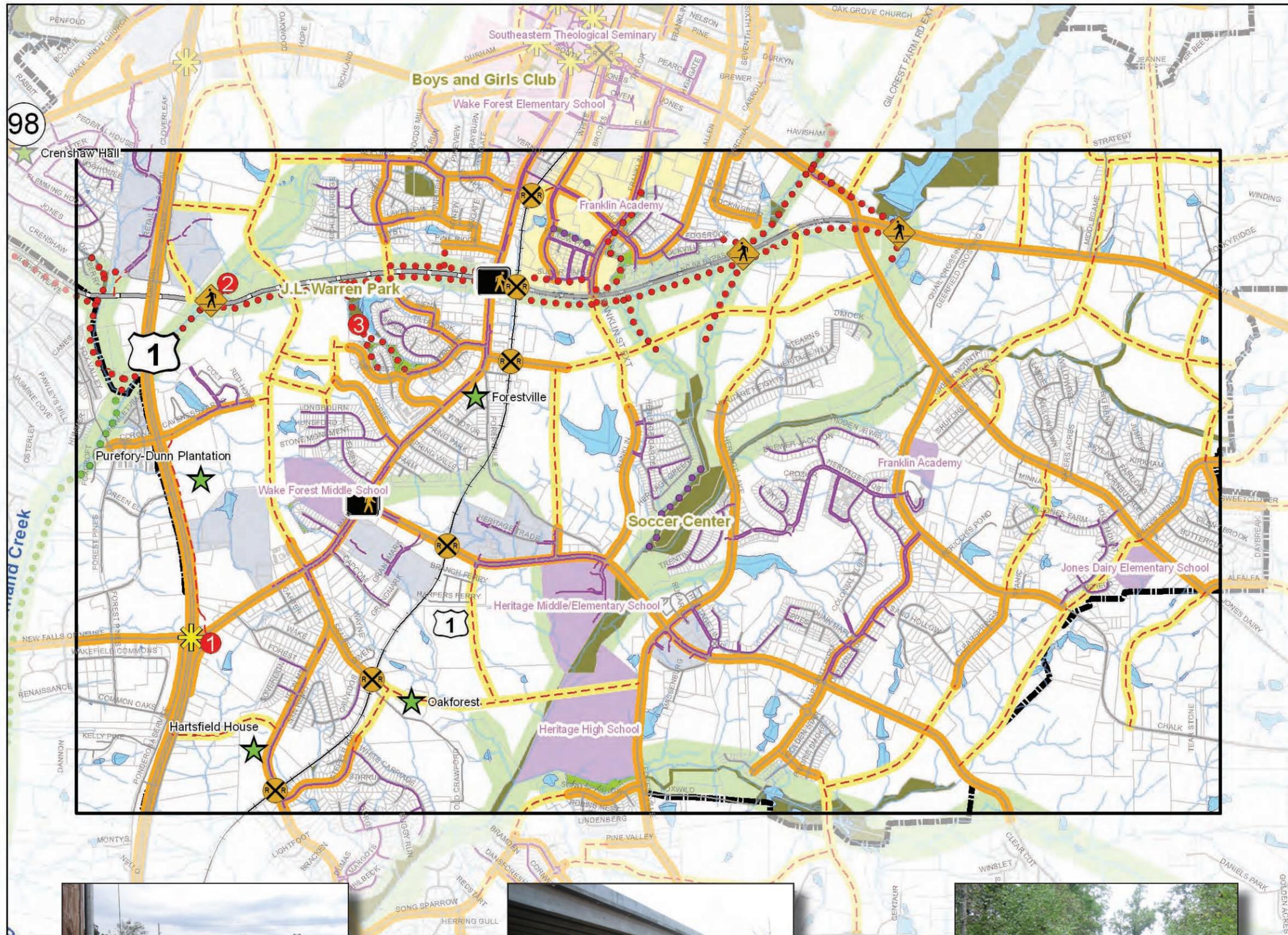
Proposed Network

Wake Forest North Carolina



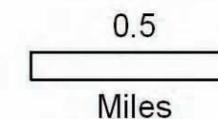
Central Study Area

Map 4.5



Legend

- Existing Pedestrian Signal
- Existing Pedestrian Underpass
- Future Grade Separated Railroad Crossing
- Intersection Improvement Project
- Point of Interest
- Proposed Pedestrian Corridor - Existing Road
- Proposed Pedestrian Corridor - Future Road
- Proposed Greenway Corridors
- Proposed NC 98 Multi-Purpose Path and Linkages
- Proposed Raleigh Greenway
- Existing Trail
- Existing Sidewalk
- Future Road
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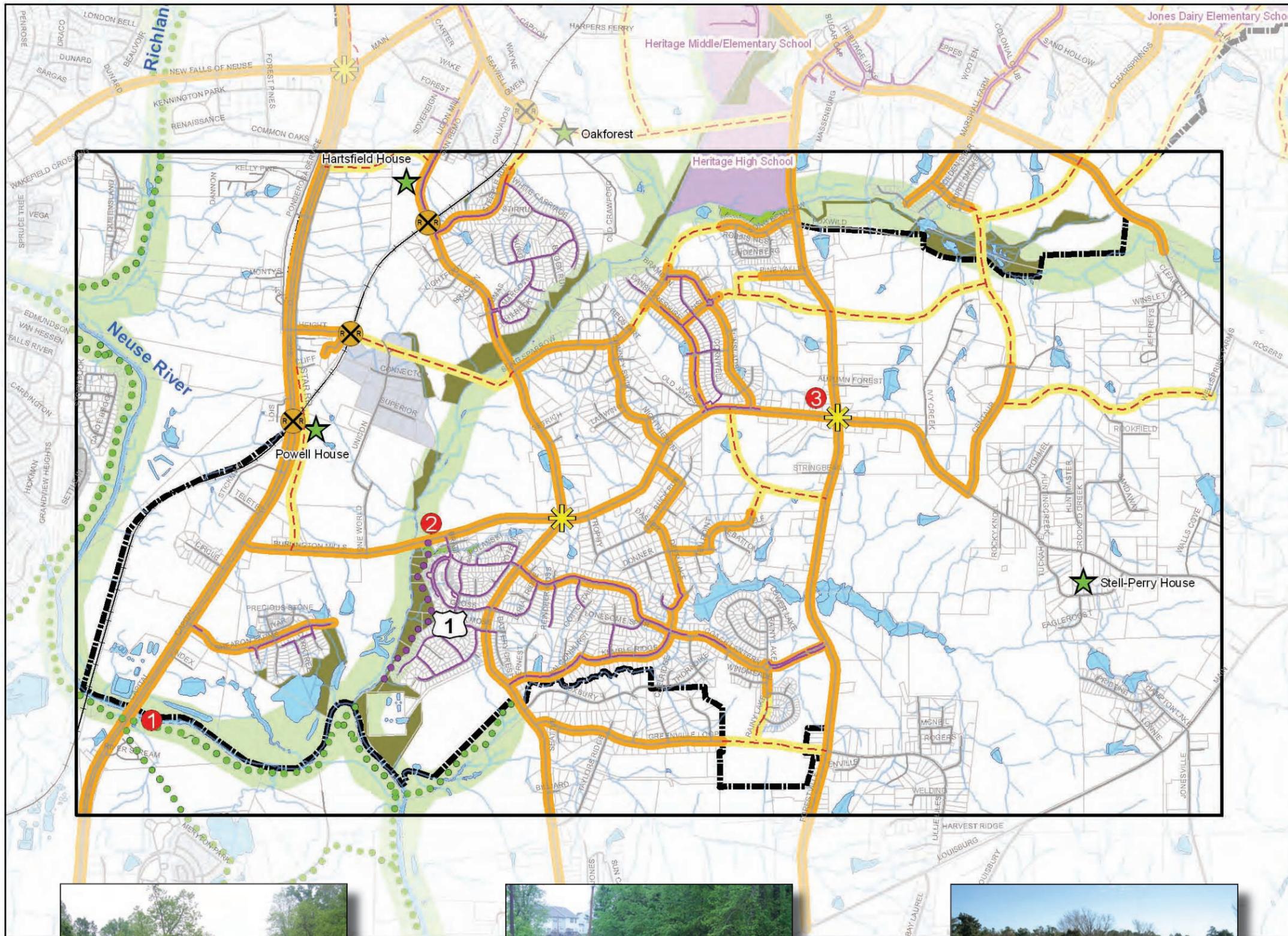
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Proposed Network

Wake Forest
North Carolina



Southern Study Area
Map 4.6



Legend

- Existing Pedestrian Signal
- Existing Pedestrian Underpass
- Future Grade Separated Railroad Crossing
- Intersection Improvement Project
- Point of Interest
- Proposed Pedestrian Corridor - Existing Road
- Proposed Pedestrian Corridor - Future Road
- Proposed Greenway Corridor
- Proposed NC 98 Multi-Purpose Path and Linkages
- Proposed Raleigh Greenway
- Existing Trail
- Existing Sidewalk
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Open Space Planning

Chapter 5

DESIGN GUIDELINES

5.1 Overview

These guidelines originate from and adhere to national design standards as defined by the American Association of State Highway Transportation Officials (AASHTO), the Americans with Disabilities Act (ADA), the Federal Highway Administration (FHWA) Pedestrian Facilities Users Guide, the Manual on Uniform Traffic Control Devices (MUTCD), and the NCDOT. Should the national standards be revised in the future and result in discrepancies with this chapter, the national standards should prevail for all design decisions. Likewise, all cost information provided is relevant only at or around the date of this report (October 2006). A qualified engineer or landscape architect should be consulted for the most up to date and accurate cost estimates.

The sections below serve as an inventory of pedestrian design elements/treatments *and* provide guidelines for their development. These treatments and design guidelines are important because they represent minimum standards for creating a pedestrian-friendly, safe, accessible community, and have been tailored to meet the specific facility development needs of Wake Forest's pedestrian system. The guidelines are not, however, a substitute for a more thorough evaluation by a landscape architect or engineer upon implementation of facility improvements. Some improvements may also require cooperation with the NCDOT for specific design solutions.

5.2 Pedestrian Facility Elements

5.2.1 Sidewalks and Walkways

Sidewalks and walkways are extremely important public right-of-way components often times adjacent to, but separate from automobile traffic. In many ways, they act as the seam between private residences, stores, businesses, and the street. They are spaces where children play, neighbors meet and talk, shoppers meander casually, parents push strollers, and



Figure 5(a):
Well designed residential sidewalk¹.



DESIGN GUIDELINES

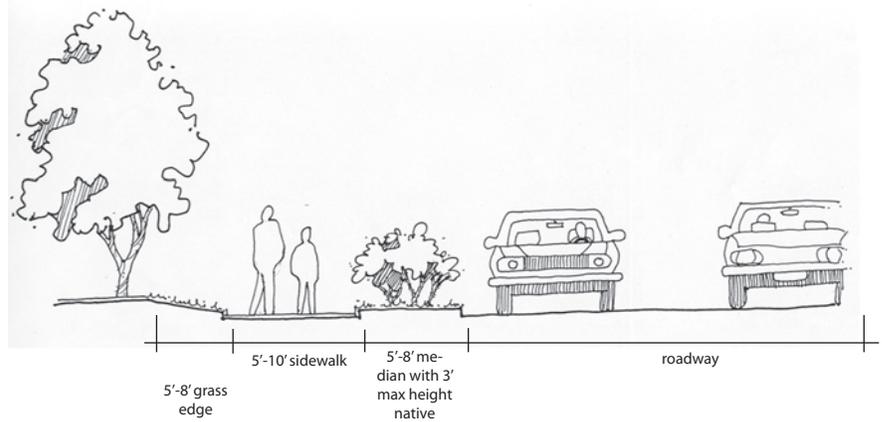


Figure 5(b):
Typical street with adjacent sidewalk

commuters walk to transit stops or directly to work. Because of the social importance of these spaces, great attention should be paid to retrofit and renovate areas with disconnected, dangerous, or otherwise malfunctioning walkways.

From a European style promenade to, in the case of a more rural environment, a simple asphalt or crushed stone path next to a secondary road, walkway form and topography can vary greatly. In general, sidewalks are constructed of concrete although there are some successful examples where other materials such as asphalt, crushed stone, or other slip resistant material have been used. The width of the walkways should correspond to the conditions present in any given location (i.e. level of pedestrian traffic, building setbacks, or other important natural or cultural features). FHWA (Federal Highway Administration) and the Institute of Transportation Engineers both suggest five feet as the minimum width for a sidewalk. This is considered ample room for two people to walk abreast or for two pedestrians to pass each other. Often downtown areas, near schools, transit stops, or other areas of high pedestrian activity call for much wider sidewalks.

Sidewalks are typically built in curb and gutter sections. They need to be kept completely free of obstructions such as utility poles. A four to eight foot buffer zone parallel to the sidewalk or walkway is recommended to separate pedestrian



traffic from automobile traffic and to keep the sidewalk free of light pole obstructions. Much like the sidewalk and walkway itself, the form and topography of this buffer will vary greatly. Native street tree plantings have historically proven to work successfully within these buffer zones. They regulate microclimate, create a desirable sense of enclosure, promote a local ecological identity and connection to place, and can act as a pleasant integration of nature into an urban environment. In the event that vegetation is not possible, a row of parked cars, bike lane, or street furniture can be used to create this buffer.

Guidelines³⁺⁹:

- Concrete is preferred surface, providing the longest service life and requiring the least maintenance.
- Sidewalks should be built as flat as possible to accommodate all pedestrians; they should have a running grade of five percent or less; with a two percent maximum cross-slope.
- Concrete sidewalks should be built to minimum depth of four inches; six inches at driveways.
- Sidewalks should be a minimum of five feet wide; eight to ten feet wide within Downtown; ten feet can also be considered in other areas of heavy pedestrian traffic. When sidewalk abuts storefronts, an additional two feet of space from walls is recommended.
- Buffer zone of two to four feet in local or collector streets; five to six feet in arterial or major streets and up to eight feet in busy streets and Downtown to provide space for light poles and other street furniture.
- Motor vehicle access points should be kept to minimum.

Cost:

Concrete curbing: \$10-\$15/linear foot
 Walkways: \$3/square foot
 Asphalt walkways are much less expensive in terms of construction cost but more difficult to traverse and more expensive to maintain.



*Figure 5(c):
Sidewalk with a vegetated buffer zone.
Notice the sense of enclosure created by
the large canopy street trees¹.*



5.2.2 Greenway Trail

A greenway is defined as a linear corridor of land that can be either natural, such as rivers and streams, or manmade, such as abandoned railroad beds and utility corridors. Most greenways contain trails. Greenway trails can be paved or unpaved, and can be designed to accommodate a variety of trail users, including bicyclists, walkers, hikers, joggers, skaters, horseback riders, and those confined to wheelchairs.

Multi-use trails are the most common trail type in the nation. These trails vary in width and can accommodate a wide variety of users. The minimum width for two-directional trails is 10', however 12'-14' widths are preferred where heavy traffic is expected. Centerline stripes should be considered for paths that generate substantial amounts of pedestrian traffic. Possible conflicts between user groups must be considered during the design phase, as cyclists often travel at a faster speed than other users. Radii minimums should also be considered depending on the different user groups.

While the vegetative clearing needed for these trails varies with the width of the trail. The minimum width for clearing and grubbing a 14' wide trail is 18' (two feet on each side). Selective thinning increases sight lines and distances and enhances the safety of the trail user. This practice includes removal of underbrush and limbs to create open pockets within a forest canopy, but does not include the removal of the forest canopy itself.

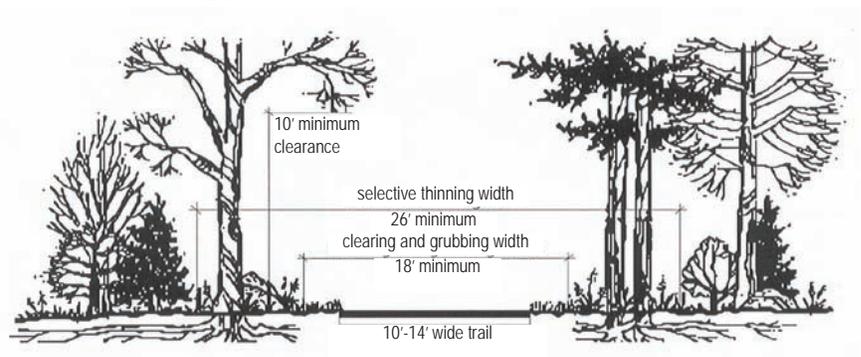


Figure 5(d):
Vegetative clearing guidelines.



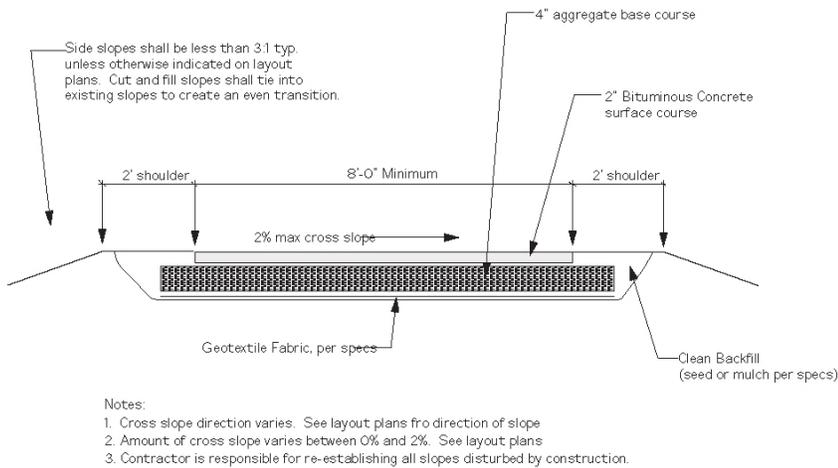


Figure 5(e):
Asphalt pavement construction detail.

Typical pavement design for a paved, off-road, multi-use trail should be based upon the specific loading and soil conditions for each project. These asphalt or concrete trails should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles.

Concrete: In areas prone to frequent flooding, it is recommended that concrete be used because of its excellent durability. Concrete surfaces are capable of withstanding the most powerful environmental forces. They hold up well against the erosive action of water, root intrusion and subgrade deficiencies such as soft soils. Most often, concrete is used for intensive urban applications. Of all surface types, it is the strongest and has the lowest maintenance requirement, if it is properly installed.

Asphalt: Asphalt is a flexible pavement and can be installed on virtually any slope. One important concern for asphalt trails is the deterioration of trail edges. Installation of a geotextile fabric beneath a layer of aggregate base course (ABC) can help to maintain the edge of a trail. It is important to provide a 2' wide graded shoulder to prevent trail edges from crumbling.



Figure 5(f):
Typical greenway approach to a roadway



DESIGN GUIDELINES

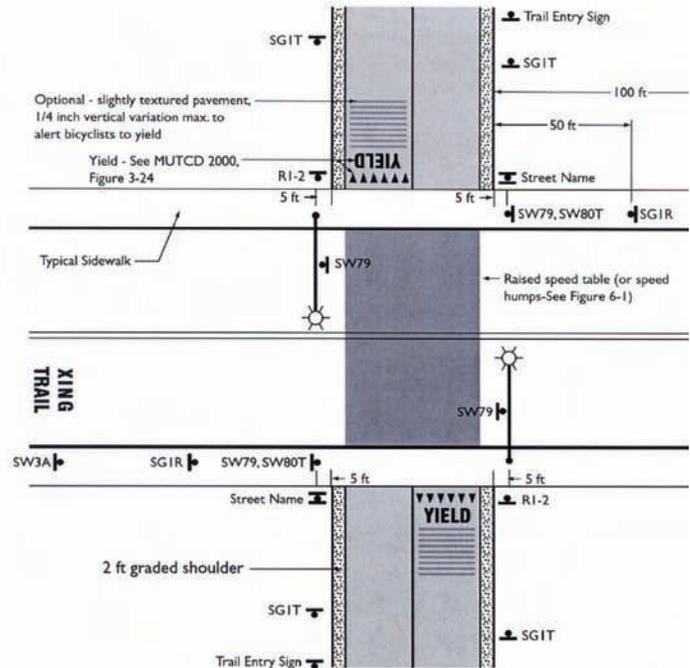


Figure 5(g):
Typical greenway trail crossing a roadway.

Trail and Roadway Intersections: The image above presents detailed specifications for the layout of intersections between trail corridors and roadways. Signage rules for these sorts of intersections are available in the MUTCD as well.

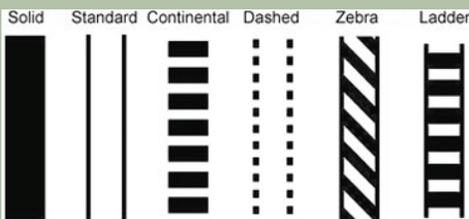


Figure 5(h):
Illustration of all the variety of patterns possible in designating a crosswalk¹.

5.2.3 Marked Crosswalks

A marked crosswalk designates a pedestrian right-of-way across a street. It is often installed at controlled intersections or at key locations along the street (mid-block crossings) and in this Plan are prescribed for the Downtown, school areas, and key residential and commercial areas where pedestrian activity is greatest. Although marked crosswalks provide strong visual clues to motorists that pedestrians are present, it is important to consider the use of these elements in conjunction with other traffic calming devices to fully recognize low traffic speeds and enhance pedestrian safety. In general, “marked crosswalks should not be installed in an uncontrolled environment where speeds exceed 40 mph”³. Every attempt should be made to install crossings in places



where pedestrians are most likely to cross. A well-designed traffic calming location is not effective if pedestrians are using other unmodified and potentially dangerous locations to cross the street.

Marked pedestrian crosswalks may be used under the following conditions: 1) At locations with stop signs or traffic signals, 2) At non-signalized street crossing locations in designated school zones, and 3) At non-signalized locations where engineering judgment dictates that the use of specifically designated crosswalks are desirable⁹.

There is a variety of form, pattern, and materials to choose from when creating a marked crosswalk. It is important however to provide crosswalks that are not slippery, are free of tripping hazards, or are otherwise difficult to maneuver by any person including those with physical mobility or vision impairments. Although attractive materials such as inlaid stone or certain types of brick may provide character and aesthetic value, the crosswalk can become slippery. Also, as it degrades from use or if it is improperly installed, it may become a hazard for the mobility or vision impaired.

A variety of color or texture may be used to designate crossings. These materials should be smooth, skid-resistant, and visible³. Reflective paint is inexpensive but is considered more slippery than other devices such as inlay tape or thermoplastic. A variety of patterns may be employed as detailed in Figure 5(h). In areas with a high volume of pedestrian traffic, particularly at mid-block crossings, a crosswalk can be raised to create both a physical impediment for automobiles and a reinforced visual clue to the motorist.

An engineering study may need to be performed to determine the appropriate width of a crosswalk at a given location, however marked crosswalks should not be less than six feet in width. In downtown areas or other locations of high pedestrian traffic, a width of ten feet or greater should be considered.



DESIGN GUIDELINES

Guidelines³⁺⁹:

- Should not be installed in an uncontrolled environment where speeds exceed 40 mph.
- Crosswalks alone may not be enough and should be used in conjunction with other measures to improve pedestrian crossing safety, particularly on roads with average daily traffic (ADT) above 10,000.
- Width of marked crosswalk should be at least six feet wide; ideally ten feet or wider in Downtown areas.
- Curb ramps and other sloped areas should be fully contained within the markings.
- Crosswalk markings should extend the full length of the crossings.
- Crosswalk markings should be white per MUTCD.
- The 'continental' pattern is recommended for intersection improvements in Wake Forest for aesthetic and visibility purposes; Lines should be one to two feet wide and spaced one to five feet apart.

Cost:

Regular striped:	\$100
Ladder crosswalk:	\$300
Pattern concrete:	\$3,000
Maintenance cost varies according to region and pattern used	

5.2.4 Advance Stop Bars

Moving the vehicle stop bar 15–30 feet back from the pedestrian crosswalk at signalized crossings and mid-block crossings increases vehicle and pedestrian visibility. Advance stop bars are 1–2 feet wide and they extend across all approach lanes at intersections. The time and distance created allows a buffer in which the pedestrian and motorist can interpret each other's intentions. Studies have shown that this distance translates directly into increased safety for both motorist and pedestrian. One study in particular claims that by simply adding a "Stop Here for Pedestrians" sign reduced pedestrian motorist conflict by 67%. When this was used in conjunction with advance stop lines, it increased to 90%¹.



Cost:

Signage (if desired): \$50 - \$150 plus installation
No additional cost if new line is installed in new paving or
as part of repaving

5.2.5 Curb ramps

Curb ramps are critical features that provide access between the sidewalk and roadway for wheelchair users, people using walkers, crutches, or handcarts, people pushing bicycles or strollers, and pedestrians with mobility or other physical impairments. In accordance with the 1973 Federal Rehabilitation Act and to comply with the 1990 Federal ADA requirements, curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist¹. In addition, these federal regulations require that all new constructed or altered roadways include curb ramps. Although the federally prescribed maximum slope for a curb ramp is 1:12 or 8.33% and the side flares of the curb ramp must not exceed a maximum slope of 1:10 or 10.0%, it is recommended that much less steep slopes be used whenever possible.

It is also recommended that two separate curb ramps be provided at each intersection (Figure 5(i)). With only one large curb ramp serving the entire corner, there is not safe connectivity for the pedestrian. Dangerous conditions exist when the single, large curb ramp inadvertently directs a pedestrian into the center of the intersection, or in front of an unsuspecting, turning vehicle.

For additional information on curb ramps see *Accessible Rights-of-Way: A Design Guide*, by the U.S. Access Board and the Federal Highway Administration, and *Designing Sidewalks and Trails for Access, Parts I and II*, by the Federal Highway Administration. Visit: www.access-board.gov for the Access board's right-of-way report¹.



Figure 5(i):
Curb ramps shown have two separate
ramps at the intersection¹.



DESIGN GUIDELINES

Guidelines⁹:

- Two separate curb ramps, one for each crosswalk, should be provided at corner of an intersection.
- Curb ramp should have a slope no greater than 1:12 (8.33%). Side flares should not exceed 1:10 (10%).

