

Town of Oak Ridge Comprehensive Pedestrian Transportation Plan

Final Draft
October 2013



Town of Oak Ridge Comprehensive Pedestrian Transportation Plan

Adopted by the Oak Ridge Town Council October 3, 2013

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1. INTRODUCTION

1.1 SCOPE AND PURPOSE

What the Plan is:

- Long range and comprehensive
- Conceptual
- A Vision for the future

What the Plan is not:

- Regulatory or binding
- A Master Plan
- Fiscally constrained

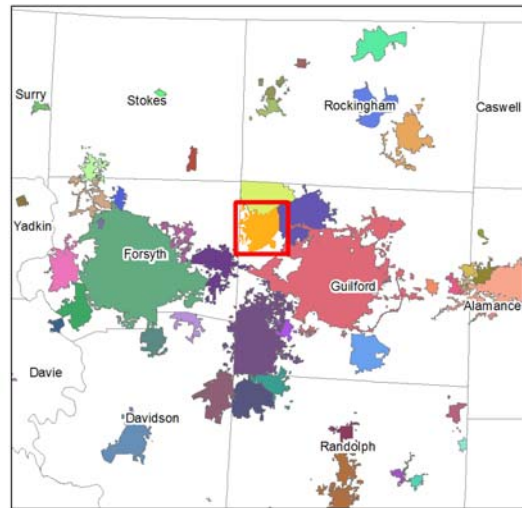
The Town of Oak Ridge is located in northwest Guilford County. Oak Ridge is bounded by Greensboro to the southeast, Kernersville to the southwest, Stokesdale to the north and Summerfield to the northeast. The planning area encompasses the current boundaries of the Town.

This planning document outlines a strategy for enhancing the walkability of the Town of Oak Ridge.

The plan looks ahead *20 years*, outlining projects, policies and programs that achieve the vision of a safe, connected and accessible pedestrian system for all Oak Ridge residents. Specific objectives are outlined to encourage daily physical activity, create safe walking in the Town Core area and connect parks and open space to residential neighborhoods via trails and sidewalks. Small, but continued investments in bicycle and pedestrian transportation can provide dividends to the community through increased transportation options, improved safety and quality of life enhancements.

1.2 BACKGROUND

Community development patterns have dramatically changed since WWII. American lives have become increasingly dominated by the automobile due to scattered land development and marked by a pattern of physical inactivity. Providing additional safe and accessible places to walk and bicycle will help Oak Ridge reduce automobile trips and traffic congestion, and in turn, reduce air pollutants and increase the overall health of the community. In addition, providing a wider mix of land uses in close proximity to each other can reduce travel distances, encourage more foot traffic and reduce car trips. Well-designed neighborhoods with ample opportunities for walking and biking can increase quality of life and foster a greater sense of community.



Town of Oak Ridge Location

Oak Ridge cannot achieve a walkable community by itself. Cooperation with state and regional organizations, as well as buy-in from neighboring jurisdictions, is integral to improving transportation options, while encouraging mixed land use, aesthetic public spaces to walk, transport and recreate.

Oak Ridge has a completed Land Use Plan identifying future land use for the Town Core and Commercial Core. The ordinance requires sidewalks in new development, which has resulted in some sidewalk segments in the Town, but connectivity between existing sidewalk are needed. Adjacent communities have also begun to address bicycle and pedestrian transportation issues by conducting comprehensive planning studies completing trails and sidewalk improvements.

The Town is also a member of the Greensboro Urban Area MPO, enabling access to federal planning and construction funding for future sidewalk, trail and bicycle facility development.

Elements of well-designed bicycle and pedestrian-friendly communities

- Safety - (addressing issues of traffic speed and volume, crime, sidewalk buffering, lighting);
- Access - (well designed sidewalks, bicycle lanes, parking, curb ramps, crossing treatments, connected streets); and
- Comfort - (lighting, benches, ample sidewalk width, compatible land uses, shade).

Common design characteristics that serve as some of the basic building blocks of bicycle and pedestrian-friendly communities

- Connectivity (bicycle routes/lanes, no sidewalk gaps, build cul-de-sac paths and connections between different land uses e.g. residential and commercial);
- Separation from traffic (bike-lanes, planting strips, landscaping, bulb-outs);
- Supportive land-use patterns (mixed use, higher density, design for the pedestrian);
- Designated space (5ft+ sidewalks in residential areas and 8-12ft sidewalks in downtown and around schools);
- Accessibility (curb ramps, crosswalks, ped-head signals, reduced travel lanes);
- Street furniture (places to sit, drinking fountains, trash receptacles); and
- Security and visibility (lighting, landscaping and ample site distance).

Source: US DOT/Federal Highway Administration

1.3 HISTORY

Walking is not as prevalent as it once was in our country. In 1969, an average of 42% of school children walked or bicycled to school nationwide. By 2001, only 16% of school children walked or bicycled to school (CDC, 2005). About 1.6% of Oak Ridge residents walk or bicycle to work, compared with 3.1% statewide (Census ACS, 2007-11). The change in walking to school may be partly due to increased distance from school, but is also influenced by the lack of a connected and accessible pedestrian or bicycle- friendly transportation network.

More and more communities are taking steps to update their land development regulations, provide walking and bicycling trails and improve road construction that includes bicycle and pedestrian accommodation. There is strong interest in providing transportation options in the Town Core from shopping to school, to the park and neighborhoods.

1.4 VISION AND GOALS

The walkability committee outlined a vision and set of goals for pedestrian transportation in Oak Ridge. The vision statement and goals were refined using public comments, meetings and survey input.

Vision Statement

In 2035, Oak Ridge residents and visitors will be able to safely walk between homes, schools, businesses and parks, and connect with regional greenways and trails. The Town's commitment to active transportation will improve public health, attract new businesses, and build a stronger sense of community. Oak Ridge will be the healthiest community in the Piedmont Triad and serve as a model to other suburban communities in the state.

The plan steering committee identified goals and objectives for pedestrian transportation.

SHORT TERM GOALS (3-5 YEARS)

Pedestrian Network Expansion and Connectivity

- Build sidewalks that will connect the school to the park and connect the Commons to Linville Road
- Build sidewalks and trails connecting school and the entire town business core/historic district
- Complete the comprehensive plan to connect downtown Oak Ridge via walkways for at least 1 mile east, west, south and north of the NC 68/150 intersection
- Master plan trails that bring outer areas to the core

Safety and Access

- Establish safe crosswalks that connect sidewalks
- Insure every new neighborhood development has safe walking or bicycling access for children to get to school

Policies and Programs

- Create a funding plan to pursue various public and private funding sources (e.g. Town fund, grants, private investment) to begin connecting the pieces of sidewalk and trail already in place
- Achieve twenty percent (20%) of Oak Ridge Elementary students will be walking to school
- Acquire easements allowing future connection from large neighborhoods to NC 68, NC 150 or the Town Park
- Continue to require development driven sidewalks and trails

LONG TERM OBJECTIVES (6-20 YEARS)

What will Oak Ridge's Pedestrian Transportation System in 2030 look like?

- Sidewalks in Town Core that will connect to trails and bring folks to our commercial core and park
- A network of sidewalks and trails connecting the neighborhoods and schools to the core retail/recreations areas
- Connect as many neighborhoods in Oak Ridge to the Town Park via sidewalk, bike path, walking path, and linking sidewalks to the NC 68/150 intersection
- Residents will be able to walk safely throughout the Town Core
- Sidewalks that are safe, inviting, lighted, well maintained and connected to regional greenways and trails
- A network of sidewalks that are both useful and pleasing to look at; these sidewalks and trails will make it possible for anyone in Oak Ridge to walk anywhere they need to go
- A connection that facilitates ease of movement to/from and between homes, businesses, parks, schools and recreation

- Any resident of Oak Ridge can get to any other destination in Oak Ridge without having to come into contact with a motor vehicle
- A statewide model of a suburban community that embraces all forms of non-automobile travel

As a result of this planning process, Oak Ridge will have...

- A 10 year plan for safe pedestrian connections to/from park, businesses and schools for most residents
- A safe community that promotes healthy lifestyles and allows for members of the community to easily gain access to various locations
- Safe and accessible corridors for recreation and commuting pedestrians throughout, interwoven in the community
- The most desirable and healthiest community in the Triad and most forward thinking community in North Carolina.
- A specified plan on areas to be addressed to accommodate the largest number of users and to focus on safety at certain problem areas (i.e. NC 68/NC 150)
- A greater sense of community connection
- The most highly desired trail and walking experience in the Triad; something for everyone including expert MTB track to meandering paths to secret gardens
- Many connecting trails and sidewalks that make walking a reasonable option when trying to travel somewhere in town
- Sidewalks/trails along 80% of roads in Town Core
- A safe community that is “walkable” 1st priority East to West and 2nd from North to South

2. EXISTING CONDITIONS

2.1 OVERVIEW

This chapter analyzes the existing conditions in Oak Ridge that relate to the pedestrian transportation system. A review of relevant demographic factors, existing plans, existing sidewalk system, crash data and a summary of community concerns and issues are discussed.

2.2 DEMOGRAPHICS

SUMMARY OF PRIMARY DEMOGRAPHICS

Table 2.1 – Town of Oak Ridge Demographic Overview

Demographic Feature	Statistic
Population, 2010	6,185
Land Area, 2010 (square miles)	15.38
Persons per Square Mile, 2010	402.2
Population gained, 2000-2010	2,197
Population Growth Rate, 2000-2010	55.1%
Percent Minority Residents, 2010	11.1%
Median Age, 2006-2010	40.9
Average Household Size, 2006-2010	2.9
Homeownership Rate	90.90%
Median Household Income, 2006-2010	\$106,336
Median Value of Owner-Occupied Housing, 2006-2010	\$342,100
Poverty Rate, 2006-2010	2.8%
Mean Travel Time to Work, 2006-2010 (minutes)	25.2
Percentage of Adults with a High School Diploma, 2006-2010	96.2%

*Sources: US Census Bureau 2010 Decennial Census,
American Community Survey 2006-2010 5-year Estimates*

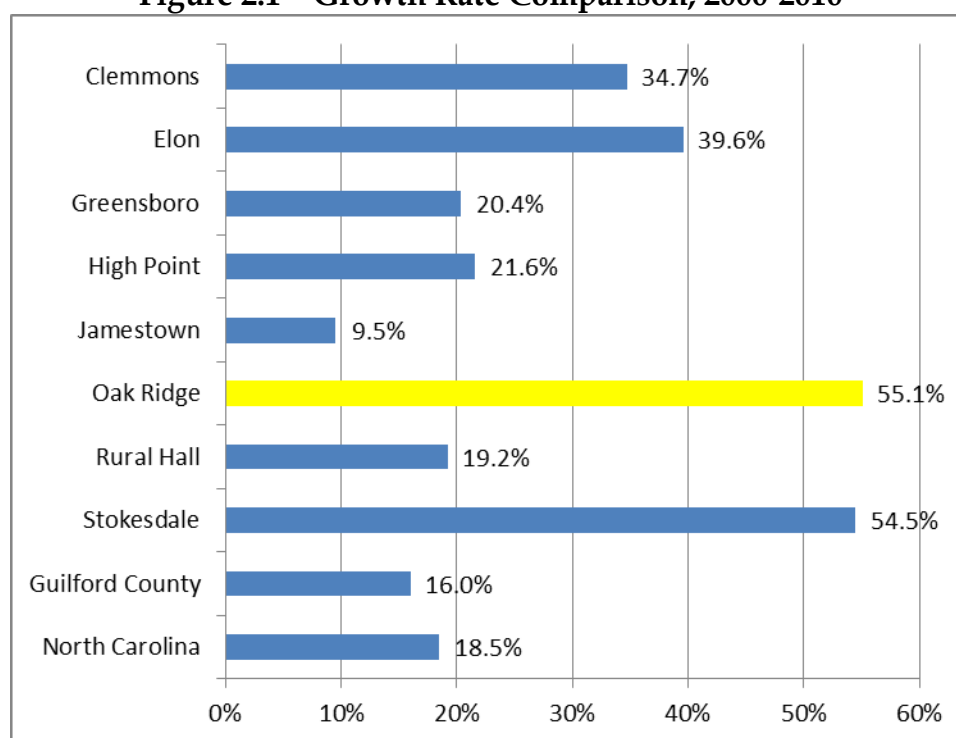
POPULATION AND GROWTH

Oak Ridge was officially incorporated in 1998. Oak Ridge's current population is 6,185 residents, making it the fifth largest municipality in Guilford County and the 124th largest in NC. The land area of Oak Ridge is just over 15 square miles. In some of the demographics found below, Oak Ridge is compared to peer communities. These peer communities reflect development trends in similar sized communities in the Piedmont Triad. Like Oak Ridge, the peer communities are considered residential (bedroom) communities in which most residents work in neighboring urban areas, work from home or travel extensively for work. In the last decade, Oak Ridge's growth has exceeded the comparison areas. The proximity of Oak Ridge to the Piedmont Triad International Airport (PTIA) and the regional transportation and industrial infrastructure that serves PTIA, will only encourage continued growth in Oak Ridge.

Table 2.2 – Population Comparison

	2010	2000	1990	1980	1970	1960	1950
Clemmons	18,627	13,827	6,020	4,842	n/a	n/a	n/a
Elon	9,419	6,748	4,448	2,873	2,150	1,284	1,109
Jamestown	3,382	3,088	2,662	2,148	1,297	1,247	748
Oak Ridge	6,185	3,988	n/a	n/a	n/a	n/a	n/a
Rural Hall	2,937	2,464	1,652	1,336	1,289	1,503	n/a
Stokesdale	5,047	3,267	2,134	n/a	n/a	n/a	n/a

Source: US Census Bureau, 1950-2010

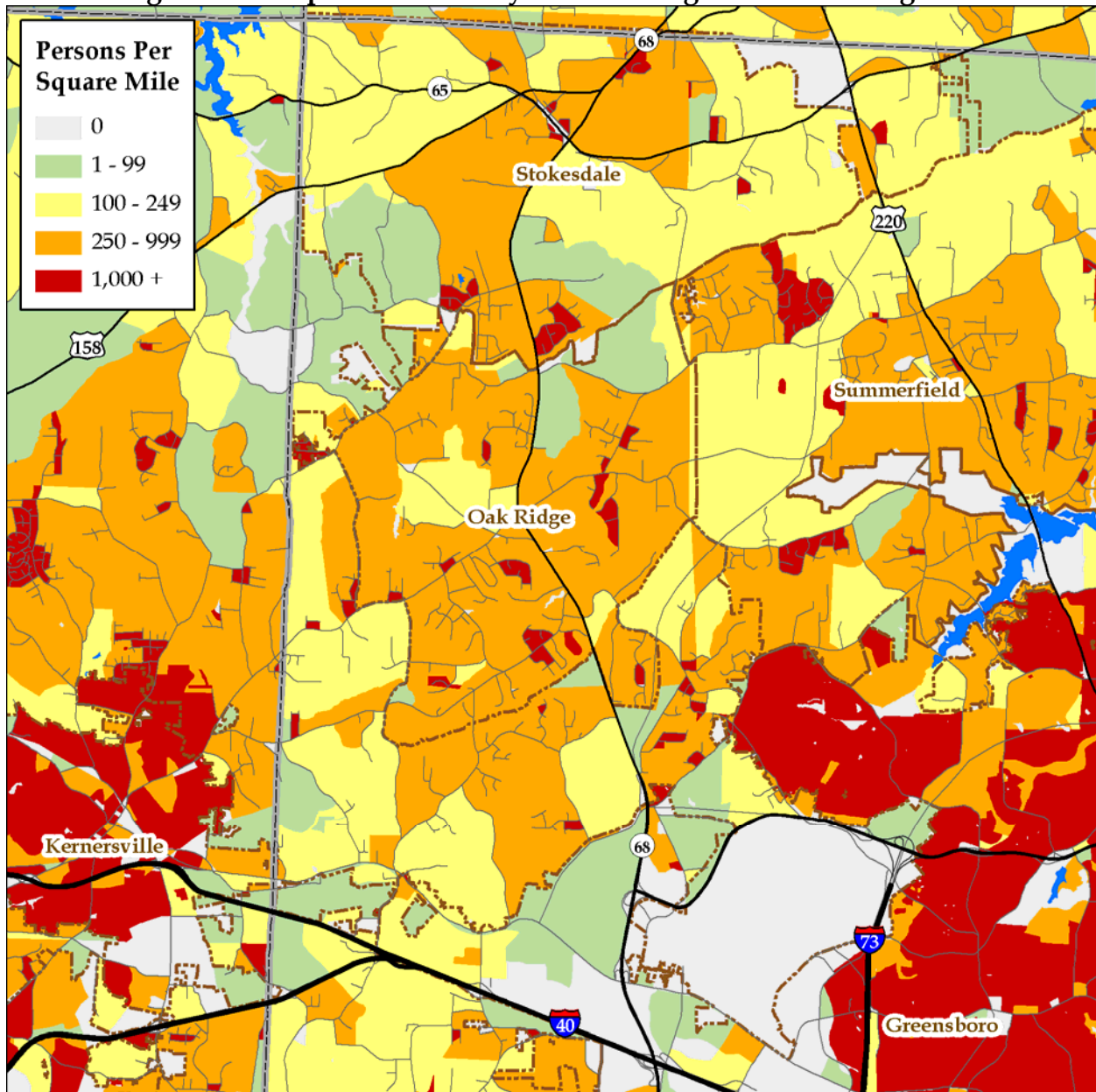
Figure 2.1 – Growth Rate Comparison, 2000-2010

Source: US Census Bureau 2010 Decennial Census

POPULATION DENSITY

Most areas within Oak Ridge typically have low to medium density. Some subdivisions have higher densities and are shown in red. The commercial town core has lower density than surrounding subdivision areas.

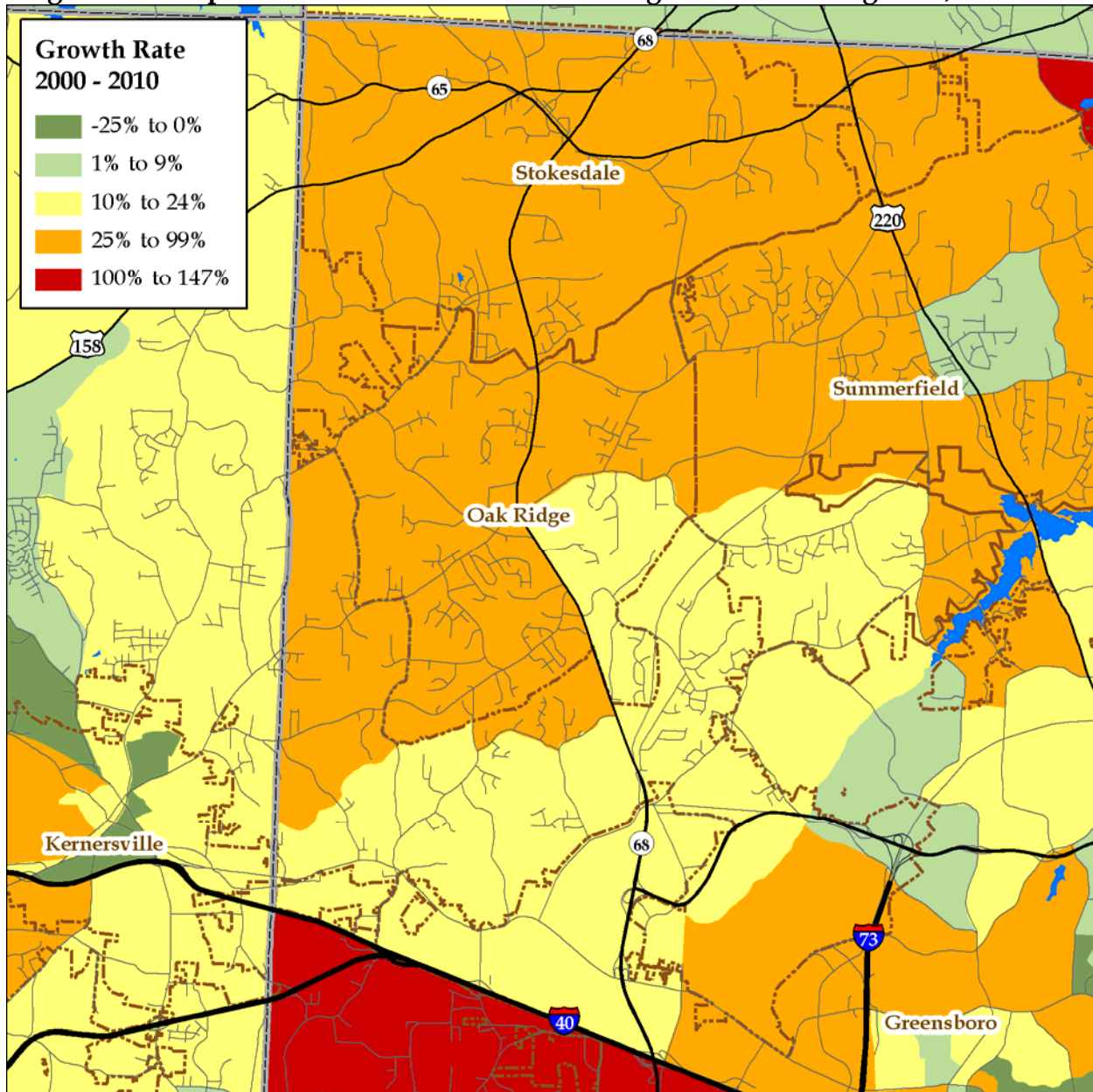
Figure 2.2 – Population Density for Oak Ridge & Surrounding Area



Source: 2010 Census of Population & Housing, SF1 File.
Data mapped at the block level by the PTRC GIS Department

Most areas around the Oak Ridge community saw moderate growth in the 2000s. Population growth was highest in to the north and northeast. Population growth was slightly lower on the eastern and southern side of town.

Figure 2.3 - Population Growth Rate for Oak Ridge & Surrounding Area, 2000-2010



Source: 1990 and 2000 Census of Population & Housing, SF1 File.
Data mapped at a block group level by the PTRC GIS Department

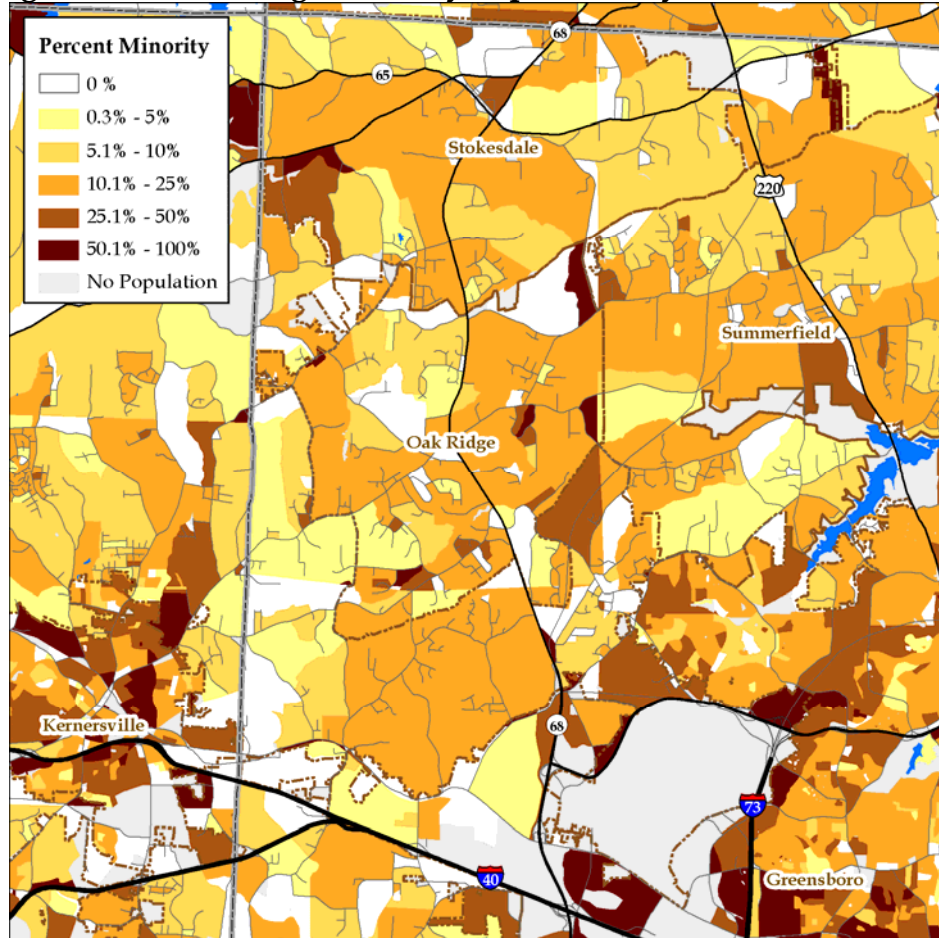
RACE AND ETHNICITY

Relatively few minorities live in Oak Ridge. Almost 89% of residents are non-Hispanic whites. Similarly, most of the comparison areas also have few minority residents.

Table 2.3 – Oak Ridge Population by Race and Ethnic Origin, 2010

RACE	
White alone	88.90%
Black or African American alone	5.20%
American Indian or Alaska Native alone	0.40%
Asian alone	3.40%
Native Hawaiian or Pacific Islander alone	0%
Some other race alone	1.10%
Multi-racial	1.00%
ETHNICITY	
Hispanic or Latino origin (of any race)	3.00%

Source: 2010 Census of Population & Housing, SF1 File.

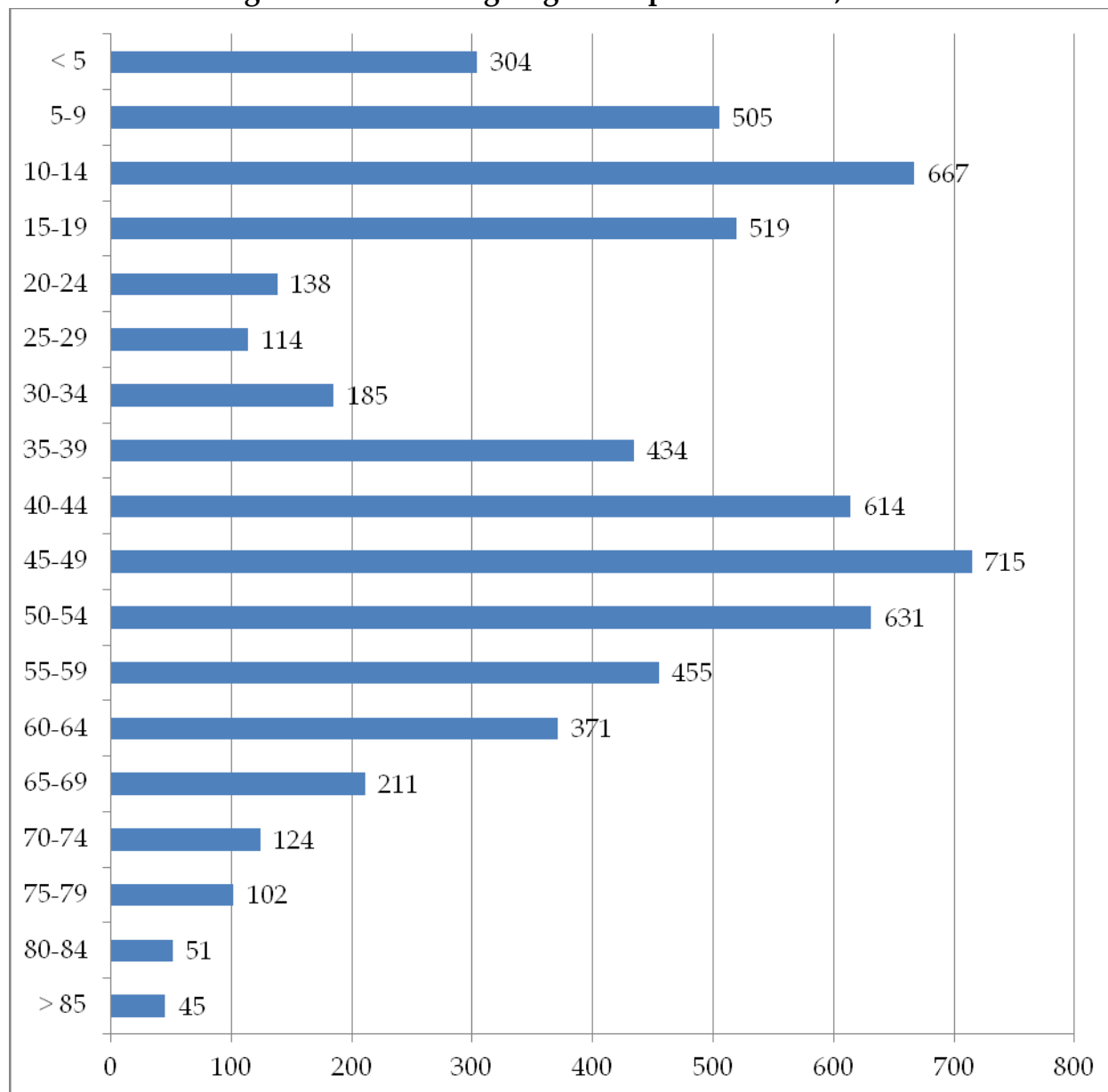
Figure 2.4 – Percentage Minority Population by Census Block, 2010

Source: 2010 Census of Population & Housing, SF1 File.