Cost:

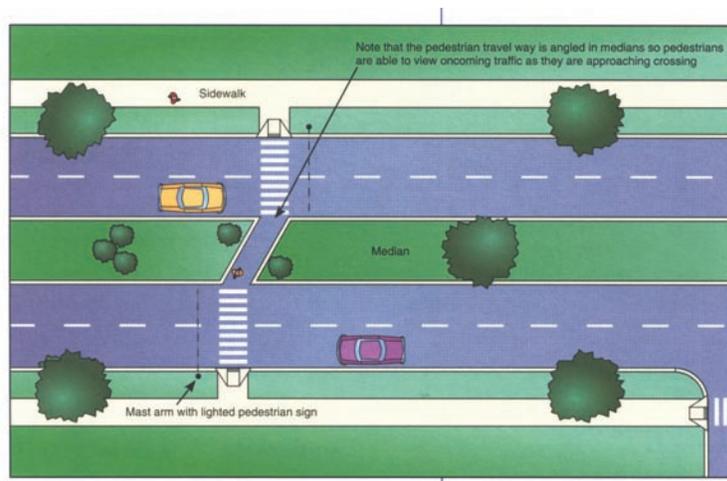
Curb ramp: \$800 - \$1,500 per ramp (new or retrofit)

5.2.6 Raised or Lowered Medians

Medians are barriers in the center portion of a street or roadway¹. When used in conjunction with mid-block or intersection crossings, they can be used as a crossing island to provide a place of refuge for pedestrians. They also provide opportunities for landscaping that in turn can help to slow traffic. A center turn lane can be converted into a raised or lowered median thus increasing motorist safety.

A continuous median can present several problems when used inappropriately. If all left-turn opportunities are removed, there runs a possibility for increased traffic speeds and unsafe U-turns at intersections. Additionally, the space occupied may be taking up room that could be used for bike lanes or

Figure 5(j):
A lowered median can be used to filter stormwater and provide a refuge for pedestrians crossing a roadway³.



other treatments discussed in this chapter. An alternative to the continuous median is to create a segmented median with left turn opportunities.

Raised or lowered medians are best suited for high-volume, high-speed roads, and they should provide ample cues for people with visual impairments to identify the boundary between the crossing island and the roadway.

Guidelines³⁺⁹:

- Median pedestrian refuge islands should be provided as a place of refuge for pedestrians crossing busy or wide roadways at either mid-block locations or intersections. They should be utilized on high speed and high volume roadways.
- Medians should incorporate trees and plantings to change the character of the street and reduce motor vehicle speed.
- Landscaping should not obstruct the visibility between motorists and pedestrians.
- Median crossings should provide ramps or cut-throughs for ease of accessibility for all pedestrians
- Median crossings should be at least 6 feet wide in order to accommodate more than one pedestrian, while a width of 8 feet (where feasible) should be provided for bicycles, wheelchairs, and groups of pedestrians
- Median crossings should possess a minimum of a 4 foot square level landing to provide a rest point for wheelchair users.
- Pedestrian pushbuttons should be located in the median of all signalized mid-block crossings, where the roadway width is in excess of 60 feet.

Cost:

Raised or lowered: \$15,000 - \$30,000 per 100 feet.



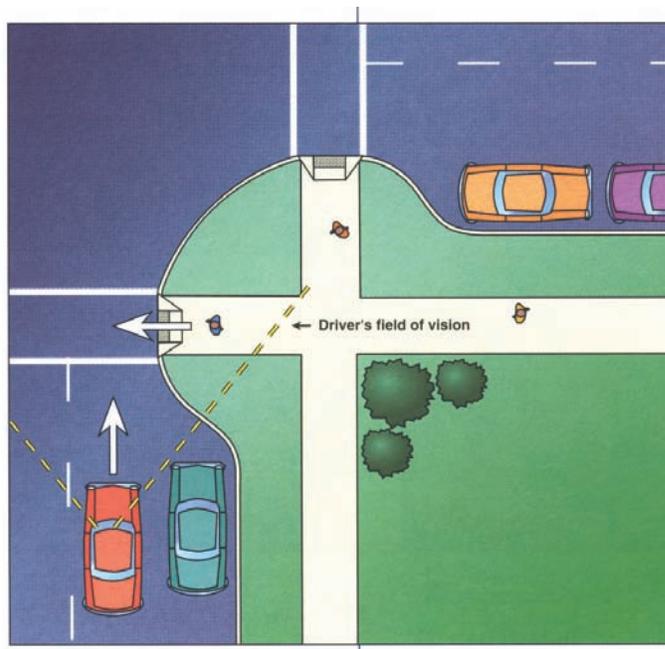
5.2.7 Bulb-outs

A bulb-out, or curb extension, is a place where the sidewalk extends into the parking lane of a street. Because these curb extensions physically narrow the roadway, a pedestrian's crossing distance and consequently the time spent in the street is reduced. They can be placed either at mid-block crossings or at intersections.

Sightlines and pedestrian visibility are reduced when motor vehicle parking encroaches too close to corners creating a dangerous situation for pedestrians. When placed at an intersection, bulb-outs preclude vehicle parking too close to a crosswalk. Also, bulb-outs at intersections can greatly reduce turning speed, especially if curb radii are set as tight as possible¹. Finally, bulb-outs also reduce travel speeds when used in mid-block crossings because of the reduced street width.

Bulb-outs should only be used where there is an existing on-street parking lane and should never encroach into travel lanes, bike lanes, or shoulders¹.

Figure 5(k):
By reducing a pedestrian's crossing distance, less time is spent in the roadway, and pedestrian vehicle conflicts are reduced³.



Guidelines¹⁰:

- Bulb-outs should be used on crosswalks in heavy pedestrian areas where parking may limit the driver's view of the pedestrian.
- Where used, sidewalk bulb-outs should extend into the street for the width of a parking lane (a minimum five feet) in order to provide for a shorter crossing width, increased pedestrian visibility, more space for pedestrian queuing, and a place for sidewalk amenities and planting.
- Curb extensions should be used on mid-block crossing where feasible.
- Curb extensions may be inappropriate for use on corners where frequent right turns are made by trucks or buses.

Cost:

Bulb-outs/Curb extensions: \$2,000 - \$20,000
Cost can increase depending on the amount of infrastructure that may have to be relocated.

5.2.8 Pedestrian Overpass/Underpass

Pedestrian overpasses and underpasses efficiently allow for pedestrian movement across busy thoroughfares¹. These types of facilities are problematic in many regards and should only be considered under suitable circumstances or where no other solution is possible. Perhaps the best argument for using them sparingly is that research proves pedestrians will avoid using such a facility if they perceive the ability to cross at grade as taking about the same amount of time¹.

The other areas of contention arise with the high cost of construction. There are also ADA requirements for stairs, ramps, and elevators that in many cases once complied with result in an enormous structure that is visually disruptive and difficult to access.

Overpasses work best when existing topography allows for smooth transitions. Underpasses as well work best with



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favorable topography when they are open and accessible, and exhibit a sense of safety¹. Each should only be considered with rail lines, high volume traffic areas such as freeways, and other high volume arteries¹.

Guidelines¹⁰:

- Over and underpasses should be considered only for crossing arterials with greater than 20,000 vehicle trips per day and speeds 35 - 40 mph and over.
- Minimum widths for over and underpasses should follow the guidelines for sidewalk width.
- Underpasses should have a daytime illuminance minimum of 10 fc achievable through artificial and/or natural light provided through an open gap to sky between the two sets of highway lanes, and a night time level of 4 foot-candle.
- In underpasses, where vertical clearance allows, the pedestrian walkway should be separated from the roadway by more than a standard curb height.
- Consider acoustics measures within underpasses to reduce noise impacts to pedestrians and bicyclists.

Cost:

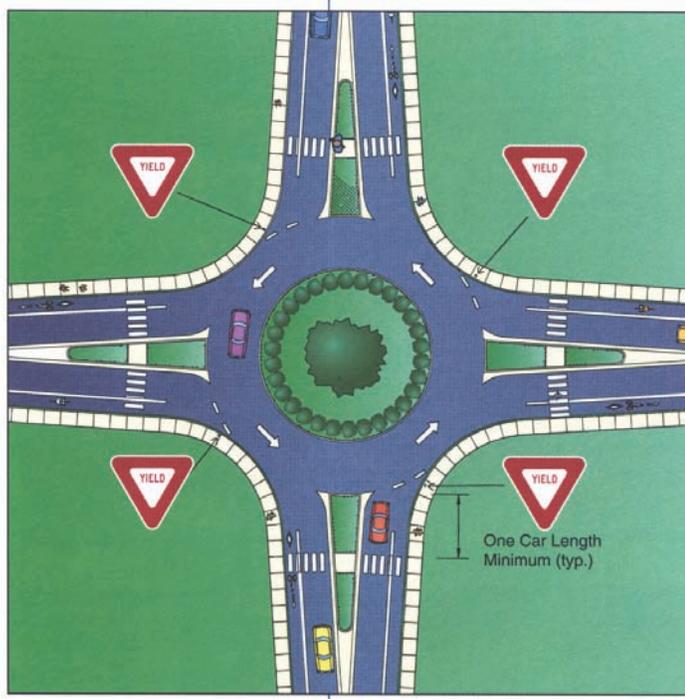
Varies greatly from \$500,000 to \$4,000,000

5.2.9 Roundabouts

A roundabout is a circular intersection that maneuvers traffic around in a counterclockwise direction so that cars make a right-hand turn onto a desired street¹. Vehicles from approaching streets are generally not required to stop although approaching vehicles are required to yield to motorists in the roundabout. It is believed that this system eliminates certain types of crashes at traditional intersections.

Roundabout design can become quite problematic in dealing with pedestrian and bicycle use. Every effort must be made to prompt motorists to yield to pedestrians crossing the roundabout. A low design speed is required to improve pedestrian safety. Splitter islands and single lane approaches





*Figure 5(l):
Typical roundabout with appropriate
pedestrian facilities³.*

both lend to pedestrian safety as well as other urban design elements discussed in this chapter.

Problems also arise with the vision-impaired because there are not proper audible cues associated with when to cross. Studies are underway to develop and test solutions. Auditory accessible pedestrian signals placed on sidewalks and splitter islands are one solution, but again there is no research to prove their efficacy¹.

In areas where traffic is low, a roundabout presents little in the way of a barrier for bicyclists. However, in multi-lane roundabouts where speeds are higher, and the traffic is heavy, bicyclists are at a distinct and dangerous disadvantage. Adding a bike lane within such a roundabout has not proven to be effective. A possible solution involves creating a bike lane that completely skirts the roundabout allowing the cyclist to use or share the pedestrian route.

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Guidelines¹¹:

- The recommended maximum entry design speed for roundabouts ranges from 15 mph for 'mini-roundabouts' in *neighborhood* settings, to 20 mph for single-lane roundabouts in *urban* settings, to 25 mph for single-lane roundabouts in *rural* settings.
- Refer to roundabout diagram for typical crosswalk placement.
- Please refer to FHWA's report, *Roundabouts, an Information Guide*, available online through: www.tfhrc.gov The report provides information on general design principles, geometric elements, and provides detailed specifications for the various types of roundabouts.

Cost:

Neighborhood intersection, landscaped: \$45,000-\$150,000
Arterial, landscaped: \$250,000
Lower maintenance cost than traditional signals

5.2.10 Signalization

5.2.10.1 Traffic Signals

Traffic signals assign the right of way to motorists and pedestrians and produce openings in traffic flow, allowing pedestrians time to cross the street¹⁴. When used in conjunction with pedestrian friendly design, proper signalization should allow for an adequate amount of time for an individual to cross the street. The suggested amount of pedestrian travel speed recommended in the Manual on Uniform Traffic Control Devices (MUTCD) is 4ft/sec however this does not address the walking speed of the elderly or children. Therefore it is suggested that a lower speed of 3.5ft/sec be used whenever there are adequate numbers of elderly and children using an area.

Engineering, as well as urban design judgment, must be used when determining the location of traffic signals and the accompanying timing intervals. Although warrants for pedestrian signal timing have been produced by the MUTCD,



each site must be analyzed for factors including new facility and amenity construction (i.e. a popular new park or museum) to allow for potential future pedestrian traffic volume. In addition, creating better access to existing places may in fact generate a higher pedestrian volume¹.

Fixed timed sequencing is often used in high traffic volume commercial or downtown areas to allow for a greater efficiency of traffic flow. In such instances, the pedestrian speed must be carefully checked to ensure safety.

5.2.10.2 Pedestrian Signals

There are a host of possible traffic signal enhancement opportunities that can greatly improve the safety and flow of pedestrian traffic. Some include: international symbols for WALK and DON'T WALK, providing large traffic signals, the positioning of traffic signals so that those waiting at a red-light cannot see the opposing traffic signal and anticipate their own green-light, installing countdown signals to provide pedestrians information on how long they have remaining in the crossing interval, automatic pedestrian sensors, and selecting the proper signal timing intervals¹.

According to the MUTCD, international pedestrian signal indication should be used at traffic signals whenever warranted¹. As opposed to early signalization that featured "WALK" and "DON'T WALK", international pedestrian symbols should be used on all new traffic signal installations as illustrated in Figure 5(m). Existing "WALK" and "DON'T WALK" signals should be replaced with international symbols when they reach the end of their useful life.

Symbols should be of adequate size, clearly visible, and, in some circumstances, accompanied by an audible pulse or other messages to make crossing safe for all pedestrians. Consideration should be paid to the noise impact on the surrounding neighborhoods when deciding to use audible signals¹. For additional information on accessible pedestrian signals, please visit: www.walkinginfo.org/aps.



Figure 5(m):
International symbols used in a crosswalk
to designate WALK and DON'T WALK¹.



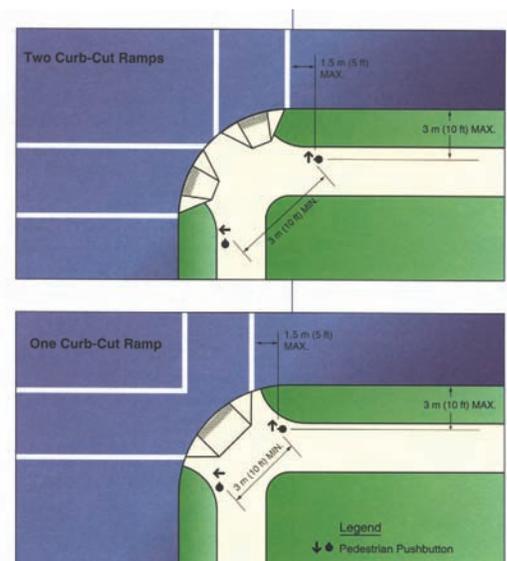
DESIGN GUIDELINES

Audible cues can also be used to pulse along with a countdown signal. Countdown signals are pedestrian signals that show how many seconds the pedestrian has remaining to cross the street. The countdown can begin at the beginning of the WALK phase, perhaps flashing white or yellow, or at the beginning of the clearance, or DON'T WALK phase, flashing yellow as it counts down.

The timing of these or other pedestrian signals needs to be adapted to a given situation. There are three types of signal timing generally used: *concurrent*, *exclusive*, and *leading pedestrian interval (LPI)*. The strengths and weaknesses of each will be discussed with an emphasis on when they are best employed.

Concurrent signal timing refers to a situation where motorists running parallel to the crosswalk are allowed to turn into and through the crosswalk, left or right, after yielding to pedestrians. This condition is not considered as safe as some of the latter options, however this type of signal crossings generally allows for more pedestrian crossing opportunities and less wait time. In addition, traffic is allowed to flow a bit more freely. *Concurrent* signal timing is best used where lower volume turning movements exist¹.

Figure 5(n):
Appropriate location of pedestrian
push-buttons³.



Where there are high-volume turning situations that conflict with pedestrian movements, the *exclusive* pedestrian interval is the preferred solution. The *exclusive* pedestrian intervals stop traffic in all directions. In order to keep traffic flowing regularly, there is often a greater pedestrian wait time associated with this system. Although it has been shown that pedestrian crashes have been reduced by 50% in some commercial or downtown areas by using these intervals, the long wait times can encourage some to attempt a cross when there is a perceived lull in traffic¹. These types of crossings are dangerous and may negate the use of the system. A problem is also created for those with visual impairments when the audible cues of the passing parallel traffic is eliminated. Often an audible signal will have to accompany a WALK signal¹.

A proven enhancement that prevents many of the conflicts addressed under either of the former methods is LPI. An LPI works in conjunction with a *concurrent* signal timing system and simply gives the pedestrian a few seconds head start on the parallel traffic. An advance walk signal is received prior to a green light for motorists. This creates a situation where the pedestrian can better see traffic, and more importantly, the motorists can see and properly yield to pedestrians¹. Long-term research has shown that this system has worked well in places like New York City (where it has been used for 20 years) at reducing motorist and pedestrian conflict¹. As with the *exclusive* pedestrian interval, an audible cue will need to accompany the WALK signal for the visually impaired.

The use of infrared or microwave pedestrian detectors has increased in many cities worldwide. These devices replace the traditional push-button system. Although still experimental, they appear to be improving pedestrian signal compliance as well as reducing the number of pedestrian and vehicle conflicts¹. Perhaps the best use of these devices is when they are employed to extend crossing time for slower moving pedestrians. Whether these devices are used or the traditional push-button system is employed, it is best to provide instant feedback to pedestrians regarding the length of their wait. This is thought to increase and improve pedestrian signal compliance.



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Guidelines³⁺⁹:

- Pedestrian signals should be placed in locations that are clearly visible to all pedestrians.
- Larger pedestrian signals should be utilized on wider roadways, to ensure readability.
- Pedestrian signal pushbuttons should be well-signed and visible.
- Pedestrian signal pushbuttons should clearly indicate which crossing direction they control.
- Pedestrian signal pushbuttons should be reachable from a flat surface, at a maximum height of 3.5 feet and be located on a level landing to ensure ease of operation by pedestrians in wheelchairs.
- Walk intervals should be provided during every cycle, especially in high pedestrian traffic areas.

Cost:

Traffic signals:	\$20,000 - \$140,000
Pedestrian signals:	\$5,000
Adjusting signal timing requires a few hours of staff time	



Figure 5(o):
A low cost sign that restricts right-hand turns at a red light¹.

5.2.11 Right Turn on Red Restrictions

Introduced in the 1970's as a fuel saving technique, the *Right Turn on Red (RTOR)* law is thought to have had a detrimental effect on pedestrians¹. The issue is not the law itself but rather the relaxed enforcement of certain caveats within the law such as coming to a complete stop and yielding to pedestrians. Often motorists will either nudge into a crosswalk to check for oncoming traffic without looking for pedestrians or slow, but not stop, for the red-light while making the turn.

There is legitimate concern that eliminating an RTOR will only increase the number of right-turn-on-green conflicts where all of the drivers who would normally have turned on red, now are anxious to turn on green. As discussed in 5.2.10 above, LPI or exclusive pedestrian intervals may help to alleviate this problem. Eliminating RTOR should be



considered on a case-by-case basis and only where there are high pedestrian volumes. This can be done by simple sign postings as illustrated in Figure 5(o).

Cost:
Signage, installed: \$230 - \$350

5.2.12 Landscaping

The introduction of vegetation in an urban environment can provide a welcomed intervention of nature into a place that is otherwise hardened from buildings, concrete, and asphalt. It can be used to provide a separation buffer between pedestrians and motorists, reduce the width of a roadway, calm traffic by creating a visual narrowing of the roadway, enhance the street environment, and help to generate a desired aesthetic.

Street trees and other plantings provide comfort, a sense of place, and a more natural and inviting setting for pedestrians. Landscaping and the aforementioned street furniture make people feel welcome

There are also some instances where islands of vegetation are created to collect and filter stormwater from nearby streets and buildings. These islands are referred to as constructed wetlands, rain gardens, and/or bioswales. When these devices are employed, the benefits listed above are coupled with economic and ecologic benefits of treating stormwater at its source. There are many examples of this in Oregon and Washington, particularly Seattle's Green Streets Program. Using thoughtful design to treat stormwater as an amenity rather than waste to be disposed of in an environmentally harmful manner is gaining popularity nationwide.

An issue with this or any landscaping treatments is that of ongoing maintenance. The responsibility often falls on local municipalities although there are instances where local community groups have provided funding and volunteers for maintenance. The best way to address the maintenance issue is to design using native plant material that is already adapted to the local soil and climate. Growth pattern and



Figure 5(p):
Landscaping used on the Sea Street in Seattle, Washington shows how stormwater treatment can be tied to aesthetically pleasing plantings⁷.



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space for maturation, particularly with larger tree plantings, are important to avoid cracking sidewalks and other pedestrian obstructions.

Guidelines³:

- Buffer zone plantings should be maintained at no higher than three feet to allow sight distance for motorists and pedestrians.
- Trees with large canopies planted between the sidewalk and street should generally be trimmed to keep branches at least seven feet above the sidewalk.
- Plants and trees should be chosen to match character of area.

Cost:

Varies greatly. May be supplemented by funds from community organizations or homeowners associations.

5.2.13 Roadway Lighting Improvements

Proper lighting in terms of quality, placement, and sufficiency can greatly enhance a nighttime urban experience as well as create a safe environment for motorists and pedestrians. Two-thirds of all pedestrian fatalities occur during low-light conditions³. Attention should be paid to crossings so that there is sufficient ambience for motorists to see pedestrians. To be most effective, lighting should be consistent, adequately spaced, and distinguished, providing adequate light.

In most cases, roadway street lighting can be designed to illuminate the sidewalk area as well. The visibility needs of both pedestrian and motorist should be considered. In commercial or downtown areas and other areas of high pedestrian volumes, the addition of lower level, pedestrian-scale lighting to streetlights with emphasis on crossings and intersections may be employed to generate a desired ambience. A variety of lighting choices include mercury vapor, incandescent, or less expensive high-pressure sodium lighting for pedestrian level lighting¹. Roadway streetlights can range from 20-40 feet in height while pedestrian-scale lighting is typically 10-15 feet.



*Figure 5(q):
The street furniture shown here is placed in such a manner so as to create a safe, pleasurable, and accessible walking environment¹.*



It is important to note that every effort should be made to address and prevent light pollution. Also known as photo pollution, light pollution is “excess or obtrusive light created by humans”⁴. Whenever urban improvements are made where lighting is addressed, a qualified lighting expert should be consulted early in the process. This individual should not only create a safe and attractive ambiance, but will do so with the minimum of fixtures, an awareness of the importance of minimizing photo pollution, and with a focus on minimizing future energy use. A thoughtful plan of how and where to light will reap benefits not only in potential reduced infrastructure cost, but future energy costs as well.

Guidelines:

- Ensure pedestrian walkways and crossways are sufficiently lit.
- Consider adding pedestrian-level lighting in areas of higher pedestrian volumes, Downtown, and at key intersections.
- Install lighting on both sides of streets in commercial districts.
- Use uniform lighting levels.

Cost:

Varies greatly depending on design, fixture selection, and public utility

5.2.14 Street Furniture and Walking Environment

As part of a comprehensive sidewalk and walkway design, all street furniture should be placed in a manner that allows for a safe, pleasurable, and accessible walking environment. Good-quality street furniture will show that the community values its public spaces and is more cost-effective in the long run. Street furniture includes benches, trash bins, signposts, newspaper racks, water fountains, bike racks, restaurant seating, light posts, and other ornaments that are found within an urban street environment. Street furniture should mostly be considered in the Downtown area and other important pedestrian-active areas.



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In addition to keeping areas free of obstruction from furniture, a walking environment should be clean and well maintained. Attention should be given to removing debris, trimming vegetation, allowing for proper stormwater drainage, providing proper lighting and sight angles, and repairing or replacing broken or damaged paving material can make an enormous difference in pedestrian perception of safety and aesthetics. Special attention should be paid to the needs of the visually impaired so that tripping hazards and low hanging obstructions are removed.

Guidelines³:

- Ensure proper placement of furniture; do not block pedestrian walkway or curb ramps or create sightline problems.
- Wall mounted Objects = not to protrude more than 4" from a wall between 27" and 7' from the ground
- Single post mounted Objects = not to protrude more than 4" from each side of the post between 27" and 7' from the ground
- Multiple Post Mounted Objects = lowest edge should be no higher than 27" and no lower than 7'
- Place street furniture at the end of on-street parking spaces rather than in middle to avoid vehicle-exiting conflict.

Cost:

Varies depending on design, furniture selection, material, and level of landscaping



*Figure 5(r):
This typical transit stop has all of the key features of shelter, ample seating, bicycle parking, landscaping, and trash bins¹.*

5.2.15 Transit Stop Treatments

Currently the Town of Wake Forest is not served by any public transportation. In the event that such an opportunity is made available to the Town, it is appropriate to consider some of the basic elements of a well designed, accessible, and functional transit stop.

Bus or other transit stops should be located in places that are most suitable for the passengers. For example, stops should be provided near higher density residential areas, commercial



or business areas, and schools, and connected to these areas by sidewalk. Some of the most important elements to consider are the most basic: sidewalk connectivity to the stops, proper lighting, legible and adequate transit stop signage, shelter, seating, trash bins, bicycle and even car parking. Transit stops create an area of activity and may generate additional business and pedestrian traffic. Therefore an opportunity is created to provide adequate sidewalks and other pedestrian oriented design elements. At a minimum, marked crosswalks (especially at mid-block stops), curb ramps, and proper sidewalk widths should be considered.

As with any human scale design element discussed, safety is an important factor to consider when locating bus stops. In the case of a bus stop, special attention should be paid to the number of lanes and direction of traffic when deciding to locate a stop on the near or far side of an intersection. Also special consideration must be paid to the wheelchair lifts in terms of how and where the mobility impaired will exit and enter the bus.

Cost:

Can vary greatly from \$1,000 to \$10,000

5.2.16 Pedestrian Signs and Wayfinding

Signage provides important safety and wayfinding information to motorist and pedestrian residents and tourists. From a safety standpoint, motorists should be given advance warning of upcoming pedestrian crossings or of traffic calming areas. Signage of any type should be used and regulated judiciously. An inordinate amount of signs creates visual clutter. Under such a condition, important safety or wayfinding information may be ignored resulting in confusion and possible pedestrian vehicle conflict. Regulations should also address the orientation, height, size, and sometimes even style of signage to comply with a desired local aesthetic.