AGE

The largest single age group within Oak Ridge is persons age 45-49, followed by persons age 10-14, and 50-54. Between 2000 and 2010, the only age group to lose population was 25-34.

Figure 2.5 – Oak Ridge Age Group Distribution, 2010



Source: 2010 Census of Population & Housing, SF1 File.

INCOME AND POVERTY

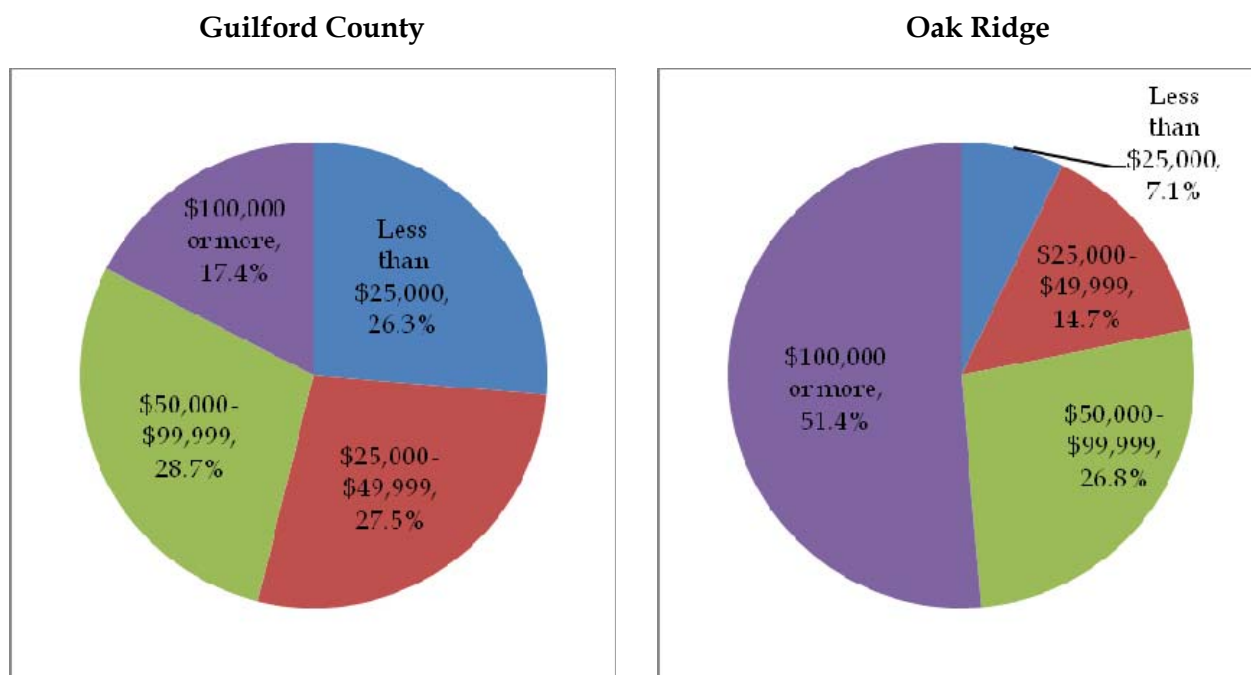
The median household and family income in Oak Ridge is higher than the county or state average and is also higher than all the comparison cities and towns.

Table 2.4 - Income Comparison, 2006-2010

	Per Capita	Median Household	Median Family
Clemmons	\$31,801	\$64,443	\$76,531
Elon	\$23,023	\$46,071	\$82,039
Jamestown	\$40,645	\$78,462	\$86,389
Oak Ridge	\$41,232	\$106,336	\$120,141
Rural Hall	\$27,139	\$47,353	\$61,064
Stokesdale	\$29,364	\$65,938	\$76,625
Guilford County	\$26,267	\$45,676	\$59,367
North Carolina	\$24,745	\$45,570	\$56,153

Source: ACS 2006-2010 5-Year Estimates (Tables B19013, B19113, B19301)

Figure 2.6 - Household Income Comparison, 2006-2010



Source: ACS 2006-2010 5-Year Estimates (Table B19001)

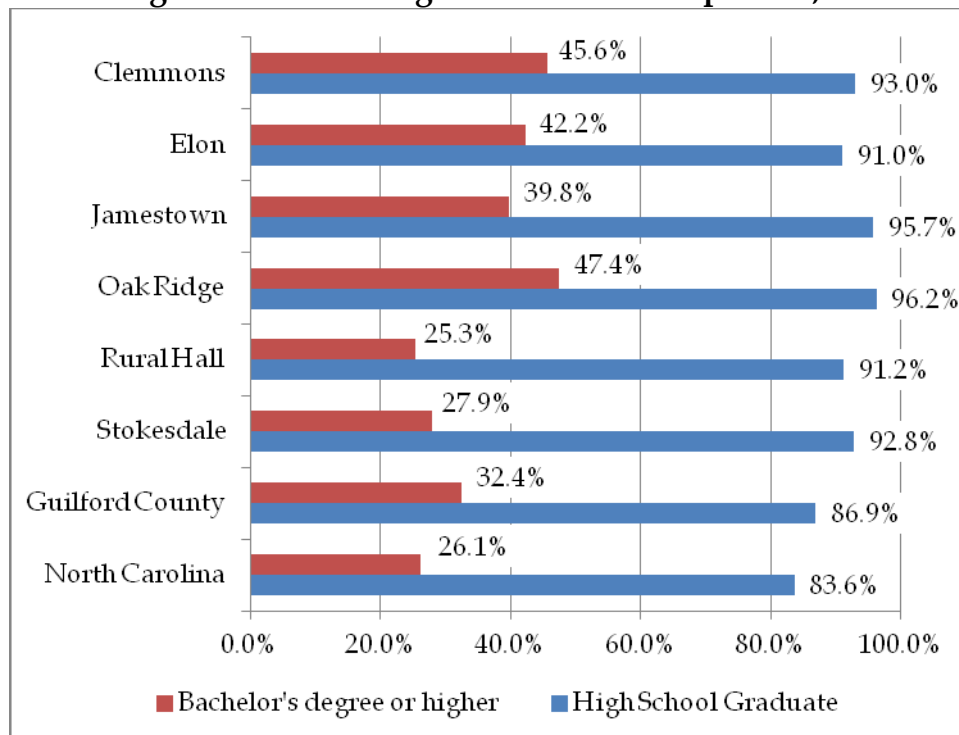
Table 2.5 – Poverty Rate Comparison, 2006-2010

	Overall	Children	Elderly
Clemmons	5.6%	8.3%	3.7%
Elon	19.9%	1.8%	2.8%
Jamestown	11.2%	11.9%	2.1%
Oak Ridge	2.8%	0.0%	7.2%
Rural Hall	5.6%	0.0%	10.8%
Stokesdale	11.5%	14.0%	5.8%
Guilford County	15.9%	22.1%	8.0%
North Carolina	15.5%	21.6%	10.7%

Source: ACS 2006-2010 5-Year Estimates (Table B17001)

EDUCATIONAL ATTAINMENT

Oak Ridge's educational attainment rates for adults are the highest among the comparison areas and throughout the state. In fact, the percentage of Oak Ridge adults with a college degree is the 27th highest in the state, and the 2nd highest in the 12-county Piedmont Triad Region. Only Bermuda Run, an exclusive gated community in Davie County, has higher educational attainment rates in the Piedmont Triad region.

Figure 2.7 – High School & College Graduation Comparison, 2006-2010

Source: ACS 2006-2010 5-Year Estimates (Table DP02)

TRANSPORTATION TO WORK, OUT-MIGRATION AND TRAVEL TIME

Almost 70% of adults in Oak Ridge (2,984 people) are in the labor force. Many of Oak Ridge residents drive to work, more than the average for North Carolina. The number of residents who work from home is also higher than the state average.

Table 2.6 - Journey to Work Mode Share and Travel Time

Mode	Oak Ridge	North Carolina
Car, truck, or van - drove alone	84.0%	80.5%
Car, truck, or van - carpooled	7.7%	11.4%
Public Transportation (including taxicab)	0.0%	1.1%
Walk or Bicycle	0.7%	2.0%
Worked at Home	6.7%	3.9%
Mean Travel Time to Work (minutes)	25.2	23.4

Source: ACS 2006-2010 5-Year Estimates (Tables B08301, DP03)

Most Oak Ridge residents do not work in Oak Ridge, but 2/3 work in Guilford County, primarily in Greensboro.

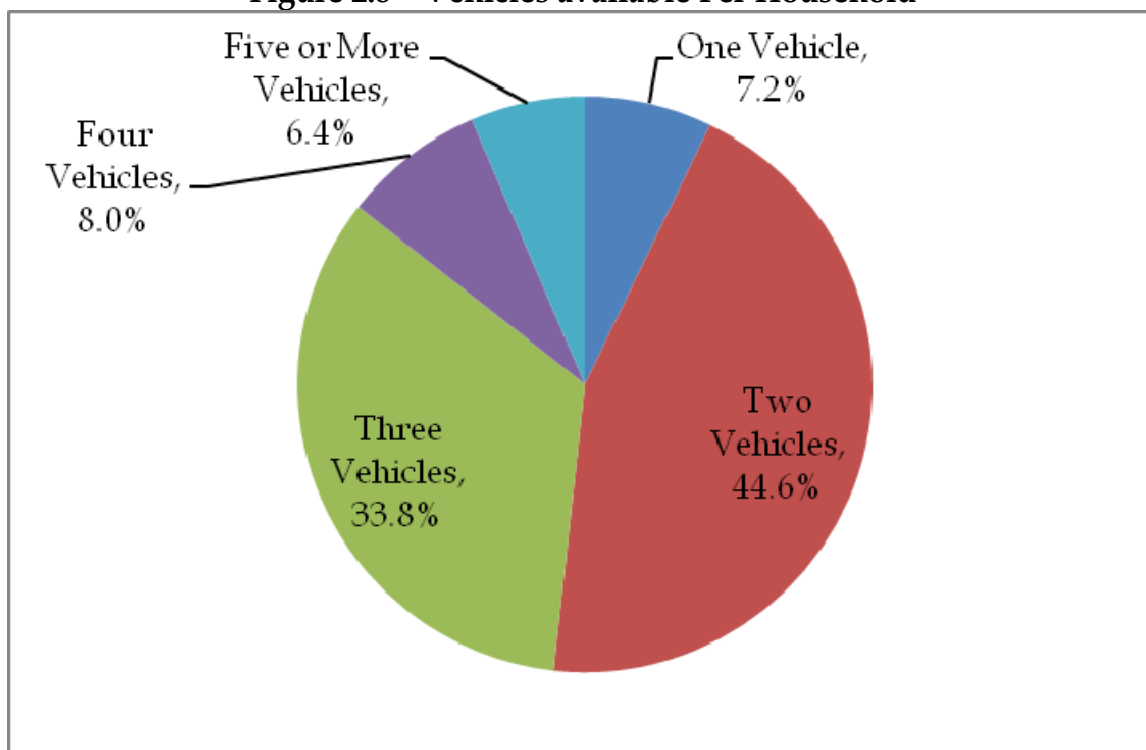
Table 2.7 - Job Counts in Cities Where Oak Ridge Residents are Employed, 2010

Municipality	# of Residents	% of Residents
Greensboro	1,168	46.1%
Winston Salem	242	9.6%
High Point	229	9.0%
Kernersville	78	3.1%
Oak Ridge	52	2.1%
Stokesdale	52	2.1%
Charlotte	44	1.7%
Raleigh	39	1.5%
Summerfield	35	1.4%
Burlington	24	0.9%
All Other Locations	568	22.4%

Source: Local Employment Dynamics, 2010.

All households in Oak Ridge with workers 16 years and over have access to a vehicle. Seven percent have one vehicle available, while almost 93% have access to two or more vehicles.

Figure 2.8 - Vehicles available Per Household



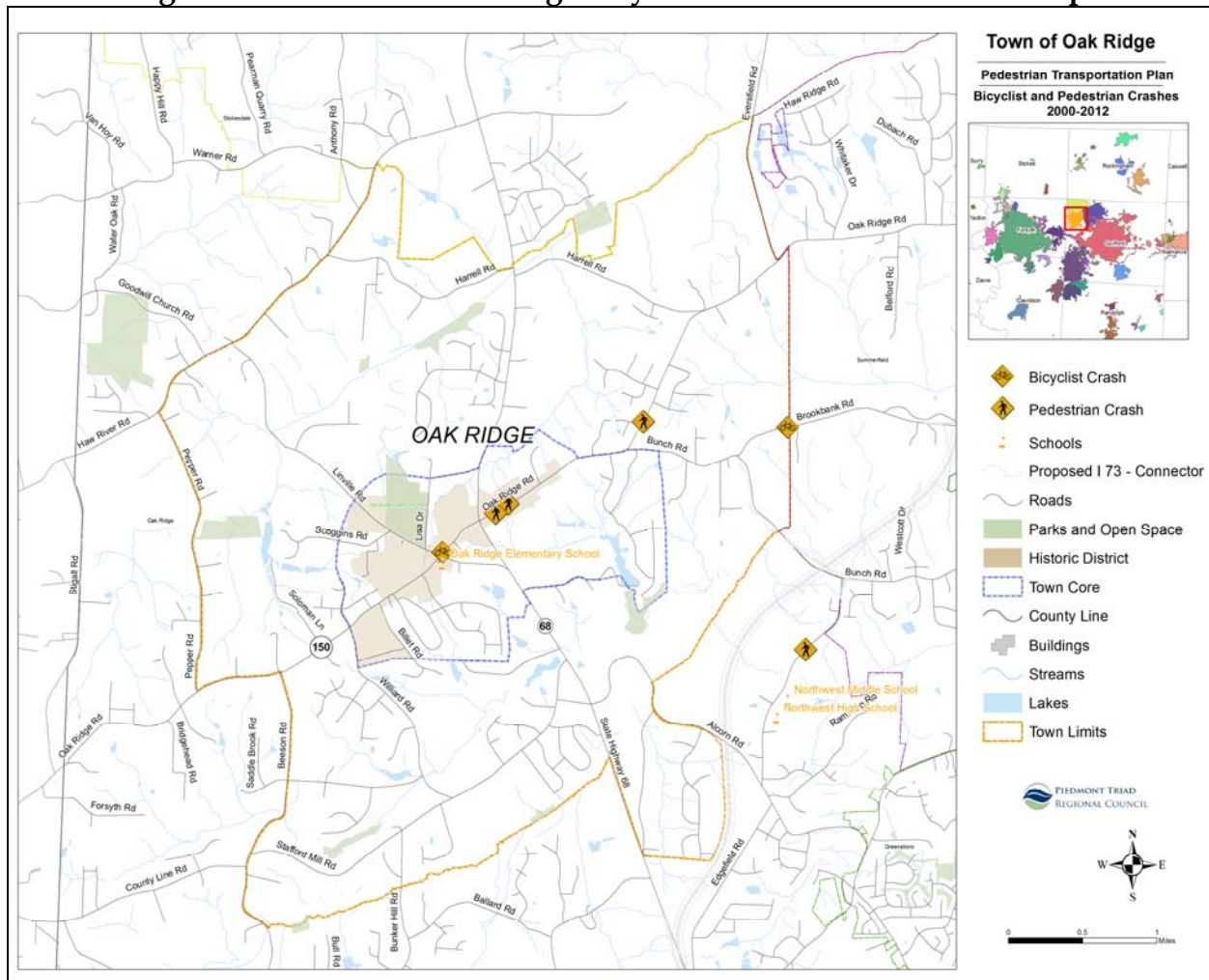
Source: ACS 2006-2010 5-Year Estimates (Table B08014)

2.3 CRASH DATA

Crash data provides insight into problem areas or dangerous locations for pedestrians. However, it does not tell the whole story. Environments with limited bicycle and pedestrian infrastructure discourage non-motorized trips because they are unsafe for these users. A low number of crashes does not necessarily indicate a safe environment, particularly when compared to the low number of pedestrian trips being made. Specific pedestrian or bicycle safety improvements will reduce the likelihood of crashes, while encouraging more non-motorized transportation.

A review of the North Carolina Department of Transportation crash information system reveals 3 pedestrian crashes between 2000 and 2012 and one bicycle crash in the same time period in the city limits of Oak Ridge. A fatal bicycle crash occurred just over the City limits in Summerfield on Brookbank Road in 2012.

Figure 2.8 – Town of Oak Ridge Bicyclist and Pedestrian Crash Map

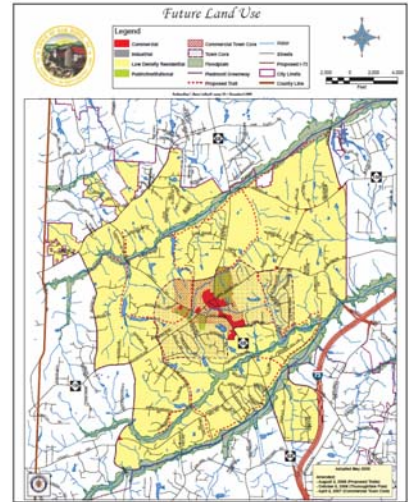


2.4 LOCAL AND REGIONAL PLANNING EFFORTS

Land Use Plan

The Town of Oak Ridge last amended its land use plan in 2007, originally adopted in 2003. The land use plan provides a vision for future land use. The focus of growth is intended for the Commercial Town Core, while rural character and open space dedication is valued. The following are key implementation policies:

- Focus development in the Town Core
 - Structures located close to the road to promote a village feel
 - Sidewalks should be constructed along all street frontages
 - Architectural elements should conform to the Oak Ridge Historic District Guidelines
- Maintain rural appearance in the Low Density Residential areas
 - Preservation of woodlands and pasture
- Continue to require open space dedication and walking trail connections as part of the development process



More Information: <http://www.oakridgenc.com/vertical/sites/%7BB40CD8E5-8C50-413B-A22C-08FF9491AB13%7D/uploads/%7BC8591CFD-E17D-4281-8694-AE4AFD119FC7%7D.PDF>

Parks and Recreation

The Oak Ridge Town Park was constructed in 2007-08 and continues to develop. This 80-acre facility provides an anchor for active and passive recreation in Oak Ridge. The Parks and Recreation Trust Fund participated with the Town of Oak Ridge to secure funds for the park construction. Hiking trails and over a mile of paved surface walking paths provide excellent opportunities for physical activity.

More information: www.oakridgenc.com/index.asp?SEC=BBD342AE-2B11-4584-AED9-B69A09950118&Type=B_BASIC

Piedmont Greenway

The Piedmont Greenway will be a 19-mile, multi-use trail connecting Guilford and Forsyth Counties through the southern portion of Oak Ridge, Triad Regional Park and downtown Kernersville. The trail will follow waterways, ridge tops and roadways and connect neighborhoods, communities, parks, cultural and historic sites, schools, commercial districts, and nature. The Piedmont Greenway will be a major regional asset, enhancing the Triad's quality of life, protecting its environment and helping the region to become more competitive.

More information: <http://toknc.com/documents/files/Plan - Proposed Piedmont Greenway.pdf>



Greensboro Urban Area BiPed Plan

The Greensboro Urban Area MPO produced a Bicycle, Pedestrian and Greenways plan in 2006 called BiPed. The plan is currently being updated for the entire MPO area including Oak Ridge. The results of the Comprehensive Pedestrian Transportation Plan will be included in the update to the BiPed plan.

More information: www.greensboro-nc.gov/index.aspx?page=2121

Long Range Transportation Plan 2035

Oak Ridge is a member of the Greensboro Urban Area MPO. The MPO completed a Long Range Transportation Plan (LRTP) update in December of 2012. The plan is not fiscally constrained and includes projects through the year 2035. Map 6-3 of the LRTP, Pedestrian Projects and Proposals, shows proposed and incidental projects for inclusion into the Fiscally constrained MTIP. The plan outlines sidewalk improvements along major streets such as Oak Ridge Road and Linville Road. Proposed projects from the Oak Ridge Pedestrian Planning Process have been submitted to the LRTP for inclusion.

Additionally, Chapter 12, Action Plan section of the LRTP discusses the following directly related to bicycle and pedestrian transportation:

**Policy Recommendations
Bicycle and Pedestrian****Urban**

- Aggressive program to retrofit sidewalk installation onto major streets
- Improve pedestrian crossing at busy intersections
- Incorporate bicycle accommodations into annual resurfacing program
- Incorporate trail system in bicycle and pedestrian networks

Rural

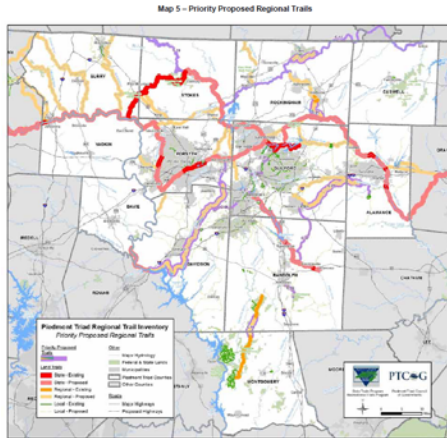
- Wide paved shoulders added to existing roads to accommodate bicycles/pedestrians
- Expand bicycle route system to connect with surrounding counties

**Project Recommendations
Bicycle and Pedestrian**

- Implement recommendations of Greensboro Urban Area Bicycle, Pedestrian and Greenway Master Plan
- Include sidewalks and bicycle facilities in all new roadway projects except on controlled-access facilities
- Develop an updated bicycle suitability and route map for the combined urban areas (Greensboro, High Point, Burlington) to include all of Guilford County on one map
- Continued expansion and infill of the sidewalk network, focusing on high priority links, ADA compliance ramps, as well as removal of obstructions
- Improve pedestrian crossing conditions through expanded pedestrian signals and high-visibility crosswalks at high volume locations
- Cooperate with local partners (Greensboro, Guilford County, High Point, Winston-Salem and surrounding towns) to expand the use of shared-use paths throughout the Triad
- Implement a yearly sidewalk maintenance program to ensure accessibility
- Implement a greenway resurfacing program

There are other items in the action plan that mention benefits to pedestrian and bicycle transportation, including reference to context-sensitive design, safety of all road users, asset management, performance measurement and shared resources. More information on the LRTP can be found here: www.greensboro-nc.gov/index.aspx?page=3480

Piedmont Triad Regional Trail Plan and Inventory

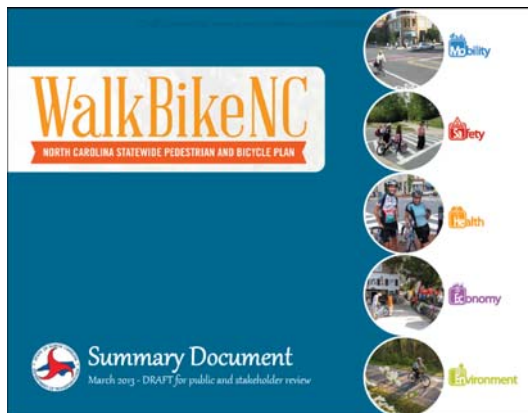


The regional trail plan and inventory identifies the Piedmont Greenway as a proposed State trail through the southern Town limits of Oak Ridge. The proposed trail, the urban route of the Mountains to Sea Trail is also called the Piedmont Greenway. Connecting to the Piedmont Greenway would also create a potential connection with the Atlantic and Yadkin Greenway in nearby Summerfield.

The Town of Oak Ridge has an opportunity to connect its developing pedestrian transportation system with regional trails if it were to complete the Piedmont Greenway.

More Information: www.pedpower.org/documents/TrailPlanInventoryReportFeb11v4print.pdf

WalkBikeNC



The North Carolina Statewide Pedestrian and Bicycle Plan *WalkBikeNC* outlines a strategy for improving pedestrian and bicycle transportation in North Carolina. Framed around 5 pillars of Mobility, Safety, Health, Economy and the Environment, the plan provides detailed strategies and action steps to improve conditions for active transportation, while quantifying and cataloguing benefits.

Vision Statement: North Carolina is a place that incorporates walking and bicycling into daily life, promoting safe access to destinations, physical activity opportunities for improved health, increased

mobility for better transportation efficiency, retention and attraction of economic development, and resource conservation for better stewardship of our environment

The following goals have been outlined for each of the 5 pillars:

Mobility Goal: Double state pedestrian and bicycle mode share by 2020 and double each decade thereafter.

Safety Goal: Reduce per capita pedestrian and bicycle crash rate by 10% by 2020 and by 10% each decade thereafter.

Health Goal: Reduce inactivity rates by 10% by 2020 and by 10% each decade thereafter.

Economy Goal: Increase investment in pedestrian and bicycle projects and programs by 25% and thus return on investment.

Environment Goal: Increase mileage of greenways by 10% by 2020 and by 10% each decade thereafter.

More Information: www.ncdot.gov/bikeped/planning/walkbikenc/

2.5 COMMUNITY OUTREACH AND INVOLVEMENT

The Oak Ridge Comprehensive Pedestrian Transportation Plan steering committee convened in April 2012 and has met 6 times during the planning process. The steering committee is comprised of a broad section of Oak Ridge residents and is charged with guiding the planning process. Project, policy and program ideas were generated by the steering committee and have informed staff about specific objectives (e.g. where projects should be built, what policies related to walkability fit in with the community of Oak Ridge). Six steering committee meetings were held:

- Meeting 1: April 17, 2012
- Meeting 2: May 15, 2012
- Meeting 3: September 18, 2012
- Meeting 4: October 16, 2012
- Meeting 5: January 8, 2013
- Meeting 6: March 12, 2013

Several public meetings were held to solicit feedback and ideas for pedestrian transportation in Oak Ridge. The first public meeting was held June 2012 at Town Hall, the 2nd at the annual Fire Department BBQ in October 2012, and a third at the Trunk or Treat in Oak Ridge Shopping Center, also in October 2012. An open house was also held in June of 2013 to review plan recommendations.



BBQ Dinner Public Input

In addition to the public meetings and events, local clubs were also used to solicit input to the plan. Talks and surveys were distributed to the Rotary Club, Garden Club, Oak Ridge Fire Department and the Merchants Association. Important feedback on the plan recommendations was received and incorporated into the project, policy and program recommendations found in Chapter 3.

In addition to steering committee and public meetings, the public involvement process included a pedestrian user survey. The survey consisted of 10 questions related to pedestrian transportation and was conducted from Spring to Fall 2012. There were paper surveys distributed at key community locations such as Town Hall, while the survey was also linked from the Town's web page and emailed out to steering committee email lists. There were 133 responses to the pedestrian user survey. The summary results on the following page, while full results of the survey with charts and comments can be found in the Appendix.