Wayfinding signage should orient and communicate in a clear, concise and functional manner. It should enhance pedestrian circulation and direct visitors and residents to



MUTCD Pedestrian-Related Signage

Regulatory Signs



School, Warning, and Informational Signs



Sources: Manual on Uniform Traffic Control Devices, 2003
<http://www.traffic-sign.us/>

Sign	MUTCD Code	MUTCD Section	Conventional Road	
Yield here to Peds	R1-5	2B.11	450x450 (18x18)	Regulatory
Yield here to Peds	R1-5a	2B.11	450x600 (18x24)	
In-Street Ped Crossing	R1-6, R1-6a	2B.12	300x900 (12x36)	
Peds and Bikes Prohibited	R5-10b	2B.36	750x450 (30x18)	
Peds Prohibited	R5-10c	2B.36	600x300 (24x12)	
Walk on Left Facing Traffic	R9-1	2B.43	450x600 (18x24)	
Cross only at Crosswalks	R9-2	2B.44	300x450 (12x18)	
No Ped Crossing	R9-3a	2B.44	450x450 (18x18)	
No Hitch Hiking	R9-4	2B.43	450x600 (18x24)	
No Hitch Hiking (symbol)	R9-4a	2B.43	450x450 (18x18)	
Bikes Yield to Peds	R9-6	9B.10	300x450 (12x18)	
Ped Traffic Symbol	R10-4b	2B.45	225x300 (9x12)	
School Advance Warning	S1-1	7B.08	900x900 (36x36)	
School Bus Stop Ahead	S3-1	7B.10	750x750 (30x30)	
Pedestrian Traffic	W11-2	2C.41	750x750 (30x30)	
Playground	W15-1	2C.42	750x750 (30x30)	
Hiking Trail	I-4	--	600x600 (24x24)	

1. Larger signs may be used when appropriate.
 2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.
 3. First dimension in millimeters; dimensions in parentheses are in inches.
 4. All information in table taken directly from MUTCD.



important destinations. In doing so, the goal is to increase the comfort of visitors and residents while helping to convey a local identity⁵.

Maintenance of signage is as important as walkway maintenance. Clean, graffiti free, and relevant signage enhances guidance, recognition, and safety for pedestrians.

Cost:

Signage: \$50 - \$150 plus installation

5.3 Bridges

Provisions should always be made to include a walking facility as a part of vehicular bridges, underpasses, or tunnels, especially if the facility is part of the Pedestrian Network. All new or replacement bridges, other than those for controlled access roadways, should accommodate pedestrians with wide sidewalks on both sides of the bridge. Even though bridge replacements do not occur regularly, it is important to consider these in longer-term pedestrian planning.

It is NCDOT bridge policy that within Urban Area boundaries, sidewalks shall be included on new bridges with curb and gutter approach roadways with no controlled access. Sidewalks should not be included on controlled access facilities. A determination on whether to provide sidewalks on one or both sides of new bridges will be made during the planning process according to the NCDOT Pedestrian Policy Guidelines. When a sidewalk is justified, it should be a minimum of five to six feet wide with a minimum handrail height of 42.”

It is also NCDOT bridge policy that bridges within the Federal-aid urban boundaries with rural-type roadway sections (shoulder approaches) may warrant special consideration. To allow for future placement of ADA acceptable sidewalks, sufficient bridge deck width should be considered on new bridges in order to accommodate the placement of sidewalks.



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For more information, visit:

<http://www.ncdot.org/doh/construction/altern/value/manuals/RDM2001/part1/chapter6/pt1ch6.pdf>

&

<http://www.ncdot.org/doh/construction/altern/value/manuals/bpe2000.doc>

Guidelines:

- Sidewalks should be included on roadway bridges with no controlled access with curb and gutter approach in Urban Areas.
- Sufficient bridge deck width should be considered on new bridges with rural-type shoulder approaches for future placement of sidewalks.
- Sidewalk should be 5' to 6' wide.
- Minimum handrail height should be 42"



5.4 Building Scale Cross-Sections

Context, dimension, and scale are important considerations when developing new or retrofitting existing pedestrian friendly environments. Context refers generally to the place: is it urban, rural, residential, commercial, industrial or mixed? Dimension relates to the actual size and distance of objects such as buildings. Scale relates to how both context and dimension work together within a given locality. It is often a subjective observation based on the feeling generated while occupying a space. A place that is not scaled properly will most likely feel uncomfortable, while those that are will be more pleasurable. According to the American Planning Association, some important factors within a pedestrian environment are⁸:

- parking configuration
- building use
- degree/type of non-motorist activity
- truck traffic percentage
- ADA requirements
- location within the urban fabric
- transit use

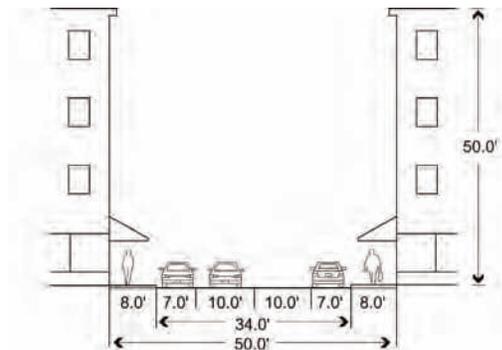
The typical cross sections on the next four pages illustrate the interaction of these concepts:



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Figure 5(s):

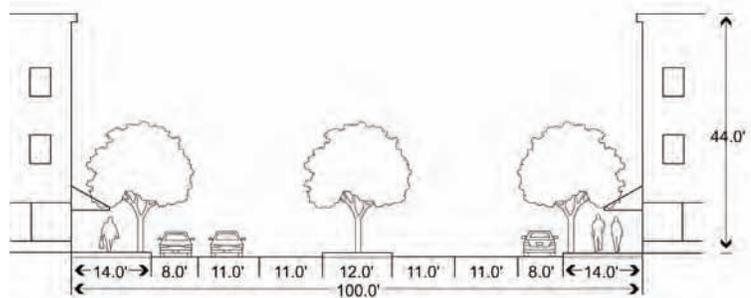
With a building ratio of 1:1, where the building heights are the same as the distance between them, a sense of enclosure is established quite easily. Depending on traffic requirements, the space can be used for tree plantings, bike lanes, wider sidewalks, or a combination of those elements⁸.



1:1 Ratio

Figure 5(t):

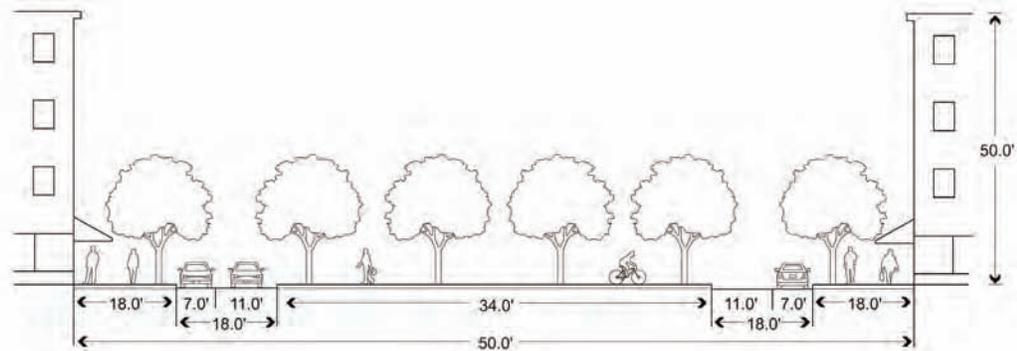
A building ratio of 2:1 where the building heights are half of the distance between them, requires the addition of other elements to help maintain a sense of enclosure and to reinforce the notion of human scale, and pedestrian friendly environments⁸.



2:1 Ratio

Figure 5(u):

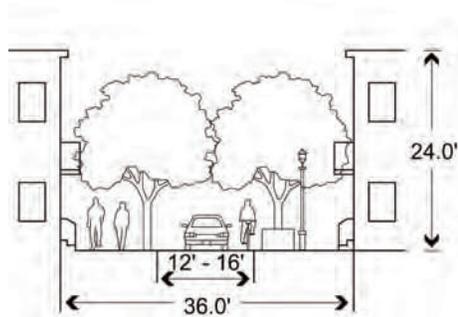
A ratio of 3:1 approaches the maximum distance between buildings before the building edges cease to relate to each other. Any ratio larger than 4:1 starts to lose a perception of enclosure and should be avoided if at all possible⁸.



3:1 Ratio

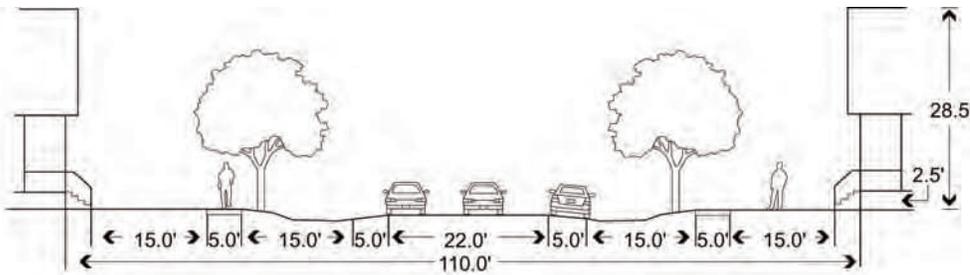


DESIGN GUIDELINES



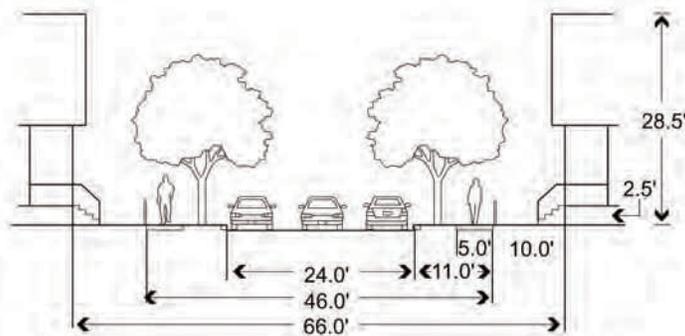
Woonerf

Figure 5(v):
 Woonerfs, otherwise known as, Home Zones, are planned communities where the pedestrian is given precedence over the automobile. The streets meander as does the paving material so that the motorist must travel slowly and cautiously. Building proportions are generally at a 1:1.5 max. Residential and mixed use buildings front the often tree lined streets. These neighborhood designs create interesting and innovative opportunities for interactions of public and private space⁸.



Low ADT Yield Street

Figure 5(w):
 In a more rural area, the Low ADT Yield Street is appropriate given the often immense building ratio of between 4:1 and 5:1. These areas are often defined by low density residential use with open drainage swales and ornamental tree plantings⁸.



Edge Yield Street

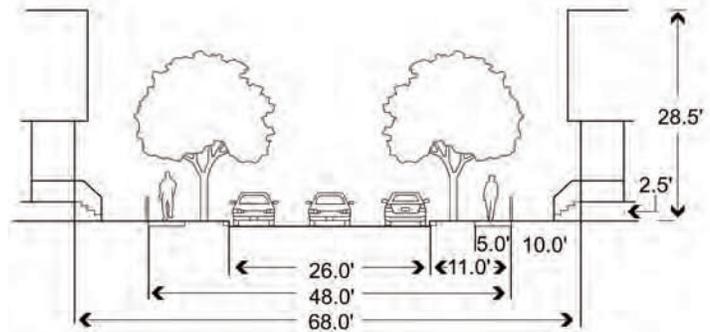
Figure 5(x):
 The Edge Yield Street is recommended for the center or edge of neighborhood. The blocks should be short and consist mostly of single family detached housing. The building separation ratio is at a 3:1 or 4:1 max⁸.



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Figure 5(y):

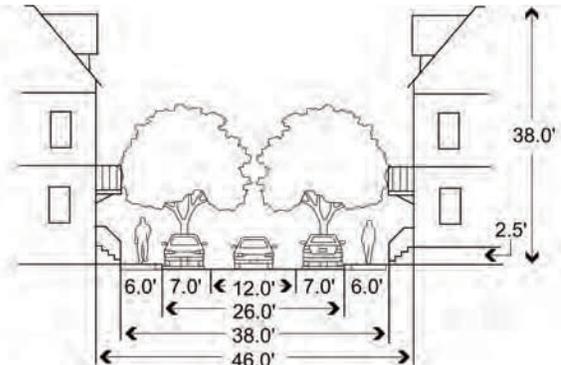
The AASHTO Recommended Street is a highly desirable form of a residential neighborhood where the Woonerf is not appropriate. Parking needs must be addressed however alleys may serve as opportunities for vehicle and building access. These neighborhoods feature closed drainage, street trees (preferably native species), and offset sidewalks⁸.



AASHTO Recommended Residential Street

Figure 5(z):

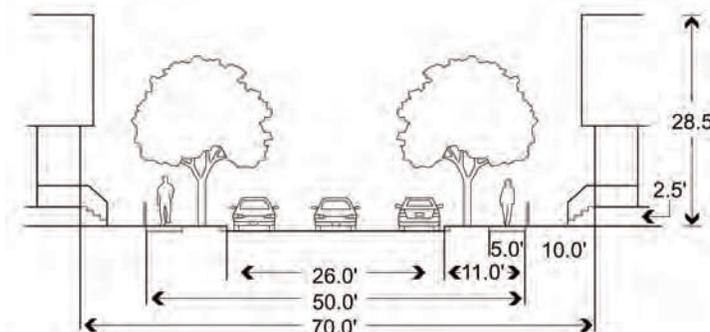
This variation of the AASHTO Recommended Residential Street, recognizes higher density, larger residential buildings and a reduced building ratio. This can be used in areas with slower traffic and lower parking densities⁸.



Modified AASHTO Residential Street

Figure 5(aa):

The Yield Street maintains a building ratio of 3:1 while allowing for an opportunity, in lower density environments, to detach the sidewalks. These streets consist of a mix of detached or attached residential and sometimes commercial or live/work buildings. The character, for the most part, remains residential⁸.



Yield Street



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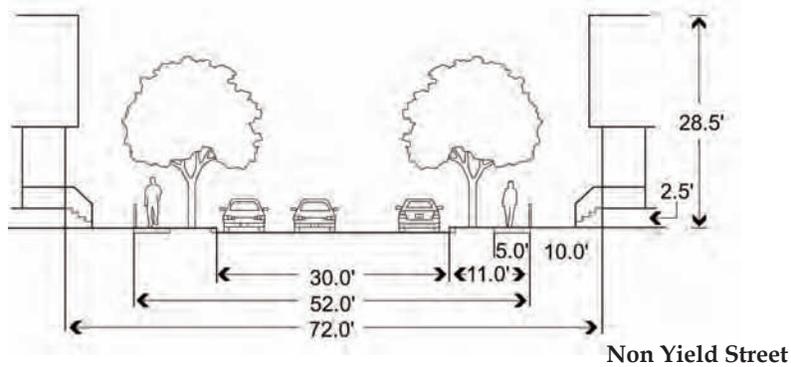


Figure 5(bb): This illustration is not entirely indicative of a Yield Street but begins to offer some of what is intended in their use. The travel lanes of a Yield Street are narrower than shown. These are predominantly residential streets of multistory buildings, a mix of land use and truck traffic. It calls for a building ratio of 3:1 and allows for both parallel and diagonal parking⁸.



5.5 Local Pedestrian Facility Improvements - Conceptual Renderings

The following pages contain some examples of conceptual retrofits that may be available to the Town of Wake Forest when considering pedestrian enhancements.



Figure 5(cc):
BEFORE

Lack of safe, unobstructed pedestrian walkway. Drainage wetland area mowed.



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Figure 5(dd):
AFTER

Asphalt trail is appropriate for wooded setting. Trees added to vegetated buffer to create a sense of ceremony and enclosure for pedestrians and motorists. Wetland plants create an aesthetically pleasing environment as well as serve to foster wildlife and water filtration.



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*Figure 5(ee):
BEFORE*

Sidewalk ends with no connectivity to nearby neighborhoods or greenway trail.



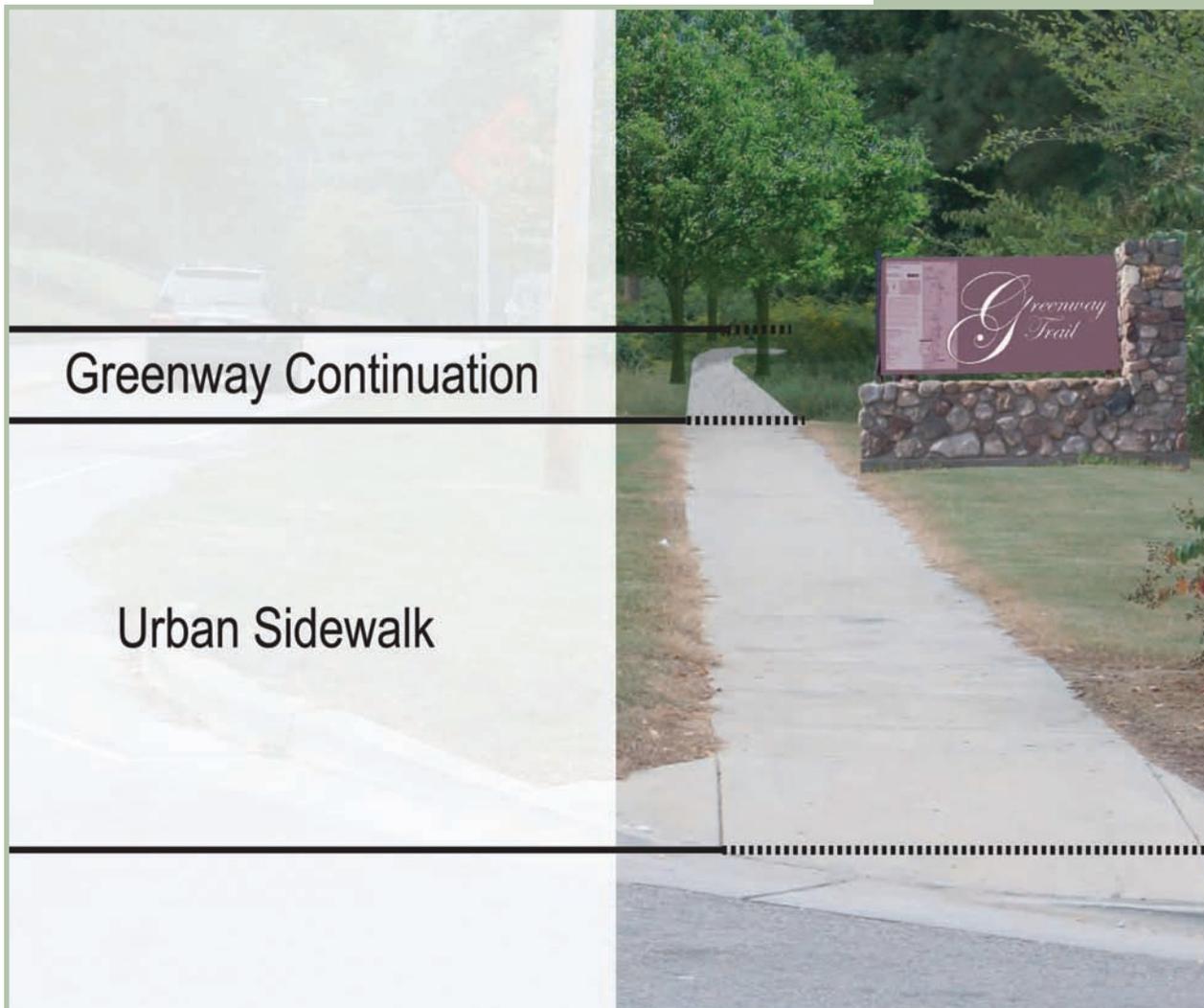


Figure 5(ff):
AFTER

An asphalt trail is added to connect to nearby greenway. Signage helps to orient and instruct the pedestrian. Formal trail side tree plantings create a pleasing transition from the suburban environment to a more naturalized environment.



DESIGN GUIDELINES

Footnotes

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- 3 Association of State Highway and Transportation Officials. (2004). *Guide for the Planning, Design, and Operation of Pedestrian Facilities*.
- 4 The Free Dictionary. [Internet]. Huntingdon Valley, PA: Farlex, Inc. (cited 2005 May 1). Available from:
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- 5 City of Portland, Office of Transportation. [Internet]. Portland OR : The City of Portland. (cited 2005 May 3). Available from:
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- 8 American Planning Association . (2006). *Planning and urban design standards*. Hooken, NJ: John Wiley & Sons, Inc. 719 p.
- 9 USDOT Federal Highway Administration. (2002). *Pedestrian Facilities Users Guide - Providing Safety and Mobility*
- 10 San Diego Regional Planning Agency (SANDAG). (2002) *Planning and Designing for Pedestrians*.
- 11 USDOT Federal Highway Administration (2000). *Roundabouts: An Informational Guide*.
- 12 NCDOT Roadway Design Manual & NCDOT Bridge Policy



Chapter 6

PROGRAM AND POLICY RECOMMENDATIONS

6.1 Overview

This chapter outlines local measures to increase walking and to promote pedestrian safety. It provides a vision and policy framework for pedestrian travel, clarifying Wake Forest's role in addressing pedestrian issues and meeting pedestrians' needs. Additionally, actions and policies are listed for better integrating pedestrian travel into the transportation system.

In order for the pedestrian network to be most effective, it is important for the necessary policies, programs, ordinances, funding, and staffing infrastructure to be in place to manage, maintain, and promote pedestrian transportation in Wake Forest.

Previous planning efforts have outlined pedestrian goals and needs for Wake Forest. The *Land Use Management Plan* recommends that a sidewalk plan "be prepared and coordinated with a greenway plan to serve as a comprehensive pedestrian circulation plan." The *Wake Forest Transportation Plan* recommends adopting pedestrian-friendly standards, policies, and guidelines, having a proactive attitude towards change, placing sidewalks on both sides of thoroughfares and collectors, and coordinating pedestrian improvements with other roadway improvements. Other policy directives from the *Land Use Management Plan* and *Transportation Plan* are listed in Section 6.2 along with the specific goals and recommendations of this Pedestrian Transportation Plan. Through these goals, policies, and action items, the Pedestrian Transportation Plan places a greater emphasis on pedestrians in the Town's ongoing work of shaping streets and managing traffic.

This emphasis on pedestrian considerations parallels new policies within the region and state as well. The CAMPO (Capital Area Metropolitan Planning Organization) *Bicycle and Pedestrian Plan* calls for improved pedestrian



Figure 6(a):
Historic Royal Mills



PROGRAM AND POLICY RECOMMENDATIONS

connectivity, safety, engineering, education, encouragement, and enforcement. The North Carolina Department of Transportation (NCDOT)'s *Board of Transportation Resolution* (2000) explains that "bicycling and walking accommodations shall be a routine part of the North Carolina Department of Transportation's planning, design, construction, and operations activities" and that "bicycling and walking [are] a critical part of the state's transportation activities."¹

The following programs, policies, and action items, described in sections 6.2 - 6.4, were prepared in consultation with the above-mentioned plans and other documentation including the *Wake Forest Parks and Recreation Master Plan*, *Wake Forest Open Space and Greenway Plan*, *Master Plan for the 98 Bypass Corridor*, and the *Renaissance Plan for the Heart of Wake Forest*. The Pedestrian Steering Committee also contributed with their visions and ideas which included education/encouragement/enforcement programs, connectivity, safety, and community strengthening. (Policies relating to implementation are listed in the Implementation Plan chapter.)



Figure 6(b):
Photo courtesy of:
www.pedbikeimages.org/ Dan
Burden

6.2 Policy Recommendations

Policy recommendations were derived from local plans and ordinances (described briefly in Section 6.1), Pedestrian Steering Committee input, other City Pedestrian Plans, and community need. Several policy action items were derived or taken directly from the Oakland, CA Pedestrian Master Plan which does an excellent, comprehensive job of recommending general policy categories and specific policies.

6.2.1 Access and Connectivity (AC)

Develop a connected network of pedestrian corridors, both on-road and off-road, prioritizing routes to schools, Downtown, and other trip attractors, that enables pedestrians to travel safely and freely.



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General Plan Policies (From local plans and ordinances)

P1. "All town center area streets, collector streets, and thoroughfares in Wake Forest should eventually have sidewalks." (*Transportation Plan*, 5-4)

P2. "Thoroughfares-sidewalks are required on both sides of the street, unless otherwise specified.

Residential Collectors-sidewalks are required on both sides of the street

Non-Residential Collectors-sidewalks are required on both sides of the street unless otherwise specified." (*Transportation Plan*, 5-4)

P3. "Sidewalks shall be included as a part of the construction of all streets included in the thoroughfare plan, collector street plan and other access roads. Sidewalks should link residential areas with employment, commercial and public areas and should interconnect the town greenway plan." (*Wake Forest Code of Ordinances*, Section 28-39)

P4. "A program of curb ramp installation should be adopted to retrofit existing sidewalks at appropriate locations and make sure that any new sidewalk that is installed meets design standards." (*Transportation Plan*, 5-4)

P5. "Establish a greenway corridor and stream buffer zone for all major streams." "Implement land trails along Smith Creek and Richland Creek." (*Open Space & Greenway Plan*, 4-6).

P6. "The accommodation of pedestrian movement and the development of pedestrian-oriented spaces should be a high priority for the [Downtown] area." (*Land Use Management Plan*, p. 30)

P7. "Link [the] park system with pedestrian ways, sidewalks, or greenways and tie them into the major floodplain/open space system." (*Land Use Management Plan*, p. 33-34)

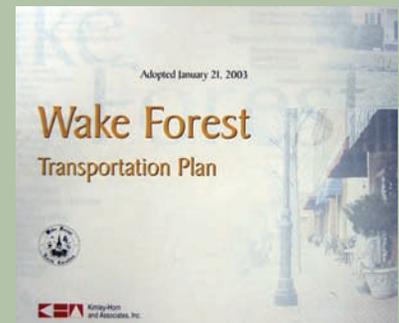


Figure 6(c):
Wake Forest Transportation Plan



PROGRAM AND POLICY RECOMMENDATIONS



Figure 6(d):
Photo courtesy of:
www.pedbikeimages.org/ Dan
Burden

P8. “The major creeks and their major branches should be used as conservation and pedestrian corridors.” (*Land Use Management Plan*, p. 39)

P9. “Sidewalk or pedestrian ways should be built along all collectors and thoroughfares, along the US-1 service road, and along the 98 Bypass.” (*Land Use Management Plan*, p. 41)

Policy Recommendations and Action Items

Route Network

Create and maintain a pedestrian route network that strengthens neighborhoods by linking places to work, shop, play, and live.

Action AC 1. Building on the Transportation Plan, sidewalks shall be required on both sides of the street along thoroughfares and collectors, on both sides of all streets in multi-family developments, and along both sides of local streets within walking distance of a major pedestrian trip attractor, such as a school, library, shopping center or similar facility. Sidewalks shall be required on one side of all other streets.