Combined over 300 people were reached directly through surveys, meetings and events. The Northwest Observer newspaper also provided citizens information about the plan throughout the process.

Pedestrian User Survey Questions and Summary

1. How *important* to you is the goal of creating a walking-friendly community?
Nearly 90% or 9 in 10 think creating a walkable community is important or very important.
2. How *often* do you walk or run now?
Over 75% walk a few times per week or more.
3. For what *purpose* do you walk now and how far? If you do not walk now, for what purpose would you walk in the future?
Fitness/recreation, social visits and transportation are top choices for existing or future walking, depending on distance
4. What is the biggest factor that *discourages* you from walking?
Lack of sidewalks and trails is the number one factor discouraging residents from walking. Followed by unfriendly streets and land uses and traffic
5. What walking destination would you *most like* to get to?
The Town Park, future greenway trails and shopping are the top three places people want to be able to walk to.
6. What is the most important action you think is *needed to increase* walking in the community?
New sidewalks is the most important action needed to increase walking in Oak Ridge, followed by trails.
7. What is the most *important consideration* in determining locations for new sidewalks?
Pedestrian safety and filling gaps should be the most important consideration in locating new sidewalks.
8. Please indicate what you think should be the primary source of funding for sidewalk, multi-use trail and lighting improvements if grants and existing revenue is not enough?
Local Bond Referendum (100 responses), Impact Fees (32) and Local Sales Tax (26) are the top three choices*
9. What do you think are the *top roadway* corridors most needing pedestrian improvements?
 - **SIDEWALK/TRAIL: Hwy 150 (84 responses), Linville Road (44), Hwy 68 (35)***
 - **INTERSECTIONS: Hwy 150 and 68 (145 responses), Linville Road and 150 (31)***
10. To help us better understand the information we receive, please tell us about yourself (age, income, education level, address).

* Questions 8 and 9 include responses from the public meetings and discussions.

2.6 INVENTORY AND ASSESSMENT OF EXISTING FACILITIES

The Town has an adopted Land Use Plan. This document sets the framework for how future development will occur in Oak Ridge. Pedestrian elements played an integral role in the future land use plan, receiving significant attention and comment by citizens of Oak Ridge. The Comprehensive Pedestrian Transportation Plan builds on these efforts and plays an important role in strategizing sidewalk and trail projects, and to advise future ordinance amendments that support walkability.

ORIGINS AND DESTINATIONS

Parks, schools and commercial centers are community trip attractors or places where people visit or travel to and from daily. These locations are the origin or destination of many trips by Oak Ridge citizens that could be taken by bicycle or by foot. Twenty-five percent (25%) all trips – social, recreational, work - under a mile nationwide are taken on foot, while the automobile is used for seventy-five percent (75%) of trips one mile or less. Approximately forty percent (40%) of trips to visit friends and relatives and for other social and recreational purposes (e.g., to go to the gym, attend a movie, visit a park, or visit a library) totaling a mile or less are accomplished by walking¹. It is important to provide opportunities to safely walk and bicycle to local parks, schools, restaurants and shops. A goal of this plan is to reduce the number of car trips, by providing a strategy to create safe and inviting opportunities to walk to destinations.

EXISTING PROGRAMS

The Town of Oak Ridge has dedicated nearly 1% of their annual Town budget towards filling sidewalk gaps in FY 2013/14. The sidewalk improvements will connect existing sidewalk on the west side of Linville Road, providing an important pedestrian connection between the Town Park and School.

Oak Ridge Walking Committee

The walking committee was established to secure funding for the pedestrian plan process and also identify new walking routes throughout Oak Ridge. Several walking committee members served on the steering committee for the Pedestrian Plan process, providing a foundation and guidance as recommendations were developed.

Oak Ridge Historic District

The Oak Ridge Historic District Commission enforces historic guidelines, pursuant to the existing ordinance. Their input on sidewalk and pedestrian transportation will be important for plan implementation, to ensure compatibility with existing and future development that supports the historic district mission.

¹ U.S. Dept. of Transportation, Bureau of Transportation Statistics, FHWA, January 2004, National Household Transportation Survey, <https://www.bts.gov/pdc/index.html>

Oak Ridge Elementary School

The Oak Ridge Elementary School leads walks to the Oak Ridge Town Park, providing opportunities for physical activity. The use of Oak Ridge Commons and the Oak Ridge Military Academy area is limited by the lack of sidewalk connectivity to the school.

OPPORTUNITIES

Oak Ridge Town Park is a hub active and passive recreation and park activities. Bicycle rides and walks take place regularly here. Soccer and baseball fields offer a place for organized league games. A pedestrian connection to the Oak Ridge Commons (shopping center) and the Elementary school is important and there have been some efforts to complete sidewalk and trail connections, with more needed.

The Haw River (Haw River Trail) and Reedy Fork Creek (Piedmont Greenway) pass through the Town of Oak Ridge, providing a potential hiking connection to neighboring jurisdictions and an opportunity for residents and visitors to access natural features important to Oak Ridge and the region. These two water corridors have been identified as priority regional trail connections.

The Oak Ridge Military Academy and the Oak Ridge Elementary School are in the heart of Oak Ridge. The construction of an interconnected sidewalk system through the Town Core would allow trips to and from these locations for students and faculty to be completed by foot. Collaboration with the Oak Ridge Historic District will provide an opportunity to construct a sidewalk network that reflects the integrity of the historic district.

BARRIERS AND GAPS

The following are barriers and gaps to a safe, connected and accessible pedestrian transportation system in Oak Ridge:

- Subdivision developments with little pedestrian connectivity to other existing development;
- Large lot single family development separated from the Town Core and along high speed rural roads with no shoulders;
- Some sidewalks constructed with development outside of NCDOT right of way, whereas existing funding protocol and policies will encourage sidewalk location in the NCDOT right of way with public funding;
- Inconsistent right of way documentation on Town Roads;
- Major intersection of NC 150 and NC 168 is at the heart of the Town Core and is major obstacle to pedestrian transportation; and
- Lack of sewer and water encourages sprawled development less suitable to pedestrian transportation due to distances between land use types.

As the Town of Oak Ridge continues to receive development pressure from the metropolitan area, these barriers and gaps to pedestrian transportation should be considered. Chapter 3, the Pedestrian Network Plan, will provide some tools to begin addressing these barriers and gaps.

2.7 TRANSPORTATION IMPROVEMENT PLAN PROJECT REVIEW

The following are major road projects or bicycle pedestrian funding programmed in the next 5 years in the vicinity of Oak Ridge. Other major projects are shown in Figure 2.9 - Draft 2013-2023 STIP for Northwest Guilford County. The project schedules are subject to change due to funding, construction or re-prioritization delays.

R - 2413

NC 68/US 220 Connector (Future I - 73)

The A/B section nearest to Oak Ridge will follow a new alignment from US 220 just south of the Haw River, cross NC 150, Brookbank Road, Bunch Road, and Alcorn Road and connect to NC 68 north of Pleasant Ridge Road. Most of the Connector will be built to Interstate Standards, with the section along existing US 220 to be upgraded to Interstate Standards later.

Funding Amount: \$223,040,000

Schedule: Right of way acquisition in process, and construction scheduled to begin in FY 2014 and completion in FY2017.

R - 2309

US 220/Battleground

Widen to multi-lanes with a median between Horse Pen Creek Road and future NC 68 Connector

Funding Amount: \$60,097,000

Schedule: Under construction and completion in FY 2014/15

SF-4907D (not shown on map)

NC 68 and SR 2269 (Alcorn Rd)

Construct turn lanes on Alcorn Rd approaches and upgrade signal.

Funding Amount: \$542,000

Schedule: Under construction

W-5114 (not shown on map)

West Harrell Road Re-Alignment

Construct turn lanes south of East Harrell Rd to Bartonshire Dr and study intersection re-alignment of West and East Harrell Rd.

Funding Amount: \$2,650,000

Schedule: Construction and completion in FY 2014

EL-5101 (not shown on map)

Pedestrian and bicycle projects

Greensboro Urban Area Metropolitan Planning Organization area.

Funding Amount: \$3,800,000 (FY 2013)

Schedule: Ongoing schedule of projects

U-5601 (not shown on map)

Pedestrian and bicycle projects

Greensboro Urban Area Metropolitan Planning Organization area.

Funding Amount: \$2,000,000 (FY 2014)

Schedule: Ongoing schedule of projects

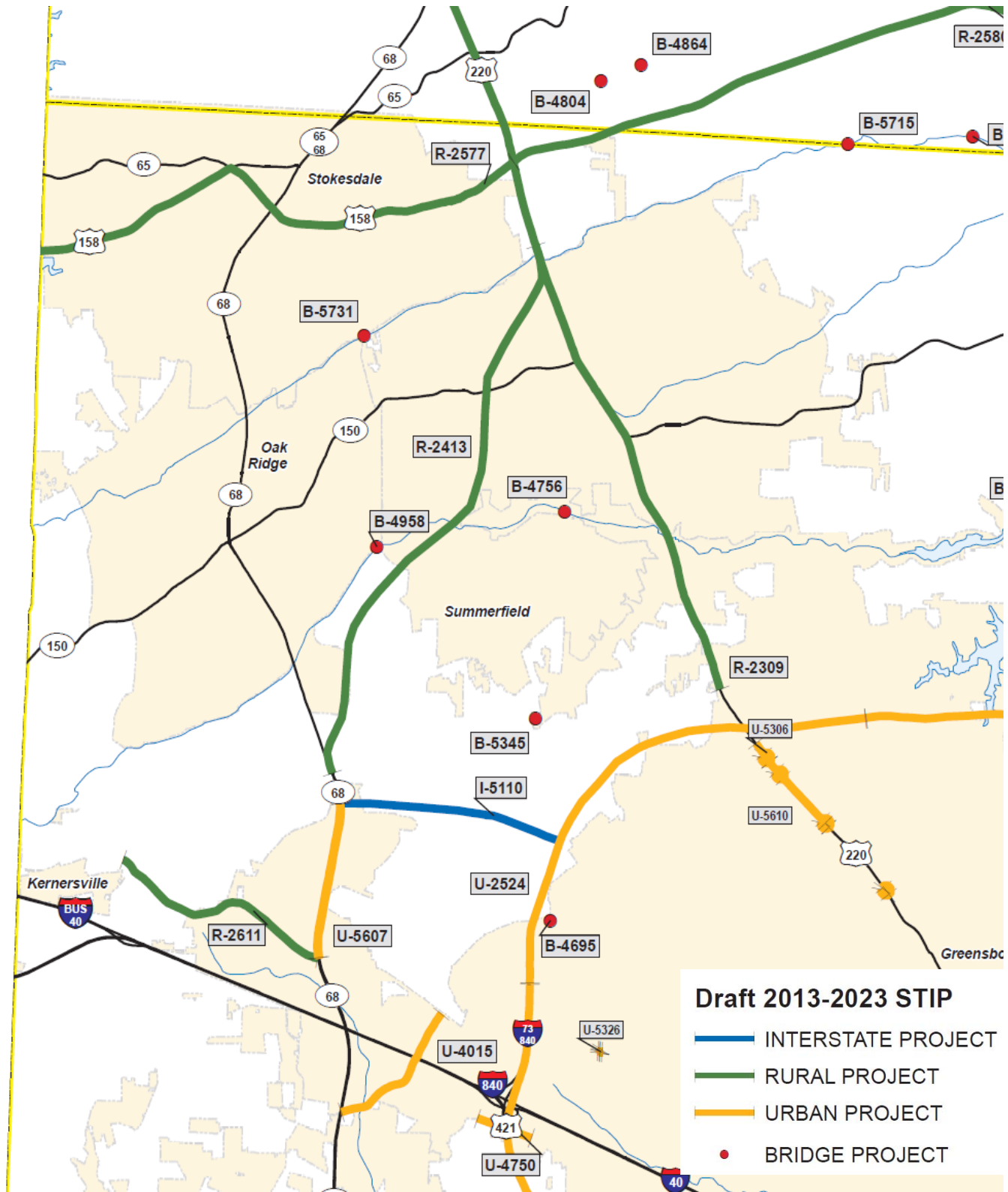
C-5555 or C-5607 (not shown on map)

Projects to improve congestion and air quality

Greensboro Urban Area Metropolitan Planning Organization area.

Funding Amount: \$1,750,000 (FY 2013)

Schedule: Ongoing schedule of projects

Figure 2.10 - Draft 2013-2023 STIP for Northwest Guilford County

2.8 PEDESTRIAN STATUTES AND LOCAL ORDINANCES

This section highlights guidelines and statutes supporting pedestrian transportation at the Federal, State and Local level.

FEDERAL AND STATE GUIDELINES

The FHWA and USDOT policy supports non-motorized transportation and is a part of the current Federal Transportation Authorization Legislation MAP-21. The Transportation Alternatives program supports bicycle and pedestrian stand alone projects. The inclusion of sidewalks as part of other highway projects may also be a means to completing bicycle and pedestrian projects. Need must be demonstrated early on in the project development process to be included in highway projects.

The NCDOT has recently completed Complete Street design guidelines. Complete Streets policy has been adopted by the NCDOT Board of Transportation and calls for consideration of all road users in any roadway construction projects. The design guidelines provide several cross sections for communities to consider adopting. The design guidelines consider neighboring land uses, traffic volumes, desired roadway speed, crossing distances, etc. These guidelines can be accessed here: www.completestreetsnc.org. A two-day training is also available for governmental agency staff and held around the State.

LOCAL ORDINANCE REVIEW

The Oak Ridge Development Ordinance has several existing sections related to supporting pedestrian transportation.

Chapter 30: Land Development Article VII – Zoning

30-2 Purpose

(o) Nonresidential building size limitation purpose. The limitations on nonresidential building size, adopted and prescribed in this chapter, are found by the town council to be necessary and appropriate to:

- (1) Promote a safe and efficient pedestrian scale environment; and
- (2) Foster a competitive and diverse mix of retail establishments.

Division 10 Overlay District Requirements Includes Historic District Requirements

30-592 – Scenic Corridor Overlay district requirements

(a) General Requirements

Site design.

- a. Parking and loading areas for nonresidential uses shall be:
 1. Designed as a single aisle of parallel or angled parking when located in front of the principal building or structure;

2. Located behind or to the side of the principal building or structure; or
 3. For group or unified developments parking shall be designed in accordance with the principles illustrated in figure 4-D.
- b. Site design shall be pedestrian and bicycle friendly and shall include:
1. Sidewalks along street frontage on properties within the town core;
 2. Clearly marked crosswalks to business entrance; and
 3. Accessible bike racks at the rate of one space per 20 automobile parking spaces, installed per the adopted town bike rack standards.
- c. All loading and dock areas shall be screened from view of the scenic corridor.
- d. Pump islands and drive-through facilities shall be located behind the principal building or structure.

Article VIII Subdivisions

Division 9 Subdivision Standards

30-860 Streets

This section has several sub-sections related to street widths, design, intersection treatments and other dimensional criteria for new streets.

30-862 Sidewalks

(a) Except along controlled access facilities, sidewalks shall be required on all thoroughfares, collectors and local streets in the town core, as shown on the Oak Ridge Future Land Use Plan adopted May 2003. Where sidewalks are installed, they shall meet City of Greensboro standards and have a minimum width of five feet and be constructed just behind the street right-of-way line. Sidewalks may be constructed within the street right-of-way with approval of the town and NCDOT.

(b) Sidewalks shall be constructed at the time of development of any single lot being used for commercial or institutional purposes, and for any subdivision of land into building lots for residential, commercial or institutional purposes. The developer or sub-divider shall be responsible for sidewalk construction on all new streets or roads created as part of the development, and for existing streets or roads that abut the property being developed.

3. PEDESTRIAN TRANSPORTATION NETWORK PLAN

Every person is a pedestrian at some point during a trip to work, school or shopping. The structure of the built environment including streets, sidewalks and entrance areas to destinations should provide safe, accessible and inviting pedestrian facilities. The safety and accessibility of street intersections influence how many people may walk along and across the street. The separation (via buffers or planting strip) of the pedestrian network from the street traffic plays an important role as to how enjoyable it is to walk along the roadway. For example, the NC 68 and NC 150 intersection will remain a barrier to pedestrian travel, until improvements to the intersection are implemented. Other “barriers and gaps” (Section 2.6) include a disjointed sidewalk network, high speed rural roads and separated land uses.

The pedestrian transportation system recommendations are categorized into 3 areas: (1) projects (e.g., sidewalk and trail construction), (2) policies (e.g., ordinances supporting walkability) and (3) programs (e.g., community events that encourage more walking). This chapter will explore recommendations that support safe, connected and accessible pedestrian transportation. Chapter 4. Implementation, will identify strategies to seek funding and partnerships, in an effort to shepherd appropriate projects, policies and programs towards implementation.

3.1 PROJECT RECOMMENDATIONS

Recommended projects include sidewalks, trails, paved shoulder and intersection treatments (e.g. refuge islands, crosswalks and pedestrian signal installations). The location of recommended sidewalks (red dashed lines), trails (green-dashed lines) and paved shoulders (brown dashed line) are displayed in Figure 3.1 and 3.3 showing existing and proposed facilities maps. Each roadway improvement recommendation has a Map ID, which can be referenced in Figure 3.2, and shows improvement recommendations in ranking order (e.g., S-1 is the highest ranked project). There are two major intersection improvement recommendations for NC 68/NC 150 and Linville Rd/NC 150, this section includes detailed maps of the recommended improvements.

The sidewalk recommendations total 10 miles; in addition, 32 miles of paved shoulder and over 27 miles of proposed trail are included in the plan recommendations. Important links between open space, the existing park, the schools and the center of Oak Ridge will be made if the plan is implemented. The NC 150, Linville Road and NC 68 corridor will be important corridors to develop sidewalk along, providing important connections between sidewalk sections that have been installed through the development process and the school and shopping destinations of the Town Core. In addition, the new open space acquisition on the northwest edge of Town provides a unique destination for Town residents, with a proposed trail along Linville Road to get closer to the open space preserve. Connecting to the Piedmont Greenway south of Town and continuing to acquire easements along Reedy Fork for this important regional and State trail is a long term objective of the region.

SIDEWALK PROJECT RECOMMENDATIONS

The sidewalk project recommendations (shown in red dashed lines in Figure 3.1 and 3.3) were originally identified by citizens and staff through public involvement and the plan development process. Many of the sidewalk projects will provide connectivity between neighborhoods the downtown, schools or existing sidewalk.

Sidewalks and sidepaths are ranked objectively based on the following prioritization factors in Figure 3.2: prevalence of pedestrian crashes, proximity to the Town Core, connections to existing sidewalk, number of public comments, proximity to parks, road type and traffic, existence of curb and gutter and density of development. Figure 3.2 also describes the distance, width and surface of each sidewalk project recommendation and ranking score related to prioritization factors, a higher score translates to a better ranking (highest score (17) = low ranking (1). The distance of gap projects on Linville Road and NC 150 are not shown in Figure 3.2, but should have a high priority for implementation. The short distance of gap projects (< 1,000 ft) should be completed using local funds. The administrative costs of spending federal and state funds will not be beneficial for short sidewalk improvements. The cost per linear foot of sidewalk often cost two times or more with federal funds due to required inspections, project development time and oversight costs.

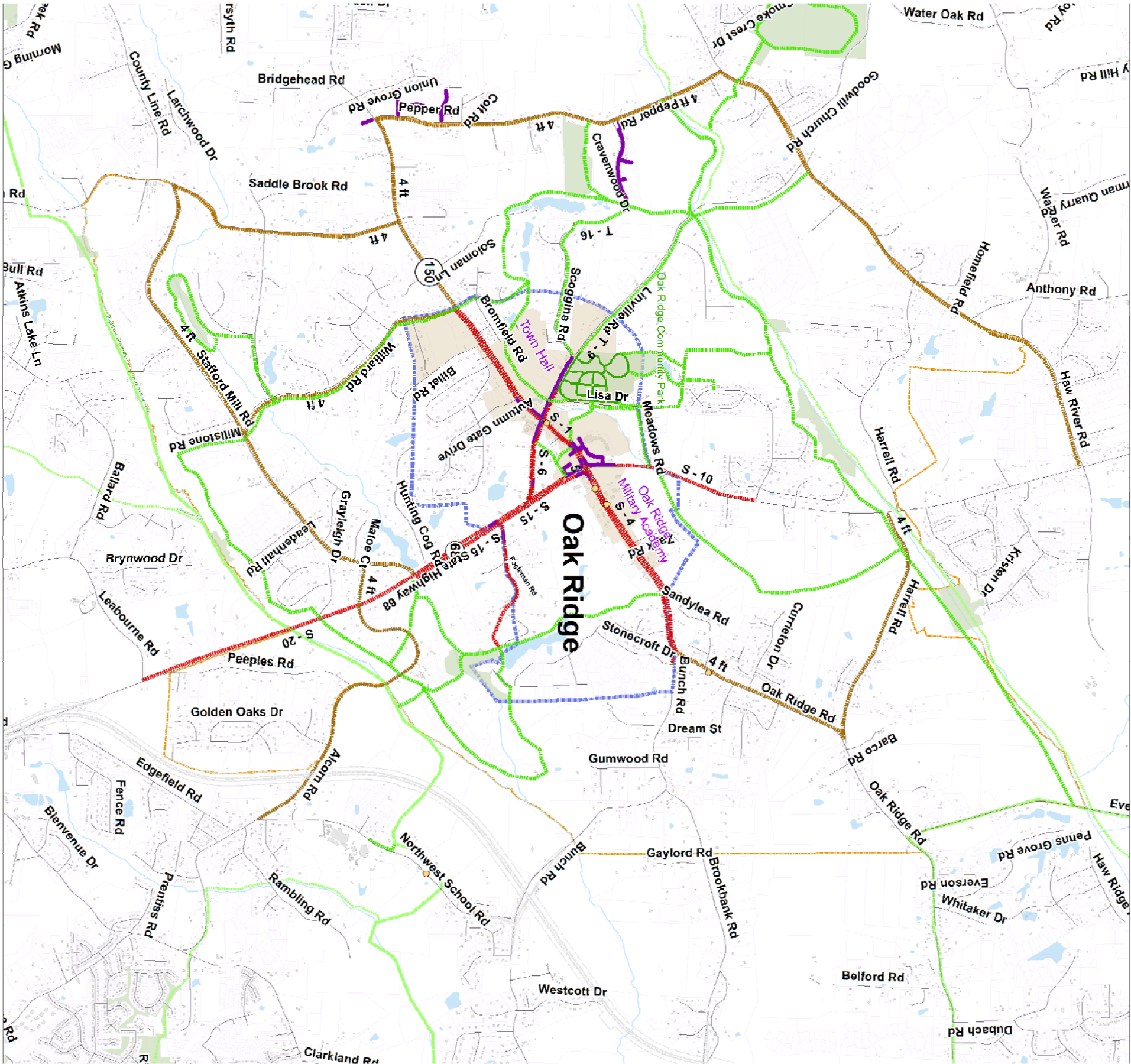
TRAIL RECOMMENDATIONS

There are over 27 miles of trail proposed in the Town of Oak Ridge, not including the Haw River Trail and Piedmont Greenway. The trail recommendations (shown in green dashed lines in Figure 3.1 and 3.3) include sidepaths, stand alone local greenways and regional greenways (e.g. Haw River Trail and Piedmont Greenway). The stand alone greenways and regional greenways included in this plan are identified in previous plans or through public and committee input. The trail surface is recommended to be natural or crushed stone to reduce installation cost and fit the rural character of the community. However, paved surface may be recommended for higher use trails during a detailed master planning process. Several public comments mentioned connecting neighborhoods with the Town Core via trails. Greenway recommendations were not prioritized through the process (except for the Linville and Scoggins Road sidepaths). Successful implementation will require landowner participation as proposed trails cross private property. It is recommended that trail easements continue to be acquired through the subdivision process where proposed trail is located in the Town of Oak Ridge.

SHOULDER IMPROVEMENTS

The 32 miles of shoulder recommendations (shown in brown dashed lines in Figure 3.1 and 3.3) are along roadways outside the Town Core where sidewalk recommendations may not suit the rural character of development. The shoulder improvements have been prioritized along with the sidewalk and sidepath recommendations. The 32 miles include mileage for both sides of the roadway. Accommodating 4 ft paved shoulders along these routes will provide a multi-purpose facility to improve pedestrian and bicycle transport and improve the safety of automobile travel.

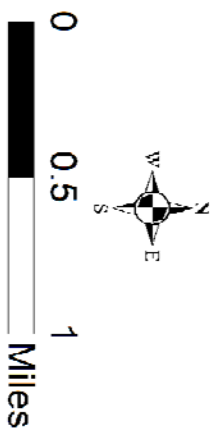
Figure 3.1 - Town of Oak Ridge Existing and Proposed Facilities



Town of Oak Ridge
Pedestrian Transportation Plan

**Existing and
Proposed
Facilities**

- Existing Sidewalks
- Proposed Sidewalks
- Proposed Paved Shoulder
- Existing Trails
- Proposed Trails
- County Line
- Bike & Ped Crashes
- Proposed I 73 - Connector
- Roads
- Parks and Open Space
- Historic District
- Town Core
- Buildings
- Parcels
- Creeks
- Lakes
- Town Limits



Data provided by: GARDNER COUNTY, NC; PITCO, NC; and NC ONE-800

Disclaimer: This map and data are for informational purposes only. It is not intended to be used for any other purpose. The map is not a guarantee of accuracy. The map is not a guarantee of accuracy.

Map Date: September 17, 2013

Figure 3.2 – Proposed Facility Improvements with Cost Estimates

Map ID (1)	Street	From	To	Distance linear ft (2)	Parcel and Segment Description	Side	Pavement Material	Curb and Gutter	Construction/Engineering Cost LF (3)	Total Estimated Cost (4)	Width	Prioritization Score (5)
S - 1	NC 150	NC 68	Linville Road	1,100	6 parcels	N	Concrete	Partial	\$100.00	\$110,000	5'	17
S - 2	NC 150	NC 68	Linville Road	1,125	2 segments, some existing sidewalk, 9 parcels	S	Concrete	Partial	\$100.00	\$112,500	5'	17
S - 3	Linville Rd	NC 150	NC 68	2,000	2 segments, some existing sidewalk. 7 parcels	N	Concrete	N	\$100.00	\$200,000	5'	15
S - 4	NC 150	NC 68	Zack Rd	2,500	5 parcels	N	Brick/Stamped Concrete	N	\$100.00	\$250,000	5'	14
S - 5	NC 150	Willard Rd	Existing Sidewalk	3,425	10 parcels	N	Concrete	N	\$100.00	\$342,500	5'	14
S - 6	Linville Rd	Existing Sidewalk	NC 68	1,800	8 parcels	S	Concrete	N	\$100.00	\$180,000	5	13
S - 7	NC 150	NC 68	Zack Rd	2,200	8 parcels	S	Brick/Stamped Concrete	Partial	\$100.00	\$220,000	5'	13
S - 8	NC 150	Willard Rd	Autumn Gate Drive	3,150	10 parcels	S	Concrete	N	\$100.00	\$315,000	5'	13
T - 9	Linville Rd	Town Park	Haw River Rd	8,750	28 parcels	NE	Asphalt/Crushed Stone	N	\$100.00	\$875,000	8'	13
S - 10	NC 68	Existing Sidewalk	Case Ridge Drive	4,205	13 parcels	W	Concrete	N	\$150.00	\$630,750	5'	12
S - 11	NC 150	Zack Rd	Stonecroft Drive	3,700	14 parcels	S	Brick/Stamped Concrete	N	\$100.00	\$370,000	5'	11
S - 12	NC 68	NC 150	68 Place	2,625	3 segments, 7 parcels	W	Concrete	N	\$150.00	\$393,750	5'	11
S - 13	NC 150	Zack Rd	Bunch Rd	3,425	18 parcels	N	Brick/Stamped Concrete	N	\$100.00	\$342,500	5'	10
S - 14	Lisa Dr/Meadows Rd	Town Park	NC 68	2,975	3 parcels	N	Asphalt	N	\$150.00	\$446,250	8'	10
S - 15	NC 68	NC 150	Old Guilford Mill	5,400	12 parcels	E	Concrete	N	\$150.00	\$810,000	5'	10
T - 16	Scoggins Rd	Linville Rd	Cravenwood Dr	6,000	19 parcels (trail portions not adjacent to roadway)	N	Asphalt/Crushed Stone	N	\$100.00	\$600,000	8'	8
S - 17	NC 150	Bunch Rd	Harrell Rd	5,475	33 parcels	NW	Concrete	N	\$100.00	\$547,500	5'	7
S - 18	NC 150	Bunch Rd	Harrell Rd	5,475	25 parcels	SE	Concrete	N	\$100.00	\$547,500	5'	7
S -19	NC 68	Existing Sidewalk 68 Place	Stafford Mill Road	2,525	9 parcels	W	Concrete	N	\$150.00	\$378,750	5'	6
S - 20	NC 68	Stafford Mill Road	Leabourne Road	8,300	16 parcels	W	Concrete	N	\$150.00	\$1,245,000	5'	5
S - 21	Haw River Rd	Pepper Rd	Harrell Rd	8,425	30 parcels	S	Concrete	N	\$100.00	\$842,500	5'	4
4 ft	Willard Rd	NC 150	Stafford Mill Road	7,450	23 parcels	E	Asphalt/Paved Shoulder	N	\$100.00	\$745,000	5'	4
S - 23	Fogleman Rd	NC 68	End of Road	3,425	12 parcels	N	Concrete	N	\$100.00	\$342,500	5'	3
S - 24	Pepper Rd	Haw River Rd	Cravenwood Dr	3,475	13 parcels	E	Concrete	N	\$100.00	\$347,500	5'	3
S - 25	Haw River Rd	Harrell Rd	NC 68	7,650	30 parcels	S	Concrete	N	\$100.00	\$765,000	5'	2
4 ft	Stafford Mill Road	Beeson Rd	Willard Rd	8,225	22 parcels	N	Asphalt/Paved Shoulder	N	\$100.00	\$822,500	5'	2
4 ft	Stafford Mill Road	Willard Rd	NC 68	6,775	22 parcels	N	Asphalt/Paved Shoulder	N	\$100.00	\$677,500	5'	2
S - 28	Pepper Rd	Cravenwood Dr	NC 150	6,850	24 parcels	E	Concrete	N	\$100.00	\$685,000	5'	1
S - 29	Harrell Rd	NC 68	NC 150	6,975	19 parcels	S	Concrete	N	\$100.00	\$697,500	5'	0
4 ft	Beeson Road	NC 150	Stafford Mill Road	7,050	16 parcels	E	Asphalt	N	\$100.00	\$705,000	5'	0

- (1) Map-ID Notes: Starts with S, improvement is a sidewalk; T, improvement is a trail; 4ft is a paved shoulder.
- (2) Distance estimated to within 25 feet
- (3) Construction and engineering cost estimates will vary due to grading, utility or other concerns
- (4) Cost estimates are to be used to guide long term fiscal planning, specific project costs should be estimated in advance of construction
- (5) Prioritization Score determined using the following schema: A. Public Comments (3 to 10 = 2; 10 or more = 3); B. Proximity to school zones (within 1/4 mile = 3, 1/4-1/2 mile = 2); C. Proximity to parks and recreation (within 1/4 mile = 3, 1/4 - 1/2 mile = 2); D. Crashes (1 ped/bike crash 2001-2010) = 2; E. Traffic Count (>2,000ADT) F. Land Use (Town Core =2, Non-Res = + 1; G. Connectivity to existing sidewalk/ trail = 1

FACILITY COST ESTIMATES

Depending on whether sidewalk improvements occur on streets with or without curb and gutter will influence installation cost. It is recommended in most cases to build curb and gutter with any sidewalk installation. This design improves safety for pedestrians and automobiles, reducing “run-off the road” crashes, but costs more to construct than ditch and swale. However, sidewalk improvements that are implementable behind the ditch would not require curb and gutter.

The average cost per linear foot of new sidewalk (\$100-150 on average) can vary significantly due to soils, slope, and other infrastructure issues (e.g., stormwater, sewer) along a project corridor. Similar to sidewalks, the cost of trails may vary due to differing requirements for surface type, grading, erosion control, culvert installations, stream crossings and other environmental factors. The estimates shown in Figure 3.2 do not include professional services such as design and administration or the acquisition of easements, land and legal fees.

INTERSECTION IMPROVEMENTS

The Town of Oak Ridge has been working with NCDOT Division 7 to improve pedestrian safety. Recent improvements include a crosswalk and sidewalk segments on the western side of the Oak Ridge/NC 150 and Linville Road intersection. Following completion of the Oak Ridge Town Park, a crosswalk was striped between the Town Hall sidewalks and the Town Park sidewalk and trail system on Linville Road.

Public feedback clearly articulated the need for pedestrian improvements at the Linville Road and NC 150/Oak Ridge Road intersection and also the NC 68 and NC 150/Oak Ridge Road intersection. These two intersections are critical points of pedestrian travel in the Town Core.

The following intersection improvement recommendations and concept maps reflect basic improvements to create accessibility, safety and connectivity. Intersection improvement projects should be constructed in coordination with sidewalk corridor improvement projects to ensure connectivity and take advantage of cost efficiencies.



*School Children and Teachers Walking on Linville Road
Photo: R. Schmitz*

Oak Ridge Road and NC 68

Overview

Speed Limit: 45 MPH (NC 68) and 35 MPH (NC 150)

Traffic Count: NC 68 (North Leg) – 15,000 AADT, NC 68 (South Leg) – 16,000 AADT; Oak Ridge Road (West Leg) – 8,600 AADT, Oak Ridge Road (East Leg) 7,000 AADT

Recommendations Concept A

- Crosswalks, curb ramps and pedestrian countdown signals and push buttons
- Improve lighting at intersection and existing crosswalk locations
- Advance crosswalk pavement markings on slip lanes and Oak Ridge Military Academy
- Construct sidewalk gaps and links to intersection

Recommendation Concept B

- Above recommendations
- Remove slip lanes to improve pedestrian safety and reduce crossing distance



NC 68 and Oak Ridge Road intersection; looking West along slip lane



Oak Ridge Road crosswalk warning; looking East at Oak Ridge Military Academy

Figure 3.4 – NC 68 & NC150/Oak Ridge Road Intersection Improvement Concept A

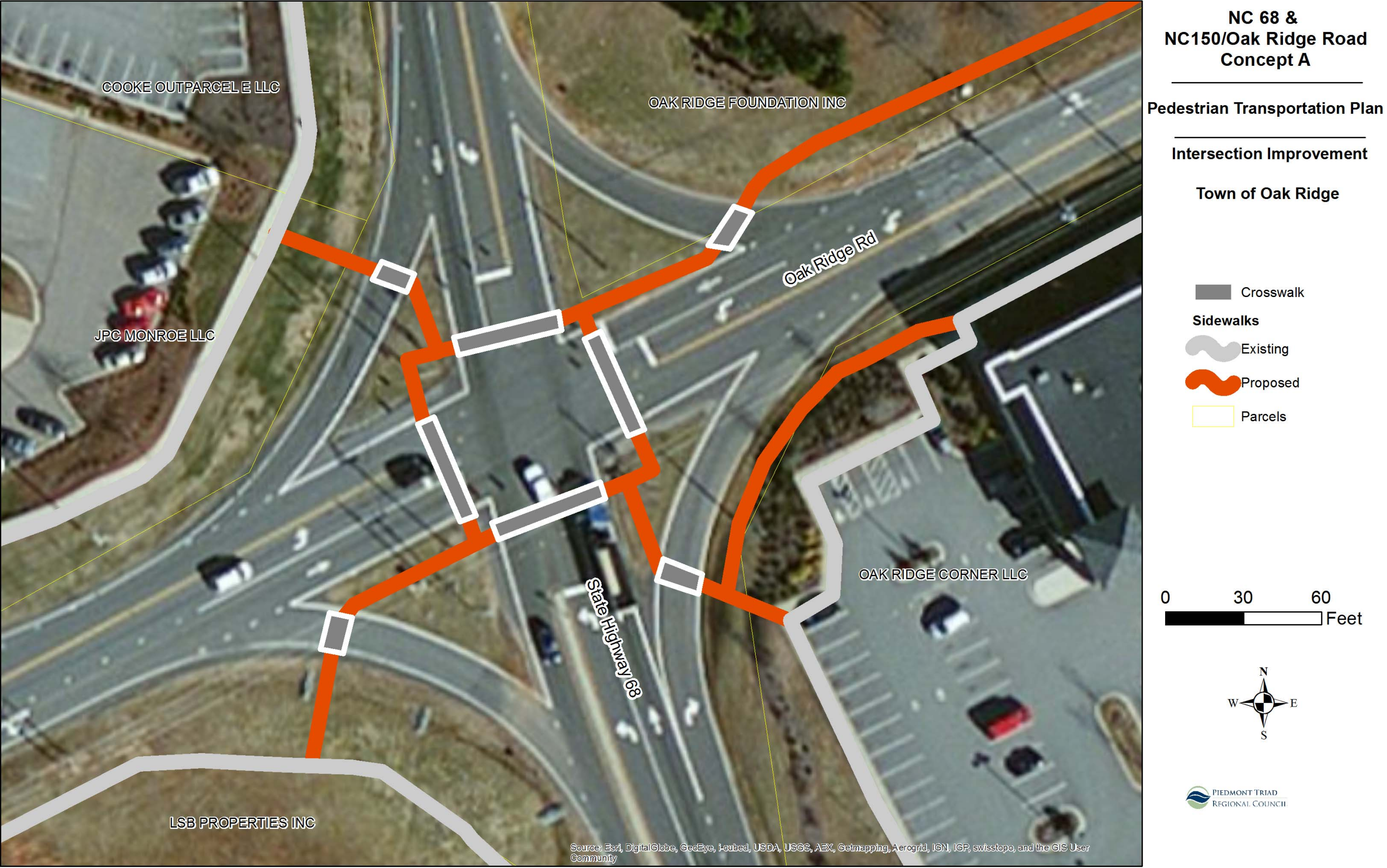
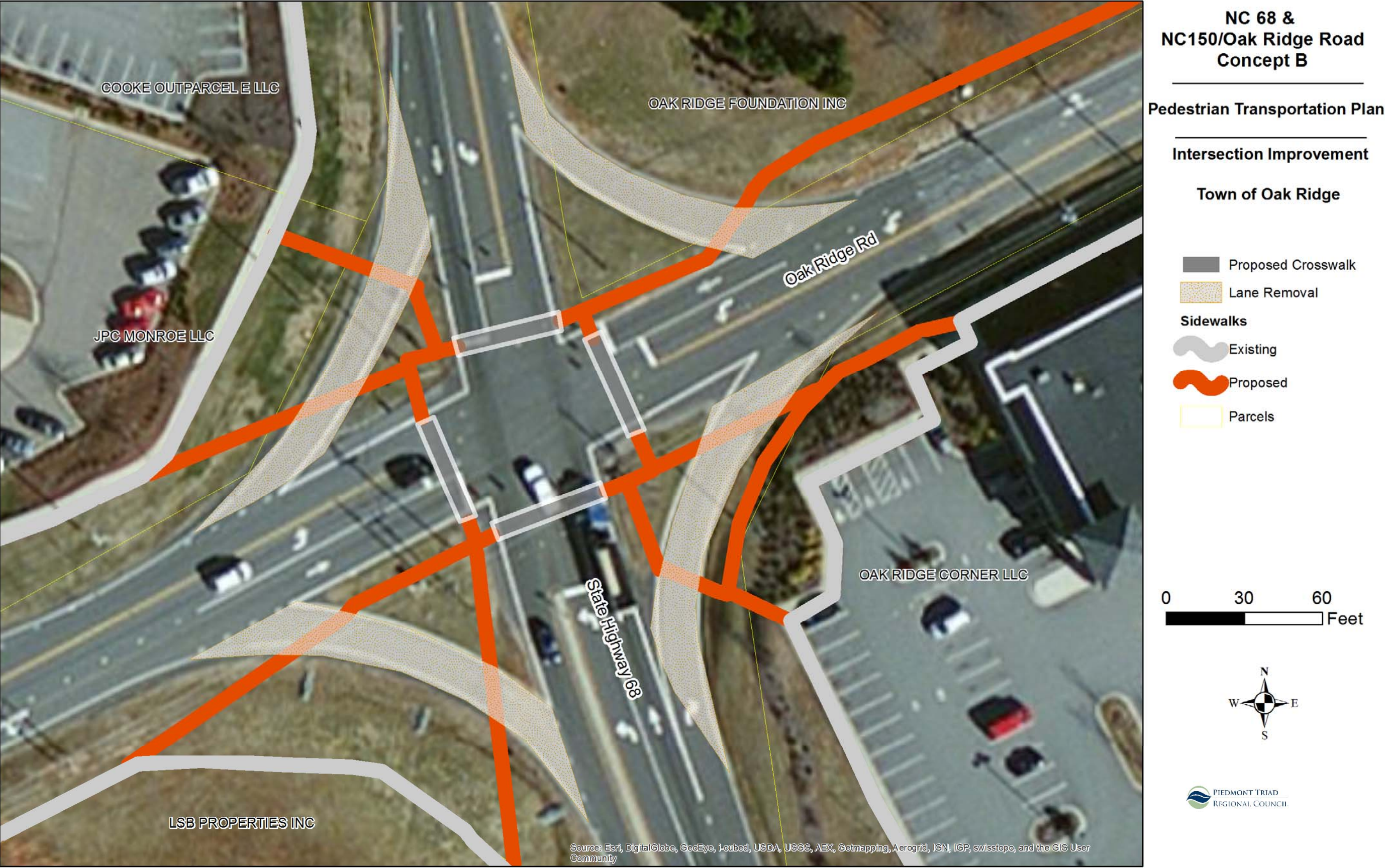


Figure 3.5 – NC 68 & NC150/Oak Ridge Road Intersection Improvement Concept B



Linville Road and Oak Ridge Road

Overview

Speed Limit: 35 MPH

Traffic Count: Linville Road (North Leg) 2,800 AADT, Linville Road (South Leg) 2,900 AADT; Oak Ridge Road (West Leg) 7,700 AADT, Oak Ridge Road (East Leg) 8,600 AADT

Recommendations

- Crosswalks and curb ramps on all 3 additional legs of the intersection
- Pedestrian push button countdown signal for all 4 legs
- Improved lighting
- Complete sidewalk and gap projects on 3 legs of the intersection
- Install speed feedback sign in school zone



Oak Ridge Road, looking West



Linville Road, looking South on the NW side



3.2 POLICY AND PROGRAM RECOMMENDATIONS

This section will offer frameworks for ordinances, internal policies and programs that will enhance the pedestrian transportation system. The ideas listed are intended to complement existing policies and programs and serve as a “menu” of options to pursue as the Town of Oak Ridge moves towards a vision of pedestrian safety, access and comfort.

POLICY CHANGES

The following policy updates build upon those developed in the Land Use Plan and the existing Ordinance. New policies have been suggested by steering committee members, citizens and staff.

A. Pedestrian Transportation Along Existing Development

Recommended Policy: Explore property assessments, impact fees and other funding sources to construct sidewalk along existing development, focusing on closing small sidewalk gaps of less than 1500 ft.

B. Public Access Easements

Recommended Policy: As new utility lines are extended along existing proposed greenway corridors, acquire public access easements for future trail use. Include a requirement in the subdivision ordinance that requires public access easements along proposed greenways when land is subdivided within the Town Limits and ETJ.

C. Pedestrian Access for New Bridges

Recommended Policy: Require all non-interstate bridges within Town limits and the ETJ to be equipped with sidewalks or multi-use paths. Include accommodation for planned multi-use paths or sidewalks under new bridges. NCDOT bridge policy:
<http://www.ncdot.gov/doh/preconstruct/altern/value/manuals/bpe2000.doc>

D. Trail Access Under New Road Bridges

Recommended Policy: Require that road bridge design accommodate future trail development where greenways or conservation areas are proposed – or within ½ mile of parks or schools. Conduct a study that identifies the feasibility of trail development under existing bridges in the town limits and ETJ.

E. Complete Streets

Recommended Policy: Adopt a Complete Streets policy, ensuring rebuilt or new streets will accommodate pedestrians, cyclists, future transit users and automobiles. The Complete Streets policy can take different forms, depending on the context in which it is being adopted, for example, specific changes to particular subdivision or street design regulations and ordinances

will also need to take place following the adoption of a general policy. New guidelines provide for specific “Complete Street” cross sections for different land use and transportation needs (see Appendix).

The NC 150 and NC 68 corridor should be studied and reviewed for Streetscape Enhancement, and a Complete Street cross section adopted for the two roads through the Town Core. Consider a conditional use district along the corridors to ensure compatible land use and development compatible with the Streetscape Enhancement.

F. Access Management

Recommended Policy: Adopt an access management policy that ensures vehicle traffic safety as well as pedestrian safety. The access management policy will work to improve safety on new and existing roadways by guiding the development of driveway locations, driveway curbs and reducing side slope for sidewalks across driveways. See Appendix A for more detailed access management recommendations.

G. Provision of Bicycle Lanes and Shoulders on Existing Streets

Recommended Policy: Analyze the existing lane widths on arterial streets in Oak Ridge and where possible reduce travel lane widths to 10-11ft and add 5-6ft bicycle lanes to streets through a restriping plan in the Town Core. This will achieve the goal of buffered sidewalks, reduced travel speeds and additional alternative transportation facilities. Installation of paved shoulders on higher speed arterial streets outside the Town Core will provide additional bicycle transportation options.

H. Sidewalk Requirements for Redevelopment – All Zoning Districts

Recommended Policy: Require sidewalk installation with a change of use and expansion where more than 50% of the building or lot is being improved, expanded or renovated. This recommendation should be codified for locations where sidewalks exist adjacent to redevelopment. Where buildings are located on street corners, adjacent will include sidewalks that existing across both adjacent streets.

I. Sidewalk Construction Standards and Access

Recommended Policy: Adopt sidewalk and greenway standards for sidewalk and trail development in Oak Ridge. The current ordinance references the City of Greensboro standards. While these standards are suitable, some sidewalk and trail development may be more context sensitive to the Town of Oak Ridge. For example, sidewalk design in the Oak Ridge Town Core and parts of the historic district may include stamped concrete or brick as recommended in this plan. In addition, require that sidewalk easements granted outside of the street right of way include a provision for public access. Ensure that sidewalks are in good repair and have been constructed properly before accepting the easement.

J. Cul-de-Sac Pedestrian Connectivity

Recommended Policy: Provide requirements for cul-de-sac development to accommodate pedestrians by connecting cul-de-sacs with the nearest neighboring street or parks. The cul-de-sacs are connected by pathway to existing public streets or trails. In cases where there are no pathways or streets to connect to behind the cul-de-sac, appropriate right-of-way should be set aside to connect with future cul-de-sacs, streets or pathways during the subdivision process.



Cul-de-sac connection (Oregon)

K. Town Core Conditional Use District

Recommended Policy: Work with the Historic Commission and other groups to create this new overlay district or to help beautify and preserve major and minor thoroughfares as the new I-73 connector is built and creates development pressure. The features would include lighting specifications, landscape requirements, signage requirements, mixed-use and parking areas. Creating mixed use districts will allow new development to have a range of uses thereby allowing shorter trips that can be made by foot or bicycle.

L. Sustainable and Decorative Lighting in Town Core

Recommended Policy: Require pedestrian scale and energy efficient light in Town Core where sidewalks are existing or planned. Using the existing dark sky guidelines as a foundation, the ordinance may require detail on aesthetic and energy efficient design, spacing requirements, foot candle and lumens. Ask the Historic Commission to lead the effort on developing the provisions of the ordinance.

PROGRAMS

Sidewalk Maintenance Agreements with Property Owners

To clarify what sidewalk maintenance is required by adjacent property owners and what is required by the Town of Oak Ridge, a sidewalk maintenance agreement and program should be conducted. This agreement will ensure clarity on sidewalk repair responsibility and public access for existing and future sidewalks.

The maintenance agreement may require property owners to cut back trees or shrubs that block the sidewalk right of way, and may also require the landowner to repair broken or damaged sidewalk. If repairs are not completed in a timely manner, the maintenance agreement may spell out the terms in which the Town would repair sidewalk and charge the property owner for the cost of repair or a percentage of the cost.

Sidewalk Gap Closure Fund

Create a capital improvement plan in the Town budget to fund construction of sidewalk gaps. As new development occurs, the gap closure fund could fill in the missing sections of sidewalk to create connectivity to existing sidewalk, making both sides of Linville Road and NC 150 a walkable environment. This gap closure fund could also support a 50/50 cost sharing agreement between property owners who want to construct sidewalk, but are not willing to pay the entire cost of sidewalk installation. In addition, minor intersection improvements including curb ramping, wheelchair landing areas and other small improvements could be eligible for this funding source.

Coordination with other municipalities on bicycle and pedestrian transportation

Oak Ridge participates in the Greensboro Urban Area MPO Transportation Advisory Committee, responsible for transportation funding and issues for large portions of Guilford County and its municipalities outside High Point and Jamestown. Encourage the development of a bicycle and pedestrian transportation advisory committee to the MPO that will work to refine and develop regional bicycle and pedestrian transportation initiatives that connect across municipal lines, encourage active transportation, cleaner air and personal health.

Establish Streetscape Committee

Establish a streetscape committee, under the Appearance Commission to target specific routes identified in this plan for lighting, trees and landscaping along existing streets and roads. The streetscape committee could also explore a *traffic calming* program in coordination with streetscape enhancements. Enhance lighting to accommodate and encourage pedestrian or bicycle travel.

Let's Go NC!

This education program teaches elementary age children how to walk and bike safely, giving them the essential skills that they need to enjoy a healthy and active lifestyle.

Let's Go NC! A Pedestrian and Bicycle Safety Skills Program for Healthy, Active Children is an all-in-one package of lesson plans, materials, activities and instructional videos that encourage children to learn about and practice fundamental skills that build safe habits.



This program was developed for the North Carolina Department of Transportation's Division of Bicycle and Pedestrian Transportation and Safe Routes to School Program by NC State University's Institute for Transportation Research and Education.

Sidewalk Art Program

Encourage creative use of public sidewalks within the Town Core area (i.e. ability to set up chairs, apply for art enhancements on the sidewalk, etc.). Help businesses develop a theme or design for the sidewalk in front of their stores and shops. Work with the newly established

streetscape committee and Historic District to implement the program and supply seed funding for the first year of this program.

Pedestrian Laws Training Program

This program created by the NCDOT Bicycle and Pedestrian Program is designed for children, adults or police. The program covers the following topics: Right-of-way at crosswalks, right turn on red, yielding to vehicles, walking on roadways without sidewalks, railroad crossings and more. More information about North Carolina pedestrian laws can be found here:

<http://www.ncdot.gov/bikeped/lawspolicies/>

Adopt a Road / Adopt a Sidewalk Programs

Adopt a Road programs are seen in many communities across North Carolina. The program provides resources to the community to sponsor and help to clean up road litter. The Town of Oak Ridge can begin a similar program for its sidewalks and (future) shared-use paths. This program could also be used as a means for the community to alert the Town government when there is a maintenance issue with a sidewalk, or as a means for a sidewalk to get special attention, funding, and improvement through a community sponsor.



Safe Routes to School Programs (SRTS)

The Safe Routes to School program is a national and international movement to enable and encourage children, including those with disabilities, to walk and bicycle to school. Safe Routes to School programs are comprehensive efforts that look at ways to make walking and bicycling to school a safer and more appealing

transportation alternative, thus encouraging a healthy and active lifestyle from an early age.

The North Carolina SRTS program

<http://www.ncdot.gov/download/programs/srts/SRTS.pdf> is administered by the North Carolina Department of Transportation Bicycle and Pedestrian Transportation Program. There is funding available for a broad spectrum of initiatives including, but not limited to:

- Walking school bus programs (i.e. groups of students and parents/teachers walking to school) www.walkingschoolbus.org
- Crossing guard training (i.e. when the school system and local law enforcement do not have the current resources to provide training)
- One-time or weekly walking and bicycling safety events (i.e. bicycle rodeos, safety and health awareness fairs, walk to school day - www.walktoschool.org)
- Safety curriculum (i.e. printing safety curriculum and training for teachers) and
- Bicycling and walking improvements (i.e. sidewalks, paths, bike parking, bike lanes, crossing treatments)

Many of the SRTS programs take few resources to get started (aside from bicycling and walking facility improvements), however a “local champion” will be needed to start and implement Safe Routes to School programs. The “local champion” will likely be a parent or teacher who can lead the effort on Safe Routes to School. This is a significant opportunity to fund programs educating and encouraging both students and parents about the benefits of walking or bicycling to school.

Tree Programs

Explore enhanced tree planting and preservation programs for the Town of Oak Ridge. Build on existing programs, encourage quality tree cover through the efforts of the Historic Preservation Commission and others. Basic requirements of the enhanced ordinance should include:

- If trees are cut down, replacement trees should be of equal or greater than the diameter of the trees cut, multiple trees can be planted where the sum of the diameters are equal to the diameter of the trees cut down;
- If trees are trimmed by utilities, provide criteria for severity and scope of trimming and a process to communicate these criteria to the utility company;
- Provide more detailed guidance on the types of trees and landscaping for commercial and retail areas; and
- Provide a certified part-time ISA arborist to educate and enforce the ordinance.

Some cities have worked with the utility company to provide free saplings and trees to customers. In addition, education for citizens, businesses and developers about affordable and quality trees can be beneficial to improve the tree canopy, property aesthetics and the pedestrian experience.

4. IMPLEMENTATION

Effective implementation of recommended projects, programs and policies outlined in this plan will require the sustained, focused and coordinated efforts by Town leaders and Oak Ridge citizens. The planning efforts in this plan and previous plans have reinforced the interest of citizens in creating more trails, sidewalks, open space and safe road crossings. Continued effort in implementing action items will create the momentum needed to carry out projects, programs and policies outlined for the next 20 years. The schedule of action items on the following page outlines how the highest priority action items can be implemented and the entities with primary responsibility for carrying out each action item.

The Town of Oak Ridge should capitalize on road projects or other unforeseen opportunities that may preclude action items shown in the table on the next page. The list of action items should be reviewed and evaluated by Town staff and reprioritized every 2 years. In addition to maintaining a list of completed projects, the Town should conduct an annual audit of pedestrian infrastructure, assets and needs to identify changing issues and re-focus limited capital efficiently.

4.1 ACTION PLAN

A step-by-step implementation process is detailed for the next 2 years and items are not necessarily in sequential order. The suggested party or parties who need to complete each action step is also included, with a reference to where more info can be found in this document. Opportunities to implement certain action items may arise before others and these opportunities should be pursued.

The walkability committee exists and should advocate for implementation of the plan and assist in public outreach and grant writing, Town staff communication and other duties. Individuals who signed up at the public meetings may be willing join the walkability committee and contribute to the implementation effort.

Funding opportunities from state and federal agencies and non-profits are listed in the Appendix. In many cases, match for grant applications will be necessary. For example, federal Transportation Alternative Programs requires a 20% local match. The Parks and Recreation Trust Fund (PARTF), a State program, requires 50% match. Dedicated funding from local sources will need to be secured to leverage grant funding. Successful applications for funding from the various resources will be integral to implementation of pedestrian transportation goals and objectives. When using federal funds for a project, it is recommended that the total estimated project cost be greater than \$150,000.