Exceptions may be considered on a case-by-case basis. For example, wide multi-purpose trails are to be provided on one side of most of the NC 98 Bypass in lieu of sidewalks on both sides of the street.

Action AC 2. Update the Town’s other plans and ordinances for consistency with the above requirements (listed in AC 1).

Action AC 3. Provide for connectivity across major thoroughfares such as US-1 and the NC 98 Bypass and railroads. Design underpass pedestrian tunnels and improve existing, potential pedestrian tunnels to enhance connectivity. Plan for pedestrian crossings over or under facilities where at grade crossings are not possible, particularly at Capital Boulevard, NC 98 Bypass, and railroad crossings, and where greenway corridors are identified.

Action AC 4. Develop a system of signage for pedestrian facilities and greenways.



PROGRAM AND POLICY RECOMMENDATIONS

Action AC 5. Pave multipurpose trails along greenway corridors as identified in the Open Space and Greenways Plan. These trails are to be designed to fulfill conservation, recreation and transportation goals of the community.

Action AC 6. Maintain the existing walkways to ensure that they are safe and free of debris and vegetation.

Action AC 7. To the maximum extent possible, provide for ADA accessibility.

Action AC 8. In order to achieve east-west connectivity, pedestrian-safe, grade-separated railroad crossings and signage should be considered.

Action AC 9. Coordinate planning efforts with surrounding jurisdictions to provide regional sidewalk and trail connectivity.

Action AC 10. Provide or require developers to provide pedestrian connectivity between developments.

Safe Routes to School

Develop projects and programs to improve pedestrian connectivity and safety around schools.

Action AC 11. All roads within walking distance of schools shall have sidewalks on both sides of the road with crosswalks and pedestrian signals at signalized intersections.

Action AC 12. Prioritize pedestrian improvements near schools.

Action AC 13. Using the Pedestrian Route Network as a base, work with schools to designate, improve, and publicize safe routes to school.

Action AC 14. Work with local school system to help implement a seamless school safety program that coordinates adult crossing guards, student safety patrols, and parent volunteers to ensure that all schools have adequate traffic safety programs.

Action AC 15. Work with schools having inadequate pick-up and drop-off facilities to improve these and create a safe automobile-pedestrian environment.



Figure 6(e):
Wake Forest Renaissance Plan





Figure 6(f):
Photo courtesy of:
www.pedbikeimages.org/ ITE
Ped/Bike Council

6.2.2 Safety (S)

Create a street environment that provides safe conditions for pedestrians.

General Plan Policies (From local plans and ordinances)

P10. "Pedestrian crossings should be installed allowing for a safer pedestrian environment." *Renaissance Plan for the Heart of Wake Forest*, p.33)

P11. "The current four lane thoroughfare is hostile to the pedestrian environment. A landscaped median along South Franklin Street will help to tame traffic, improve the pedestrian realm, and enhance the aesthetics of the area." (*Renaissance Plan for the Heart of Wake Forest*, p.33)

P12. "In general, installing sidewalks along a roadway entails the construction of a strip of concrete 5 feet wide along one or both sides of the street, set back from the back of the curb by a minimum of 5 feet of planted verge or hardscaped area. In areas where pedestrians are expected in greater numbers and around activity centers, it is likely that wider sidewalks will be needed." (*Transportation Plan*, 5-4)

P13. "No person shall stop, stand or park a vehicle, except when necessary to avoid conflict with other traffic, or in compliance with the directions of a police officer or traffic-control device in any of the following places:

- (1) On a sidewalk;
- (2) On a crosswalk;" (*Wake Forest Code of Ordinances*, Section 30-159)

Policy Recommendations and Action Items

Sidewalk Safety

Strive to maintain a complete sidewalk network free of broken or missing sidewalks, curb cuts, or curb ramps.

Action S 1. Prioritize sidewalk construction where gaps are located in areas with pedestrian traffic. Maintain data on new



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sidewalk construction, cost, potential for connectivity and feasibility of filling gaps to provide for the greatest benefit.

Action S 2. Consider property assessments and grantsmanship to fund sidewalk construction in deficient areas that are already developed or where the need for pedestrian connections cannot rely upon the timing of private property development, maintenance and repair.

Action S 3. Provide for pedestrian safety across driveways. Extend concrete sidewalks through the driveway with a maximum two percent slope on the driveway apron.

Action S 4. Create a program to enforce the responsibility of adjacent property owners to add sidewalks to close gaps with new adjacent sidewalk development.

Action S 5. Dedicate revenue for construction of sidewalks. Prioritize projects based on obtaining the greatest connectivity for the funds expended, school routing, ADA compliance and for safety.

Action S 6. Provide pedestrian scale lighting at regular intervals in areas of high pedestrian activity such as Downtown and shopping centers to promote pedestrian safety and discourage criminal activity.

Action S 7. Develop and expand the City's program of on-demand sidewalk repairs. Consider assessment of fees to property owners to provide for sidewalk construction, maintenance and repair.

Action S 8. Connect business entrances to the public sidewalk system.

Action S 9. Require contractors to provide safe, convenient, and accessible pedestrian rights-of-way along construction sites that require sidewalk closure.

Crossing Safety

Improve pedestrian crossings in areas of high pedestrian activity where safety is an issue.

Action S 9. Install marked crosswalks at all intersections.

Action S 10. Consider the full range of design elements - including bulbouts and refuge islands - to improve pedestrian safety.

Action S 11. Update crossing treatment policy guidelines for



Figure 6(g):
Photo courtesy of:
www.pedbikeimages.org/ Michael
Ronkin



PROGRAM AND POLICY RECOMMENDATIONS

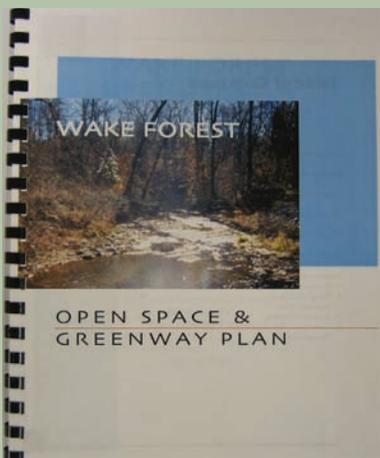


Figure 6(h):
Wake Forest Open Space and
Greenway Plan

all types of crossings based on current federal research (FHWA 2002a, FHWA 2002b). Striping and texture that stands out from roadway should be considered.

Action S 12. Use residential and business densities to establish lower speed limits in areas with a high level of pedestrian activity or a history of pedestrian-involved motor vehicle collisions.

Action S 13. Ensure that crosswalks are properly lit at night.

Action S 14. Analyze the circumstances contributing to pedestrian involved motor vehicle collisions for possible actions or improvements needed to reduce conflicts.

Action S 15. Install detectable warning surfaces at sidewalk and street boundaries.

Traffic Signals

Use traffic signals and their associated features to improve pedestrian safety at dangerous intersections.

Action S 16. Install pedestrian crossing signals at all major intersections and especially at intersection improvement sites denoted in this Plan.

Action S 17. Seek additional funds to pay for the retrofitting of traffic signals with pedestrian signal heads and the maintenance costs that such additions may incur.

Action S 18. Review the signal-timing program to ensure that it incorporates the needs of pedestrians by providing adequate crossing times.

Action S 19. Seek funds to address the backlog of traffic signals with special attention to signals in front of schools, senior centers, and other high-pedestrian activity centers.

Action S 20. Consider installing audible pedestrian signals at all new and retrofitted traffic signals, especially in Downtown area and near senior centers.

Action S 21. Consider using crossing enhancement technologies like countdown pedestrian signals at the highest pedestrian volume locations, especially in the Downtown area.



6.2.3 Community Strengthening (CS)

Provide pedestrian amenities, promote land uses to enhance these public spaces, and promote these features to make Wake Forest a more desirable place to live and a stronger community.

General Plan Policies (From local plans and ordinances)

P14. “Streetscape improvements, sidewalks, and public benches are recommended to encourage visitors to stroll and linger throughout the downtown.” (*Renaissance Plan for the Heart of Wake Forest*, p.10)

P15. “The Town should not hesitate to set any standards for development it believes will contribute to the quality of life for its residents.” (*Land Use Management Plan*, p.42)

P16. “The collection of buildings in and the pedestrian scale of the [Downtown area] make it one of Wake Forest’s strongest assets. It is and can be a destination for residents and visitors alike. Every opportunity to enhance or expand this asset in a manner that is architecturally compatible and pedestrian-oriented will increase the value of this asset.” (*Land Use Management Plan*, p.30)

P17. “Orient place/spatial planning and design to the pedestrian scale. Undertake the establishment of public spaces, primarily intimate in scale, to complement and encourage pedestrian circulation.” (*Land Use Management Plan*, p.31)

P18. “Optimize the appreciation, use and stewardship of Wake Forest’s historic, cultural and natural resource heritage.” & “Develop and maintain parks and greenways using nationally-accepted sustainable design principles and best management practices.” (*Parks and Recreation Master Plan*, p.23)

P19. “Develop environmental education and interpretive facilities [along Greenway Corridors].” (*Parks and Recreation Master Plan*, p.24)



Figure 6(i):
Smith Creek Greenway



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Figure 6(j):
Future Smith Creek Greenway
tunnel under NC 98 Bypass

P20. “Develop stewardship programs for the greenway system.” (*Parks and Recreation Master Plan*, p.27)

P21. “In general, installing sidewalks along a roadway entails the construction of a strip of concrete 5 feet wide along one or both sides of the street, set back from the back of the curb by a minimum of 5 feet of planted verge or hardscaped area.” (*Transportation Plan*, 5-4)

Policy Recommendations and Action Items

Streetscaping and “Trailscaping”

Encourage the inclusion of art, historic, and nature elements along with street furniture, landscaping, and lighting in pedestrian improvement projects.

Action CS 1. Identify pedestrian routes in neighborhood commercial districts and in the downtown to prioritize streetscaping improvements.

Action CS 2. Prioritize the replacement of dead or missing trees.

Action CS 3. Design streetscapes with pedestrian safety as a primary objective. Require street trees and planting buffers between the sidewalk and the street along new roadways wherever possible.

Action CS 4. Include pedestrian-scale lighting in streetscaping projects around Downtown and shopping centers (areas of high pedestrian activity).

Action CS 5. Consider incorporating local artwork into the Pedestrian Route Network, especially along greenways.

Action CS 6. Consider placing signage to identify historic and natural landmarks along the Pedestrian Route Network to enliven the pedestrian experience.

Action CS 7. Encourage and require property owners to keep sidewalks and greenways free of litter and debris. Provide or require street furniture and trash receptacles along high traffic pedestrian routes.



Land Use

Promote land uses and site designs that make walking convenient and enjoyable.

Action CS 8. Use building and zoning codes to produce a mixture of uses with entrances and exits connected to the public sidewalk system, pedestrian scale design elements and street level activity.

Action CS 9. Promote parking and development policies that encourage pedestrian access to multiple destinations within an area. Provide for shared parking where possible, require interconnections between parking areas to allow for foot traffic between multiple businesses and provide for safe and convenient pedestrian access to and from parking areas.

Action CS 10. Encourage programs to clean up trash and blighted buildings at the street level. Encourage programs for businesses and business associations to improve streetfronts and overall cleanliness.

Action CS 11. Encourage the inclusion of public walkways or trails in large, private developments.

Action CS 12. Encourage the development of pocket parks and plazas along the Pedestrian Route Network.

Action CS 13. Parking areas shall be designed to minimize pedestrian and motor vehicle conflicts. The parking areas shall be subordinate to the building to the greatest extent possible to provide for pedestrian interest, convenience and safety.

Action CS 14. Provide or require developers to provide pedestrian connections beyond their development to link nearby trip attractors to adjacent communities.

6.3 Other Policies

6.3.1 Future Pedestrian Facility Development

To ensure that needed pedestrian facilities are constructed, elected leaders should allocate sufficient resources on an annual basis to regularly expand and maintain the pedestrian network. Funding for roadway or bridge reconstruction or replacement must include pedestrian facilities.

Regarding future pedestrian facilities on state roads, it will be



Figure 6(k):
Photo courtesy of:
www.pedbikeimages.org/ ITE
Ped/Bike Council



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important to know how NCDOT and CAMPO are involved in the approval process for construction, reconstruction, repaving, and bridge projects on different roads in the Wake Forest area. Since the NCDOT has jurisdiction over the rights-of-way of most thoroughfares and some collectors in Wake Forest, it is important to coordinate pedestrian facility planning with the NCDOT.

The issues could potentially include:

- Bridge culverts/underpasses
- Shoulder regrading and drainage
- Adequate easement acquisition for new pedestrian facilities



Figure 6(l):
Disconnected sidewalks
on Stadium Drive

Sidewalks should be constructed during the infrastructure development phase of the subdivision (when streets, curbs, gutters and etc. are installed). Installation of the sidewalks at this stage is less expensive due to the economy of scale and provides for pedestrian access from the first occupant rather than with later occupants. If the sidewalk sections are later damaged during construction, the damaged sections will need to be repaired or replaced prior to occupation. Precautions taken during construction could prevent this from occurring. For example, strategically placed access points could be created throughout the construction site, allowing heavy equipment to enter and exit the site without disturbing the pedestrian facilities, or those using them. The downside of such a precaution on behalf of the developer is that it may require extra incentives due to the inefficient use of space it presents for the construction crews on site.

Because it is advised to build sidewalks with other early neighborhood infrastructure development, conflict might occur when constructing the driveway that crosses the sidewalk. Because driveways require a 6" base while sidewalks only require a 4" base, three options should be available to developers. The developer can 1) select driveway locations for each lot to install sidewalks with the required



base across the driveway sections (offering less flexibility in driveway location at the permit stage), 2) replace sidewalk sections to install the required base across the driveway at a location to be selected at a later point in the development (allowing driveway location flexibility at the additional cost of demolition and reconstruction of sidewalk) or 3) install the full length of sidewalk with the required base for a driveway section allowing the maximum flexibility in driveway location at marginally higher initial installation costs.

On a case-by-case basis, the Town can consider allowing sidewalks to be constructed at some later point in time, but should require grading for the ultimate construction of the sidewalk sections.

Sidewalk should be extended across driveway cuts to maintain the continuity of the sidewalk and reinforce to drivers that they should yield to pedestrians as required by law. Also, driveway aprons should not extend through the sidewalk area of the driveway, which must also be constructed at a maximum two percent cross slope.

Finally, local ordinances should be amended to require pedestrian facilities be built as part of a subdivision project to be extended beyond the limits of the subdivision boundaries to connect to nearby trip attractors and developments.

6.3.2 Maintenance

Once the proposed network has been adopted by the Town and efforts to implement the network are underway, focus should be directed towards the maintenance and enhancement of the system. Well maintained and managed facilities are critical elements to the long-term success and accessibility of Wake Forest's pedestrian network. Regular maintenance of the community's pedestrian facilities will be essential to maintain the safety of the facilities and their overall usability. To facilitate the practice of regular maintenance, the Town of Wake Forest should develop a schedule of maintenance



Figure 6(m):
Photo courtesy of:
www.pedbikeimages.org/ Dan
Burden



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Figure 6(n):
Photo courtesy of:
www.pedbikeimages.org/ Dan
Burden

activities for the pedestrian network along with the existing maintenance projects of the NCDOT and Wake Forest's Public Works Department.

The Public Works Department's maintenance process must provide for complaint based maintenance issues and prevent vegetation from encroaching into walkways as well. Clearances and sight distances should be maintained at driveways and intersections. A regular pruning and maintenance program is advised to remove vegetation litter and debris.

Types of maintenance required include:

- Repair of surface
- Repair of trail
- Restriping of crosswalks/pavement markings
- Replacement or repair of route signs due to damage caused by vandalism or general wear
- Removal of any collected debris (including sand, gravel, trash and vegetation)
- Pruning to keep sight distances and clearances adequate

Many of these maintenance projects are already regularly scheduled along the area's roadways. They now must simply be expanded to include the pedestrian facilities as well. Off-road pedestrian routes may require the attention of separate agencies. Local civic groups could contribute by "adopting-a-trail" and regularly maintain trail segments. The Town should develop a standard pedestrian maintenance schedule for incorporation into the activities of all the appropriate Town agencies. Many of the basic roadway maintenance tasks, such as debris removal, can be combined to reduce the number of hours needed to complete tasks and maximize the use of Town resources.

Finally, it should be the responsibility of the owner or occupant of private property to keep their property and adjacent sidewalk free of litter and debris. Basic cleanliness should be maintained by local residences and businesses. Properly-



placed signage and garbage cans can help encourage clean sidewalks.

6.3.3 Annexation

For areas eligible for annexation under North Carolina's statutes, plans are developed to provide all required municipal services and an estimate for providing such services². If pedestrian facilities are to be included in annexed areas, they should be addressed in the annexation study and should be included in an update of any Town plan that addresses such facilities, such as the Wake Forest Pedestrian Plan.

Services that will require no extensive capital outlay, such as crosswalk striping, could be provided within a short time. With respect to services involving capital outlays, such as greenway trail development or bike/pedestrian bridges, it should be remembered that: (1) extension of improvements should be commensurated with other parts of the Town and should be related to the needs of present settlement and future growth, and (2) extensions should be based on previously approved policies and standards. Therefore, if the Town of Wake Forest is to ensure consistent pedestrian facilities in annexed areas, the first step will be adopting the Wake Forest Pedestrian Plan. Furthermore, residents in the annexed area do not expect to be taxed without benefits, but they should also not expect a disproportionate balance of improvements at the expense of the other residents. Therefore, an annexation ordinance that addresses improvements, such as pedestrian facilities, should take this balance into account when defining the services to be provided.

In some cities, such as Wake Forest and Fayetteville, NC, facilities (such as sidewalks for example) are not something the Town provides as a base service for annexed areas³. The developer is responsible for all public facilities upon development including sidewalks. However, as the area becomes part of the Town, it should be eligible for the same improvements based on future need. These are examples of ways in which Wake Forest has policies in place that apply to



Figure 6(o):
Photo courtesy of:
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Burden



the Town as a whole, which would immediately include new areas once they are annexed.

6.3.4 Local Ordinances

Local ordinances are another means to develop and encourage safer pedestrian activity throughout Wake Forest which in turn could lead to larger numbers of people walking. There should be an effort to seek out ordinances that may need updating and/or to develop new ordinances that would relate to the new pedestrian network.

Wake Forest currently addresses sidewalks in Section 28 of their Code of Ordinances. Section 28-39 states that “sidewalks shall be included as a part of the construction of all streets included in the thoroughfare plan, collector street plan and other access roads. Sidewalks should link residential areas with employment, commercial and public areas and should interconnect the town greenway plan.” It also states that “multifamily and planned developments shall provide sidewalks for interior movement of pedestrians and for the interior to connect to the public sidewalk system.” Updates to Section 28 should be considered as described in Section 6.2.1 of this Plan.

The Subdivision Regulations require sidewalks to be constructed on one side of the street for single-family residences on 10,000 sq. ft. lots or smaller, and on both sides of the streets for multi-family groups. The Subdivision Regulations contradict the Transportation Plan by requiring sidewalks on only one side of minor thoroughfares and all residential collector streets. Furthermore, since Municipal Code supersedes Subdivision Regulations, an amendment to the Subdivision Regulations is recommended to remove the ‘minor thoroughfare/sidewalk location’ conflict. The amendment should call for sidewalks on *both* sides of the street, as stated in the Wake Forest Municipal Code for Sidewalk Location

The Town should also be aware of North Carolina laws relating to walking in *The Guide to North Carolina Bicycle and Pedestrian*



Laws. A portion of this booklet discusses local ordinances and the issues sometimes addressed by these ordinances. If issues arise in the Town of Wake Forest, the Town can consider developing ordinances that would be enforced by local police. Common issues are bicycling on sidewalks, greenway use, and headphone usage

6.4 Program Recommendations

Education, encouragement, and enforcement programs should be in place to teach and encourage safety and ensure the success and integrity of Wake Forest's future pedestrian network.

The recommended pedestrian facilities revealed in Chapter 4 will most successfully serve the Town of Wake Forest with continued support for walking, built through programs that focus on education, encouragement, and enforcement. Many of the following programs were suggested by members of the steering committee. Additional resources can be found on the NCDOT Division of Bicycle and Pedestrian Transportation website.

6.4.1 Education

Long term educational strategies should be developed to teach and promote safety. A good education program provides instruction in lawful behavior for pedestrians and motorists. This education should be available to youngsters and adults. This will require support through the Town, citizens, and local groups.

Children are the current and future users of Wake Forest's pedestrian network. Teaching children about walking can foster lifelong habits. Local schools should be used to teach children about pedestrian safety. Instruction programs and events for children should also be available in Wake Forest through the Parks and Recreation Department. The National Safe Routes to School also offers a national course that would



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be very beneficial to Wake Forest. Pedestrian instruction for teenagers can be taught in driver's education courses.

Motorists should be taught to respect and work with pedestrians who are sharing their travel corridors. Many do not realize that the law requires that they yield to pedestrians in marked crosswalks for instance.

Instruction programs for adults are more difficult to develop. Events sponsored by the Wake Forest Parks and Recreation Department may provide opportunities for adult education. For example, the Town could hold a Pedestrian Day in the spring for children and adults and offer training classes all summer.

Education may also be provided through various print and electronic media. Safety tips for pedestrians and motorists could appear as a video on a local television channel. A pedestrian brochure could include educational items about proper skills, road crossings, and habits. The Town of Wake Forest website could also provide educational materials.

6.4.2 Encouragement

Encouragement programs should be initiated to help build a larger pedestrian community. Financial incentives, prizes, or public praise can be provided to local businesses or schoolchildren that support walking through their actions. Awards can be created to celebrate advances in the community's pedestrian facilities, pedestrian use, and overall pedestrian friendliness.

There are a variety of means to promote walking. Pedestrian booths could distribute information at local events such as *Downtown After Hours*, *Meet in the Street* and the *Autumn Arts Festival*. Local businesses and tourist information centers could distribute pedestrian maps and information. Inserts into local newsletters can detail the health benefits of walking. Mileage



clubs could be established and awards given to those who reach their goals. An annual Pedestrian Day could be sponsored by the Wake Forest Parks and Recreation Department with promotions, contests, and education programs. National Trails Day, celebrated nationwide annually in June, could become an annual event along one of Wake Forest's greenways.

Other means to encourage and promote Wake Forest as a walkable community include:

- Publish and distribute a Wake Forest walking guide or walking tour brochure that cover the area's history, safety tips, suggested walking routes, and pedestrian rights and responsibilities.
- Promote neighborhood walks, clean up walks, nature walks and art walks.
- Promote walk-for-health programs with local schools, businesses, and recreation centers.
- Organize walk-to-work and walk-to-school days and weeks.

Wake Forest should also tap into existing national encouragement programs:

- National Walk a Child to School is usually held in October with the objective to encourage adults to teach children practice safe pedestrian behavior, to identify safe routes to school, and to remind everyone of the health benefits of walking.
www.walktoschool-usa.org



PROGRAM AND POLICY RECOMMENDATIONS

- Safe Routes to School is a national program with \$612 million dedicated from Congress from 2005 to 2009. Local Safe Routes to School programs are sustained by parents, community leaders, and citizens to improve the health and well-being of children by enabling and encouraging them to walk and bicycle to school. As of 2006, the North Carolina Safe Routes to School program has \$15 million over five years for infrastructure improvements within two miles of schools. It also offers programs and workshops held at schools that request guidance. There is an application process and schools that hold workshops and programs will be likely candidates for the capital improvement money.

<http://www.saferoutesinfo.org/>

6.4.3 Enforcement

Enforcement is critical to ensure that proper actions are being taken by both pedestrians and motorists and that the rights of each are recognized. A local law enforcement program for a shared transportation system should be developed for Wake Forest. Appropriate and updated pedestrian traffic laws are an important first step in developing an adequate enforcement program. The most effective pedestrian ordinances distinguish between motorized vehicles and pedestrians and clarify the manner in which each shall lawfully share the roadways. Existing state traffic laws should be reviewed to ensure that appropriate rules and regulations are applied to Wake Forest's pedestrian network. This will result in a meaningful policy of which to enforce.

Effective enforcement efforts require participation by parents, teachers and police officers. Officers should take an active role in enforcement, teaching safety, evaluating traffic concerns, providing a presence, and giving warnings or tickets to those who disobey the law. Examples include speeding, disobeying signs and signals, and walking along the road. Children can benefit from training classes. Law enforcement officers can set examples for citizens.



Local law enforcement should refer to and be competent with the NCDOT's *A Guide to North Carolina Bicycle and Pedestrian Laws*.

6.5 Program and Policy Recommendation Summary

The following are key program and policy recommendations that Wake Forest should examine and consider.

6.5.1 Policies

- Require sidewalks on both sides of all thoroughfares, collectors, and residential roads within walking distance of schools, shopping centers, or other destinations. All other small residential roads can be examined on a case-by-case basis.
- Continue to require sidewalks be a minimum of five feet in width with a buffer between curb and sidewalk. Multi-use, paved, greenway trails should be a minimum of ten feet in width.
- Accommodate pedestrians with all new roadway development, including bridges, interchanges, and underpasses.
- Coordinate planning efforts with surrounding jurisdictions to provide regional sidewalk and trail connectivity.
- Fill gaps in the existing sidewalk network.
- Improve all crosswalks considering the full range of design treatments shown in Chapter 5 - Design Guidelines.
- Design streetscapes with safety, comfort, and aesthetics in mind.



PROGRAM AND POLICY RECOMMENDATIONS

- Promote parking and development policies that encourage safe pedestrian access to multiple destinations and land uses within Town.

- Require developers to install sidewalks within developments as immediate infrastructure and to provide connections that link to nearby trip attractors and subdivisions.

- Develop adequate maintenance program to keep facilities safe, repairing facilities when needed, removing obstacles, and replacing damaged ancillary facilities such as signage.

6.5.2 Programs

- Get involved with the North Carolina Safe Routes to School program.

- Incorporate pedestrian safety instruction into local school programs.

- Hold a Pedestrian/Bicycle Day to teach families about safety.

- Publish materials such as a pedestrian safety guide, walking guide with suggested walking routes and safety tips, information on Town website, information through local television.

- Establish encouragement programs such as Mileage Clubs, Walking School Buses, clean up walks, nature walks, etc.

- Promote walking-for-health programs with local schools, businesses, and recreation centers.

- Celebrate National Trails Day with an annual event.

- Provide effective law enforcement and teaching about pedestrian laws by local police.



PROGRAM AND POLICY RECOMMENDATIONS

Footnotes:

¹NCDOT's Bicycling & Walking in North Carolina, a Critical Part of the Transportation System (adopted by the Board of Transportation on September 8, 2000).

http://www.ncdot.org/transit/bicycle/laws/laws_resolution.html

² Charlotte-Mecklenburg Planning Commission. Annexation - Frequently Asked Questions.

Retrieved on 11/30/05 from:

www.charmeck.org/Departments/Planning/Annexation/Annexation+FAQ.htm

³ Town of Fayetteville. Often Asked Smart Growth Questions and Corresponding Answers. Retrieved on 11/30/05 from:

<http://www.Townoffayetteville.org/sgn/faq.htm>

References:

Guide for the Planning, Design, and Operation of Pedestrian Facilities. American Association of State Highway and Transportation Officials (AASHTO). July 2004.

Pedestrian Master Plan. The City of Oakland. Part of the Land Use and Transportation Element of the City of Oakland's General Plan. November 12, 2002.

http://www.oaklandnet.com/government/Pedestrian/Ch_4.pdf



PROGRAM
AND POLICY
RECOMMENDATIONS

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Chapter 7

IMPLEMENTATION

7.1 Overview

The text in this chapter describes how the Town of Wake Forest can turn the vision of a connected network of safe pedestrian routes into a reality. The strategy for doing so involves the physical changes discussed in Chapter 4, as well as new policy and program considerations covered in Chapter 6. This chapter deals with opportunities and strategies, key implementation steps (implementation policies), phasing of the pedestrian network, necessary staffing, and methods for developing facilities. Together these chapters fit together to form the implementation program.

7.2 Opportunities and Strategies

Among the opportunities to promote the Plan recommendations available to the Town of Wake Forest, is the opportunity to build upon an already committed and active base of citizens, pedestrians, and Downtown leaders and enthusiasts in the area. Through their organizations, institutions, publications, and networks, the Town can get the word out about improved or new pedestrian facilities and programs.

Second among the opportunities, is the availability of the existing pedestrian facilities (Downtown sidewalks, existing trails, etc). Though some changes are being suggested in the short-term and a much expanded network is suggested for the long-term, the presence of an existing network provides a strong foundation from which to build. Residents are already accustomed to seeing pedestrians on sidewalks and trails and should become used to seeing pedestrian walkway and trail signs. Building on their existing awareness is much easier than building on no awareness.

The final category of opportunity is building upon the existing patchwork of destination points. The Downtown,



Figure 7(a):
Kiwanis Greenway



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schools, parks, and residential and commercial areas, are all places pedestrians currently travel to or would like to travel to. Short connectors between destinations connect with other connectors to the next destination. In the end, long corridors are created from this distribution of linked destination points. The addition of crosswalks and signage will make these destinations more attractive to pedestrians.

From these opportunities comes the framework for an initial implementation strategy:

- 1) Use the base of pedestrians to expand the awareness of the benefits of a walkable community.
- 2) Expand and modify the existing pedestrian route network to a comprehensive, connected, safe system so that it better meets the needs of the community, provides access to all, and enhances the current transportation infrastructure.
- 3) Begin making the critical connections between destination points that will allow for continuous growth of and improvement in the pedestrian transportation network.

These three steps represent the core of the implementation strategy. As the individual policy recommendations and physical recommendations are addressed, they should each fit with one of these three primary strategies.

7.3 Adopting this Plan

The first step in implementation of the Pedestrian Plan is adoption. By adopting the Pedestrian Plan, the community is able to shape larger regional decisions so that they fit within the goals of the plan. The Town also gives itself greater authority in shaping local land use decisions so that they achieve the goals and vision of this plan.



Figure 7(b):
Dr. Calvin Jones House



7.4 Action Steps

After the plan is adopted, implementation of specific recommendations can begin. Many of these will occur simultaneously and include policy and facility improvement changes. The key steps are:

- Create the necessary governance capability and administration (staffing) capability to support and oversee the implementation of this plan and the proper maintenance of the facilities that are developed.
- Secure the funding necessary to undertake the short-term projects and develop a funding strategy that will allow the community to incrementally complete each of the suggested pedestrian facility improvements over a 10 year period. Opportunities are listed below.

Considering Town bond referendum for monies allocated towards pedestrian walkways

Expanding local capital improvements program for yearly appropriation for greenway and sidewalk development

Setting aside money for construction and maintenance of pedestrian facilities

Pursuing and requesting roads within Town be added to TIP program for sidewalk and greenway development/improvement

Applying for monies from North Carolina Safe Routes to School Program to make infrastructure improvements within 2 miles of schools

Pursuing Community Development Block Grants (CDBG) that provide money for capital improvements (including sidewalks and greenways) in low-income neighborhoods.

Seeking other sources of City funding for pedestrian improvements that may include local assessment districts, developer exactions, local bonds, and code enforcement.



Figure 7(c):
Franklin Street



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Figure 7(d):
Downtown Wake Forest

Pursuing funding from other sources listed in Appendix C-Funding

- Add signs to the recommended network routes so that functional, safe, and updated pedestrian routes and greenways are immediately available to the community. Where worn, used foot paths exist and further greenway development is anticipated, add signs to promote use and safety.
- Develop and implement education and awareness programs such as public events, which can be used to announce new pedestrian routes and some of the upcoming projects.
- Begin working on the proposed facilities that are categorized as short-term phasing projects, which are outlined in Appendix B and on Map 7.1.
- Ensure that pedestrian planning is integrated with other transportation planning efforts at the state and local level, as well as with long-range and current land use, economic development, parks and recreation, environmental, and community planning.
- Coordinate pedestrian improvement projects with scheduled street re-paving, streetscaping, and other utility work.

7.5 Pedestrian Network Prioritization and Phasing

7.5.1 Sidewalk Projects

From the overall pedestrian network described in Chapter 4, facilities were phased into short-term (0-3 years), medium-term (4-7 years), and long-term (8-10 years). Top Priority projects are the top ranked of the short-term projects and were determined by the facility segment's ability to serve key destinations, address safety concerns, and expand connectivity. These segments will provide immediate benefits, but the Town should also evaluate



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cost and feasibility of each project when determining order of construction. The methodology of prioritization, scoring, and the entire phasing table are described in detail in Appendix B. The Top 20 priorities segments are listed in the table below and can be seen in Map 7.1.

"Top Twenty Sidewalk Projects"

Road Segment	Starting	Ending
North Main Street	North Avenue	Harris Road
Durham Road	Capital Blvd. (US-1)	North Wingate Street
North White Street	Roosevelt Avenue	Flaherty Park
North Avenue	Start	End
Roosevelt Avenue	Front Street	Wait Avenue
Rogers Road	Forestville Road	South Main Street
South Main Street	South Avenue	Holding Avenue
E Cedar Avenue	North Main Street	Railroad Tracks
North Franklin Street	NC 98 Bypass	Wait Avenue
Front Street	Start	End
Heritage Lake Road	Rogers Road	Heritage Heights
South Avenue	Start	End
South Wingate Street	Holding Avenue	Stadium Drive
Spring Street	North White Street	Taylor Street
Wait Avenue	Allen Road	Roosevelt Avenue
Rogers Road	ETJ	Forestville Road
Stadium Drive	North Wingate Street	Capital Blvd.
North Wingate Street	Stadium Drive	Chestnut Street
Rock Spring Road	Stadium Drive	Juniper Avenue
South Main Street	Holding Avenue	Rogers Road



Figure 7(e):
Downtown Wake Forest

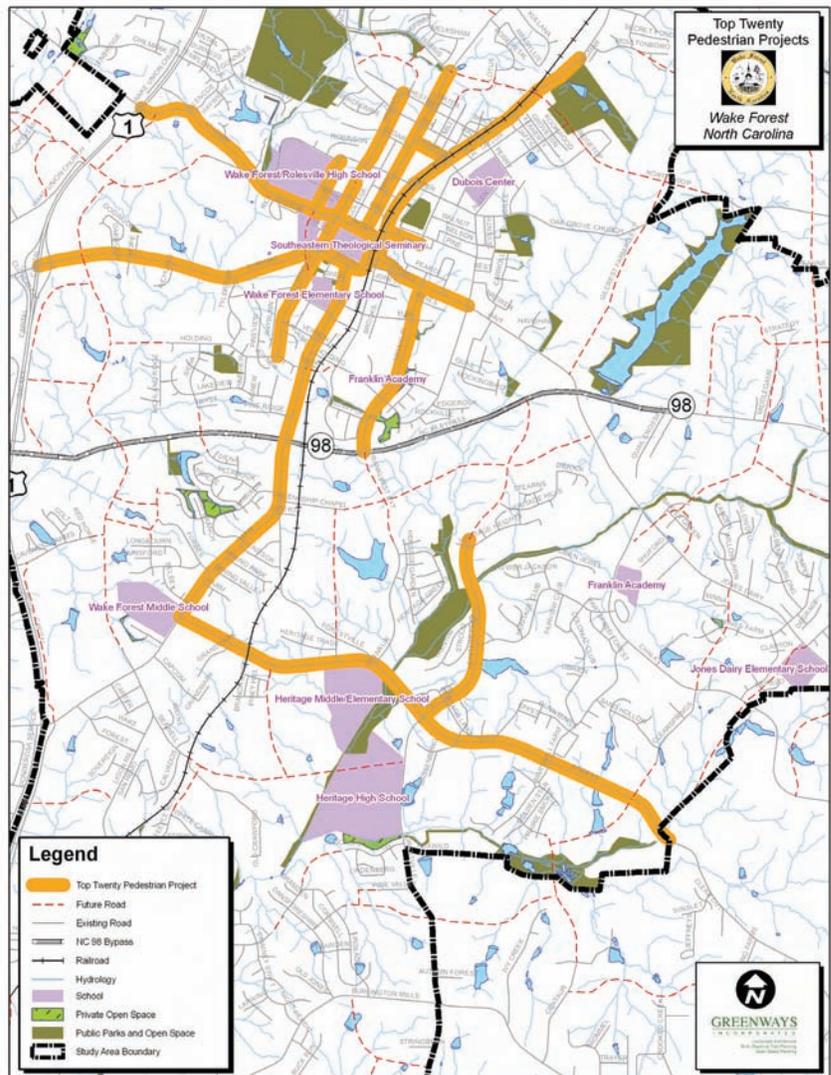


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Figure 7(f):
North Main Street

“Top Twenty” Pedestrian Projects



Map 7.1



7.5.2 Greenway Corridors

Greenway corridors were prioritized based on their connections to multiple land uses and destinations, available easements, and existing greenway trail segments. Further evaluation of obstacles and environmental constraints should be conducted to assess feasibility, while weighing cost and benefits of each greenway corridor. The following greenway corridors are listed in order of priority:

- 1) Wake Forest Bypass Greenway (Along NC 98 Bypass)
- 2) Smith Creek Greenway
- 3) Richland Creek Greenway
- 4) Sanford Creek Greenway
- 5) Cimarron Greenway
- 6) Tom's Creek Greenway (Conservation Corridor)

7.6 Staffing

In order to implement, construct, promote, and maintain a pedestrian network, Town departments and staff should be given the responsibilities shown in the table below:

Implementation: Planning Department

Facility Development and Maintenance: Public Works Department

Community Programs: Planning Department, Parks and Recreation Department

Enforcement: Town Police Department

Public Information Distribution:

Adapted from other successful pedestrian communities, recommended staffing for each department is shown below:

Planning Department: The Town Planning Director or another high-ranking planning official should take on the responsibilities of "Pedestrian Coordinator." These duties would include the overall commitment to carrying out recommendations from this Plan, applying for funding, and



Figure 7(g):
Pedestrian crossing at
Rogers Road and South
Main Street



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overseeing the entire pedestrian program. Overseeing the program requires an evaluation and monitoring process to measure successes and failures of the Plan's implementation. This includes updating and improving portions of the Plan and pedestrian facility development methods over time if necessary.

Members of the Planning staff should also conduct tasks such as updating and publishing new local pedestrian maps, creating and updating GIS layers of all pedestrian facilities, proposing future alternative routes, and working with adjacent communities and regional organizations to coordinate pedestrian linkages.

Public Works Department: The Public Works Director should oversee the construction and maintenance of all pedestrian facilities. The Public Works section responsible for Streets should also be responsible for future sidewalk construction and maintenance. One member of the Public Works should handle pedestrian facility development, construction, maintenance among his/her other responsibilities.

Parks and Recreation Department: The Parks and Recreation Director and/or staff should play a role in education and encouragement programs. Recreation centers and other trail, park, and school areas can be the location of events such as educational courses. This department should also play a role in managing off-road pedestrian facilities.

Police Department: All local police officers should be educated about North Carolina bicycle and pedestrian laws and interactions between bicyclists, pedestrians, and motorists. *The Guide to North Carolina Bicycle and Pedestrian Laws*, written by the NCDOT Division of Bicycle and Pedestrian Transportation, should be distributed to local law enforcement officers. Police officers should become more proactive in educating the public and enforcing laws when they are broken.

Public Information Office: Town of Wake Forest employees responsible for providing public information and promoting



the implementation of this Plan should ensure that updated information is available on the web, at the Wake Forest Chamber of Commerce, Town of Wake Forest public facilities, and also promoted through local media. To promote the pedestrian network and build momentum, officials should present pedestrian improvements and achievements by means of local newsletters, newspapers, the Town website, and local cable television. Ribbon cutting ceremonies could be held for accomplishments such as greenways. Programs and events are another way to involve the public.

Volunteers: Services from volunteers, student labor, and seniors, or donations of material and equipment may be provided in-kind to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail or adopt-a-highway can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as needed with senior class projects, scout projects, interested organizations or clubs or a neighborhood's community service to provide for the basic needs of the pedestrian network. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and connection to the Town's pedestrian network, and increased awareness about pedestrian safety issues.

7.7 Methods for Developing Facilities

This section describes types of transportation facility construction and maintenance projects that can be used to create new pedestrian facilities. Note that roadway construction and reconstruction projects offer excellent opportunities to incorporate facility improvements for pedestrians. It is much more cost effective to construct pedestrian facilities while roadway maintenance or construction is underway than to initiate the improvement later as a "retrofit."

To take advantage of upcoming opportunities and to incorporate pedestrian facilities into routine transportation and utility projects, the "Pedestrian Coordinator" should



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keep track of the Town's projects (through the Public Works Department), any road maintenance or construction projects, and any other local and state transportation improvements. The "Pedestrian Coordinator" should be aware of the different procedures for state and local roads. More detail on facility design and treatment can be found in Chapter 5.

Finally, it is imperative throughout the development of facilities to have coordination with NCDOT. Short term projects can be discussed with the NCDOT Division 5 office. Scoping and requesting TIP (Transportation Improvement Program) projects should continue by coordinating with the CAMPO (Capital Area Metropolitan Planning Organization) and contacting the PDEA (Project Development and Environmental Analysis) Branch of the NCDOT. More information about the TIP can be found in Appendix C. Finally, long-term needs can be discussed with the NCDOT Transportation Planning Branch.

7.7.1 Roadway Construction and Reconstruction

Pedestrians should be accommodated any time a new road is constructed or an existing road is reconstructed. All new roads with moderate to heavy motor vehicle traffic should have sidewalks and safe intersection attributes. The Town of Wake Forest should take advantage of any upcoming construction projects, including roads being built from the Thoroughfare Plan. Also, case law surrounding the ADA has found that roadway resurfacing constitutes an alteration, which requires the addition of curb ramps at intersections where they do not exist.

7.7.2 Residential and Commercial Development

As detailed in Chapter 6, the construction of sidewalks and safe crosswalks should be required during development. Pedestrian facilities that are built along with site construction are more cost-effective than retrofit projects. This ensures the future growth of the pedestrian network and the development of safe communities.



7.7.3 Retrofit Roadways with New Pedestrian Facilities

There may be critical locations in the proposed Pedestrian Network that have pedestrian safety issues or are essential links to destinations. In these locations, it may be justified to add new pedestrian facilities before a roadway is scheduled to be reconstructed or utility work is scheduled.

In some places, such as along S. Main St., it may be relatively easy to add sidewalk segments to fill gaps, but other segments may require removing trees, relocating landscaping or fences, and regrading ditches or cut and fill sections.

Another opportunity to improve the pedestrian environment are under-used travel lanes. In the future, the Town should identify and consider streets with under-used travel lanes for potential traffic calming projects including restriping, lane reduction, and sidewalk widening.

7.7.4 Bridge Construction or Replacement

Provisions should always be made to include a walking facility as a part of vehicular bridges, underpasses, or tunnels, especially if the facility is part of the Pedestrian Network. All new or replacement bridges should accommodate pedestrians with wide sidewalks on both sides of the bridge.

7.7.5 Signage and Wayfinding Projects

Signage along specific routes or throughout an entire community can be updated to make it easier for people to find destinations. Pedestrian route and greenway signs are one example of these wayfinding signs, and they can be installed along routes independently of other signage projects or as a part of a more comprehensive wayfinding improvement project.

7.7.6 Greenway Acquisition

Because the majority of greenways exist in an off-road environment, the acquisition of land or easements becomes a critical part of the implementation process. The recommended alignment of greenways in this Plan follows publicly-owned land where possible, but in many cases, an acquisition



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strategy will have to be implemented in areas of privately-owned land.

There are several resources and strategies that can aid in the implementation and acquisition process. First, greenways should be considered as “infrastructure” and an important facility in the Town of Wake Forest, providing ecological and recreational services. They can and should be complementary elements of the overall drainage and floodplain infrastructure and be a part of the City’s water quality and flood management programs.

Second, the Town of Wake Forest should pursue partnerships with land trust and land managers to make more effective use of its land acquisition funds and strategies. Enlisting the support of a local land trust could help broker land protection arrangements between private landowners and the Town of Wake Forest. The Town should also take advantage of its existing, Town-owned utility easements where acquisition is not necessary.

Finally, providing educational material to local landowners and developers about the benefits of greenways and land/easement donations is also an excellent means to stimulate greenway acquisition.

The following list of tools describe various methods of acquisition that can be used by landowners, land conservation organizations, and the City of Graham to acquire greenway lands.

Land Management

Management is a method of conserving the resources of a specific greenway parcel by an established set of policies called management plans for city-owned greenway land or through easements with private property owners. Property owners who grant easements retain all rights to the property except those which have been described in the terms of the easement. The property owner is responsible for all taxes associated with the property, less the value of the easement granted. Easements are generally restricted to certain portions



of the property, although in certain cases an easement can be applied to an entire parcel of land. Easements are transferable through title transactions, thus the easement remains in effect perpetually.

Management Plans: The purpose of a management plan is to establish legally binding contracts which define the specific use, treatment, and protection for city-owned greenway lands. Management plans should identify valuable resources; determine compatible uses for the parcel; determine administrative needs of the parcel, such as maintenance, security, and funding requirements; and recommend short-term and long-term action plans for the treatment and protection of greenway lands.

Conservation Easement: This type of easement generally establishes permanent limits on the use and development of land to protect the natural resources of that land. When public access to the easement is desired, a clause defining the conditions of public access can be added to the terms of the easement. Dedicated conservation easements can qualify for both federal income tax deductions and state tax credits. Tax deductions are allowed by the Federal government for donations of certain conservation easements. The donation may reduce the donor's taxable income.

Preservation Easement: This type of easement is intended to protect the historical integrity of a structure or important elements in the landscape by sound management practices. When public access to the easement is desired, a clause defining the conditions of public access can be added to the terms of the easement. Preservation easements may qualify for the same federal income tax deductions and state tax credits as conservation easements.

Public Access Easements: This type of easement grants public access to a specific parcel of property when a conservation or preservation easement is not necessary. The conditions of use are defined in the terms of the public access easement. Often times, these easements already exist, are owned by the City,



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and are linear, following utility lines. A City utility easement or recreation easement are two options to be considered in Graham. If an easement has already been cleared and set aside for utilities such as sewer or for recreation, a greenway can be an easy addition.

Government Regulation

Regulation is defined as the government's ability to control the use and development of land through legislative powers. The following types of development ordinances are regulatory tools that can meet the challenges of projected suburban growth and development as well as conserve and protect greenway resources.

Dedication/Density Transfers: Also known as incentive zoning, this mechanism allows greenways to be dedicated for density transfers on development of a property. The potential for improving or subdividing part or all of a parcel of property, as permitted under Wake Forest's or Wake County's land use development laws, can be expressed in dwelling unit equivalents or other measures of development density or intensity. Known as density transfers, these dwelling unit equivalents may be relocated to other portions of the same parcel or to contiguous land that is part of a common development plan. Dedicated density transfers can also be conveyed to subsequent holders if properly noted as transfer deeds.

Negotiated Dedications: This type of mechanism allows the City to negotiate with landowners for certain parcels of land that are deemed beneficial to the protection and preservation of specific stream corridors. This type of mechanism can also be exercised through dedication of greenway lands when a parcel is subdivided. Such dedications would be proportionate to the relationship between the impact of the subdivision on community services and the percentage of land required for dedication-as defined by the US Supreme Court in *Dolan v Tigar*.



Fee-in-Lieu: To complement negotiated dedications, a fee-in-lieu program may be necessary to serve as a funding source for other land acquisition pursuits. Based on the density of development, this program allows a developer the alternative of paying money for the development/protection of greenways in lieu of dedicating greenway lands. This money is then used to implement greenway management programs or acquire additional greenway land.

Reservation of Land: This type of mechanism does not involve any transfer of property rights but simply constitutes an obligation to keep property free from development for a stated period of time. Reservations are normally subject to a specified period of time, such as 6 or 12 months. At the end of this period, if an agreement has not already been reached to transfer certain property rights, the reservation expires.

Buffer / Transition Zones: This mechanism recognizes the problem of reconciling different, potentially incompatible land uses by preserving greenways that function as buffers or transition zones. Care must be taken to ensure that the use of this mechanism is reasonable and will not destroy the value of a property.

Overlay Zones: An overlay zone and its regulations are established in addition to the zoning classification and regulations already in place.

Subdivision Exactions: An exaction is a condition of development approval that requires development to provide or contribute to the financing of public facilities at their own expense. For example, a developer may be required to build a greenway on-site as a condition of developing a certain number of units because the development will create the need for new parks or will harm existing parks due to overuse. This mechanism can be used to protect or preserve greenway lands, which are then donated to either the City or County. Consideration should be given to include greenway development in future extraction programs.



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Acquisition

Acquisition requires land to be donated or purchased by a government body, public agency, greenway manager, or qualified conservation organization. It should be noted that in land acquisition for which a greenway may be built with federal funds, the landowner must be offered payment of fair market value and documentation of the offer must be recorded.

Donation or Tax Incentives: In this type of acquisition, a government body, public agency, or qualified conservation organization agrees to receive the full title or a conservation easement to a parcel of land at no cost or at a “bargain sale” rate. The donor is then eligible to receive a federal tax deduction of up to 30 to 50 percent of their adjusted gross income. Additionally, North Carolina offers a tax credit of up to 25 percent of the property’s fair market value (up to \$5000). Any portion of the fair market value not used for tax credits may be deducted as a charitable contribution. Also, property owners may be able to avoid any inheritance taxes, capital gains taxes, and recurring property taxes.

Fee Simple Purchase: This is a common method of acquisition where a local government agency or private greenway manager purchases property outright, Fee simple ownership conveys full title to the land and the entire “bundle” of property rights including the right to possess land, to exclude others, to use land, and to alienate or sell land.

Easement Purchase: This type of acquisition is the fee simple purchase of an easement. Full title to the land is not purchased, only those rights granted in the easement agreement. Therefore the easement purchase price is less than the full title value.

Purchase / Lease Back: A local government agency or private greenway organization can purchase a piece of land and then lease it back to the seller for a specified period of time. This lease may contain restrictions regarding the development and use of the property.



Bargain Sale: A property owner can sell property at a price less than the appraised fair market value of the land. Sometimes the seller can derive the same benefits as if the property were donated. Bargain Sale is attractive to sellers when the seller wants cash for the property, the seller paid a low cash price and thus is not liable for high capital gains tax, and/or the seller has a fairly high current income and could benefit from the donation of the property as an income tax deduction.

Option / First Right of Refusal: A local government agency or private organization establishes an agreement with a public agency or private property owner to provide the right of first refusal on a parcel of land that is scheduled to be sold. This form of agreement can be used in conjunction with other techniques, such as an easement to protect the land in the short-term. An option would provide the agency with sufficient time to obtain capital to purchase the property or successfully negotiate some other means of conserving the greenway resource.

Purchase of Development Rights: A voluntary purchase of development rights involves purchasing the development rights from a private property owner at a fair market value. The landowner retains all ownership rights under current use, but exchanges the rights to develop the property for cash payment.

Condemnation: The practice of condemning private land for use as a greenway is viewed as a last resort policy. Using condemnation to acquire property or property rights can be avoided if private and public support for the greenway program is present. Condemnation is seldom used for the purpose of dealing with an unwilling property owner. In most cases, condemnation has been exercised when there has been an absentee property ownership, when the title of the property is not clear, or when it becomes apparent that obtaining the consent for purchase would be difficult because there are numerous heirs located in other parts of the United States or different countries.



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Eminent Domain: The right of exercising eminent domain should be done so with caution by the community and only if the following conditions exist: 1) the property is valued by the community as an environmentally sensitive parcel of land, significant natural resource, or critical parcel of land, and as such has been defined by the community as irreplaceable property; 2) written scientific justification for the community's claim about the property's value has been prepared and offered to the property owner; 3) all efforts to negotiate with the property owner for the management, regulation, and acquisition of the property have been exhausted and that the property owner has been given reasonable and fair offers of compensation and has rejected all offers; and 4) due to the ownership of the property, the timeframe for negotiating the acquisition of the property will be unreasonable, and in the interest of pursuing a cost effective method for acquiring the property, the community has deemed it necessary to exercise eminent domain.

References

Guide for the Planning, Design, and Operation of Pedestrian Facilities. American Association of State Highway and Transportation Officials (AASHTO). July 2004.