In five years a broader assessment and evaluation of efforts should be performed to both re-prioritize if necessary and check progress on implementing projects, programs and policies. New ideas, challenges and opportunities should also be explored. The 5-year reassessment would serve as a Comprehensive Pedestrian Transportation Plan Update and may modify a number of sections of this current Pedestrian Transportation Plan.

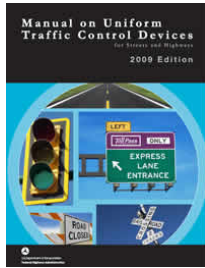
2 YEAR ACTION ITEMS

2014 Action Items	Partners	More Information
<ul style="list-style-type: none"> ○ Submit and apply to MPO for funding of 1 priority sidewalk project, 1 multi-use path project, 1 crossing improvement project 	<p>Town Council, sub-contractor, Greensboro MPO</p>	<p>See Section 3.1</p>
<ul style="list-style-type: none"> ○ Fund a streetscape plan for one or multiple corridors, depending on resource availability 	<p>Town Council, Planning Board and Historic Preservation Committee</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Establish a program to fund sidewalk gaps and a policy on how to equitably reward and fund the program, include guidance on sidewalk maintenance agreements for property owners 	<p>Town Council</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Establish a Complete Streets policy that explicitly includes accommodation of pedestrians and bicycles on new road projects 	<p>Town Council</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Seek funding sources needed to build top priority projects 	<p>Town Council, Pedestrian Transportation Implementation committee, Greensboro MPO</p>	<p>See Appendix</p>
<ul style="list-style-type: none"> ▪ Establish grant writing schedule and seek grants for specific projects to achieve project building goals ▪ Provide matching money for grant applications ▪ Establish Oak Ridge Greenway Trust Fund ▪ Seek Safe Routes to School Funding ▪ Increase Capital Program funding for sidewalks <ul style="list-style-type: none"> ▪ Seek other funding sources 	<p>Town Council, Town of Oak Ridge, Intern, NCDOT, Pedestrian Walkability committee and Non-Profit Partners</p>	<p>See Section 3.2 & Appendix</p>

2015 Action Items	Partners	More Information
<ul style="list-style-type: none"> ○ Submit and apply for funding 2 additional sidewalk projects, complete multi-use path project, identify and fund another multi-use path project, complete crossing improvement project 	<p>Town of Oak Ridge and sub-contractor, Greensboro MPO</p>	<p>See Section 3.1</p>
<ul style="list-style-type: none"> ○ Adopt an Access Management Policy and include an assessment of streets where bicycle lanes may be feasible on existing streets in Oak Ridge 	<p>Town Council and Oak Ridge Planning</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Work with Duke Energy to fund a streetlight inventory focusing on gaps, streetlight styles and foot candles 	<p>Planning Board and Historic Preservation</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Complete a streetscape plan and begin construction 	<p>Town Council, sub-contractor, NCDOT Division, Greensboro MPO</p>	<p>See Section 3.2</p>
<ul style="list-style-type: none"> ○ Continue to seek funding sources needed to build pedestrian projects 	<p>Town Council, PTRC Pedestrian Transportation Implementation committee, Greensboro MPO</p>	<p>See Appendix</p>
<ul style="list-style-type: none"> ▪ Establish grant writing schedule and seek grants for specific projects to achieve project building goals ▪ Town to provide matching money for grant applications; ▪ Renew Capital Program funding for sidewalks ▪ Seek other funding sources 	<p>Town Council, Planning Board, PTRC, Walkability committee and Non-Profit Partners</p>	<p>See Appendix</p>

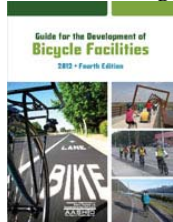
APPENDIX A. DESIGN GUIDELINES AND PROJECT DEVELOPMENT

The basic principles of walkable communities (see Chapter 1) should guide the development of new facilities. These new facilities may be built by the Town of Oak Ridge, NCDOT or built as new development occurs by private contractors and individual property owners.

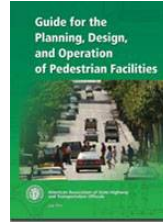


There are a number of ways to build the facilities called for in this plan. Many of the facility improvement recommendations will need further investigation and engineering before improvements and design are finalized. The designs and improvements to federally funded streets must follow Federal Highway Administration guidelines outlined in the Manual of Uniform Traffic Control Devices – MUTCD (see inset) or be in jeopardy of losing funding or adding liability. More flexibility is allowed for municipal owned streets where local or state funding is used.

Additional guidance for trails and sidewalks can be found in the following manuals:



American Association of State Highway and Transportation Officials (AASHTO) Guide to the Development of Bicycle Facilities 4th Edition(2012)



AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities (2004)

The placement and design of new pedestrian facilities may vary somewhat depending on the make-up of the adjoining land uses. The North Carolina Department of Transportation released the Complete Street Planning and Design Guidelines in 2012, which gives an opportunity to view adopted design criteria to fit local conditions. These guidelines will prove useful to municipalities looking to design streets that accommodate pedestrians and bicyclists.

SIDEWALKS

The most important feature of the pedestrian transportation system is the sidewalk. . In many ways, they act as the seam between private residences, stores, businesses, and the street. Sidewalks are spaces where children play, neighbors meet and talk, shoppers meander casually, parents push strollers, and 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 sidewalks.

The Federal Highway Administration (FHWA) defines sidewalks as “walkways that are parallel to a street or highway” and walkways as generally being “pedestrian paths, including plazas and courtyards.”

Sidewalk Widths

DBPT recommends a minimum travel path width of 5 ft. for a sidewalk or walkway, in accordance with the American Association of State and Highway Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the Institute of Transportation Engineers (ITE). A sidewalk width of 5 feet is considered ample room for two people to walk abreast or for two pedestrians to pass each other. Without a sidewalk, many people will not or cannot walk safely along streets and roads. Many of the recommendations for improvement have suggested closing sidewalk gaps, improving handicap accessibility, and making neighborhood connections to shopping areas, schools and nearby parks.

The following are recommended cross-sections of sidewalks, depending on location. Variations in these recommendations should be considered on a case-by-case basis and are guidelines. Streetscape plans, complete street design guidelines, community or historic district considerations and environment may vary actual widths. Minimums should not be reduced, but maximums may be increased.

Figure A.1.A – Sidewalk Widths and Buffers by Location*

Type	Sidewalk Width	Planting Strips/ Buffer	
		With Street Tree	No Street Tree
Local residential	5-6 ft.	4 - 8 ft.	3 - 7 ft.
Thoroughfares/ Collectors	6 - 10 ft.	6 – 8 ft.	5 - 7 ft.
Downtown or business districts	10 - 15 ft.	n/a**	n/a**

* See figures A.10-12 Complete Street Cross-Sections for More Information. **Planting strip or tree pit would be located within sidewalk width.

AASHTO recommends the construction of sidewalks on all city or town streets, including those in rural areas. The Institute of Transportation Engineers (ITE) recommends sidewalk installation on both sides of the street whenever possible for new urban and suburban streets, especially in commercial areas, residential areas with 4 or more units per acre, or residential areas on major arterials and collectors. If sidewalks on both sides of the road are not possible,

lower density rural residential or suburban areas might adequately serve its pedestrians with a sidewalk on only one side. Under certain low-traffic, low-density situations, a wide paved shoulder can serve as an adequate pedestrian path.

It is important to note the potential for conflict between pedestrians and bicyclists on paved shoulder. Both bicyclists and pedestrians must exercise caution in order to avoid potential crashes on paved shoulders.

Construction Materials and Methods

Improvements for new, retrofitted, and repair to sidewalks throughout the municipality should be constructed using the following methods and materials:

Materials

Sidewalks should be constructed of Portland Cement Concrete (PCC) with a 14-day flexural strength that is not less than 3,000 pounds per square inch (psi).

Subgrade Preparation

Subgrade should be thoroughly compacted and finished to a smooth, firm surface, and should be moist at the time the concrete is placed.

Subgrade Compaction

Except in areas where it is impractical to use standard type rollers, compaction should be by means of vibratory hand compactors.

Final Finish

Surface finish for sidewalks should be completed by brushing (with brooms) or by another approved method to provide a uniform non-skid surface.

Inspections and Performance

Sidewalk forms should be inspected by municipal staff prior to the placement of concrete. Concrete that does not meet minimum mixture and strength standards or settles after placement should be removed and replaced by the installer.

Alternative Materials Usage

Use of materials for sidewalks other than concrete and the construction methods used therewith must be approved by the town or a designated representative on a case by case basis. There are some successful examples where other materials such as asphalt, crushed stone, brick, granite fines, or other slip resistant material have been used. Concrete is preferred surface, providing the longest service life and requiring the least maintenance.

Figure A.1.B – Sidewalk Widths and Construction Type Examples



*Sidewalk Design Example A
Brick, Behind Curb and Gutter*



*Sidewalk Design Example B
Brick, Behind Ditch*



*Sidewalk Example C
Concrete Behind Ditch*



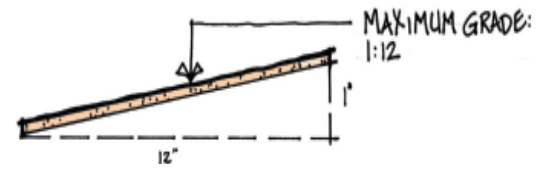
*Sidewalk Example D
Concrete, Behind Curb*

Grade

AASHTO recommends the following grades for sidewalks:

Continuous sidewalk grades should not exceed 5% (1:20).

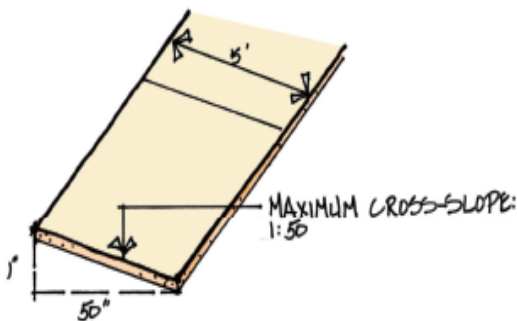
However, in areas where the existing topography or the adjacent street cause grades of more than 5%, sidewalk grades of up to 8.33% (1:12) may be used for a rise of no more than 2.5 feet, provided that level landings (grades less than 0.5%) are provided at the end of such grades and are at least 5 feet long.



In cases where grades greater than 8.33% (1:12) must be negotiated, switchbacks or other approved ramping techniques must be provided and will conform to ADA requirements. Additional right-of-way and/or easements necessary to accommodate these features will be obtained by the applicant and legally dedicated to the city or town.

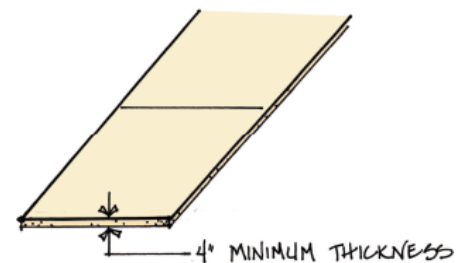
Cross-Slope

Sidewalks and walkways should be designed such that grades and cross slopes are minimized to allow those with mobility impairments to negotiate with greater ease. The maximum allowable cross-slope for sidewalks is 2% (1:50). At driveways, curb cuts, and both marked and unmarked crosswalks, the maximum allowable cross-slope must be maintained for a minimum width of 3 feet. Cross-slope should be oriented toward the adjacent roadway and sufficient to provide storm water runoff without creating standing water on the walkway.



Sidewalk Thickness

A minimum thickness (or depth) of 4 inches of concrete is required for all new sidewalks except as noted. To accommodate the additional loading caused by pedestrian density or by vehicles crossing a sidewalk, a thickness of 6 inches is required where sidewalks intersect at wheelchair/crosswalk ramps, and at driveways that use a ramp or apron-type access to cross the sidewalk from the adjacent public street.



Transitions

Wheelchair ramp and driveway transitions to or crossing sidewalks must conform to current ADA requirements.

Sidewalks and driveways

It is important to design sidewalks to be level across driveways, including both the cross and running slope.



The 'Level Landing' picture shows an example of how a continuous sidewalk grade can be maintained. This design helps people in wheelchairs negotiate driveways and driveway aprons with ease.

Tapers

Transitional tapers to and from sidewalks of different widths are to be at a maximum rate of 1-foot of width per 10 feet of length (1:10) except as approved by the city or town.

Sidewalk Alignment

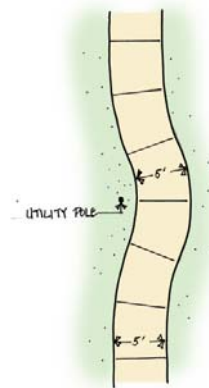
Sidewalks should parallel the roadway. Typical exceptions include:

Horizontal Curve Sections on Roadways

In situations where a roadway curves at an angle greater than 60 degrees (and where right-of-way permits), the designer is permitted to adjust the curve of the sidewalk to more easily accommodate pedestrians.

Presence of Natural and Manmade Features

The 5-foot minimum width of the travel path must be free of obstructions. The designer is permitted to alter the sidewalk path to avoid significant obstructions including but not limited to: transformers, utilities and utility poles, fire hydrants, and traffic signal hardware. Sidewalk path exceptions should be evaluated and approved on a case-by-case basis by the city or town. Care should also be used to ensure that the travel path does not interfere with the integrity of trees or of historic features.



Meanders

Sidewalk meandering is strongly discouraged. People generally prefer to walk in a straight line, particularly when walking for utilitarian purposes. Meanders must meet minimum ADA requirements unless otherwise approved by the municipality.

Sidewalk Buffers

Buffer zones between pedestrian paths and vehicular traffic provide a sense of security to those on foot or in wheelchairs and give the path a comfortable scale and clear definition. Buffers can also provide other benefits to pedestrians depending on the type used. Buffer zones may either be paved, providing space between the pedestrian and traffic, or they may involve a planting strip with trees and shrubs, but is not recommended for high-traffic pedestrian areas. Much like the sidewalk itself, the form and topography of a buffer may vary greatly. AASHTO recommends a buffer width of two to four feet for local or collector streets, and a buffer width of five to six feet for arterial or major streets, whether for a paved buffer zone or a planting strip.

Planting Strips

Continuous zones of landscape, located between the sidewalk and the street curb or the edge of road pavement, perform a multitude of essential tasks. Planting strips contribute to the walkability of a street by providing shade. In addition to providing shade, street trees - along with turf and other plantings - help reduce urban temperatures, improve water quality, lower

stormwater management costs, and add beauty to the street for the pedestrian, the driver, and the adjacent land use.

The recommended planting width to permit healthy tree growth is 4 to 10 feet measured from the back of curb. Planting strips, or tree lawns, are the preferred means of providing a buffer, but are not feasible or appropriate in all pedestrian situations.

The width of the planting strip shall increase with a greater plant density and potential as the intensity of development increases. This separation from motorized traffic decreases road noise while increasing a pedestrian's sense of security and comfort. Added benefits of this separation include space for signage, utilities (fire hydrants), and vegetation.

Paved buffer zones

In some situations, continuous planting strips are not feasible, particularly where there is a high degree of foot traffic between the sidewalk and the street. As such, these planting strips are typically used in downtown or commercial areas. In these cases, a paved buffer zone should be provided between the travel path of the sidewalk and the curb. Though a constant width is preferred for this buffer zone, the width may vary as long as the buffer does not interrupt the pedestrian travel path. Items located in the buffer zone can include street furniture, planters, trees planted with tree grates, streetlights, street signs, fire hydrants, etc. Such items are placed in the buffer zones so as not to restrict pedestrian flow in the travel path.

Street tree plantings in tree pits (with grates and guards, have historically proven to work successfully within these buffer zones. They regulate micro-climate, 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. For healthy trees, attention should be given to amending the soil and providing drainage within the tree pits. In the event that a paved or vegetative buffer zone is not possible, a row of parked cars or a bike lane can be used to create this buffer.

Buffer Paving Options

A different type of paving from the sidewalk paving could be considered for the buffer zone for various reasons. Textured pavements -- pavers or pervious pavement -- can be used to add significant aesthetic value and help define a unique place. Using pervious materials for parking, sidewalk furniture areas, and for frontage zones could reduce environmental concerns. A change in paving type can help distinguish the pedestrian buffer zone from the pedestrian travel path. Sand-set pavers are recommended in the buffer zone for ease of utility maintenance. In designing sidewalk buffers, it is important to provide adequate clearance from potential obstructions.

Additional Considerations

Though the buffers described above each provide some sort of physical barrier from moving vehicular traffic, it is vital for pedestrians on the sidewalk to have a clear view of drivers and vice-versa. This is a particularly important consideration in designing and maintaining planting strips. It is important to eliminate both high and low contact points with tree branches, mast-arm signs, overhanging edges of amenities or furniture. In addition, it is necessary to provide

two feet of clear space from store fronts to accommodate shy distance from walls and the opening and closing of doors.

INNOVATIVE SIDEWALK MATERIALS

This section provides information on additional materials to consider when building new or repairing existing sidewalk infrastructure.

Rubber Sidewalk

The rubber sidewalk shown here reduces maintenance costs when compared to concrete sidewalks. According to Rubber Sidewalks, Inc. the average cost per square foot, including break out and installation, is \$15.00. The cost for a linear foot of rubber sidewalk (5' width) is approximately \$75. When including the cost of grading for new installations, the cost is competitive with concrete installation. The rubber sections of sidewalk are large tiles that can be removed for tree root maintenance as well. In most cases, concrete sidewalk must be replaced after tree root maintenance.

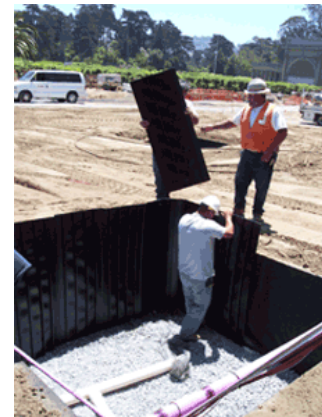


Rubber Sidewalk (Source: Rubber Sidewalks, Inc.)

Root Barriers

There are a number of different vendors that supply root barriers for street tree plantings. The root barriers should be installed when a street tree is first planted, but can also be installed around mature trees. The root barrier should surround the tree root ball in a circle for newly planted trees. Mature trees will need to have the roots trimmed and a barrier installed between the tree and sidewalk or path. If installed correctly, the root barrier forces tree roots downward away from the sidewalk, path, building or utilities.

Root barriers can be made with any impermeable durable material that can withstand burial in soil for an extended period of time. Root barriers are recommended to be installed to a depth of 30 inches minimum and they must extend above the surface of the soil enough to prevent roots from growing over the top. There are root barrier materials that are permeable to moisture but will not allow roots to grow through, but may be more expensive.



Root Barrier (Source: Vespro, Inc.)

STREET TREES

Street trees enhance the landscape for pedestrians, creating an attractive and comfortable environment for walking. Street trees also act as a traffic calming device, encouraging drivers to drive more slowly. In addition, a large line of leafy street trees can absorb engine noise, providing enough of a buffer to block street traffic noise from reaching private yards and homes. Trees also improve air quality by consuming carbon dioxide and emitting oxygen. Street trees may also increase real estate values by increasing curb appeals of homes. This Plan

strongly recommends that municipalities adopt a tree ordinance to give direction for tree installation and maintenance.

Planting requirements

All street trees should be selected according to the standards described in the American Standard for Nursery Stock of the American Nursery and Landscape Association. Install and maintain trees according to the International Society of Arboriculture (ISA) guidelines. A landscape architect should be consulted to select the proper tree and planting technique.

Visibility

Street trees should never be allowed to obscure the line of sight between pedestrians and drivers. A clear view should be maintained between 30" and 72" above street. This area must be free of limbs and foliage for safe cross visibility. Other plantings should also follow this rule within 50 ft. proximity of street corners and other designated crossing points. In order to maintain visibility, provide shade, and a comfortable pedestrian corridor, street trees should primarily be vase shaped, columnar, or oval in form (habit) with large spreading crowns.



Roots

Avoid trees with aggressively invasive roots adjacent to pavement or buildings.

Size

Large trees (growing over 35 ft. in height at maturity) are preferred as street trees except near overhead utility lines. Small trees (growing less than 35 feet in height at maturity) should be used in areas directly adjacent to or under utility lines.

Spacing

Typically, large trees should be spaced approximately 40 – 50 feet on center when planted in a line, and small trees spaced at approximately 30 ft. The spacing of street trees in a planting strip will depend upon the size of the tree and upon the demand for sidewalk furniture and parking.

Tree Pits and Tree Grates

Street trees should generally be located in open planting strips. However, tree pits with tree grates may be a practical, although expensive, alternative in very high pedestrian traffic areas. Tree grates should generally not encroach upon the travel path. For optimal pedestrian safety and comfort, all tree grates used should meet the ADA standards for "accessible pathway".

Maintenance

Trees and landscaping require ongoing maintenance. Local municipalities typically take responsibility for maintenance of these amenities, although there are instances where local community groups have provided funding and volunteers for maintenance. In order to reduce the amount of maintenance necessary, it is helpful to use native plant material that is already adapted to the local soil and climate. Growth pattern and space for maturation, particularly

with larger tree plantings, are important to avoid cracking sidewalks and causing a pedestrian obstruction.

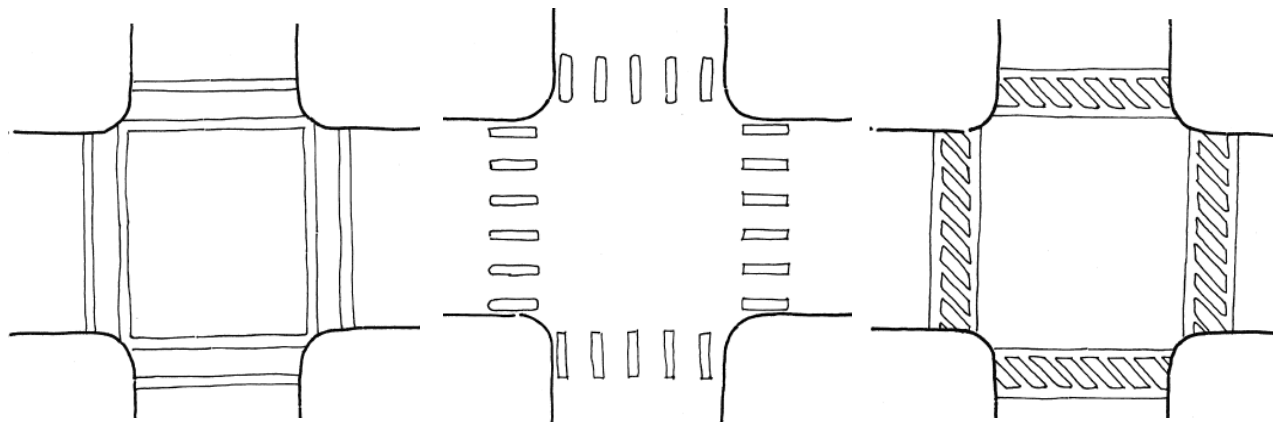
INTERSECTIONS

Pedestrian-vehicular conflict occurs primarily at intersections. As shown by the intersection project recommendations, features that help pedestrians include: crosswalks, curb ramps, refuge islands, signals, signs, advance stop bars, curb extensions and other treatments. Some of the most important treatments for improving pedestrian intersection crossings are included below, but there are many other treatments to consider. The *PEDSAFE: Pedestrian Safety Guide and Countermeasures Selection System* www.walkinginfo.org/pedsafe/ may be consulted in addition to a number of the other resources found in the References section of this Plan when considering improvements to intersections.

CROSSWALKS

Crosswalks direct pedestrians to the best places to cross the street. Curb ramps should be aligned with crosswalks. Crosswalks do not always provide the needed safety to cross a street safely; for example on higher speed arterial streets, additional treatments are needed to make it safe for pedestrians to cross, including medians, crossing islands and other treatments.

Figure A.2 – Crosswalk Design

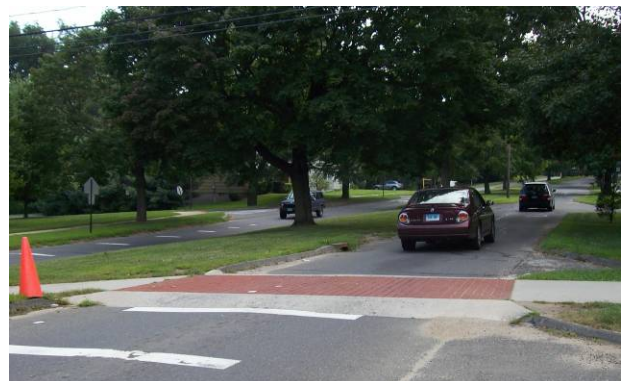


Horizontal Line (most common)

*Ladder Style (high vis., low maintenance)
Courtesy: ITE*

Diagonal (high vis., and maintenance)

The crosswalk designs shown in Figure A.2 are approved by the MUTCD and should be marked with white paint at all times. Crosswalks should be at least 6 feet wide and 10 feet wide or more in high pedestrian traffic areas. The horizontal line crosswalk is common in Oak Ridge. The ladder and diagonal style are the most visible design. When installed correctly, the ladder style requires less maintenance as the hash marks can be aligned so that motor vehicle wheels will not



Raised Crosswalk, CT

Source: www.pedbikeimages.org, Tom Harned

track over them, reducing wear and tear. The NCDOT installation of crosswalks typically requires sidewalks on both sides of the roadway. A raised crosswalk may be recommended for high pedestrian usage areas (i.e. next to parks or schools) and are typically installed on two lane roads with a posted speed limit of less than 35mph.

Mid-block crossings

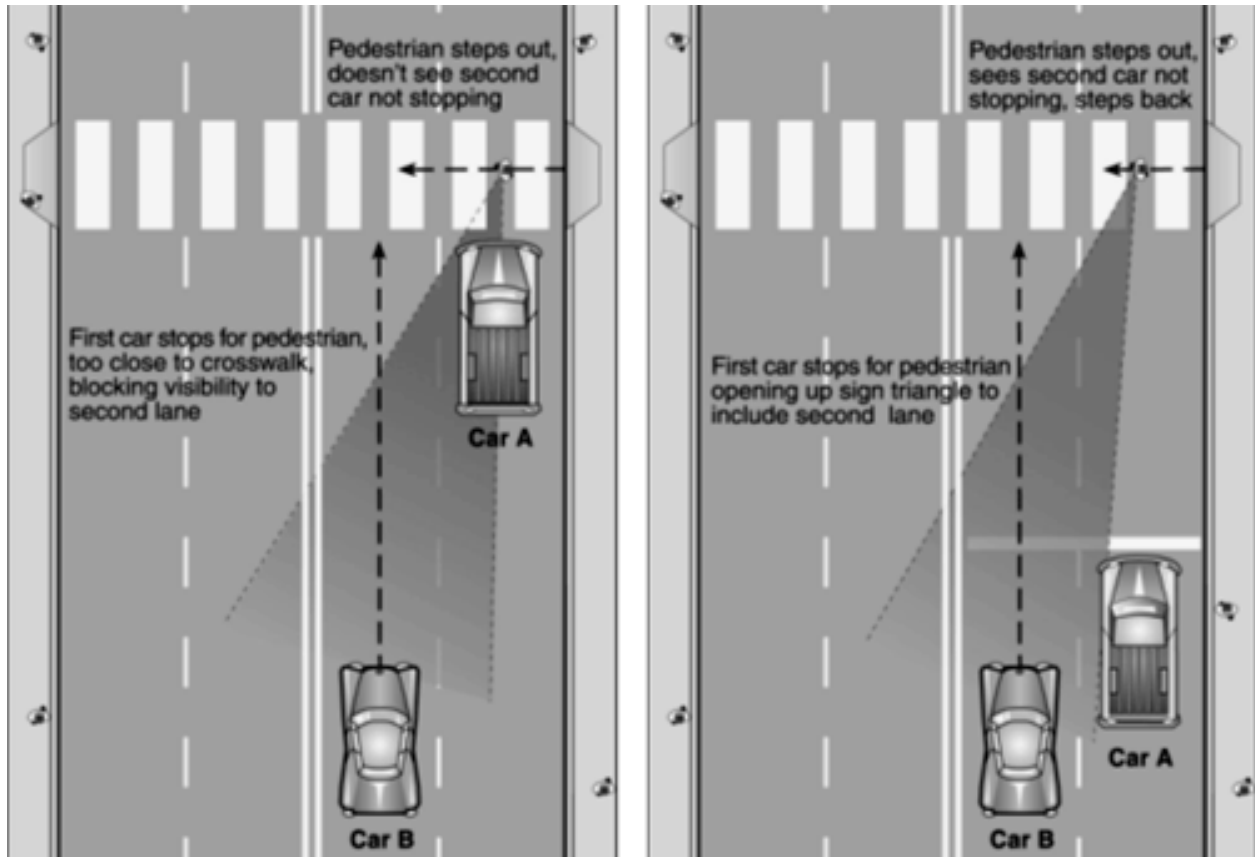
In general mid-block crosswalk crosswalks should **not** be:

- Installed in an uncontrolled environment where speeds exceed 40mph;
- Installed within 300 feet of another designated crossing point;
- Installed without other safety treatments such as warning signage or pavement markings, signalization or curb extensions, raised crosswalks, etc.