Pedestrian Master Plan. The City of Oakland. Part of the Land Use and Transportation Element of the City of Oakland's General Plan. November 12, 2002. http://www.oaklandnet.com/government/Pedestrian/Ch_4.pdf



Appendix A

SUMMARY OF PUBLIC INPUT

A.1 Overview

Public input was gathered through several different means, with the chief efforts being public workshops, public opinion forms, walkability checklists, and top ten lists. Two public workshops were held during the planning process, with the first being held in June 2005 and the second in March 2006. The initial public workshop informed the public of the pedestrian planning process and gathered early input and recommendations. The second public workshop presented preliminary recommendations to the public, in order to receive feedback. Public input was taken in the form of map markups, written comments, and discussion between citizens, consultants from Greenways, Incorporated and Town of Wake Forest staff.



Figure A.1 - Map comment collection at March 2006 Public Workshop



SUMMARY OF PUBLIC INPUT



*Figure A.2 - Map comment collection at
June 2005 Public Workshop*

A.2 Map Comment Summary

Common overall recommendations included providing more pedestrian facilities to fill in gaps across the Town, connecting neighborhoods to schools, recreation sites, existing trails and commercial areas. A large majority of the map comments pointed to specific locations where citizens requested a sidewalk, crosswalk, or a link to a desired destination. Additionally, areas of concern were highlighted and it was noted that safety issues needed to be addressed in certain areas. Some specific areas indicated as unsafe for pedestrians included the following: the intersection of US-1 and South Main Street, Rogers Road, Heritage Lake Road, Stadium Drive, and Durham Road. These comments and all other suggestions were taken into account when developing the comprehensive recommended pedestrian network.

A.3 Public Comment Form Summary

Various destination points were emphasized by citizens that filled out the Public Opinion Form, Walkability Checklist and/or Top 10 Lists. Connectivity and safety were among



SUMMARY OF PUBLIC INPUT

the highest priorities on most citizens' lists. Again, some top destination points included schools, parks, greenways, commercial areas, and places of work. Specific destinations included Downtown Wake Forest, the Seminary, The Factory, the Heritage shopping district, and the Wake Forest Soccer Complex. Other general requests included the following: locating sidewalks a safe distance from busy roads, aesthetically pleasing walking environments, benches, encouraging the police to walk around town, producing a map of Wake Forest's pedestrian and trail network, and opening future greenway corridors to citizens for use prior to completion or paving.



Figure A.3 - Comment markup map from March 2006 Public Workshop



SUMMARY OF
PUBLIC
INPUT

Wake Forest Pedestrian Plan

Participant Survey for the June 23, 2005 Public Workshop

1) What is your age?

<18 26-35 46-55 >65

19-25 36-45 56-65

2) What is your sex?

Male

Female

3) How many times per month (on average) do you walk for the following purposes?

_____ To go to work

_____ To go to school

_____ For general recreation/exercise

_____ To attend social activities/events

_____ To shop or run errands

_____ Nature study/appreciation

_____ Other _____

4) Are there places you would like to be able to bike that you cannot at this time?

FROM: _____ TO: _____

FROM: _____ TO: _____

FROM: _____ TO: _____

5) Please order this list according to the importance you place on each item.

Rank the options below from 1 (highest importance) to 4 (lowest importance)

_____ A) Maximizing safety for pedestrians across the entire community

_____ B) Perfecting a few major travel corridors for pedestrians

_____ C) Maximizing pedestrian opportunities in certain hubs or nodes around the community

_____ D) Improving aesthetic quality of existing pedestrian facilities

Please complete both sides of this form

Form 2005

Figure A.4 - Page 1 of the Public Opinion Form distributed to Wake Forest's citizens



SUMMARY OF
PUBLIC
INPUT

7) Which of the following factors play a role in whether or not you walk to a destination?

Check as many as apply

Availability of a safe route

Availability of an aesthetically pleasing route

Costs of other travel modes

Availability of other travel options

Need for exercise

Weather

Travel time/length of trip

Other _____

8) Should public funds be used to improve pedestrian options and facilities?

Yes

No

9) If yes, what types of funds should be used? (select one or multiple)

Existing local taxes

New local taxes

State and federal grants

Other _____

10) Do you have suggestions about specific programming or pedestrian related policies that you would like to see enacted?

11) Please provide your address below so we can better understand who was represented at tonight's meeting.

Address: _____

Thanks for your input!

Please complete both sides of this form

Form 2006

Figure A.5 - Page 2 of the Public Opinion Form distributed to Wake Forest's citizens



SUMMARY OF
PUBLIC
INPUT

Wake Forest Pedestrian Plan
Neighborhood Walkability Checklist

Take this checklist on a typical walk and note things that might discourage people from walking regularly along that route. Score each question with a score from 1 (low) to 6 (high), then submit the form to the address on the back so your responses can be included in the planning for Wake Forest's pedestrian facilities

PLEASE DESCRIBE THE ROUTE YOU WALKED, LIST STARTING POINT, ENDING POINT, AND THE ROADS OR TRAILS YOU FOLLOWED. IF YOU WOULD LIKE TO DRAW THE ROUTE, PLEASE DO SO ON THE BACK OF THIS SHEET.

What is your age? _____
 How many people were in your group? _____ Any children? _____
 How often do you walk this route? _____
 What is the purpose of this walk? (commute, exercise, etc) _____

Question 1: Is there enough room to walk? SCORE _____

Comments? Location of good or bad areas? _____

A score of 6 indicates room for 2-3 people. A score of 1 would indicate that there is barely room for 1 person.

Question 2: Was it easy to cross streets? SCORE _____

Comments? Location of good or bad areas? _____

A score of 6 indicates there was no problem. A score of 1 would indicate that it took a very long time to cross and it seemed very dangerous.

Question 3: Was traffic a problem? SCORE _____

Comments? Location of good or bad areas? _____

A score of 6 indicates that you barely even noticed the presence of cars. A score of 1 would indicate that cars were far too many cars, travelling too close and too fast.

Please answer the questions on both sides of the page

Figure A.6 - Page 1 of the Neighborhood Walkability Checklist distributed to Wake Forest's citizens



SUMMARY OF PUBLIC INPUT

Question 4: Did you feel safe? SCORE _____

Comments? Location of good or bad areas?

A score of 6 indicates that you would walk here alone at any time. A score of 1 would indicate that this route is scary, even with other people in daylight.

Question 5: Was it a pleasant place to walk? SCORE _____

Comments? Location of good or bad areas?

A score of 6 indicates that it was great and you'd be like to go back again. A score of 1 would indicate that there really is no reason to be here.

Please return this survey to: Ann Ayers, 221 Brooks Street, Wake Forest, NC 27587
If you have questions, please call Ann at: (919) 570-7999

If you would like to be contacted about future Wake Forest Pedestrian Plan events, please provide your contact information below. Thanks!

Name _____

Address _____

Email _____

If you'd like to sketch your route, please do so in the box provided here.

This survey sheet was designed specifically for Wake Forest but is based on Mark Fenton's adaptation of the checklist for a walkable america, which is available at www.walkinginfo.org

Figure A.7 - Page 2 of the Neighborhood Walkability Checklist distributed to Wake Forest's citizens



SUMMARY OF
PUBLIC
INPUT

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Appendix B

NETWORK PRIORITIZATION

B.1 Methodology

The Pedestrian Network for the Town of Wake Forest is outlined in Chapter 4. This expansive network of facilities will likely be implemented incrementally. Development will occur piece by piece, in a coordinated effort between the Town of Wake Forest, surrounding communities, and other local and state government bodies. This appendix describes how the recommended facilities in the Pedestrian Network are prioritized.

The following factors guided the prioritization of individual segments of the Pedestrian Network and were derived from input and desires specified by the citizens of Wake Forest and the Pedestrian Plan Steering Committee:

- Safety concerns in areas with higher concentrations of motorist-pedestrian interaction
- Connectivity and coverage between neighborhoods and existing facilities
- Accessibility
- Proximity to pedestrian attractors and destinations, such as schools and historic sites
- Access to natural areas, parks and greenways
- Regional connections to surrounding communities

Lower-priority projects are in areas where the trip attractors will likely serve fewer pedestrians, on roadways that are not scheduled for regular transportation improvements, and in locations discouraged by committee and public input or where safety is not as large of a concern. However it should be noted that if an opportunity arises (through Municipal or State Roadway Projects, Land Development Requirements,



NETWORK PRIORITIZATION

State Highway Participation, etc.) for the completion of an identified facility improvement, that opportunity should be taken regardless of its rank in the priority matrix.

B.2 Facility Phasing

The Pedestrian Network Prioritization Index divides recommended pedestrian facility segments into the following three categories: short-term, medium-term, and long-term. In general, short-term projects should be completed within the next 3 years, medium-term should be completed within 4-7 years, and long-term should be completed within 8-10 years. A complete Prioritization Index of all pedestrian projects is provided at the end of this appendix.

In addition to the short-term, medium-term, and long-term project phasing, Greenways, Inc. has created a list of top-priority action items that should receive immediate attention. These are specific improvements and changes that will facilitate an immediate increase in safety and a timely and orderly start to completing the short-term and medium-term project phases.



B.3 Top 20 Priority Projects

The following road segments listed in the chart below are top priorities and should be addressed immediately. Action steps should be taken to expand or upgrade facilities on these road segments to adhere to the definition of a Pedestrian Corridor prescribed in Chapter 4 and conform to the design guidelines outlined in Chapter 5.

Road Segment	Starting	Ending
North Main Street	North Avenue	Harris Road
Durham Road	Capital Blvd. (US-1)	North Wingate Street
North White Street	Roosevelt Road	Flaherty Park
North Avenue	Start	End
Roosevelt Road	Front Street	Wait Avenue
Rogers Road	Forestville Road	South Main Street
South Main Street	South Avenue	Holding Avenue
Cedar Road	North Main Street	Railroad Tracks
North Franklin Street	NC 98 Bypass	Wait Avenue
Front Street	Start	End
Heritage Lake Road	Rogers Road	Heritage Heights
South Avenue	Start	End
South Wingate Street	Holding Avenue	Stadium Drive
Spring Street	North White Street	Taylor Street
Wait Avenue	Allen Road	Roosevelt Road
Rogers Road	ETJ	Forestville Road
Stadium Drive	North Wingate Street	Capital Blvd.
North Wingate Street	Stadium Drive	Chestnut Street
Rock Spring Road	Stadium Drive	Juniper Avenue
South Main Street	Holding Avenue	Rogers Road



NETWORK PRIORITIZATION

B.4 Pedestrian Network Prioritization Index

The Pedestrian Network Prioritization Index is an essential tool that provides the Town of Wake Forest with a detailed breakdown of the priority score of each roadway segment in the Pedestrian Network and the factors that determined that score. Road segments were broken into logical geographic segments when a specific road segment extended across a significant distance, such as Capital Boulevard or Main Street. Thirteen categories, with weighted values ranging from 1-3 points, constituted the highest possible score of 30.

The Prioritization Matrix is included in its entirety on the following pages.





Pedestrian Facility Prioritization Index

Recommended pedestrian facilities (below) are prioritized according to weighted pedestrian potential criteria (right)

Elem. School Proximity (1/2 mile radius)
Middle School Proximity (1/2 mile radius)
High School Proximity (1/2 mile radius)
College Proximity (1/2 mile radius)
Park Proximity (1/2 mile radius)
Direct Access to/from Proposed Greenways
Direct Access to/from Existing Greenways
Direct Access to/from Commercial Destination
*Point of Interest Proximity (1/2 mile radius)***
Regional Connectors (links In/out of W/F)
Direct Access to/from Historic/Renaissance Area
Connectivity to Existing Sidewalks
Direct Access to/from Residential Subdivision

Pedestrian Corridor Segment	From	To	3	3	3	3	3	1	2	2	2	1	3	2	2	Priority Score***	Phase
North Main Street	North Avenue	Harris Road	3	0	3	3	3	1	0	2	2	1	3	2	2	25	Short Term
Durham Road (Old NC 98)	Capital Boulevard (US-1)	North Wingate Street	3	0	3	3	3	1	0	2	2	1	2	2	2	24	Short Term
North White Street	Roosevelt Avenue	Flaherty Park	3	3	0	3	3	0	0	2	2	1	3	2	2	24	Short Term
North Avenue	Start	End	3	0	3	3	3	0	0	2	2	0	3	2	2	23	Short Term
Roosevelt Avenue	Front Street	Wait Avenue	3	0	3	3	3	0	0	2	2	0	3	2	2	23	Short Term
Rogers Road	Forestville Road	South Main Street	3	3	3	0	3	1	2	2	0	1	0	2	2	22	Short Term
South Main Street	South Avenue	Holding Avenue	3	0	3	3	3	0	0	0	2	1	3	2	2	22	Short Term
Cedar Avenue	North Main Street	Railroad Tracks	3	0	3	3	3	0	0	0	2	0	3	2	2	21	Short Term
Franklin Street	NC 98 Bypass	Wait Avenue	3	0	0	3	3	1	2	2	0	0	3	2	2	21	Short Term
Front Street	Start	End	3	0	3	3	3	0	0	0	2	0	3	2	2	21	Short Term
Heritage Lake Road	Rogers Road	Heritage Heights	3	3	3	0	3	1	2	2	0	0	0	2	2	21	Short Term
South Avenue	Start	End	3	0	3	3	3	0	0	0	2	0	3	2	2	21	Short Term
South Wingate Street	Holding Avenue	Stadium Drive	3	0	3	3	3	0	0	0	2	0	3	2	2	21	Short Term
Spring Street	North White Street	Taylor Street	3	0	3	3	3	0	0	0	2	0	3	2	2	21	Short Term
Wait Avenue	Allen Road	Roosevelt Road	3	0	0	3	3	0	0	2	2	1	3	2	2	21	Short Term
Rogers Road	ETJ	Forestville Road	3	3	3	0	3	1	0	2	0	1	0	2	2	20	Short Term
Stadium Drive	North Wingate Street	Capital Boulevard (US-1)	3	0	3	3	3	1	0	0	2	1	0	2	2	20	Short Term
North Wingate Street	Stadium Drive	Chestnut	3	0	3	3	3	0	0	0	0	0	3	2	2	19	Short Term
Rock Spring Road	Stadium Drive	Juniper Avenue	3	0	3	3	3	0	0	0	3	0	0	2	2	19	Short Term
South Main Street	Holding Avenue	Rogers Road	3	3	0	0	3	1	0	2	2	1	0	2	2	19	Short Term
Chestnut Avenue	North Wingate Street	Elizabeth Street	3	0	3	0	3	0	0	0	2	0	3	2	2	18	Short Term
Pine Avenue	Taylor Road	Seventh Street	3	0	0	3	3	0	0	0	2	0	3	2	2	18	Short Term
Pine Avenue	Rock Spring Road	North Main Street	0	0	3	3	3	0	0	0	2	0	3	2	2	18	Short Term
South White Street	Roosevelt Road	Elm Avenue	3	0	0	3	3	0	0	2	0	0	3	2	2	18	Short Term
South White Street	Elm Avenue	Holding Avenue	3	0	0	3	3	0	0	2	0	0	3	2	2	18	Short Term
South White Street	Holding Avenue	Sugar Maple	3	0	0	0	3	1	2	2	0	0	3	2	2	18	Short Term
Jones Dairy Road	Chalk Road	ETJ	3	3	3	0	0	1	2	0	0	1	0	2	2	17	Short Term
Juniper Avenue	North White Street	Jubilee	3	0	0	3	3	1	0	0	2	1	0	2	2	17	Short Term
Juniper Avenue	Rock Spring Road	North Main Street	0	0	3	3	3	0	0	0	2	0	2	2	2	17	Short Term
Oak Avenue	Harris Road	Elizabeth Street	0	0	3	0	3	1	0	0	2	1	3	2	2	17	Short Term
Franklin Street	Rogers Road	End	3	3	3	0	0	1	2	0	0	0	0	2	2	16	Short Term
Holding Avenue	Allen Road	White Street	3	0	0	0	3	1	0	2	0	0	3	2	2	16	Short Term
NC 98 Bypass	South Main Street	Jones Dairy Road	3	0	0	0	0	1	0	2	2	1	3	2	2	16	Short Term
Woodland Drive	South Wingate Street	Tyler Run Drive	3	0	3	3	3	0	0	0	0	0	0	2	2	16	Short Term
Chalk Road	Jones Dairy Road	ETJ	3	3	3	0	0	1	0	0	0	1	0	2	2	15	Short Term
Forestville Road	Burlington Mills Road	Rogers Road	3	3	3	0	0	1	0	2	0	1	0	2	0	15	Short Term
Taylor Street	Spring Street	Groveton Trail	3	0	0	3	3	0	0	0	2	0	0	2	2	15	Short Term
Allen Road	Holding Avenue	Wait Avenue	3	0	0	0	3	1	0	0	0	0	3	2	2	14	Short Term
McDowell Drive	Stadium Drive	Ligon Mill Road (Future)	0	0	3	3	3	1	0	0	0	0	0	2	2	14	Short Term
Harris Road	Capital Boulevard (US-1)	North Main Street	0	0	0	0	3	1	2	0	2	1	0	2	2	13	Medium Term
Holding Avenue	South Main Street	Richland Creek	3	0	0	0	3	0	0	0	0	0	3	2	2	13	Medium Term
NC 98 Bypass	Capital Boulevard (US-1)	South Main Street	0	0	0	0	3	1	0	2	2	1	0	2	2	13	Medium Term

Allen Road	Wait Avenue	Perry Street	3	0	0	0	3	0	0	0	2	0	0	2	2		12	Medium Term
Cimarron Parkway	South Main Street	South Main Street	0	3	0	0	0	1	2	0	2	0	0	2	2		12	Medium Term
Flaherty Avenue	North White Street	End	3	0	0	0	3	0	0	0	2	0	0	2	2		12	Medium Term
Franklin Street	Perry Street	Flaherty Park	3	0	0	0	3	0	0	0	2	0	0	2	2		12	Medium Term
North White Street	Flaherty Park	ETJ	3	0	0	0	3	1	0	0	0	1	0	2	2		12	Medium Term
Perry Street	North White Street	Jubilee	3	0	0	0	3	0	0	0	2	0	0	2	2		12	Medium Term
Seventh Street	Pine Avenue	Juniper Avenue	3	0	0	0	3	0	0	0	2	0	0	2	2		12	Medium Term
Capital Boulevard (US-1)	Stadium Drive	Harris Road	0	0	0	0	3	1	0	0	2	1	0	2	2		11	Medium Term
Caveness Farms Avenue	Capital Boulevard (US-1)	End	0	3	0	0	0	1	0	0	2	1	0	2	2		11	Medium Term
Durham Road (Old NC 98)	ETJ	Capital Boulevard (US-1)	0	0	0	0	0	1	0	2	2	2	0	2	2		11	Medium Term
Ligon Mill Road	Song Sparrow Drive	South Main Street	0	3	0	0	0	1	0	0	2	1	0	2	2		11	Medium Term
North Main Street	Harris Road	ETJ	0	0	0	0	3	1	0	0	2	1	0	2	2		11	Medium Term
South Main Street	Rogers Road	Capital Boulevard (US-1)	0	3	0	0	0	1	0	2	0	1	0	2	2		11	Medium Term
Tyler Run Drive	Holding Avenue	Durham Road (Old NC 98)	3	0	0	0	3	1	0	0	0	0	0	2	2		11	Medium Term
Wall Road	Capital Boulevard (US-1)	Harris Road	0	0	0	0	3	1	0	0	2	1	0	2	2		11	Medium Term
Amherst Creek Drive	Cimarron Parkway	End	0	3	0	0	0	1	0	0	2	0	0	2	2		10	Medium Term
Burlington Mills Road	Capital Boulevard (US-1)	Ligon Mill Road	0	0	0	0	0	1	2	0	2	1	0	2	2		10	Medium Term
Marshall Farm Road	Chalk Road	Rogers Road	0	3	3	0	0	0	0	0	0	0	0	2	2		10	Medium Term
Pineview Drive	Holding Avenue	Lakeview Avenue	3	0	0	0	3	0	0	0	0	0	0	2	2		10	Medium Term
Carroll Street	Wait Avenue	End/Future Park	0	0	0	0	2	1	0	0	2	0	0	2	2		9	Medium Term
Forbes Road	South Main Street	End	0	3	0	0	0	0	0	0	2	0	0	2	2		9	Medium Term
Mockingbird Lane	Robin Avenue	End/Greenway Connection	3	0	0	0	3	1	0	0	0	0	0	0	2		9	Medium Term
Seawell Drive	Ligon Mill Road	End	0	3	0	0	0	0	0	0	2	0	0	2	2		9	Medium Term
Wait Avenue	NC 98 Bypass	Allen Road	0	0	0	0	3	1	0	0	0	1	0	2	2		9	Medium Term
Capital Boulevard (US-1)	South Main Street	NC 98 Bypass	0	0	0	0	0	1	0	2	2	1	0	0	2		8	Medium Term
Capital Boulevard (US-1)	NC 98 Bypass	Durham Road (Old NC 98)	0	0	0	0	0	1	0	2	0	1	0	2	2		8	Medium Term
Jones Dairy Road	NC 98 Bypass	Chalk Road	0	3	3	0	0	1	0	0	0	1	0	0	0		8	Medium Term
Moultonboro Avenue	North White Street	End	0	0	0	0	3	1	0	0	0	0	0	2	2		8	Medium Term
NC 98 Bypass	Durham Road (Old NC 98)	Capital Boulevard (US-1)	0	0	0	0	0	1	0	2	2	1	0	0	2		8	Medium Term
Pine Ridge Court	South Main Street	NC 98 Bypass Greenway	0	0	0	0	3	1	0	0	0	0	0	2	2		8	Medium Term
Siena Drive	Holding Avenue	NC 98 Bypass	0	0	0	0	3	1	0	0	0	0	0	2	2		8	Medium Term
Siena Drive	NC 98 Bypass	Faithful Place	0	0	0	0	3	1	0	0	0	0	0	2	2		8	Medium Term
Song Sparrow Drive	Ligon Mill Road	Forestville Road	0	0	3	0	0	1	0	0	0	0	0	2	2		8	Medium Term
Wake Union Church Road	Durham Road (Old NC 98)	Capital Boulevard (US-1)	0	0	0	0	0	0	0	2	2	0	0	2	2		8	Medium Term
Capital Boulevard (US-1)	Neuse River	South Main Street	0	0	0	0	0	0	0	2	2	1	0	0	2		7	Medium Term
Lakeview Avenue	South Wingate Street	Siena Drive	0	0	0	0	3	0	0	0	0	0	0	2	2		7	Medium Term
Linslade	Burlington Mills Road	Song Sparrow Drive	0	0	3	0	0	0	0	0	0	0	0	2	2		7	Medium Term
Tansley Street	Dansforeshire Way	Linslade	0	0	3	0	0	0	0	0	0	0	0	2	2		7	Medium Term
Alfalfa Lane	Jones Dairy Road	ETJ	3	0	0	0	0	0	0	0	0	1	0	0	2		6	Long Term
Friendship Chapel Road	South Main Street	End	0	0	0	0	0	0	0	0	2	0	0	2	2		6	Long Term
Kearny Road	Wake Union Church Road	Birch Tree	0	0	0	0	0	0	0	2	0	0	0	2	2		6	Long Term
Ligon Mill Road	Greenville Loop Road	Burlington Mills Road	0	0	0	0	0	1	0	0	0	1	0	2	2		6	Long Term
Purnell Road	Fairlake	Capital Boulevard (US-1)	0	0	0	0	0	1	0	0	2	1	0	0	2		6	Long Term
Star Road	Burlington Mills Road	South Main Street	0	0	0	0	0	0	0	2	2	0	0	0	2		6	Long Term
Tillamook Drive	Cimarron Parkway	Faithful Place	0	0	0	0	0	0	0	0	2	0	0	2	2		6	Long Term
Burlington Mills Road	Ligon Mill Road	Centaur Road	0	0	0	0	0	0	0	0	0	1	0	2	2		5	Long Term
Capital Boulevard (US-1)	Durham Road (Old NC 98)	Stadium Drive	0	0	0	0	0	0	0	2	0	1	0	0	2		5	Long Term

Cardinal Drive	Wait Avenue	Robin Avenue	0	0	0	0	3	0	0	0	0	0	0	0	2		5	Long Term
Clear Springs	Chalk Road	Rogers Road	3	0	0	0	0	0	0	0	0	0	0	0	2		5	Long Term
Dansforeshire Way	Burlington Mills Road	Song Sparrow Drive	0	0	0	0	0	1	0	0	0	0	0	2	2		5	Long Term
Falcon Hurst Drive	Ligon Mill Road	Kemble Ridge Drive	0	0	0	0	0	1	0	0	0	0	0	2	2		5	Long Term
Forestville Road	Lillie Liles	Burlington Mills Road	0	0	0	0	0	0	0	0	0	1	0	2	2		5	Long Term
Marshall Farm Road	Rogers Road	Orange Cosmos	0	0	0	0	0	1	0	0	0	0	0	2	2		5	Long Term
Oak Grove Church Road	Jubilee	ETJ	0	0	0	0	3	1	0	0	0	1	0	0	0		5	Long Term
Pine Valley	Forestville Road	End	0	0	3	0	0	0	0	0	0	0	0	0	2		5	Long Term
Robin Avenue	Cardinal Drive	Mockingbird Lane	0	0	0	0	3	0	0	0	0	0	0	0	2		5	Long Term
Sweet Clover Drive	Winter Spring Drive	ETJ	3	0	0	0	0	0	0	0	0	0	0	0	2		5	Long Term
Winter Spring Drive	Jones Dairy Road	Sweet Clover Drive	3	0	0	0	0	0	0	0	0	0	0	0	2		5	Long Term
Coach Lantern Avenue	Ligon Mill Road	Forestville Road	0	0	0	0	0	0	0	0	0	0	0	2	2		4	Long Term
Deer Lake Trail	Kemble Ridge Drive	Buck Run Trail	0	0	0	0	0	0	0	0	0	0	0	2	2		4	Long Term
Galaxy Drive	Start	End	0	0	0	0	0	0	0	2	0	0	0	2	0		4	Long Term
Jenkins Road	Heuristic	Capital Boulevard (US-1)	0	0	0	0	0	1	0	0	0	1	0	0	2		4	Long Term
Kemble Ridge Drive	Falcon Hurst Drive	Deer Lake Trail	0	0	0	0	0	0	0	0	0	0	0	2	2		4	Long Term
Ligon Mill Road	Burlington Mills Road	Song Sparrow Drive	0	0	0	0	0	1	0	0	0	1	0	0	2		4	Long Term
Shearon Farms Avenue	Capital Boulevard (US-1)	End	0	0	0	0	0	0	0	0	0	0	0	2	2		4	Long Term
Forgotten Pond	Marshall Farm Road	Prairie Smoke	0	0	0	0	0	1	0	0	0	0	0	0	2		3	Long Term
Biscay Lane	Kearny Road	Capellan	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Buck Run Trail	Deer Lake Trail	Deer Chase Trail	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Chimney Swift Drive	Night Herron Drive	Song Sparrow Drive	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Deer Chase Trail	Buck Run Trail	Burlington Mills Road	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Donner Trail	Deer Lake Trail	Ten Point Trail	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Greenville Loop Road	Ligon Mill Road	ETJ	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Hampton Way Drive	Durham Road (Old NC 98)	Shopping Center	0	0	0	0	0	0	0	2	0	0	0	0	0		2	Long Term
Night Herron Drive	Burlington Mills Road	Chimney Swift Drive	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Ten Point Trail	Donner Trail	End	0	0	0	0	0	0	0	0	0	0	0	0	2		2	Long Term
Centaur Road	Burlington Mills Road	End	0	0	0	0	0	0	0	0	0	1	0	0	0		1	Long Term
Future Collectors/Thoroughfares*	Start	End																At Development

* Pedestrian Corridor Facilities should be incorporated in the design of all future neighborhood collectors and thoroughfares.

** General Destinations include libraries, community centers, civic buildings, post offices, historic sites, cultural sites, etc.

*** If an opportunity arises (through Municipal or State Roadway Projects, Land Development Requirements, State Highway Participation, etc.) for the completion of an identified facility improvement, that opportunity should be taken regardless of its rank in the priority matrix.

Appendix C

FUNDING SOURCES

C.1 Overview

Implementing the recommendations of this plan will require a combination of funding sources that include local, state, federal, and private money. This Appendix provides a listing of the most commonly used funds for pedestrian and greenway facility projects in North Carolina. Fortunately, the benefits of protected greenways are many and varied. This allows programs in Wake Forest to access money earmarked for a variety of purposes including water quality, hazard mitigation, recreation, air quality, alternate transportation, wildlife protection, community health, and economic development. Competition is almost always stiff for state and federal funds. It becomes imperative that local governments work together to create multi-jurisdictional partnerships and to develop their own local sources of funding. These sources can then be used to leverage outside assistance. The long term success of this plan will almost certainly depend on the dedication of a local revenue stream for pedestrian and greenway projects.

It is important that Wake Forest fully evaluate its available options and develop a funding strategy that can meet community needs, maximize local resources, and leverage outside funding. Financing will be needed to administer the continued planning and implementation process, acquire parcels or easements, and manage and maintain facilities. Further research into these programs is recommended to determine requirements for specific grants.

Greenways Incorporated advises the Town of Wake Forest to pursue a variety of funding options. Below is a list of some of the pedestrian and greenway funding opportunities that have typically been pursued by other communities. Creative planning and consistent monitoring of funding options will likely turn up new opportunities not listed here.



C.2 Federal Government Funding Sources

Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003 (SAFETEA-LU)

While generally a transportation-based program, the Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003 (SAFETEA) funds programs to protect the environment. Through increased funding to the Surface Transportation Program (STP) and the National Highway System (NHS), SAFETEA allows for more environmental projects. States may spend up to 20 percent of their STP dollars (used for transportation facility reconstruction, rehabilitation, resurfacing, or restoration projects) for environmental restoration and pollution abatement projects. Additionally, each state sets aside 10 percent of STP funds for transportation enhancement projects, which can include acquisition of conservation and scenic easements, wetland mitigation, and pollution abatement, as well as scenic beautification, pedestrian and bicycle trails, archaeological planning, and historic preservation. For more information on all SAFETEA-LU programs, visit <http://www.fhwa.dot.gov/safetealu/>. Some of the most pertinent programs under this act are:

Surface Transportation Program (STP)

This is the largest single program within the legislation from a funding point of view, with \$32.5 billion committed over the next five years. Of particular interest to greenway enthusiasts, 10 percent of the funding within this program is set aside for *Transportation Enhancements* (TE) activities. Historically, a little more than half of the TE funds have been used nationally to support bicycle/pedestrian/trail projects. So nationally, it is projected that \$1.625 billion will be spent on these projects under SAFETEA-LU. These funds may be used for construction or non-construction projects that benefit bicycles and pedestrians. “Non-construction” projects are items such as maps, brochures, and public service announcements. These funds may be programmed to bring sidewalks and intersections into compliance with ADA regulations.

Congestion Mitigation and Air Quality (CMAQ)

Under SAFETEA-LU, approximately \$8.6 billion has been set aside. Historically, about five percent of these funds have



been used to support bicycle/pedestrian/trail projects. This would equal about \$430 million under SAFETEA-LU. CMAQ Improvement Program funds are similar to STP funds in that they may be used for construction or non-construction projects that benefit bicyclists and pedestrians. These funds have been used for bicycle related projects in many states. An additional potential source of funds relating to outreach and public education is the EPA's Mobile Source Outreach Assistance Competition. This funding source focuses on outreach and public education relating to cleaner air and alternative transportation. These grants have a \$100,000 maximum with a 40% required local match.

Recreational Trails Program

Originally titled the Symms National Recreational Trails Fund Act, this funding source assists with the development of non-motorized and motorized trails. States receive the funds and can then grant them to other private or public organizations. Under this program, grant recipients must provide a 20 percent match and the projects must be consistent with the Statewide Comprehensive Outdoor Recreation Plan (SCORP) - updated every 5 years by the NC Division of State Parks.

Highway Safety Improvement Program (HSIP)

SAFETEA-LU funds this program at \$5 billion over four years. Historically, bicycle and pedestrian projects have accounted for one percent of this program, or about \$50 million under SAFETEA-LU. Some of the eligible uses of these funds would include traffic calming, bicycle and pedestrian safety improvements, and installation of crossing signs. This is not a huge source of funding, but one that could be used to fund elements of a project.

Safe Routes to School Program (SR2S)

A new program under SAFETEA-LU is the Safe Routes to School (SR2S) program, with \$612 million in funding during the term of the legislation. This is an excellent new program that within North Carolina will be paired with a variety of health and wellness programs, to increase funding for access to the outdoors for children. Each state will receive no less



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than \$1 million in funding, with 10% to 30% of the funds allocated to non-infrastructure activities. The SR2S Program was established in August 2005 as part of the most recent federal transportation re-authorization legislation--SAFETEA-LU. This law provides multi-year funding for the surface transportation programs that guide spending of federal gas tax revenue. Section 1404 of this legislation provides funding (for the first time) for State Departments of Transportation to create and administer SR2S programs which allow communities to compete for funding for local SR2S projects.

The administration of section 1404 has been assigned to FHWA's Office of Safety, which is working in collaboration with FHWA's Offices of Planning and Environment (Bicycle and Pedestrian Program) and the National Highway Traffic Safety Administration (NHTSA) to establish and guide the program.

High Priority Projects

Under SAFETEA-LU more than 5,091 transportation projects were earmarked by Congress for development, with a total value in excess of \$3 billion. An example is the Charlotte metropolitan area with one project receiving funding under the HPP label, the Little Sugar Creek Greenway, which is funded at \$3.15 million.

The National Scenic Byways Program

This program provides funds for bikeways and walkways along scenic routes. It recognizes certain roads as National Scenic Byways or All-American Roads based on their archeological, cultural, historic, natural, recreational, and scenic qualities. There are 72 such designated byways in 32 states. Bicycle and pedestrian facilities can be funded as a component of a corridor's management plan. Historically only 2 percent of these funds have been used to support bicycle and pedestrian improvements.

Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund is the largest source of federal money for park, wildlife, and open space land acquisition. This federal funding source was established



in 1965 to provide “close-to-home” park and recreation opportunities to residents throughout the United States. The program’s funding comes primarily from offshore oil and gas drilling receipts, with an authorized expenditure of \$900 million each year. However, Congress generally appropriates only a fraction of this amount. LWCF grants can be used by communities to build a variety of park and recreation facilities, including trails and greenways. Fifty percent of the local project costs must be met through in-kind services or cash provided by the recipient. The allotted money varies yearly and unfortunately, the fund has been “zeroed” out for 2006. For more state-based information, see the LWCF description in Section C.3.

Wetlands Reserve Program

This federal funding source is a voluntary program offering technical and financial assistance to landowners who want to restore and protect wetland areas for water quality and wildlife habitat. The US Department of Agriculture’s Natural Resource Conservation Service (USDA-NRCS) administers the program and provides direct payments to private landowners who agree to place sensitive wetlands under permanent easements. This program can be used to fund the protection of open space and greenways within riparian corridors.

National Highway System Funds

These funds can be used for pedestrian and bicycle projects adjacent to any highway on the National Highway System, including Interstate Highways.

Transportation Enhancement Activities (TEAs)

10 percent of STP funds are earmarked for Transportation Enhancement Activities (TEAs). The list of activities that are eligible under the TEA program, include the following:

- Pedestrian and bicycle facilities
- Pedestrian and bicycle safety and education activities
- Acquisition of scenic easements and historic easements and sites



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- Scenic or historic highway programs including tourist and welcome centers
- Landscaping and scenic beautification
- Historic preservation
- Rehabilitation and operation of historic transportation buildings, structures or facilities
- Preservation of abandoned railway corridors
- Control and removal of outdoor advertising
- Archaeological planning and research
- Mitigation of highway runoff and provision of wildlife under crossings
- Establishment of transportation museums

Hazard Elimination and Railway-Highway Crossing Programs

These funds account for 10 percent of a state's STP funds. These funds should be used to inventory and/or address safety concerns of motorists, pedestrians, and bicyclists.

Federal Lands Highway Program Funds

These fund bicycle and pedestrian facilities as a provision of roads, highways, and parkways. This program is under the discretion of the appropriate Federal Land Agency or Tribal government.

Job Access and Reverse Commute Grants

These can fund pedestrian and bicycle-related services intended to transport welfare recipients and eligible low-income individuals to and from employment.

State and Community Highway Safety Grants

These are part of the Section 402 formula grants for which each state is eligible. States must submit a Performance Plan that establishes goals and performance measures for improving highway safety, including improved bicycle and pedestrian safety.

Environmental Protection Agency

Funding for pedestrian facilities have been available through the EPA's Office of Transportation and Air Quality



(OTAQ). One such grant source under OTAQ is “Clean Air Transportation Communities: Innovative Projects to Improve Air Quality and Reduce Greenhouse Gases.” These funds assist in the funding of innovative pilot projects to reduce transportation related emissions of criteria pollutants and greenhouse gases by decreasing vehicle miles traveled and increasing use of cleaner technologies. Eligible recipients are state, local, multi-state, and tribal agencies involved with transportation/air quality and/or climate change issues. The use of federal air quality monies was utilized in Billings, Montana for implementation of bike trails using the idea of increased number of bicycles as non-polluting vehicles as justification for obtaining air quality grants.

The Community Development Block Grant (HUD-CDBG)

The U.S. Department of Housing and Urban Development (HUD) offers financial grants to communities for neighborhood revitalization, economic development, and improvements to community facilities and services, especially in low and moderate-income areas. Several communities have used HUD funds to develop greenways, including the Boulding Branch Greenway in High Point, North Carolina. Grants from this program range from \$50,000 to \$200,000 and are either made to municipalities or non-profits. There is no formal application process.

Rivers Trails and Conservation Assistance Program (RTCA)

This is a National Park Service program. Although the program does not provide funding for projects, it does provide valuable on-the-ground technical assistance, from strategic consultation and partnership development to serving as liaison with other government agencies. Communities must apply for assistance.

The National Endowment of the Arts

Many organizations seek ways to incorporate more of their community into their pedestrian, and greenway planning. One way to do this is to celebrate the cultural and historic uniqueness of communities. There are many funding



opportunities for these types of projects. The National Endowment of the Arts funds arts-related programs through the Design Arts Program Assistance, and provides many links to other federal departments and agencies that offer funding opportunities for arts and cultural programs.

C.3 State Funding Sources

Current public sidewalk construction is financed in a range of ways. Town projects have been funded using a mix of transportation bond funds (primarily for sidewalks that have been provided as a part of larger roadway projects) and the use of Powell Bill reserves. The sidewalk portion of state roadway projects is typically funded in part by the State and in part by the local government. Federal highway funds have been used for independent sidewalk projects as well, but this has not been a major portion of the funding mix to date.

The Powell Bill Program is a state grant to municipalities for use in street system maintenance and construction activities. In the past, the Town allocated a considerable portion of these revenues for construction purposes. Over the years reserves built up, and the sidewalk program has drawn off these reserves. However, budgetary constraints since 2001 have led to a shift of new Powell Bill funds to cover maintenance and operations activities. Therefore, future Powell Bill allocations are not expected to yield substantial resources for construction purposes.

Both the Powell Bill reserves and the 2000 Transportation Bond funds are limited funding sources that will eventually be depleted. Further, federal highway funds can be expected to provide only a portion of the future resource needs of the sidewalk construction program. For this reason, the development of future transportation bond initiatives will be critical for continuing implementation of the sidewalk construction program in the future.

The most direct source of public-sector funding for local governments will come from state agencies in North



Carolina. Generally, these funds are made available to local governments based on grant-in-aid formulas. A large amount of the following programs are funded from different programs under SAFETEA-LU mentioned in C.2. The single most important key to obtaining state grant funding is for local governments to have adopted plans for greenway, bicycle, pedestrian or trail systems in place prior to making an application for funding. A good starting website with links to many of the following programs is http://www.enr.state.nc.us/html/tax_credits.html.

In North Carolina, the Department of Transportation, **Division of Bicycle and Pedestrian Transportation (DBPT)** has been the single largest source of funding for bicycle, pedestrian and greenway projects, including non-construction projects such as brochures, maps, and public safety information for more than a decade. DBPT offers several programs in support of bicycle and pedestrian facility development. The following information is from NCDOT's interactive web site (www.ncdot.org). Contact the NCDOT, Division of Bicycle and Pedestrian Transportation at (919) 807-2804 for more information.

Transportation Improvement Program (TIP)

Transportation projects in North Carolina progress through a standard process of planning, design and construction. Improvements for bicycling and walking may be included in the TIP as part of the construction of a highway project or, where no highway project is programmed, as an independent project. Bicycle and pedestrian projects follow essentially the same TIP process as do highway projects. The Division of Bicycle and Pedestrian Transportation (DBPT) works with localities to create a statewide four-year schedule for funding projects using the locality's priority listing of needs along with the adopted project selection criteria. The DBPT compiles candidate bicycle and pedestrian projects to be considered for inclusion in the TIP from the following sources:

- The prioritized Metropolitan Transportation Improvement Program (MTIP) lists produced by the 17 Metropolitan



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Planning Organizations (MPOs), which have been derived from separate lists produced by communities comprising the MPO.

- Project requests that are made at the biennial TIP meetings or through written requests within 30 days of the meetings from the state's small urban areas, counties, public and private entities, and citizens.
- Internal DBPT assessment of statewide bicycle and pedestrian project needs. All project requests are documented and distinguished as independent or incidental (part of a highway project). Independent project requests are evaluated by DBPT using project selection criteria. A prioritized list of these projects is presented to the North Carolina Bicycle Committee. The Committee reviews the list, makes revisions and recommendations, and adopts a four-year schedule of projects. The adopted schedule is sent to the North Carolina Board of Transportation for approval and inclusion in the state's TIP.

Inclusion of a bicycle or pedestrian project in the TIP does not guarantee that it will be implemented; rather, it means that it will receive further study and will be implemented if feasible. Incidental projects are considered in conjunction with the planning study for the given highway or bridge project and implemented, if feasible.

For independent construction projects, DBPT conducts a detailed feasibility study, including cost estimates. If the project is determined to be feasible, DBPT prepares a more detailed planning study, which is reviewed and approved by the Bicycle and Pedestrian Task Force before being submitted to the Board of Transportation for funding authorization. Once the funding is authorized, project design and development begins.

For more information, visit http://www.ncdot.org/transit/bicycle/funding/funding_TIP.html



Bicycle and Pedestrian Planning Grant Initiative

This program was initiated by NCDOT in 2004, to provide communities with planning grants in support of the completion of community-wide bicycle and pedestrian plans. NCDOT will continue this program through 2006 and beyond. For more information, visit <http://www.itre.ncsu.edu/ptg/bikeped/ncdot/index.html>

North Carolina Safe Routes to School Program

Recently, the state of North Carolina started the NC Safe Routes to School Program based off of the national program. The state has \$15 million over the next 5 years for infrastructure improvements within 2 miles of schools. This funding can also be used towards the development of school related programs to improve safety and walkability initiatives. The state requires the completion of a competitive application to apply for funding, similar to the bicycle/pedestrian planning grants, and a workshop at the school to determine what improvements are needed. After a school has the workshop, it will have a good shot of getting that funding. For more information, contact Theresa Canales at NCDOT, (919) 733-2520.

Federal Aid Construction Funds

These funds are included in the National Highway System (NHS), Surface Transportation Program (STP), and Congestion Mitigation and Air Quality (CMAQ). The funds provide for the construction of pedestrian and bicycle transportation facilities. The primary source of funding for bicycle and pedestrian projects is STP Enhancement Funding.

State Construction Funds

These funds (not including the Highway Trust Fund for Urban Loops and Interchanges) may be used for the construction of sidewalks and bicycle accommodations that are a part of roadway improvement projects.

The North Carolina Conservation Tax Credit

This program provides an incentive (in the form of an income tax credit) for landowners that donate interests in real property for conservation purposes. Property donations can be fee simple or in



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the form of conservation easements or bargain sale. The goal of this program is to manage stormwater, protect water supply watersheds, retain working farms and forests, and set-aside greenways for ecological communities, public trails, and wildlife corridors. (For more information see: <http://ncctc.enr.state.nc.us/>).

The Land and Water Conservation Fund (LWCF)

This is the largest source of federal grant money for states and local governments in regards to park, wildlife, and open space land acquisition. The state-and-local grant portion of the program provides up to 50 percent of the cost of a project, with the balance of the funds paid by states or municipalities. LWCF funds are apportioned by formula to all 50 states, the District of Columbia and territories. In North Carolina, the federally granted money is allocated through the State Division of Parks and Recreation. Cities, counties, state agencies, and school districts are eligible for LWCF fund monies. These funds can be used for outdoor recreation projects, including greenway acquisition, renovation, and greenway development. Projects require a 50 percent match. The allotment can vary from year to year. Between 1995 and 1998, no funds were provided for the state-and-local grant portion of the program. In fiscal year 2000, Congress approved stateside grant funding at \$40 million. In FY 2001, \$89 million was approved. In the current fiscal year 2006, the allotted money has been “zeroed” out again.

For more information and how to apply for a grant in North Carolina, visit <http://ils.unc.edu/parkproject/lwcf/home1.html>.

North Carolina Recreational Trails Program

The Recreational Trails Program is a grant program funded by Congress with money from the federal gas taxes paid on fuel used by off-highway vehicles. This program’s intent is to meet the trail and trail-related recreational needs identified by the Statewide Comprehensive Outdoor Recreation Plan. Grant applicants must be able contribute 20% of the project cost with cash or in-kind contributions. Applications for funding may be obtained by contacting your regional trails specialist or the State Trails Program at (919) 715-8699.



North Carolina Parks and Recreation Trust Fund (PARTF)

Generally several million dollars a year are available to local governments across NC through this program. Applicable projects require a 50/50 match from the local government and no more than \$250,000 can be requested. The money can be used for the acquisition, development and renovation of recreational areas. The NC Division of State Parks manages the program along with the Recreational Resources Service. Visit <http://www.partf.net/> for information on how to apply.

Clean Water Management Trust Fund

This fund was established in 1996 and has become one of the largest sources of money in North Carolina for land and water protection. At the end of each fiscal year, 6.5 percent of the unreserved credit balance in North Carolina's General Fund, or a minimum of \$30 million, is placed in the CWMTF. The revenue of this fund is allocated as grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. Local governments may apply for grants to acquire easement or fee-simple interest in properties that (1) enhance or restore degraded waters, (2) protect unpolluted waters, and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits. For a history of awarded grants in North Carolina and more information about this fund and applications, visit <http://www.cwmtf.net/>.

Farmland Protection Trust Fund

Ranging from only a couple hundred thousand dollars to millions of dollars over the last several years, this program is funded through an allocation by the NC General Assembly to the NC Department of Agriculture and Consumer Services. It is a voluntary program designed to protect farmland from development by either acquiring property outright or acquiring conservation easements on the property. The program is administered by the Conservation Trust for North Carolina (CTNC). Questions about available funding should be directed to CTNC (Website: <http://www.ctnc.org/>).



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Natural Heritage Trust Fund

Money from this fund may only be allocated to State agencies, so the Town of Wake Forest must work with State level partners to access this fund. 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. Additional information is available from the NC Natural Heritage Program. For more information and grant application information, visit <http://www.ncnhtf.org/>.

North Carolina Wetlands Restoration Program (NCWRP)

This is a non-regulatory program established by the NC General Assembly in 1996. The goals of the NCWRP are to:

- Protect and improve water quality by restoring wetland, stream and riparian area functions and values lost through historic, current and future impacts.
- Achieve a net increase in wetland acreage, functions and values in all of North Carolina's major river basins.
- Promote a comprehensive approach for the protection of natural resources.
- Provide a consistent approach to address compensatory mitigation requirements associated with wetland, stream, and buffer regulations, and to increase the ecological effectiveness of compensatory mitigation projects.

Additional information about the program and potential funding assistance with the restoration or creation of wetlands can be found at www.h2o.enr.state.nc.us/wrp

Ecosystem Enhancement Program

Developed in 2003 as a new mechanism to facilitate improved mitigation projects for NC highways, this program will have money available for both restoration projects and protection projects that serve to enhance water quality and wildlife habitat in NC. Additional information is available by contacting the Natural Heritage Program



in the NC Department of Environment and Natural Resources (NCDENR). For more information, resources, and links, visit <http://www.nceep.net/pages/partners.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 <http://www.enr.state.nc.us/DSWC/pages/agcostshareprogram.html>.

Conservation Reserve Enhancement Program (CREP)

A joint effort between the NC Division of Soil and Water Conservation, the North Carolina Clean Water Management Trust Fund, the North Carolina Wetlands Restoration Program, and the United States Department of Agriculture to address water quality programs of specific river basins and watershed areas. This is a voluntary program to protect riparian lands that are currently in agricultural production. The program is managed by the NC Division of Soil and Water Conservation. For more information, visit <http://www.enr.state.nc.us/DSWC/pages/crep.html>.

North Carolina Conservation Tax Credit Program

An incentive program that encourages landowners to donate land or easements on their land for conservation purposes. Participants receive a state tax credit for the value of their donation. For more information see: <http://ncctc.enr.state.nc.us>.

NC Adopt-A-Trail Grant Program

Operated by the Trails Section of the NC Division of State Parks, annual grants are available to local governments for trail and facility construction. Grants are generally capped at about \$5,000 per project and do not require a match. Applications are due in the fall. For more information, visit <http://ils.unc.edu/parkproject/trails/grant.html>



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Urban and Community Forestry Assistance Program

The program operates as a cooperative partnership between the NC Division of Forest Resources and the USDA Forest Service, Southern Region. It offers small grants that can be used to plant urban trees, establish a community arboretum, or other programs that promote tree canopy in urban areas. To qualify for this program, a community must pledge to develop a street-tree inventory, a municipal tree ordinance, a tree commission, and an urban forestry-management plan. All of these can be funded through the program. For more information and a grant application, contact the NC Division of Forest Resources and/or visit http://www.dfr.state.nc.us/urban/urban_grantprogram.htm.

Water Resources Development Grant Program

The NC Division of Water Resources offers cost-sharing grants to local governments on projects related to water resources. Stream Restoration and Land Acquisition and Facility Development for Water-Based Recreation Projects are two of the categories of projects that are generally funded. For more information, see: http://www.ncwater.org/Financial_Assistance.

Small Cities Community Development Block Grants

State level funds are allocated through the NC Department of Commerce, Division of Community Assistance. These funds can be used to promote economic development and to serve low-income and moderate-income neighborhoods. Greenways that are part of a community's economic development plans may qualify for assistance under this program. Recreational areas that serve to improve the quality of life in lower income areas may also qualify. Approximately \$50 million is available statewide to fund a variety of projects. For more information, visit <http://www.hud.gov/offices/cpd/communitydevelopment/programs/stateadmin/>.

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) announces the establishment of Fit Community, a designation and grant program that recognizes 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 the following:

- physical activity in the community, schools, and workplaces
- healthy eating in the community, schools, and workplaces
- tobacco use prevention efforts in schools

Designations will be 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)
- reinvigoration of a community's sense of civic pride (each Fit Community will serve as a model for other communities that are trying to achieve similar goals)
- use of the Fit Community designation logo for promotional and communication purposes.



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The application for Fit Community designation is available on the Fit Together Web site:

www.FitTogetherNC.org/FitCommunity.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.

Blue Cross Blue Shield Grant

The Blue Cross and Blue Shield of North Carolina Foundation has a grants program called “Fit Together.” The purpose of the program is to provide support to rural North Carolina communities to improve community health by implementing innovative and integrated strategies to increase physical activity. Approximately \$40,000 each is available for up to five grantees. Eligible applicants include nonprofit organizations in North Carolina with 501 c(3) status. Applicants must utilize the “5Ps approach” in their strategy to increase physical activity: preparation, promotions, programs, policies, and physical projects. Visit web site: www.bcbsnc.com/foundation/fittogether_grants.html.

C.4 Local Funding Sources

A number of local funding options have been grouped here under the primary banners of taxes, fees, loans, bonds, and other resources.

Taxes

Many communities have raised money through self-imposed increases in taxes and bonds. For example, Pinellas County residents in Florida voted to adopt a one-cent sales tax increase, which provided an additional \$5 million for the development of the overwhelmingly popular Pinellas Trail. Sales taxes have also been used in Alleghany County, Pennsylvania, and



in Boulder, Colorado to fund open space projects. A gas tax is another method used by some municipalities to fund public improvements.

A number of taxes provide direct or indirect funding for the operations of local governments. Some of them are:

Sales Tax

In North Carolina, the state has authorized a sales tax at the state and county levels. Local governments that choose to exercise the local option sales tax (all counties currently do), use the tax revenues to provide funding for a wide variety of projects and activities. Any increase in the sales tax, even if applying to a single county, must gain approval of the state legislature. In 1998, Mecklenburg County was granted authority to institute a one-half cent sales tax increase for mass transit.