Advance stop bars

In conjunction with striping crosswalks on multi-lane roads, it is recommended that installation of advance stop bars be included for pedestrian safety. Figure A.3 illustrates the site distance advantage when advance stop bars are included for vehicles. The advance stop bars may have yield to pedestrian sign (MUTCD R1-5, R1-5a, R1-6, R1-6a) at un-signalized intersections indicating that vehicles must yield at the stop bar. The stop bar should be place 6 to 15 feet from the crosswalk on multi-lane roads or un-signalized intersections and 4 to 10 feet from the crosswalk at signalized intersections.

Figure A.3 - Advance Stop Bar for Crosswalks



Source: www.walkinginfo.org

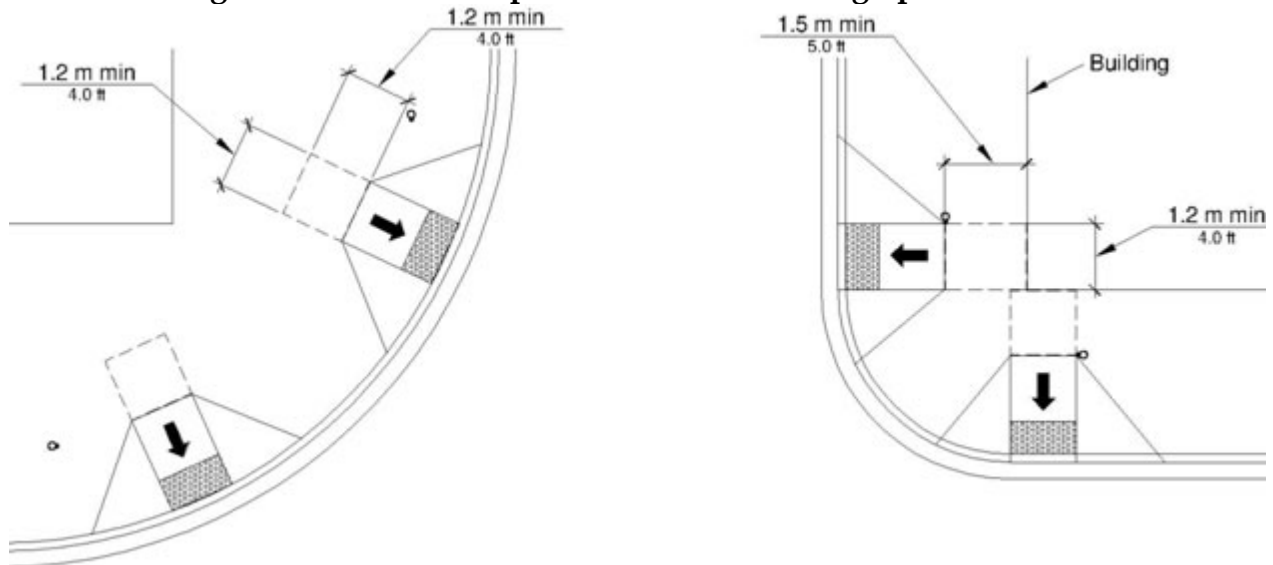
Figure A.4 - In-Pavement Yield to Pedestrian Sign*In Pavement Yield to Pedestrian Sign - Greensboro, NC*

It is important to study the best crosswalk locations before installation. The vehicles need to be able to see the pedestrians and the pedestrians need to be able to see the vehicles. In addition, there must be ample room for wheelchair landings where the curb ramp meets the sidewalk. Figure A.4 shows the sign design from the MUTCD which can be placed on plastic bollards in advance of the crosswalk as shown in the photo. These improvements are recommended in a number of intersections for Oak Ridge.

CURB RAMPS

There are many locations along existing sidewalks where the installation of curb ramps will enhance the walking environment. The design shown in Figure A.5 follows the guidelines of the Americans with Disabilities Act (ADA). Each four-way intersection should have 8 ramps or 2 to a corner. The curb ramp should align with the crosswalk. The width of the ramp should be at least 4 feet and a detectable warning for the visually impaired (see truncated dome image below) should extend 24 inches from the bottom of the ramp, covering the entire width of the ramp. The image below shows a curb ramp installation in a parking lot, which is required by law.

Figure A.5 - Curb Ramp and Sidewalk Landing Specifications



Source: www.access-board.gov/prowac/nprm.htm Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way



Source: Wikipedia, tactile paving

RAISED OR LOWERED MEDIANS

Medians are barriers in the center portion of a street or roadway. Medians allow for less interaction between cars and bicycle and pedestrians, and make more opportunities for bicycle lanes. A center turn lane can be converted into a raised or lowered median thus increasing motorist safety. Travel lanes may be narrowed to accommodate the placement of a median. Raised or lowered medians should provide ample cues for people with visual impairments to identify the boundary between the crossing island and the roadway. According to AASHTO guidelines, the length of a median should be a least 20 feet.

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



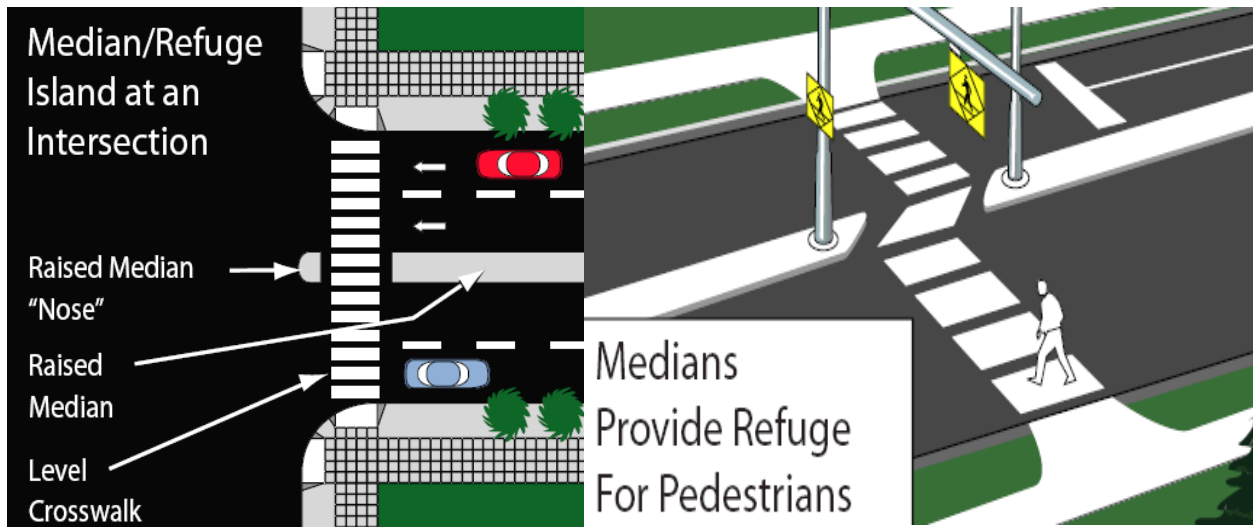
Sensitivity to large vehicles (buses, trucks and fire equipment) dictates some elements of the median design, curb style, and placement. Median-controlled roadways reduce the number of turning conflicts and are generally preferred for both pedestrians and cyclists over a two-way, left-turn lane (TWLTL) roadway.

Landscaping

Medians provide opportunities for landscaping that in turn can change the character of the street and help to slow traffic. Landscaping should not obstruct the visibility between motorists and pedestrians.

REFUGE ISLANDS

The design and installation of a refuge island (or crossing island) at an intersection is shown in Figure A.6 on the left. The installation of a refuge island increases the safety of pedestrians allowing refuge when a complete crossing is interrupted by speeding or turning vehicles. The refuge or crossing island is especially helpful to pedestrians on major thoroughfares with 3 or more lanes. Figure A.6 shows how a median can help pedestrians across the street where there is no intersection.

Figure A.6 - Median/Refuge Islands

Source: Pedestrian Bicycling Information Center, Dan Burden

This installation would be appropriate on long blocks where pedestrians are observed crossing mid-block and it is greater than $\frac{1}{4}$ mile +/- distance to the nearest intersection. Median refuge islands should be at least 6 feet wide to accommodate two pedestrians and at least 10 feet wide for high pedestrian use areas. At a minimum, a 4 square foot level landing area should be included to accommodate wheelchair users.

PEDESTRIAN SIGNALIZATION

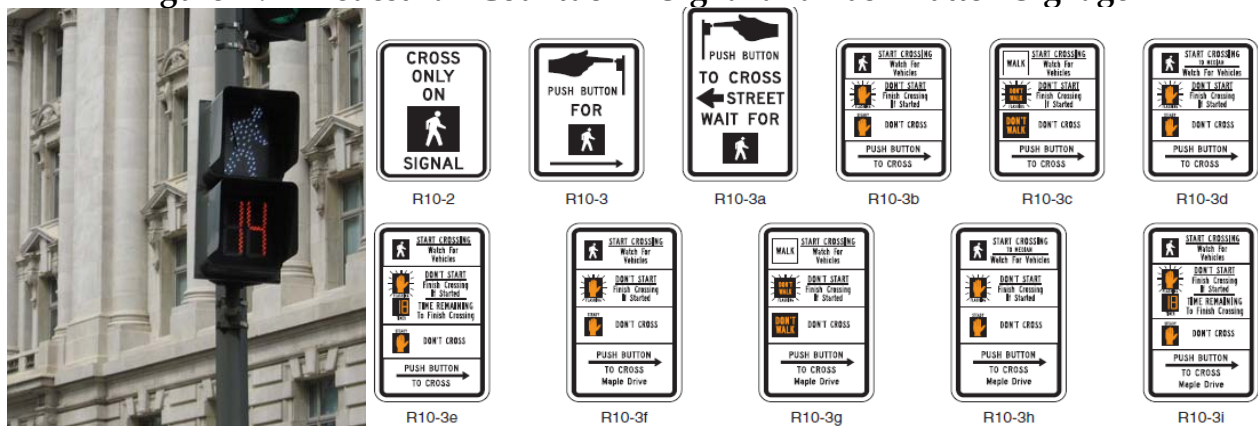
Pedestrian push button activated signals and signage is shown Figure A.7. The push button should be located on the sidewalk and easily accessible to persons with disabilities, but in a location that does not interfere with pedestrian travel or encroach on the landing area from the curb ramp. The countdown signal shows the amount of time the pedestrian has to cross the street and counts down to show how much time is left. The countdown signal should be included on all installations and is the standard for NCDOT. The pedestrian interval or countdown time should be based on a walking speed of 3.5ft/s.

Other Considerations for Pedestrian Signalization

- To reduce right turn on red crashes with pedestrians, a “leading pedestrian interval” can be programmed into the signal time so pedestrians can safely cross the lane(s) where turning conflicts may exist.
- Audible signals to help people with visual impairment know when to cross safely.
- In high pedestrian traffic areas, automatic pedestrian signal activation can improve pedestrian transportation.

At intersections where pedestrians are observed and may be experiencing delay in crossing the street, traffic engineers should consult the MUTCD Section 4C.05 Warrant 4, Pedestrian Volume: <http://mutcd.fhwa.dot.gov/hm/2009/part4/part4c.htm> to determine if a pedestrian signal is needed. There is additional information on accessible pedestrian signals regarding types and placement guidelines at the Pedestrian and Bicycling Information Center website: www.walkinginfo.org/aps.

Figure A.7 – Pedestrian Countdown Signal and Push Button Signage



Source: Pedestrian Bicycling Information Center, James Wagner and MUTCD 2009

The pedestrian in roadway beacon and sign shown in Figure A.8 provides automobile traffic a warning signal that pedestrians are in the roadway. The light can be activated either by a sensor or by push-button activation for pedestrians before using a designated crosswalk. This application is particularly useful for mid-block crossings or crosswalks with poor sight distance. The sign used with the flashing light is from the MUTCD Chapter 2C and is code W11-2.

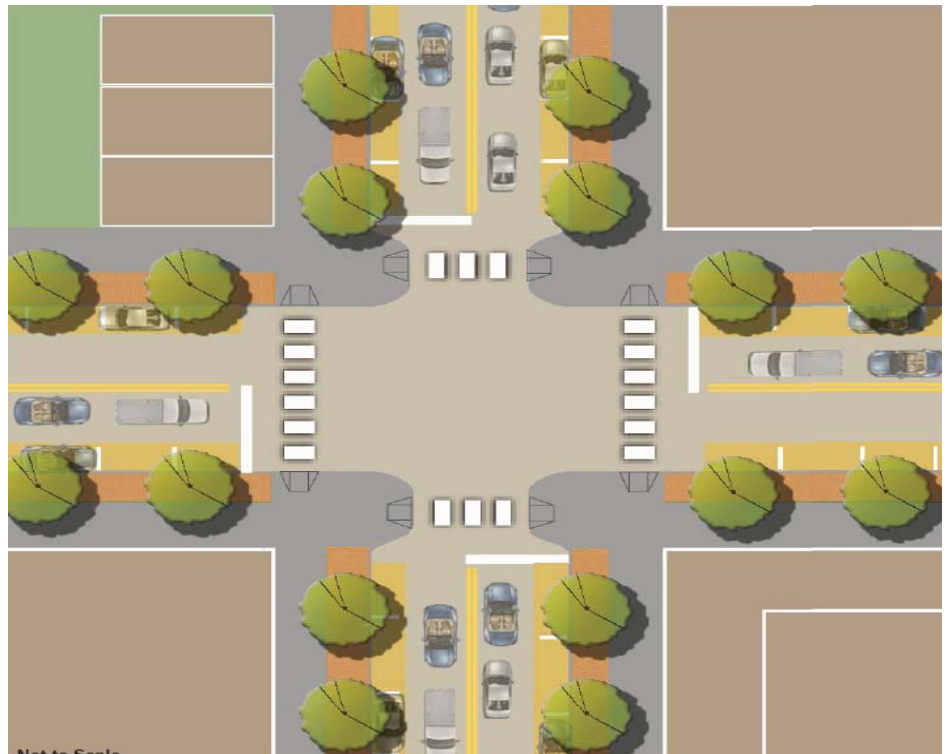
Figure A.8 - Pedestrian in Roadway Light and Rapid Flashing Beacon



Source: Dan Burden and FHWA

BULB-OUTS OR CURB RADII

The curb radii of an intersection influences not only crossing distance, but also the speed of vehicles traveling through the intersection. Decreasing the crossing distance through bulb-outs reduces the curb radius and helps pedestrian safety, comfort and access. Bulb-outs can be installed at intersections or mid-block crossings, much like pedestrian refuge islands. Large trucks can maneuver through the intersections by traveling slower or encroaching slightly into the other travel lanes as necessary to complete turns.

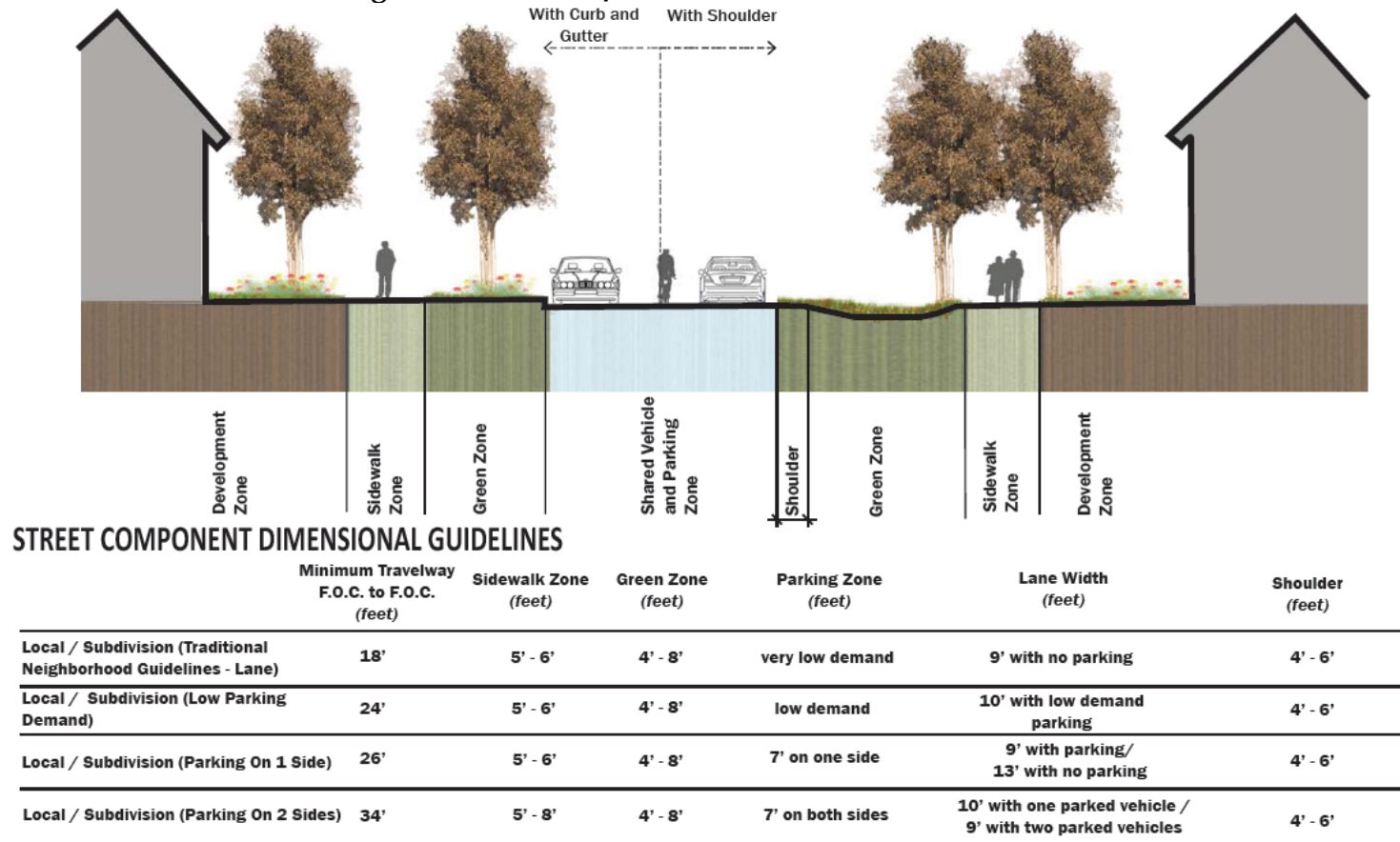


Source: NC Complete Streets Planning and Design Guidelines

STREET CROSS SECTIONS

The following street cross sections are from the NC Complete Streets Planning and Design Guidelines. The street cross section shown in Figure A.10 is appropriate for residential subdivision streets in the Town of Oak Ridge.

Figure A.10 - Local/Subdivision Street Residential Cross Section

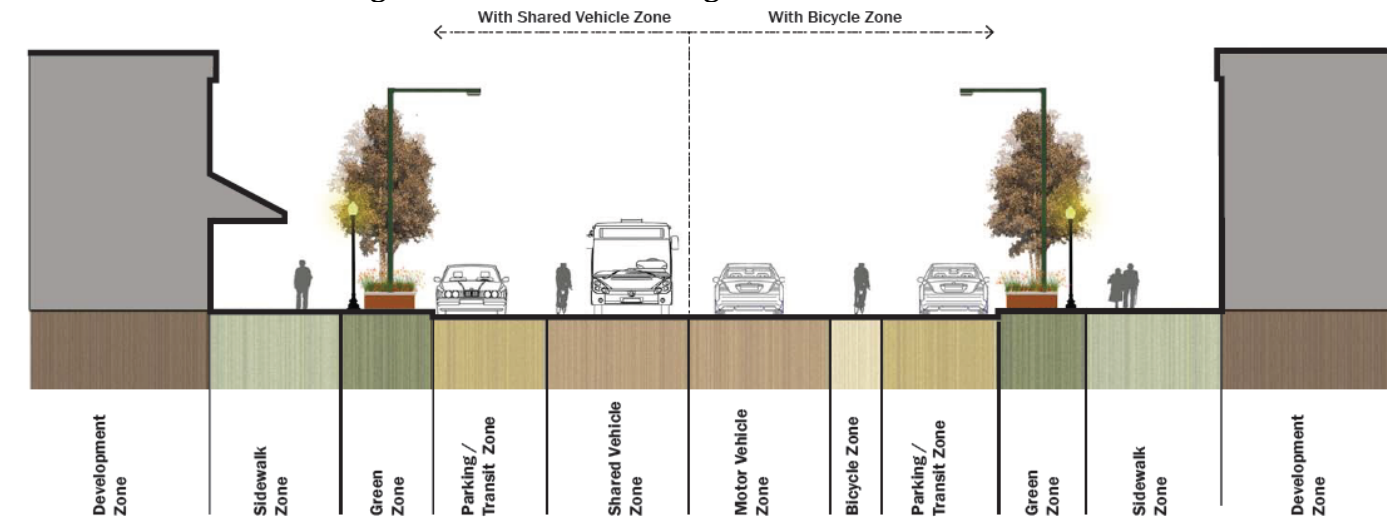


NOTES

1. Minimum travelway measured from Face of Curb (FOC) to FOC.
2. Median typically not provided on local streets unless for aesthetic reasons. If provided, lane widths will be increased by 2' - 5'.
3. Shoulder zone on local street typically has grass.

In commercial areas, the planting strips should not encroach on the travel way of the sidewalk, which should be at least 8 feet in width between the building and the planting wells or street furniture in the Town Core. The street cross section shown in Figure A.11 may be appropriate for NC 150 through the Town Core.

Figure A.11 - Rural Village Main Street Cross Section



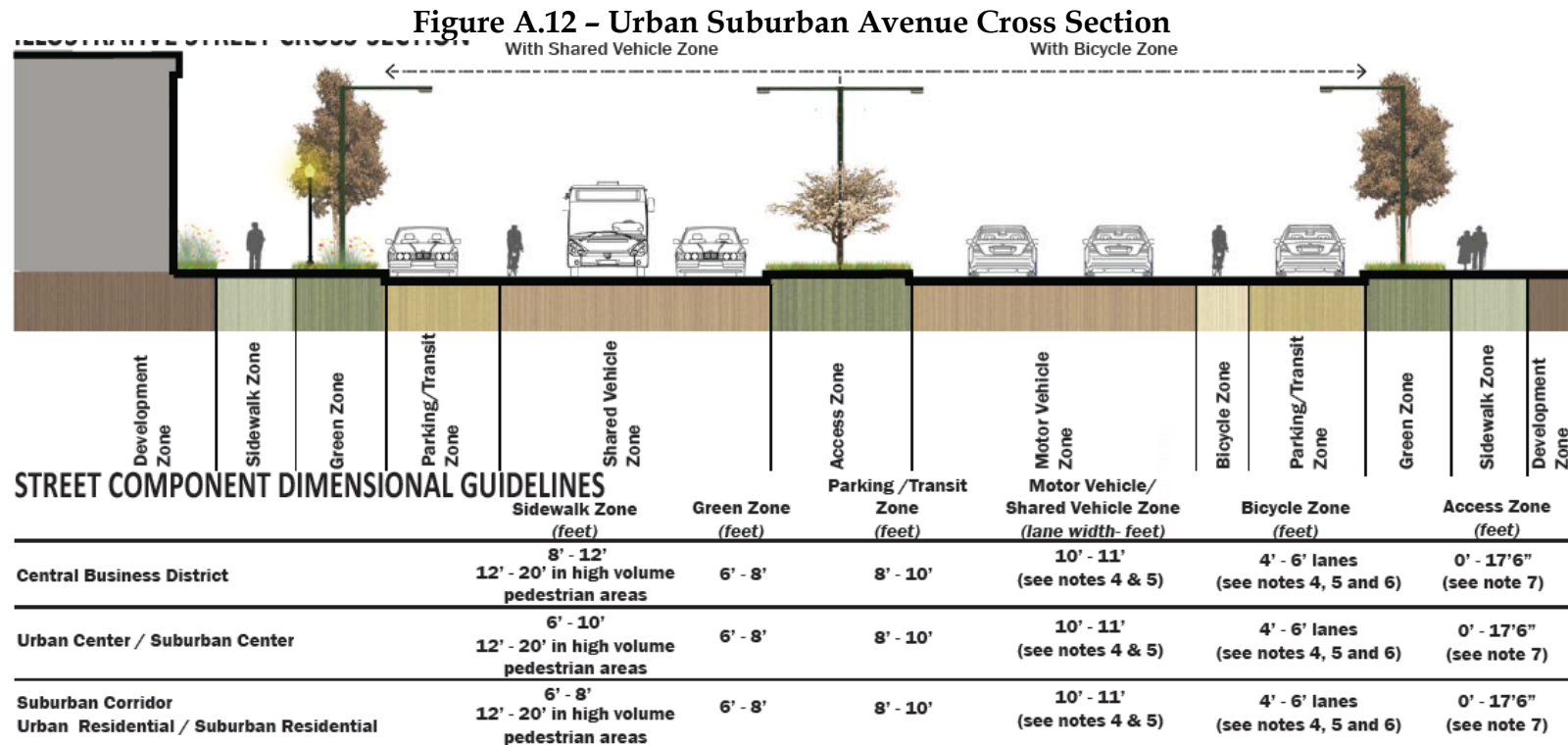
STREET COMPONENT DIMENSIONAL GUIDELINES

	Sidewalk Zone (feet)	Green Zone (feet)	Parking / Transit Zone (feet)	Motor Vehicle/ Shared Vehicle Zone (lane width- feet)	Bicycle Zone (feet)
Rural Village	10' - 12'	6' - 8'	8' - 10'	10' - 13'	4' - 6' lanes (see note 4)
Rural Developed	8' - 10'	6' - 8'	8' - 10'	10' - 13'	4' - 6' lanes (see note 4)

NOTES

1. Sidewalk zone should typically extend to the front of the building. Sidewalks are the most important element on a main street, because pedestrians are the priority. Therefore, the sidewalk width should typically be at least 10' unobstructed.
2. Green zone may include hardscaping, landscaping, street trees, lighting, and related pedestrian /bike /transit amenities. Hardscaping (with street trees in appropriately-designed planters) is typical, for access to on-street parking and transit.
3. Parking is expected on main streets. Parking zone dimensions vary depending upon the type of parking provided. Angle parking is allowed, preferably reverse angle parking. Angle parking will require a wider dimension than shown.
4. Shared lanes are the preferred treatment, due to the low speeds. In this case, travel lanes should be 13' wide to allow for maneuvering and opening car doors. Shared lane markings can be used on streets < 35 mph. If a bicycle lane is provided, it should be 6' wide, and the motor vehicle lane should be narrowed to 10'.

The cross section shown in Figure A.12 may be appropriate for future development of the NC 68 corridor through the Town Core.