Property Tax

Property taxes generally support a significant portion of a municipality’s activities. However, the revenues from property taxes can also be used to pay debt service on general obligation bonds issued to finance greenway system acquisitions. Because of limits imposed on tax rates, use of property taxes to fund greenways could limit the municipality’s ability to raise funds for other activities. Property taxes can provide a steady stream of financing while broadly distributing the tax burden. In other parts of the country, this mechanism has been popular with voters as long as the increase is restricted to parks and open space. Note, other public agencies compete vigorously for these funds, and taxpayers are generally concerned about high property tax rates.

Excise Taxes

Excise taxes are taxes on specific goods and services. These taxes require special legislation and the use of the funds generated through the tax are limited to specific uses. Examples include lodging, food, and beverage taxes that generate funds for promotion of tourism, and the gas tax that generates revenues for transportation related activities.



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Fees

Several fee options that have been used by other local governments are listed here:

Stormwater Utility Fees

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 discharge 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. Greenway sections may be purchased with stormwater fees, if the property in question is used to mitigate floodwater or filter pollutants.

Impact Fees

Impact fees, which are also known as capital contributions, facilities fees, or system development charges, are typically collected from developers or property owners at the time of building permit issuance to pay for capital improvements that provide capacity to serve new growth. The intent of these fees is to avoid burdening existing customers with the costs of providing capacity to serve new growth ("growth pays its own way"). Greenway impact fees are designed to reflect the costs incurred to provide sufficient capacity in the system to meet the additional needs of a growing community. These charges are set in a fee schedule applied uniformly to all new development. Communities that institute impact fees must develop a sound financial model that enables policy makers



to justify fee levels for different user groups, and to ensure that revenues generated meet (but do not exceed) the needs of development. Factors used to determine an appropriate impact fee amount can include: lot size, number of occupants, and types of subdivision improvements. If Wake Forest is interested in pursuing open space impact fees, it will require enabling legislation to authorize the collection of the fees.

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.

Installment Purchase Financing

As an alternative to debt financing of capital improvements, communities can execute installment/ lease purchase contracts for improvements. This type of financing is typically used for relatively small projects that the seller or a financial institution is willing to finance or when up-front funds are unavailable. In a lease purchase contract the community leases the property or improvement from the seller or financial institution. The lease is paid in installments that include principal, interest, and associated costs. Upon completion of the lease period, the community owns the property or improvement. While lease purchase contracts are similar to a bond, this arrangement allows the community to acquire the property or improvement without issuing debt. These instruments, however, are more costly than issuing debt.

Partnerships

Another, often overlooked, method of funding pedestrian systems and greenways is to partner with public agencies and private companies and organizations. 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.



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Major employers and developers should be identified and provided with a “Benefits of Walking”-type handout for themselves and their employees. Very specific routes which make those critical connections to place of business would be targeted for private partners’ monetary support, but only after a successful master planning effort. People rarely fund issues before they understand them and their immediate and direct impact. Potential partners include major employers which are located along or accessible to pedestrian facilities such as multi-use paths or greenways. Name recognition for corporate partnerships would be accomplished through signage trail heads 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.

In-Lieu-Of Fees

As an alternative to requiring developers to dedicate on-site greenway sections that would serve their development, some communities provide a choice of paying a front-end charge for off-site protection of pieces of the larger system. Payment is generally a condition of development approval and recovers the cost of the off-site land acquisition or the development’s proportionate share of the cost of a regional facility serving a larger area. Some communities prefer in-lieu-of fees. This alternative allows community staff to purchase land worthy of protection rather than accept marginal land that meets the quantitative requirements of a developer dedication but falls a bit short of qualitative interests.

Bonds and Loans

Bonds have been a very popular way for communities across the country to finance their pedestrian and greenway projects. A number of bond options are listed below. Contracting with a private consultant to assist with this program may



be advisable. Since bonds rely on the support of the voting population, an education and awareness program should be implemented prior to any vote.

Billings, Montana used the issuance of a bond in the amount of \$599,000 to provide the matching funds for several of their TEA- 21 enhancement dollars. Austin, Texas has also used bond issues to fund a portion of their bicycle and trail system.

Revenue Bonds

Revenue bonds are bonds that are secured by a pledge of the revenues from a certain local government activity. The entity issuing bonds, pledges to generate sufficient revenue annually to cover the program’s operating costs, plus meet the annual debt service requirements (principal and interest payment). Revenue bonds are not constrained by the debt ceilings of general obligation bonds, but they are generally more expensive than general obligation bonds.

General Obligation Bonds

Cities, counties, and service districts generally are able to issue general obligation (G.O.) bonds that are secured by the full faith and credit of the entity. In this case, the local government issuing the bonds pledges to raise its property taxes, or use any other sources of revenue, to generate sufficient revenues to make the debt service payments on the bonds. A general obligation pledge is stronger than a revenue pledge, and thus may carry a lower interest rate than a revenue bond. Frequently, when local governments issue G.O. bonds for public enterprise improvements, the public enterprise will make the debt service payments on the G.O. bonds with revenues generated through the public entity’s rates and charges. However, if those rate revenues are insufficient to make the debt payment, the local government is obligated to raise taxes or use other sources of revenue to make the payments. G.O. bonds distribute the costs of land acquisition and greenway development and make funds available for immediate purchases and projects. Voter approval is required.



Special Assessment Bonds

Special assessment bonds are secured by a lien on the property that benefits by the improvements funded with the special assessment bond proceeds. Debt service payments on these bonds are funded through annual assessments to the property owners in the assessment area.

State Revolving Fund (SRF) Loans

Initially funded with federal and state money, and continued by funds generated by repayment of earlier loans, State Revolving Funds (SRFs) provide low interest loans for local governments to fund water pollution control and water supply related projects including many watershed management activities. These loans typically require a revenue pledge, like a revenue bond, but carry a below market interest rate and limited term for debt repayment (20 years).

C.5 Other Local Options

Local Capital Improvements Program

In communities that can afford it, a yearly appropriation for greenway and trail development in the capital improvements program is another option. In Raleigh, for example, the greenways system has been developed over many years through a dedicated source of annual funding that has ranged from \$100,000 to \$500,000, administered through the Recreation and Parks Department.

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 from 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.

C.6 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.

Land for Tomorrow Campaign

Land for Tomorrow is a diverse partnership of businesses, conservationists, farmers, environmental groups, health professionals and community groups committed to securing support from the public and General Assembly for protecting land, water and historic places. The campaign is asking the North Carolina General Assembly to support issuance of a bond for \$200 million a year for five years to preserve and protect its special land and water resources. Land for Tomorrow will enable North Carolina to reach a goal of ensuring that working farms and forests; sanctuaries for wildlife; land bordering streams, parks and greenways; land that helps strengthen communities and promotes job growth; historic downtowns and neighborhoods; and more, will be there to enhance the quality of life for generations to come. For more information, visit <http://www.landfortomorrow.org/>

American Greenways Eastman Kodak Awards

The Conservation Fund's American Greenways Program has teamed with the Eastman Kodak Corporation and the National Geographic Society to award small grants (\$250 to \$2,000) to stimulate the planning, design and development of greenways. These grants can be used for activities such as mapping, conducting ecological assessments, surveying land, holding conferences, developing brochures, producing interpretive displays, incorporating land



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trusts, and building trails. Grants cannot be used for academic research, institutional support, lobbying or political activities. For more information visit The Conservation Fund's website at: www.conservationfund.org

The Robert Wood Johnson Foundation

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

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

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

The Trust for Public Land

Land conservation is central to TPL's mission. Founded in 1972, the Trust for Public Land is the only national nonprofit working exclusively to protect land for human enjoyment and well being. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities. TPL's legal and real estate specialists work with landowners, government agencies, and community groups to:

- Create urban parks, gardens, greenways, and riverways
- Build livable communities by setting aside open space in the path of growth
- Conserve land for watershed protection, scenic beauty, and close-to home recreation safeguard the character of communities by preserving historic landmarks and landscapes.

For more information, visit <http://www.tpl.org/>.



Z. Smith Reynolds Foundation

This Winston-Salem based Foundation has been assisting the environmental projects of local governments and non-profits in North Carolina for many years. They have two grant cycles per year and generally do not fund land acquisition. However, they may be able to support Wake Forest 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. The foundation also manages various scholarship programs statewide. Web site: <http://nccommunityfoundation.org/>

Bank of America Charitable Foundation, Inc.

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

National Trails Fund

American Hiking Society created the National Trails Fund in 1998, the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. 73 million people enjoy foot trails annually, yet



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many of our favorite trails need major repairs due to a \$200 million backlog of badly needed maintenance. National Trails Fund grants help give local organizations the resources they need to secure access, volunteers, tools and materials to protect America's cherished public trails. 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.

What types of projects will American Hiking Society consider? Securing trail lands, including acquisition of trails and trail corridors, and the costs associated with acquiring conservation easements. Building and maintaining trails which will result in visible and substantial ease of access, improved hiker safety, and/or avoidance of environmental damage. Constituency building surrounding specific trail projects - including volunteer recruitment and support. Web site: www.americanhiking.org/alliance/fund.html.



Appendix D

COST ESTIMATES

The material in section D1, along with the sidewalk cost estimates per square foot, were taken directly from "Recommended Guidelines/Priorities for Sidewalks and Walkways," from PEDSAFE online resource, a project sponsored by the USDOT Federal Highway Administration.

D.1 Sidewalk Cost Considerations (1)

The actual cost of providing sidewalks is different for each region of the country and varies with the season. Actual bid prices are also influenced by how busy contractors are at the time of construction.

The cost of constructing sidewalks alone is relatively low; typical bids run between \$20 to \$30 a square yard (\$2.22 - \$3.33 square foot).

Factors to consider when calculating the cost of sidewalks:

1. Presence of curb and gutter: The costs of providing curb and gutter, which presumes the need to also provide a street drainage system, run much higher than the cost of sidewalk alone.
2. Number of driveways: To comply with ADA, many existing driveways must be replaced with ones that provide a level passage at least 0.9 (3 ft) wide. It can also be advantageous to inventory all existing driveways to see if any can be closed, resulting in a cost-savings.
3. Number of intersections: While intersections represent a reduction in the sidewalk, curb ramps are required where sidewalks cross intersections and the cost of



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providing additional traffic control at each intersection should be considered.

4. **Obstacles to be removed:** The cost for moving or removing obstacles such as utility poles, signposts, and fire hydrants vary too much to be itemized here; however, they are required to be moved if they obstruct access. These costs must be calculated individually for each project.
5. **Structures:** While minor sidewalk projects rarely involve new structures such as a bridge, many projects with significant cuts and fills may require retaining walls and/or culvert extensions. The costs of retaining walls must be calculated individually for each project.
6. **Right-of-way:** While most sidewalk projects can be built within existing rights-of-way (especially infill projects), some may require some right-of-way easement. An alternative to acquiring right-of-way is to narrow the roadway, which should consider the needs of bicyclists (e.g., through bike lanes or shoulders, at a minimum of 1.5 m (5 ft)).
7. **Miscellaneous factors:** Planters, irrigation, benches, decorative lampposts, and other aesthetic improvements cost money, but they are usually well worth it if the impetus for the project is to create a more pleasant and inviting walking environment.

When project costs appear to be escalating due to one or more of the above-listed items, especially retaining walls or acquiring right-of-way, consideration may be given to narrowing the sidewalk in constrained areas as a last



resort. The full sidewalk width should be resumed in non-constrained areas – this is preferable to providing a narrow sidewalk throughout, or dropping the project because of one difficult section.

Tips to Reduce Total Costs:

1. Stand-alone vs. integrated within another project: Sidewalks should always be included in road construction projects. Stand-alone sidewalk projects cost more than the same work performed as part of a larger project. Sidewalks can be piggybacked to projects such as surface preservation, water or sewer lines, or placing utilities underground. Besides the monetary savings, the political fallout is reduced, since the public doesn't perceive an agency as being inefficient (it is very noticeable if an agency works on a road, then comes back to do more work later). The reduced impacts on traffic are a bonus to integration.
2. Combining Projects: A cost-savings can be achieved by combining several small sidewalk projects into one big one. This can occur even if the sidewalks are under different jurisdictions, or even in different localities, if they are close to each other. The basic principle is that bid prices drop as quantities increase.

D.2 Cost Estimates

Estimated costs were also calculated for the five major recommended greenways in the Wake Forest area and roadway segments for sidewalk projects. These estimates are simply to serve as a rough guide for the Town of Wake Forest, as other factors can increase actual costs.



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Greenway Trail Cost Estimates

Greenway Corridor	From	To	Length (ft)	Cost per Mile	Min. Width (ft)	Estimated Cost*
Wake Forest Bypass Greenway	Durham Road	Wake Forest Reservoir	25350	\$350,000	10	\$1,680,398
Smith Creek Greenway	Neuse River	Sedgefield Subdivision	34050	\$350,000	10	\$2,257,102
Richland Creek Greenway	Neuse River	Richland Hills Subdivision	34775	\$350,000	10	\$2,305,161
Sanford Creek Greenway	Smith Creek	Rogers Road	11370	\$350,000	10	\$753,693
Cimarron Greenway	NC 98 Bypass	Cimarron Parkway	3530	\$350,000	10	\$233,996
					Total:	\$7,230,350

A value of \$350,000 per mile of trail assumes a 10-foot wide asphalt surface, with signage, trailheads, and minor bridges. This cost is significantly reduced for natural surface trail types which will be options for portions of these facilities. These estimates are based on a number of local studies and local research. The chart above outlines approximate baseline costs for each recommended greenway.

The sidewalk project cost index table on the following pages uses an estimate of \$3/square foot to provide an estimate per each pedestrian corridor. \$3/square foot was chosen to be conservative and is towards the high end of typical costs per square foot. Some pedestrian corridors have sections of existing sidewalk so these sections were subtracted from



the overall construction length. Wake Forest policy requires sidewalks on both sides of thoroughfares, collectors, and commercial streets and it is recommended in this Plan to also require sidewalks on both sides of any street near multi-family development, schools, and other trip attractors. Otherwise, residential streets only require one side. This was taken into consideration when developing these cost estimates.

Footnote

1 “Recommended Guidelines/Priorities for Sidewalks and Walkways.” US Department of Transportation, Federal Highway Administration.

http://www.walkinginfo.org/pedsafe/moreinfo_sidewalks.cfm#cost.



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Pedestrian Facility Cost Estimate Index



Recommended pedestrian facilities (below) and their estimated costs (right)

Pedestrian Corridor Segment	From	To	Estimated Cost Per Square Foot (\$)	Width of Sidewalk (feet)	Estimated Length of Segment (feet)	Sidewalk Located on 1 Side or 2 Sides of Street	Existing Total Sidewalk in Segment (feet)	Estimated Segment Cost (\$)*
Alfalfa Lane	Jones Dairy Road	ETJ	\$3	5	1222	2	0	\$36,660
Allen Road	Holding Avenue	Wait Avenue	\$3	5	3733	1	1298	\$36,525
Allen Road	Wait Avenue	Perry Street	\$3	5	3835	2	3835	\$57,525
Amherst Creek Drive	Cimarron Parkway	End	\$3	5	1633	1	0	\$24,495
Biscay Lane	Kearny Road	Capellan	\$3	5	358	2	0	\$10,740
Buck Run Trail	Deer Lake Trail	Deer Chase Trail	\$3	5	1210	1	0	\$18,150
Burlington Mills Road	Capital Boulevard (US-1)	Ligon Mill Road	\$3	5	6805	2	0	\$204,150
Burlington Mills Road	Ligon Mill Road	Centaur Road	\$3	5	10304	2	1274	\$290,010
Cardinal Drive	Wait Avenue	Robin Avenue	\$3	5	567	1	0	\$8,505
Carroll Street	Wait Avenue	End/Future Park	\$3	5	1864	1	785	\$16,185
Caveness Farms Avenue	Capital Boulevard (US-1)	End	\$3	5	2466	2	1135	\$56,955
Cedar Avenue	North Main Street	Railroad Tracks	\$3	5	990	1	0	\$14,850
Centaur Road	Burlington Mills Road	End	\$3	5	2898	2	0	\$86,940
Chalk Road	Jones Dairy Road	ETJ	\$3	5	7444	2	0	\$223,320
Chimney Swift Drive	Night Herron Drive	Song Sparrow Drive	\$3	5	2017	1	0	\$30,255
Cimarron Parkway	South Main Street	South Main Street	\$3	5	3140	2	1834	\$66,690
Clear Springs	Chalk Road	Rogers Road	\$3	5	3501	2	0	\$105,030
Coach Lantern Avenue	Ligon Mill Road	Forestville Road	\$3	5	7420	2	7202	\$114,570
Dansforeshire Way	Burlington Mills Road	Song Sparrow Drive	\$3	5	2827	1	2350	\$7,155
Deer Chase Trail	Buck Run Trail	Burlington Mills Road	\$3	5	687	1	0	\$10,305
Deer Lake Trail	Kemble Ridge Drive	Buck Run Trail	\$3	5	1676	1	230	\$21,690
Donner Trail	Deer Lake Trail	Ten Point Trail	\$3	5	859	1	0	\$12,885
Durham Road (NC 98)	Capital Boulevard (US-1)	North Wingate Street	\$3	5	7600	2	1330	\$208,050
Durham Road (NC 98)	ETJ	Capital Boulevard (US-1)	\$3	5	3950	2	149	\$116,265
Falcon Hurst Drive	Ligon Mill Road	Kemble Ridge Drive	\$3	5	1715	1	1715	\$0
Flaherty Avenue	North White Street	End	\$3	5	2670	1	2670	\$0
Forbes Road	South Main Street	End	\$3	5	2065	1	426	\$24,585
Forestville Road	Burlington Mills Road	Rogers Road	\$3	5	7774	2	580	\$224,520
Forestville Road	Lillie Liles	Burlington Mills Road	\$3	5	7274	2	0	\$218,220

Forgotten Pond	Marshall Farm Road	Prairie Smoke	\$3	5	1187	1	0	\$17,805
Franklin Street	NC 98 Bypass	Wait Avenue	\$3	5	4660	2	4660	\$69,900
Franklin Street	Perry Street	Flaherty Park	\$3	5	2020	2	575	\$51,975
Franklin Street	Rogers Road	End	\$3	5	3370	2	0	\$101,100
Friendship Chapel Road	South Main Street	End	\$3	5	1731	2	0	\$51,930
Front Street	Start	End	\$3	5	1050	2	1500	\$9,000
Galaxy Drive	Start	End	\$3	5	5516	2	0	\$165,480
Greenville Loop Road	Ligon Mill Road	ETJ	\$3	5	6238	2	0	\$187,140
Hampton Way Drive	Durham Road (Old NC 98)	Shopping Center	\$3	5	581	2	0	\$17,430
Harris Road	Capital Boulevard (US-1)	North Main Street	\$3	5	7500	2	0	\$225,000
Heritage Lake Road	Rogers Road	Heritage Heights	\$3	5	5150	2	830	\$142,050
Holding Avenue	Allen Road	White Street	\$3	5	2340	2	4680	\$0
Holding Avenue	South Main Street	Richland Creek	\$3	5	3790	2	2784	\$71,940
Jenkins Road	Heuristic	Capital Boulevard (US-1)	\$3	5	2698	2	0	\$80,940
Jones Dairy Road	Chalk Road	ETJ	\$3	5	7377	2	0	\$221,310
Jones Dairy Road	NC 98 Bypass	Chalk Road	\$3	5	3671	2	0	\$110,130
Juniper Avenue	North White Street	Jubilee	\$3	5	2750	2	2750	\$41,250
Juniper Avenue	Rock Spring Road	North Main Street	\$3	5	1444	2	0	\$43,320
Kearny Road	Wake Union Church Road	Birch Tree	\$3	5	3394	2	370	\$96,270
Kemble Ridge Drive	Falcon Hurst Drive	Deer Lake Trail	\$3	5	3045	1	2600	\$6,675
Lakeview Avenue	South Wingate Street	Siena Drive	\$3	5	2100	1	675	\$21,375
Ligon Mill Road	Song Sparrow Drive	South Main Street	\$3	5	8808	2	4614	\$195,030
Ligon Mill Road	Greenville Loop Road	Burlington Mills Road	\$3	5	5251	2	0	\$157,530
Ligon Mill Road	Burlington Mills Road	Song Sparrow Drive	\$3	5	3300	2	0	\$99,000
Linslade	Burlington Mills Road	Song Sparrow Drive	\$3	5	3658	1	1120	\$38,070
Marshall Farm Road	Chalk Road	Rogers Road	\$3	5	4011	2	7822	\$3,000
Marshall Farm Road	Rogers Road	Orange Cosmos	\$3	5	2520	1	0	\$37,800
McDowell Drive	Stadium Drive	Ligon Mill Road (Future)	\$3	5	1240	2	0	\$37,200
Mockingbird Lane	Robin Avenue	End/Greenway Connection	\$3	5	2100	1	0	\$31,500
Moultonboro Avenue	North White Street	End	\$3	5	2170	2	2170	\$32,550
Night Herron Drive	Burlington Mills Road	Chimney Swift Drive	\$3	5	644	1	0	\$9,660
North Avenue	Start	End	\$3	5	1227	2	1560	\$13,410
North Main Street	North Avenue	Harris Road	\$3	5	4470	2	5760	\$47,700
North Main Street	Harris Road	ETJ	\$3	5	4505	2	0	\$135,150
North White Street	Roosevelt Avenue	Flaherty Park	\$3	5	7150	1	2835	\$64,725

North White Street	Flaherty Park	ETJ	\$3	5	4120	2	0	\$123,600
North Wingate Street	Stadium Drive	Chestnut	\$3	5	3630	2	490	\$101,550
Oak Avenue	Harris Road	Elizabeth Street	\$3	5	1365	2	0	\$40,950
Oak Grove Church Road	Jubilee	ETJ	\$3	5	5900	2	0	\$177,000
Perry Street	North White Street	Jubilee	\$3	5	1765	2	388	\$47,130
Pine Avenue	Taylor Road	Seventh Street	\$3	5	1980	1	0	\$29,700
Pine Avenue	Rock Spring Road	North Main Street	\$3	5	2110	2	0	\$63,300
Pine Ridge Court	South Main Street	NC 98 Bypass Greenway	\$3	5	1500	1	0	\$22,500
Pine Valley	Forestville Road	End	\$3	5	1348	1	0	\$20,220
Pineview Drive	Holding Avenue	Lakeview Avenue	\$3	5	870	1	350	\$7,800
Purnell Road	Fairlake	Capital Boulevard (US-1)	\$3	5	7793	2	0	\$233,790
Robin Avenue	Cardinal Drive	Mockingbird Lane	\$3	5	200	1	0	\$3,000
Rock Spring Road	Stadium Drive	Juniper Avenue	\$3	5	1632	2	690	\$38,610
Rogers Road	Forestville Road	South Main Street	\$3	5	7350	2	6786	\$118,710
Rogers Road	ETJ	Forestville Road	\$3	5	7120	2	2150	\$181,350
Roosevelt Avenue	Front Street	Wait Avenue	\$3	5	1070	2	1120	\$15,300
Seawell Drive	Ligon Mill Road	End	\$3	5	1480	2	0	\$44,400
Seventh Street	Pine Avenue	Juniper Avenue	\$3	5	1125	1	0	\$16,875
Shearon Farms Avenue	Capital Boulevard (US-1)	End	\$3	5	3286	1	2006	\$19,200
Siena Drive	Holding Avenue	NC 98 Bypass	\$3	5	1390	1	915	\$7,125
Siena Drive	NC 98 Bypass	Faithful Place	\$3	5	2431	1	1758	\$10,095
Song Sparrow Drive	Ligon Mill Road	Forestville Road	\$3	5	7600	2	0	\$228,000
South Avenue	Start	End	\$3	5	1160	2	1560	\$11,400
South Main Street	South Avenue	Holding Avenue	\$3	5	3000	2	3000	\$45,000
South Main Street	Holding Avenue	Rogers Road	\$3	5	7600	2	8833	\$95,505
South Main Street	Rogers Road	Capital Boulevard (US-1)	\$3	5	4690	2	7674	\$25,590
South White Street	Roosevelt Avenue	Elm Avenue	\$3	5	1471	2	2942	\$0
South White Street	Elm Avenue	Holding Avenue	\$3	5	1522	2	1522	\$22,830
South White Street	Holding Avenue	Sugar Maple	\$3	5	2050	2	2800	\$19,500
South Wingate Street	Holding Avenue	Stadium Drive	\$3	5	4036	2	1400	\$100,080
Spring Street	North White Street	Taylor Street	\$3	5	991	1	0	\$14,865
Stadium Drive	North Wingate Street	Capital Boulevard (US-1)	\$3	5	6215	2	1010	\$171,300
Star Road	Burlington Mills Road	South Main Street	\$3	5	10506	1	0	\$157,590
Sweet Clover Drive	Winter Spring Drive	ETJ	\$3	5	1930	1	0	\$28,950
Tansley Street	Dansforeshire Way	Linslade	\$3	5	832	1	351	\$7,215

Taylor Street	Spring Street	Groveton Trail	\$3	5	4590	1	2660	\$28,950
Ten Point Trail	Donner Trail	End	\$3	5	2075	1	0	\$31,125
Tillamook Drive	Cimarron Parkway	Faithful Place	\$3	5	682	1	682	\$0
Tyler Run Drive	Holding Avenue	Durham Road (NC 98)	\$3	5	2015	2	1625	\$36,075
Wait Avenue	Allen Road	Roosevelt Road	\$3	5	1890	2	1890	\$28,350
Wait Avenue	NC 98 Bypass	Allen Road	\$3	5	3727	2	450	\$105,060
Wake Union Church Road	Durham Road (NC 98)	Capital Boulevard (US-1)	\$3	5	4400	2	700	\$121,500
Wall Road	Capital Boulevard (US-1)	Harris Road	\$3	5	7176	2	0	\$215,280
Winter Spring Drive	Jones Dairy Road	Sweet Clover Drive	\$3	5	2306	1	0	\$34,590
Woodland Drive	South Wingate Street	Tyler Run Drive	\$3	5	1864	1	0	\$27,960

**Segments with an estimated cost of \$0.00, presently contain sufficient sidewalk coverage. Upgrades such as ADA compliance, crossing treatments and surface improvements might be necessary, therefore incurring additional costs.*