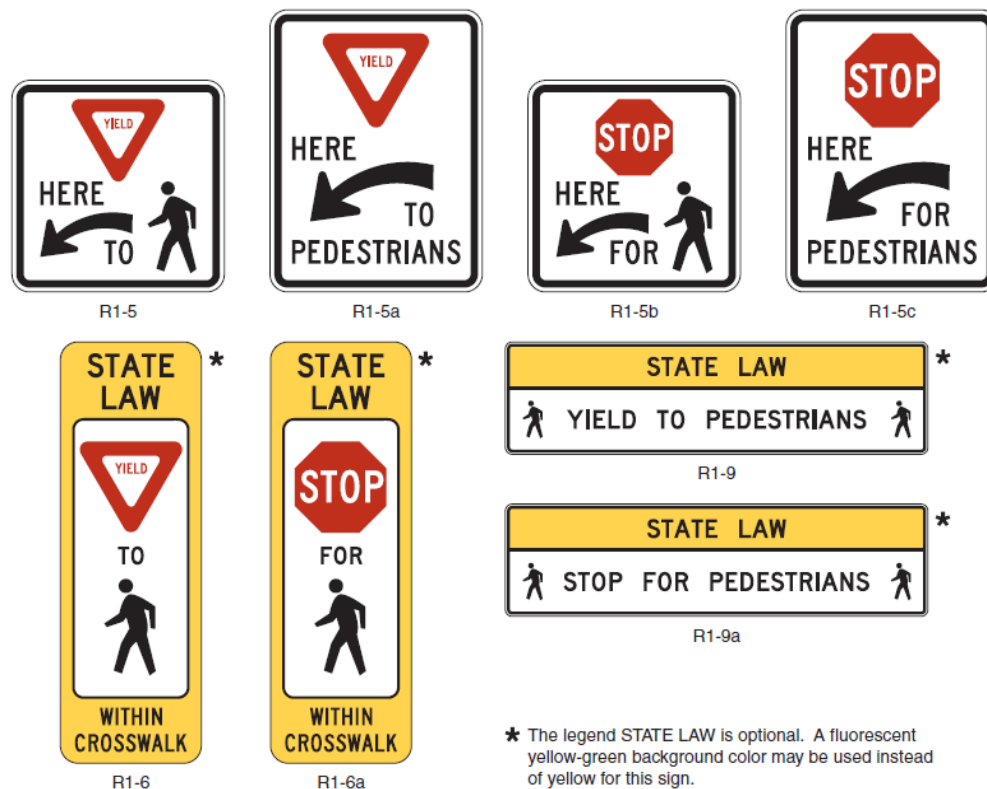
NOTES

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

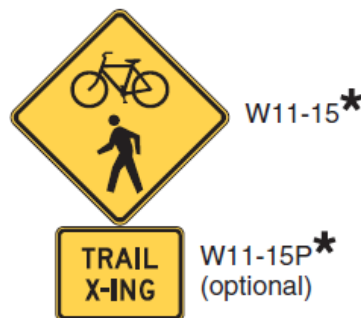
OTHER PEDESTRIAN RELATED SIGNAGE

There are a number of warning signs to aid drivers in observing traffic laws and to avoid problems with pedestrians. Figure A.13 shows examples of pedestrian signage from the MUTCD. The majority of pedestrian signs can be found in Chapter 2B. School safety signage related to pedestrians is found in Part 7B of the MUTCD and examples are shown in Figure A.14. The number below each sign indicates the code for the design of the traffic control device.

Figure A.13 - MUTCD Pedestrian Related Signage



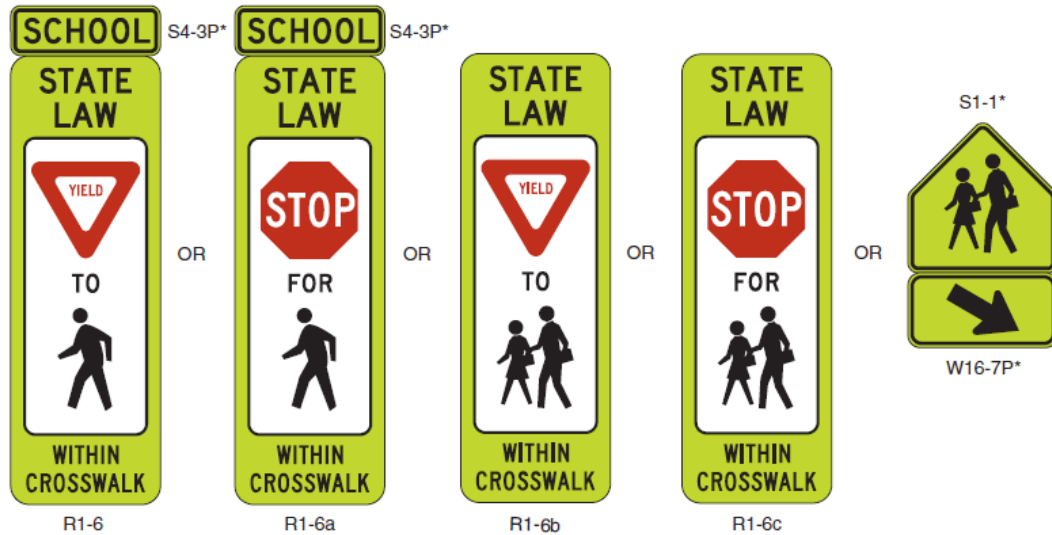
Source: MUTCD 2009 Chapter 2B, p. 55



Source: MUTCD 2009 Chapter 2C, p. 129

Figure A.14 - MUTCD School Zone Pedestrian Related Signage**Figure 7B-6. In-Street Signs in School Areas****A - In advance of the school crossing**

* Reduced size signs:
 S1-1 12 x 12 inches
 S4-3P 12 x 4 inches
 W16-7P 12 x 6 inches
 W16-9P 12 x 6 inches

B - At the school crossing**Notes:**

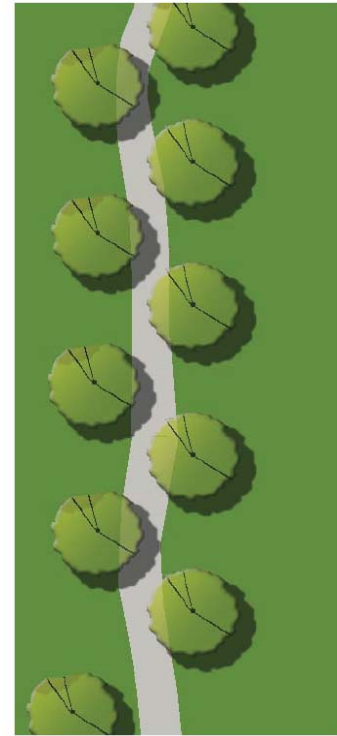
1. The use of the STATE LAW legend is optional on the R1-6 series signs (see Section 7B.12).
2. The use of the SCHOOL plaque above the R1-6 and R1-6a signs is optional.

Source: MUTCD 2009 Chapter 7B, p. 741

MULTI-USE PATHS AND GREENWAYS

Multi-use paths benefit pedestrians, bicyclists, in-line skaters and other non-motorized vehicle users. These facilities are extremely popular when designed and built correctly. Multi-use paths can serve as transportation or recreation and provide a motor-vehicle free walking or bicycling experience. These pathways may run along streams, abandoned railroads or major corridors. Paths can be paved or unpaved, can be along creeks or streams, and can be designed to accommodate a variety of path users.

The alignment of these corridors should avoid paralleling road right-of-way whenever possible to minimize intersection and driveway crossings. Because these paths typically do not cross roads at signalized intersections, they should include warning signs, raised or textured crosswalks, flashing beacons at each road crossing for safety (see Figure A.16 for an example). The MUTCD provides guidance on trail or road volumes that warrant a signalized intersection. Trail and road crossing should not be installed close to other intersections and include flat topography to improve visibility. If the crossing distance is extensive with high trail or vehicular traffic volume, refuge islands need to be considered for crossing safety.

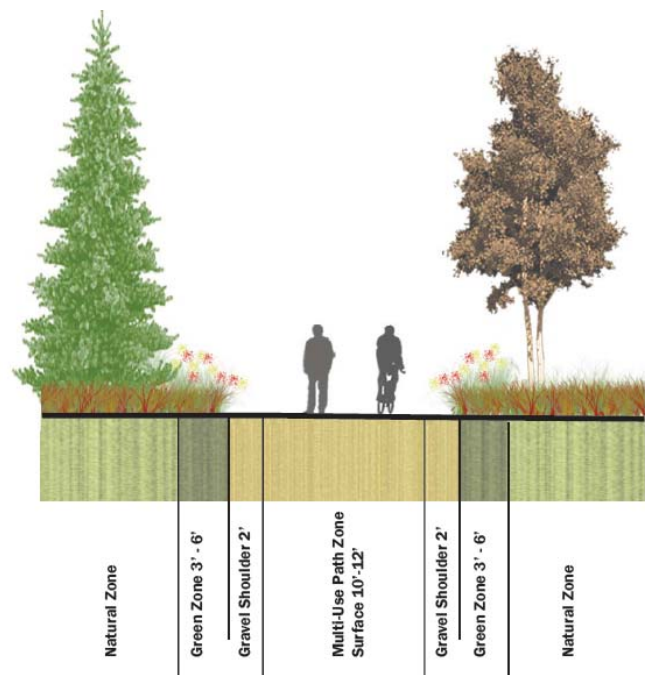


Design Criteria

Multi-use paths shall be designed with clearance requirements, minimum radii, stopping sight distance requirements, and other criteria – similar to the criteria for roadway design. High standards should be observed when designing these paths.

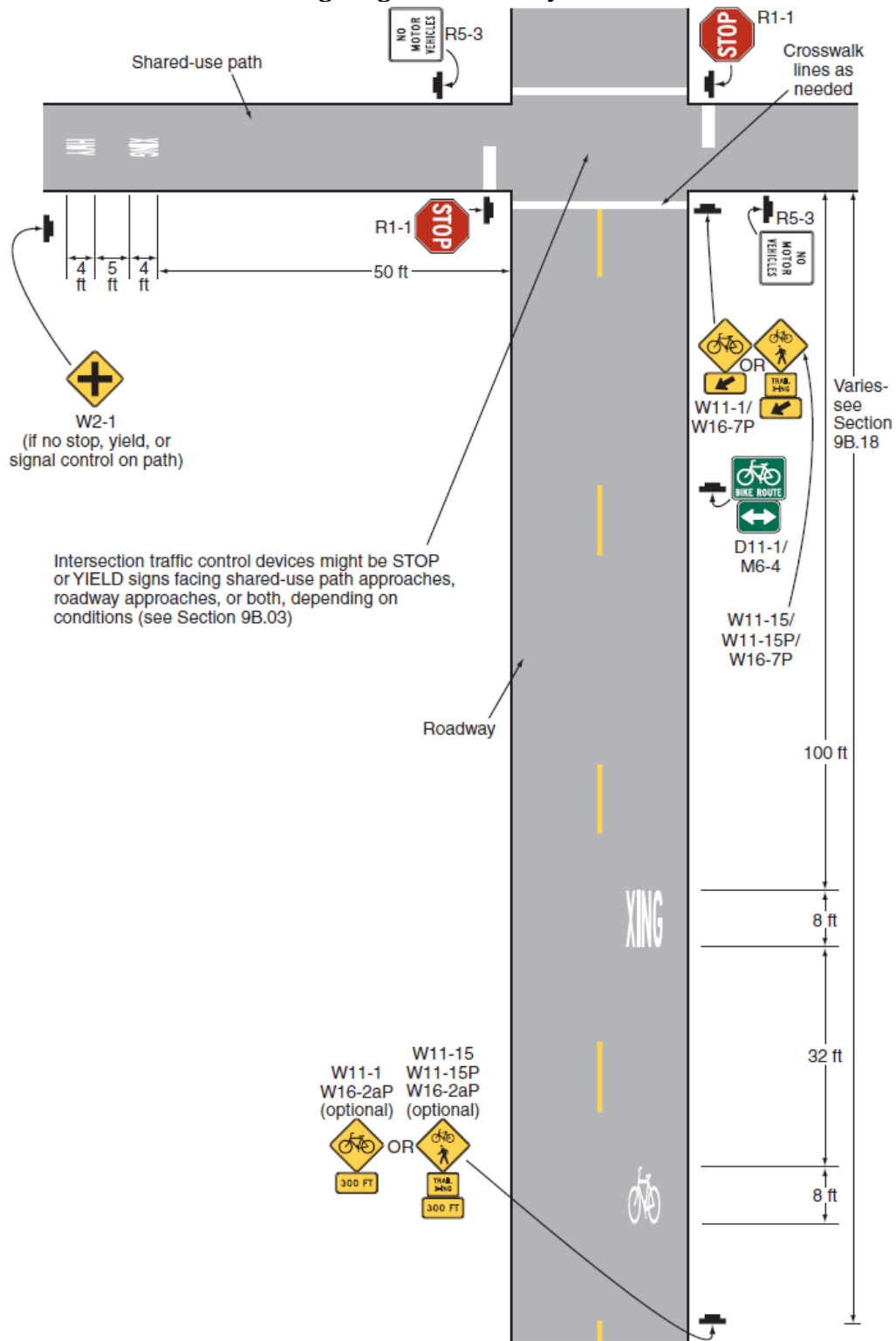
Multi-use paths should be a minimum of 10 feet wide; with minimum 2 foot wide graded shoulders on each side (AASHTO recommends 5 foot shoulders) to protect users from grade differences. These shoulders can be grass, sand, finely crushed rock or gravel, natural groundcover, or other material. Sections of the path where shoulders cannot be provided because of stream crossings or other elevation or grade issues should have protection such as rails or fences.

Figure A.15 – Multi-Use Path Cross-section



Source: NC Complete Streets Planning and Design Guidelines

Figure A.16 - Multi-Use Path Signing for Roadway Intersections



Source: MUTCD 2009 p. 803

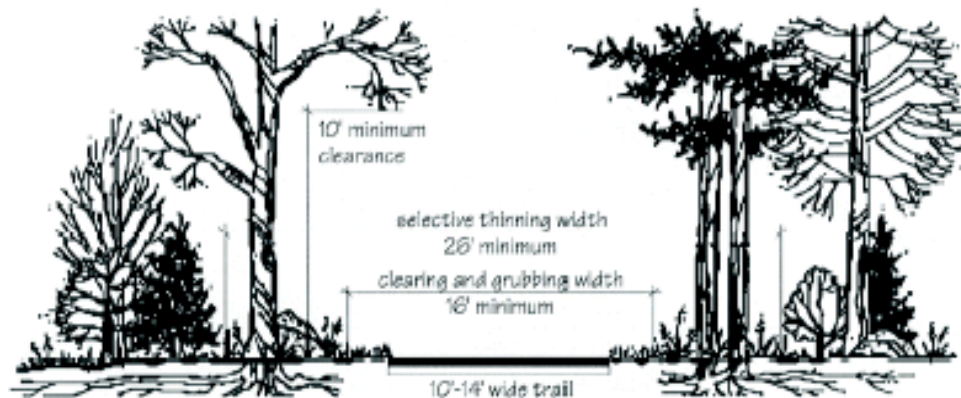
Paths of 12-14 feet in width are preferred for areas where high volumes of users are expected. If it is not possible to increase the width, including a divider line down the center for bi-directional traffic can be helpful as a means of increasing safety for path users. Width of a path may be reduced to 8 feet, depending upon physical or right-of-way constraints, but only in exceptional cases.

These paths should keep the contour of the land for aesthetic and environmental reasons, but for practicality reasons should not be unnecessarily curved. The minimum radii or curvature recommended by AASHTO is 30-50 feet, and the cross slope should typically be less than 2%. The grade should not be more than 5%, but could reach 11% for short distances according to ADA and AASHTO guidelines. Right angles should be avoided for safety reasons, especially when considering bridge and road crossings.

Vertical and Horizontal Clearance

Selective thinning of vegetation along a path increases sight lines and distances and enhances the safety of the path 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. A total of 8 to 10 feet of vertical clearance should be provided, see Figure A.17.

Figure A.17 – Vegetation Clearing Guidelines

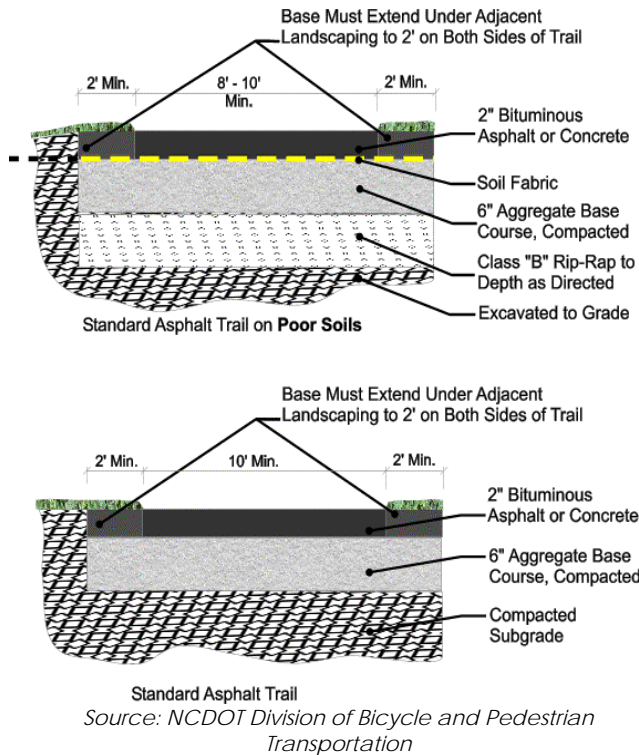


NCDOT Division of Bicycle and Pedestrian Transportation

Pavement Types

Each path is unique in terms of its location, design, environment, and intended use. For each segment of the path, care should be given in selecting the most appropriate pavement type,

Figure A.18 – Asphalt Trail Pavement Base Construction



Considering cost-effectiveness, environmental benefit, and aesthetics.

Typical pavement design for paved, off-road, multi-use paths and greenway paths should be based upon the specific loading and soil conditions for each project. These paths should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles. Pavement types may vary between conventional or pervious concrete, asphalt, crusher fines, dirt or boardwalk.

Conventional Concrete – In areas prone to frequent flooding, it is recommended that concrete be used because of its excellent durability. Concrete surfaces are capable of holding up well against the erosive action of water, root intrusion and sub-grade deficiencies such as soft soils. Of all surface types, it is the strongest and has the lowest maintenance requirement, if it is

properly installed. Installation of concrete is the most costly of all surface types, but, when properly installed, requires less periodic maintenance than asphalt or crusher fines. It is recommended to install 4-inch thickness on compacted 4-inch aggregate base course.

Pervious Concrete – This concrete allows storm water to percolate, reducing pollutants in the stormwater runoff, when used over permeable soils. If seeking superior traction, this surface may be unfavorable to rollerblading and skateboarding and includes a higher installation cost.

Asphalt – Asphalt is a flexible pavement and can be installed on virtually any slope. Asphalt is smooth, joint free and softer than concrete, preferred by runners, rollerbladers, cyclists, handicap users, and parents pushing baby buggies. Construction costs significantly less than concrete. Install a minimum 2-inch I-2 asphalt thickness with 4-inch aggregate base course. Installation of a geotextile fabric beneath a layer of aggregate base course (ABC) can help to maintain the edge of a path. Asphalt pavement is also helpful in supporting a path in poor soils. Asphalt pavement can last up to 20 years with periodic maintenance. One important concern for asphalt paths is the deterioration of path edges. It is important to provide a 2 foot wide graded shoulder to prevent path edges from crumbling.

Crusher fines – Excellent for running paths, as well as walking, mountain bike and equestrian use. Can be constructed to meet ADA requirements. Paths must be smoothed out and graded several times per year. Constructed of small, irregular and angular particles of rock, crushed into an interlocking tight matrix.

Dirt – Recommended for mountain bikes and equestrian uses. It is important to grade dirt on steep slopes to avoid erosion.

Boardwalk – A path made of wooden planks constructed for pedestrians or vehicles along beaches or through wetlands, coastal dunes and other sensitive environments.

Environmental Issues

Environmental protection should be a priority with the planning and construction of a path. Path design, construction type, and construction schedule should all reflect environmental considerations. For example, a path offers some leniency with its alignment compared to a sidewalk, offering opportunities for selective clearing of vegetation. Also, asphalt may not be considered a good surface material in wet areas because of its petroleum base.

Greenway paths improve water quality by establishing buffers along creeks and streams. These buffers provide habitat for a diversity of plant and animal species. They serve as natural filters, trapping pollutants from urban runoff, eroding areas and agricultural lands. Stream buffers also reduce the severity of flooding by releasing storm water more gradually, giving the water time to evaporate, or percolate into the ground and recharge aquifers, or be absorbed and transpired by plants. In addition, paths provide more transportation choices for people who wish to walk or bicycle. By doing so, they help to decrease dependence upon automobiles and thus contribute to improved air quality. All proposed paths and other improvements should be designed, constructed and maintained with their ecological value in mind. Any disturbance of natural features should be kept to a minimum and conform to all jurisdictional environmental policies and ordinances.

The protection of streams by easement and the creation of paths along a greenway easement can help to ensure that no dumping occurs in the waterway, as users of this facility would report dumping to authorities. There is a need to help preserve these resources by ensuring that there is sufficient space between the greenway and the waterway, by avoiding building in the path of trees, and by avoiding construction on rock features, such as escarpments.

Path Amenities and Accessibility

Though paths should be thought of as roadways for geometric and operational design purposes, they require much more consideration for amenities than do roadways. Shade and rest areas with benches and water sources should be designed along multi-use paths. Where possible, vistas should be preserved. Way finding signs (e.g., how far to the library or the next rest area, or directions to restrooms) are important for non-motorized users.

Path amenities should be just as accessible as the paths themselves. Periodic rest areas off to the side of accessible paths are important features as well, and should be level and placed after a long ascent.

These paths should be open at all hours so that it can serve as a reliable transportation route. Lighting in some situations should be avoided along greenways, as it would disrupt the atmosphere surrounding the path. A reflective stripe or markers would help to make this path navigable in limited light. Lighting the path itself can restrict the visibility of areas beyond the path. Existing street and structure lighting in urban areas can effectively and adequately light the adjacent path. For safety reasons, requiring that all bicycles and roller-bladers carry lights and all pedestrians wear reflective clothing during non-daylight hours would be recommended.

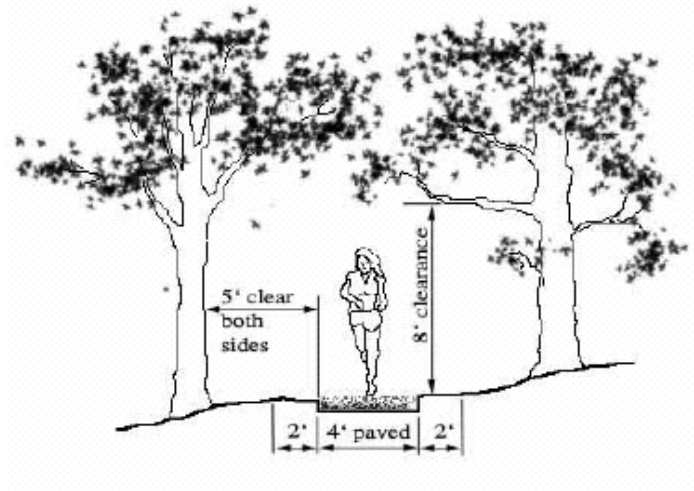
Sidepaths

A sidepath is essentially a multi-use path that is oriented alongside a road. The AASHTO bike guide and North Carolina Design Guidelines strongly caution those communities contemplating the construction of a sidepath facility to investigate various elements of the roadway corridor environment and right-of-way before committing to its construction. Sidepaths should only be considered where there are relatively few intersections and driveways to reduce conflict points.

Foot Path

In environmentally sensitive areas, such as stream banks and lowlands, a 4 ft. wide soft surface should be used (crusher fines recommended), with 2 ft. improved shoulders. Maintain a vertical clearance minimum of 8 ft. All paths should be maintained with a 5 ft. cleared area from the edge of the path on each side. Pitch paths to drain with a 2% minimum grade. Paving materials may vary in specific locations.

Figure A.19 – Foot Path Cross Section



Source: NCDOT NCDOT Division of Bicycle and Pedestrian Transportation

STREET LIGHTING

There are a myriad of different lighting fixture and pole styles available for use today. The traditional cobra style lights are standard issue from Duke Energy, while decorative street lights will cost more for installation.

Figure A.20 – Decorative Fixtures Available from Duke Energy

FIXTURES Photos are representative of fixture and pole styles. Actual products and colors may vary slightly. Please inquire about our other fixture/pole combinations.



DELUXE ACORN
This enhanced Victorian-style fixture adds curb appeal to any walkway or sidewalk and dramatically limits unwanted "up light." It is available on multiple pole styles and a mounting height of 12 ft.
Colors: **Black Green**



SIX-SIDED TRADITIONAL
The six-sided traditional is designed to reduce light pollution while still providing excellent lighting and aesthetics. It is typically used for sidewalk and pathway lighting and is available on multiple pole styles and a mounting height of 12 ft.
Colors: **Black Green**



DELUXE TRADITIONAL
This elegant colonial style fixture makes a dramatic statement as it lights walkways and pathways and comes on multiple pole styles and a mounting height of 12 ft.
Colors: **Black**



OPEN TRADITIONAL
This environmentally-friendly fixture provides an installation with curb appeal and is available on multiple pole styles and a mounting height of 12 ft.
Colors: **Black Green**



ACORN
Reminiscent of turn-of-the-century lights, this is the perfect choice for historic neighborhoods and revitalized downtown areas. Typically used for sidewalk and pathway lighting, it is available on multiple pole styles and a mounting height of 12 ft.
Colors: **Black Green**



TRADITIONAL
The Traditional fixture fits any neighborhood and provides pathway lighting. It is available on multiple pole styles and a mounting height of 12 ft.
Colors: **Black**



POST TOP
This attractive colonial style fixture is a perfect residential light and an ideal complement to any home. The post top light mounts on an 8 ft. pole.
Colors: **Black**



TEARDROP
This beautiful fixture is multifunctional and adds elegance wherever it is placed. The Teardrop is used to light sidewalks, pathways, parking lots and streets and has mounting heights of 15 ft. and 25 ft. There are two options available for brackets.
Colors: **Black Green**
Available on pole style "C" only.



CUBE
This fixture is the perfect choice whenever large areas are to be covered with lighting, such as in larger parking areas.
Colors: **Black Bronze**
Available on pole style "A" only.



SHOEBOX
This is an excellent blend of form and functionality that is ideal for illuminating parking lots. It is available in multiple mounting heights and colors.
Colors: **Black Bronze Gray Green**
Available on pole style "A" only.



COBRA
An ideal fixture for broadly casting light on roadways and increasing drivers' safety. Multiple bracket lengths are available to move lamps beyond tree growth and ensure it is properly directed. It is available in multiple colors and pole heights.
Colors: **Black Bronze Gray Green**
Available on pole style "A" only.



FLOODLIGHT
Aesthetically pleasing, this directional fixture puts light where you need it most - particularly for security purposes. It is available in multiple colors.
Colors: **Black Bronze Gray Green**
Available on pole style "A" only.

www.duke-energy.com

More sustainable lighting designs and technology are reaching the marketplace. However, some hurdles to new technologies such as solid state lighting (e.g. LEDs) and solar powered light fixtures and arrays continue to prevent widespread use. These hurdles include high upfront costs, narrow foot candle and heat dissipation issues. The solid state lighting is currently better suited for areas where lamp posts are closer to the ground, such as decorative street lamps. The LED fixtures are more efficient at lower wattages than comparable technologies used in street lights, which are designed for higher wattages and greater lumens.

Lighting design is much more flexible than sidewalk or bicycle lane design, free from strict guidance such as the MUTCD manual or ADA accessibility guidelines. Duke Energy provides much of the lighting fixtures in Oak Ridge. The suggested spacing of streetlights

in new development will vary depending on type of streetlight fixture used.

For the purposes of conducting a streetlight inventory, gaps in lighting should be recorded, as well as suggestions on where decorative or cobra style lights would be most appropriate.

STREETSCAPE ENHANCEMENTS

There are several different streetscape enhancement opportunities that can achieve the goals of improving roadway aesthetics, safety, reducing traffic speed, enhancing walkability, etc. A detailed streetscape master plan is recommended for Oak Ridge Rd. and NC 68, to identify and design streetscape enhancements that achieve the goals above. The following are potential enhancements that may be included in a streetscape project:

- Travel lane reconfiguration (e.g. raised or lowered median, on-street parking, lane reduction or road diet)
- Landscaping and street trees
- Traffic or access management (e.g. reducing driveway conflicts, shared parking and driveways)
- Street furniture (e.g. benches, utility poles, sidewalk art)
- Sidewalk condition and width
- Building façade location and materials

There are several resources available online that provide images of suggested streetscape improvements, examples of streetscape plans, background on specific improvements and statistics on safety improvement and travel speed reduction. The following table illustrates how road diets (4 lanes to 3) reduced traffic crashes on arterials in Seattle Washington:

Figure A.21 – Road Diet Crash Reduction Impacts, Seattle WA

Table 2 Road Diet Crash Reduction Impacts (Seattle DOT)

Roadway Location	Date Change	ATD Before	ADT After	Collision Reduction
Greenwood Ave N, N 80th St to N 50 th	April 1995	11,872	12,427	24 to 10 (58%)
N 45th Street, Wallingford Area	December 1972	19,421	20,274	45 to 23 (49%)
8th Ave NW, Ballard Area	January 1994	10,549	11,858	18 to 7 (61%)
Martin Luther King Jr Way, North of I 90	January 1994	12,336	13,161	15 to 6 (60%)
Dexter Ave N, Queen Ann Area	June 1991	13,606	14,949	19 to 16 (59%)
24th Ave NW, NW 85th to NW 65th	October 1995	9,727	9,754	14 to 10 (28%)

Source: Victoria Transport Policy Institute: Streetscape Improvements Enhancing Urban Roadway Design
<http://www.vtpi.org/tdm/tdm122.htm>

A useful resource for streetscape improvements, example plans and before and after images is the Municipal Research and Services Center of Washington – Streetscape Topics
<http://www.mrsc.org/Subjects/Transpo/streetscape.aspx>.

ACCESS MANAGEMENT POLICIES FOR WALKABILITY

Access management is the control of traffic movements through a variety of engineering, signalization and signage. Balanced access management strategies permit safe vehicle movements and property access while supporting walkable environments, reducing conflicts between cars and pedestrians and improving community aesthetics. Below are several local policy standards that address access management that support walkability.

A community-based access management approach should control not just access controls related to the roadway, but consider the broader context of site access that relate to access to building location, parking and internal circulation patterns. Local adoption of access management standards should be coordinated with the District and Division offices of the North Carolina Department of Transportation.

Control the spacing of driveways and new intersections

- o Minimum driveway and intersection spacing should be based on speed limits or roadway classifications (TRB Access Management Manual)
 - 25 mph 200 feet minimum
 - 30 mph 330 feet minimum
 - 35 mph 470 feet minimum
 - 40 mph 630 feet minimum
- o Restrict location of new driveways within the functional area of road intersections (this includes cueing space for right and left hand turning movements and accommodation of downstream travel lane flows)
- o Consider the purchase of access rights in locations where driveways should be eliminated or discouraged

Control the design details of driveways

- o Coordinate driveway permitting with the Division office; establish a clear appeal procedure if the driveway applicant requests a deviation from the preferred design
- o 'Dust pan' or 'drop curb' driveway design preferred (See TRB manual)
- o Create continuous sidewalk across driveways with no more than 2% slope and constructed of a contrasting material to improve visibility
- o Minimize curb radii to the extent possible to reduce turning speed

Consider site characteristics

- o Include site access and circulation in site plan review process
- o Clear pedestrian path between sidewalk, parking and building access
- o Require new driveway permitting when changes of use or intensity on an existing site occurs

PARKING LOT DESIGN

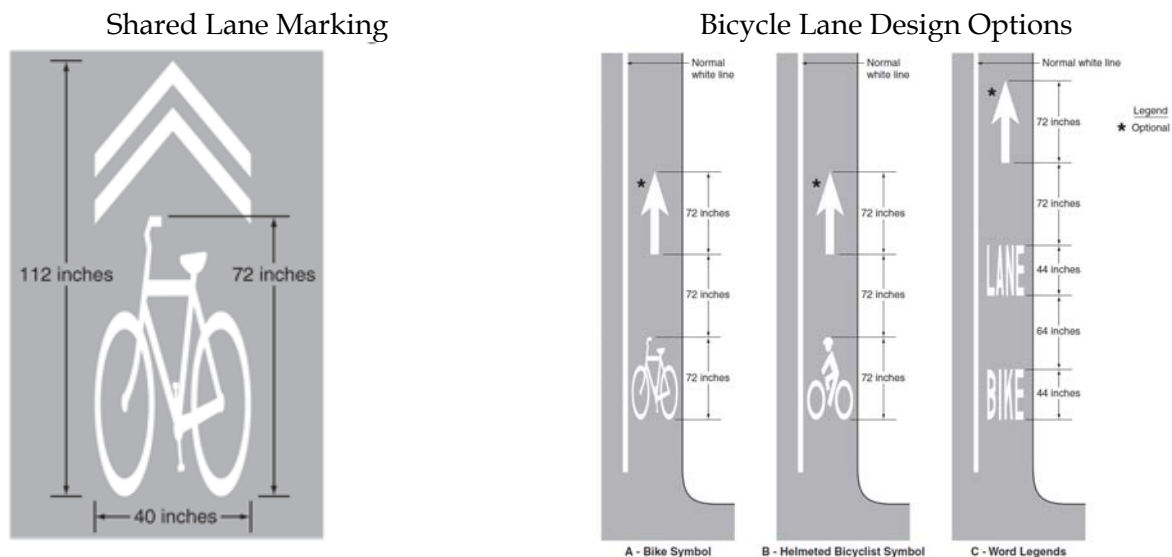
Parking lot layout can influence pedestrian transportation. Allowing for shared parking in the Town Core area and fewer off street parking spaces may be warranted in the ordinance. In addition, guidance should require the provision of off-street parking behind buildings. The requirement for pedestrian connections through large parking lots to buildings should also be part of the ordinance; a pedestrian connection between parking lots is also suggested.

ON-ROAD BICYCLE FACILITIES

The design guidelines for bicycle lanes and shared lane pavement markings are shown here and can be found in Chapter 9 of the MUTCD. Bicycle lanes can be installed on busier roads where existing travel lane widths can be reduced or incorporated into new or expanded roads. Bicycle lanes should be a minimum of 5 feet wide and generally not installed next to on-street parking to avoid the door zone. The shared lane marking is more appropriate for streets with on-street parking and should be placed at least 11 feet or more from the curb on streets where on-street parking exists to avoid the door zone. Streets with shared lane marking should have travel speeds of 35 mph or less and spaced every 250 feet and after intersections.

Consult the MUTCD for additional information on signing bicycle facilities and examples of pavement marking layout at intersections. In addition the AASHTO Guide to the Development of Bicycle Facilities (1999) should also be consulted when considering bicycle facilities.

Figure A.22 – Shared-Lane and Bicycle Lane Pavement Markings



Source: MUTCD Chapter 9, p. 815

Source: MUTCD Chapter 9, p. 809

WAYFINDING SIGNAGE

The development ordinance provides some guidance for wayfinding signage (Article 17). A master sign plan for a corridor or specific area can be completed to allow creativity in signage design and look. Wayfinding signage along sidewalks and trails enhances a visitor's pedestrian experience, encouraging use of sidewalks and trails. Production of a walking map and installation of wayfinding signage (including location and walking times/distance) will improve the walking experience in Oak Ridge for visitors and residents of Oak Ridge.



Charlotte
www.pedbikeimages.org
Dan Burden

Figure A.23 – Greenway Cost Elements

Description	Unit	Unit Cost
Construct 10-foot multi-use path	Linear foot	\$133
	Linear mile	\$700,000
Construct 10-foot crushed stone walkway	Linear foot	\$15-\$25
	Linear mile	\$80,000-\$106,000
Construct 6- to 8-foot wooden or recycled synthetic material boardwalk	Linear foot	\$200-\$250
	Linear mile	\$1,000,000-\$1,300,000
Trail markers - Flat fiberglass pole 4" wide x 1/8 inch thick. Decal 4" in width or a sign applied to the pole. Name of facility, mile marker, feature of interest shown.	Each	\$50
1 All items listed include installation costs. 2 All items reflect 2008 pricing. 3 Cost for sidewalks and paths include clearing, grubbing and grading. Geotextile cost or other major costs, including utility relocation, are not included in multi-use path or sidepath estimates. Multi-use paths and sidepaths are asphalt, with 2" asphalt and 6" aggregate base course.		

The average cost of intersection improvements may vary significantly with cost of materials, scope of work variables and engineering design constraints. The costs of intersection improvements are included as a guide for budgeting funds. It is suggested to develop an engineering level cost estimate if possible when budgeting for capital improvements. The following cost information was compiled from the Pedestrian and Bicycle Information Center and other sources.

Figure A.24 – Intersection Improvement Cost Elements

Item	Cost Estimate	Cost Notes
Curb Ramp	\$1,500	Range of \$300-1500
Refuge Island	\$15,000	Range of \$4,000-30,000
Pedestrian Countdown Signal	\$5,000	\$20,000-40,000 for all four legs of intersection
Crosswalks - Horizontal Line	\$100	n/a
Crosswalks - Ladder Style	\$300	n/a
Crosswalk Stamped/Colored (15ftWx40ftL)	\$3,000	Brick inlay, raised surface increases cost
Sign and Post	\$250	Range of \$200-300 Additional cost for in pavement bollard signs
Curb Radii Reduction/Extension	\$30,000	Range of \$5,000-40,000
Remove Right-Turn Slip Lane Design	\$50,000	Range of \$50,000-200,000

PEDESTRIAN OVERPASS/UNDERPASS

Pedestrian overpasses and underpasses efficiently allow for pedestrian movement across busy thoroughfares. These types of facilities typically feature very high construction costs. These facilities are problematic in many regards and should only be considered when no other solution is expected to be effective. Research shows that pedestrians will avoid using such a facility if they perceive the ability to cross at grade as taking about the same amount of time. ADA requirements for stairs, ramps, and elevators often require the construction of an enormous structure that is visually disruptive.

Overpasses and underpasses should only be considered with rail lines, high volume traffic areas such as freeways, and other high volume arteries.

In addition, they 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 these structures should follow the guidelines for sidewalk width. Underpasses should have a daytime illuminance minimum of 10 foot-candle 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.



Attempting to separate pedestrians from the street is often problematic. As shown here, given the opportunity, many choose to cross at street level.

TRANSIT STOP TREATMENTS

To accommodate as many users as possible, a transit system must include well-planned routes and safe, accessible stops. Bus stops should be designed to accommodate the appropriate number of users and should be highly visible to pedestrians and motorists.

Bus or other transit stops should be located in places that are most suitable for 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.



Pedestrian-friendly bus stop

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. It is good practice to construct a transit stop just beyond an intersection, which encourages riders to cross the intersection behind the bus and in full view of approaching motorists. The location also

should be set back enough from the roadway to buffer users from traffic without impeding pedestrian activity.

Safety and comfort at a bus stop is determined by the amenities offered to users. Bus stop signage including route information, shelter with seating, trash cans, and bicycle parking encourage transit use. Pedestrian-level lighting improves the visibility of pedestrians to motorists and increases the level of safety for users. At a minimum, marked crosswalks (especially at mid-block stops), curb ramps, and proper sidewalk widths should be considered.

BRIDGES

Provisions should be made to include a walking facility as a part of vehicular bridges, if there is an indication that pedestrians would use the facility. It is important to consider the needs of pedestrians when planning for a bridge replacement or the construction of a new bridge. Sidewalks on bridges should be a minimum of 5 feet wide, with a minimum handrail height of 42."

TRAFFIC CALMING TECHNIQUES

Traffic Calming Devices (TCDs) are physical measures in street design that cue drivers to slow down. The effectiveness of TCDs does not depend upon a driver's compliance with traffic signs and signals, or police enforcement, though they may be used effectively in conjunction with them. In coordinated combinations, TCDs reduce speeds, alert drivers to pedestrians, and reduce the severity of collisions. TCDs listed below are generally recommended for consideration on a project-by-project basis. These include traffic circles, roundabouts, speed humps, speed tables, textured pavements and curb extensions (bulbouts). Curb extensions are discussed in detail earlier in this section.

Neighborhood Traffic Circles

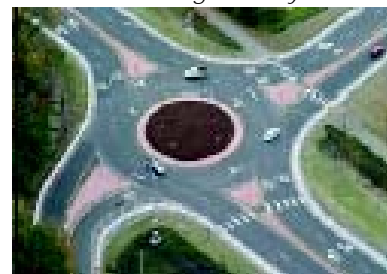
A small, raised circular island positioned in the center of an intersection, designed to slow traffic by requiring traffic to maneuver around the island.



Neighborhood Traffic Circle Source: PBIC Image Gallery

Roundabout

Circular intersection with raised circular islands in the center, with "yield on entry" and deflecting islands on all approaches designed to slow traffic. Traffic proceeds in a counterclockwise direction. Roundabouts are highly engineered to accommodate specific traffic types, volumes and speeds.



Typical Modern Roundabout Source: Reid Middleton, Inc.

Speed Humps



Speed Hump Source: PBIC

Raised sections of a roadway, these are similar to the speed bump in their application, but a speed hump is wider and has a sloping side taper so they are easy to navigate at slower speeds. They are placed across residential streets to control chronic speeding problems where other methods of slowing traffic have not been effective. They are designed to calm traffic in

residential areas, particularly near parks and schools. The physical impact on passing vehicles is less severe at slower speeds than at higher speeds. Studies indicate that speed humps reduce speeds by approximately six miles per hour. A standard speed hump has a length of approximately 22 feet and a height of 3 and 5/8 inches at its center.

Speed Tables

Flat-topped speed humps typically long enough for the entire wheelbase of a passenger car to rest on the flat section. They often constructed with brick or other textured materials on the flat section.



Speed Table
Source: PBIC

Textured pavements - stamped pavement or alternate paving materials to create an uneven surface for vehicles and pedestrians to traverse. Textured street pavement provides a visual and tactile cue for both drivers that they are driving in an area of high pedestrian usage. Similarly, they cue pedestrians that they are entering a vehicular zone, and are a particularly effective treatment to warn visually impaired pedestrians. Textured street pavements should be used in areas of substantial pedestrian activity and where noise is not a major concern.

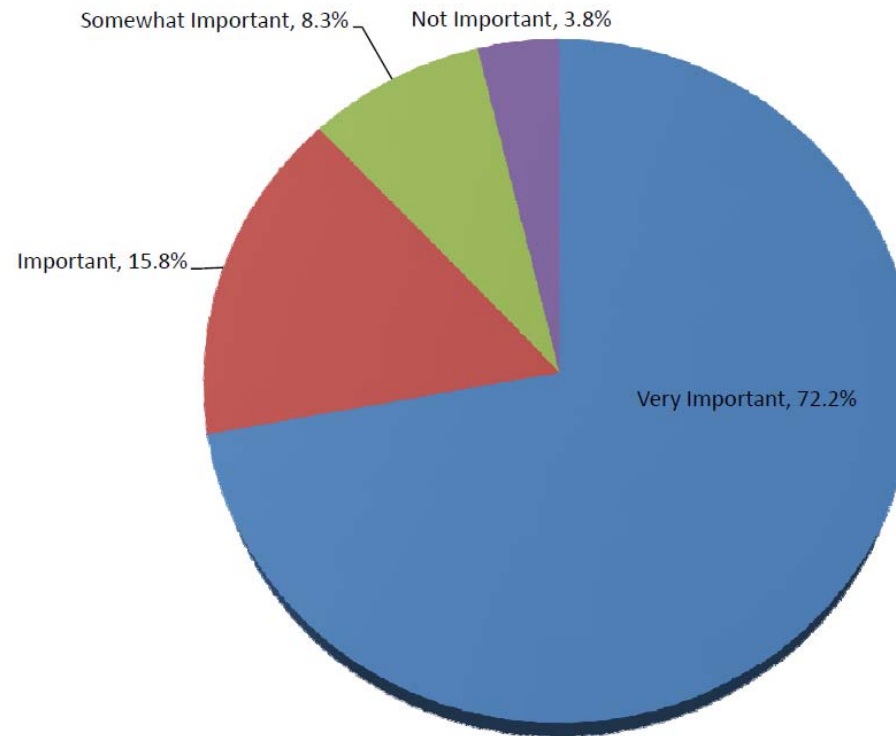
Curb Extensions –rounded extensions of the curb which slow vehicles by alerting drivers to potential pedestrians, visually tightening the vehicular path, and physically reduces turning radii, thereby encouraging a decrease in vehicle speeds. Curb extensions also increase safety for pedestrians by shortening the road crossing distance. Curb extensions are covered in more detail earlier in this section.

TEMPORARY WORK

Temporary work should be accessible. Where construction blocks a public sidewalk for more than a short time, an alternate accessible route should be provided that is cane-detectable. Sidewalk barriers should be continuous and cane-detectable as well. Temporary events and facilities should also meet accessibility criteria.

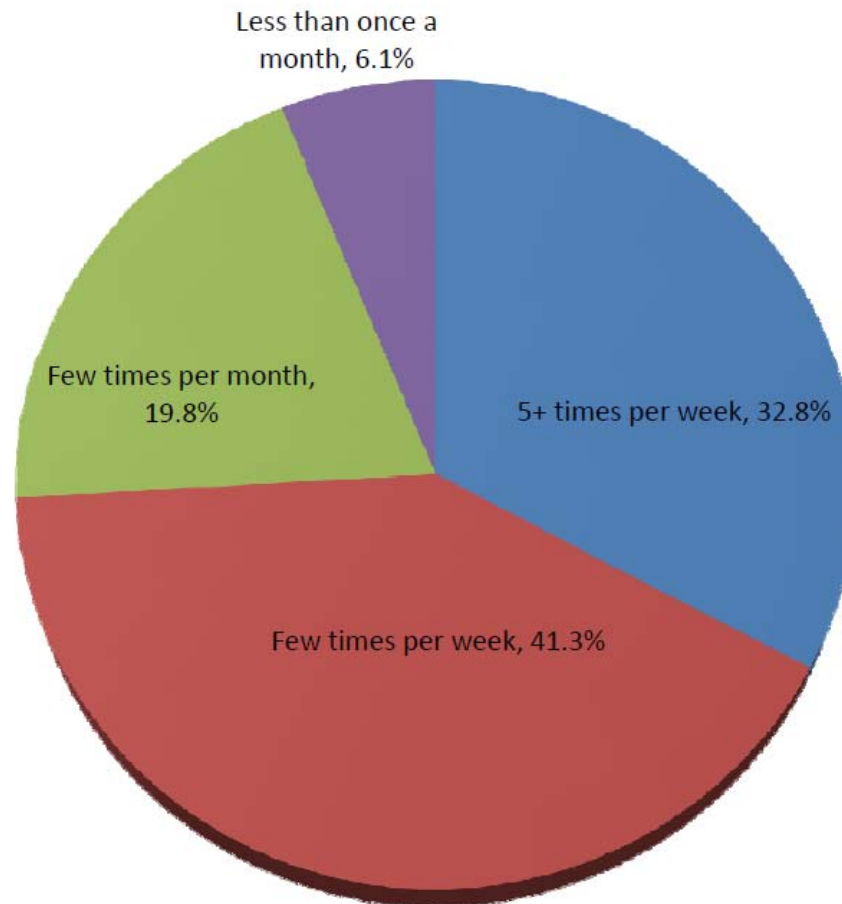
APPENDIX B. PEDESTRIAN USER SURVEY

1. How important to you is the goal of creating a walking-friendly community? (select one)



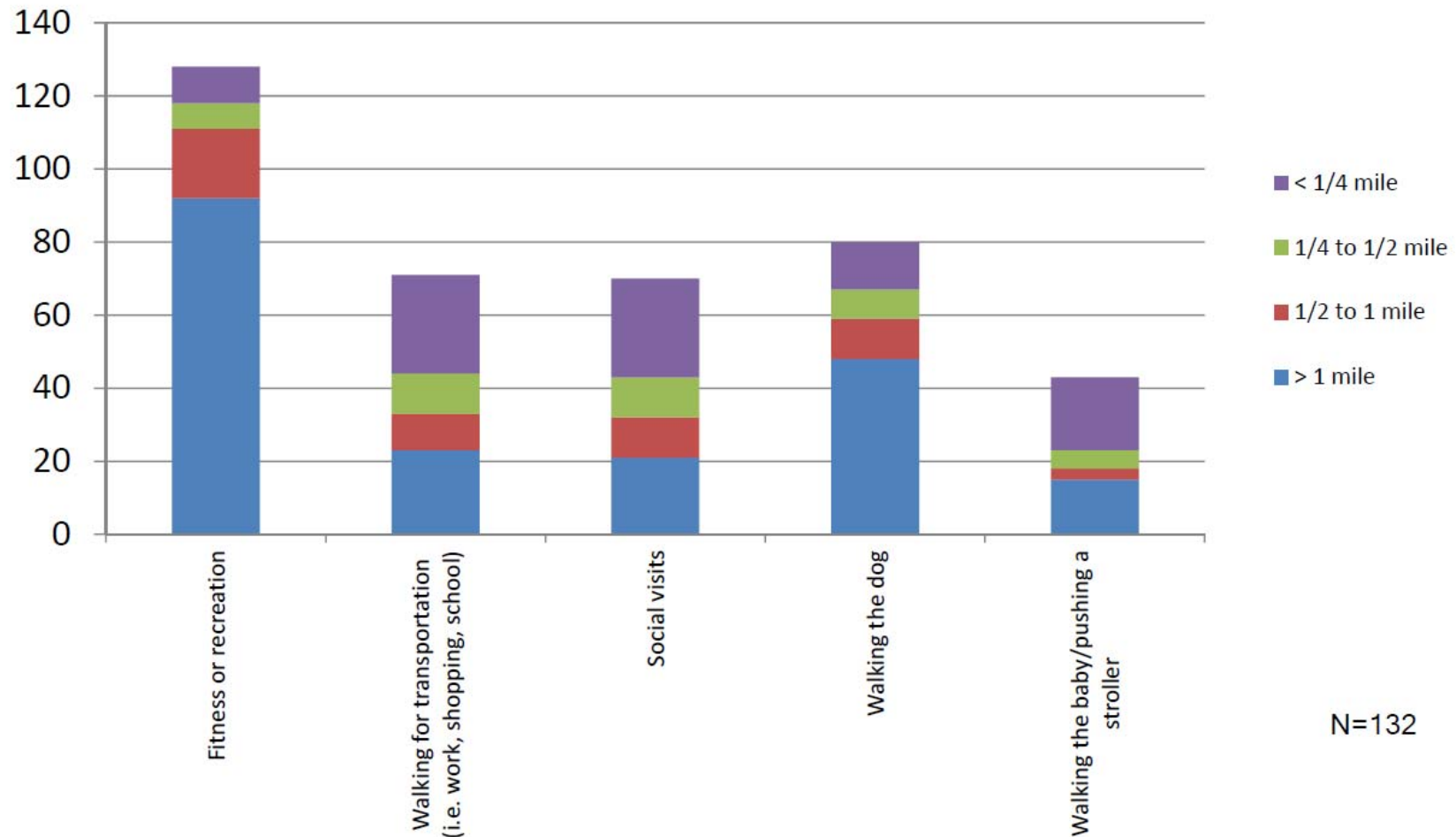
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2. How often do you walk now? (select one)



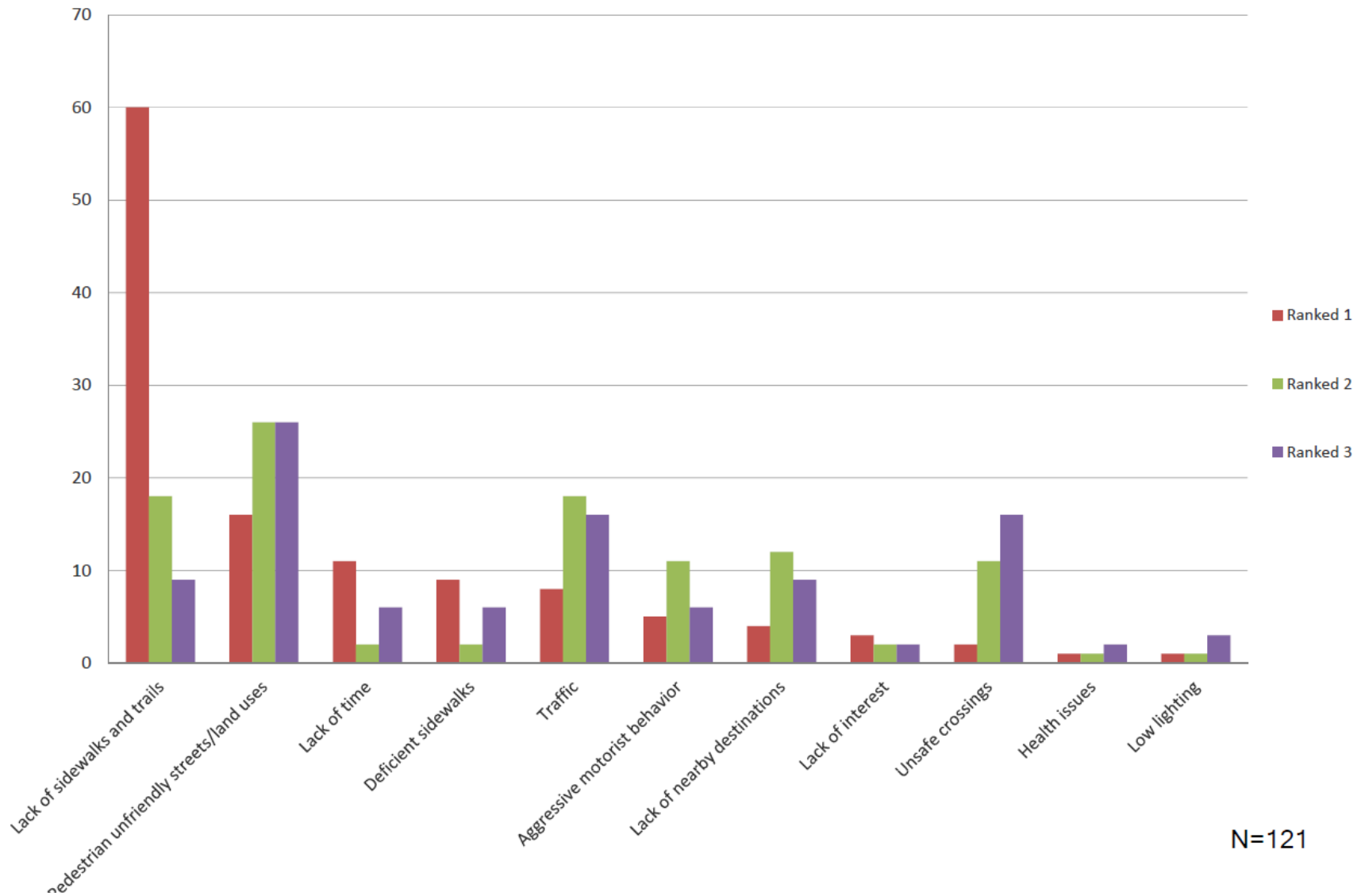
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3. For what purpose do you walk now? If you do not walk now, for what purpose would you walk in the future? Please also include the distance. (select all that apply)

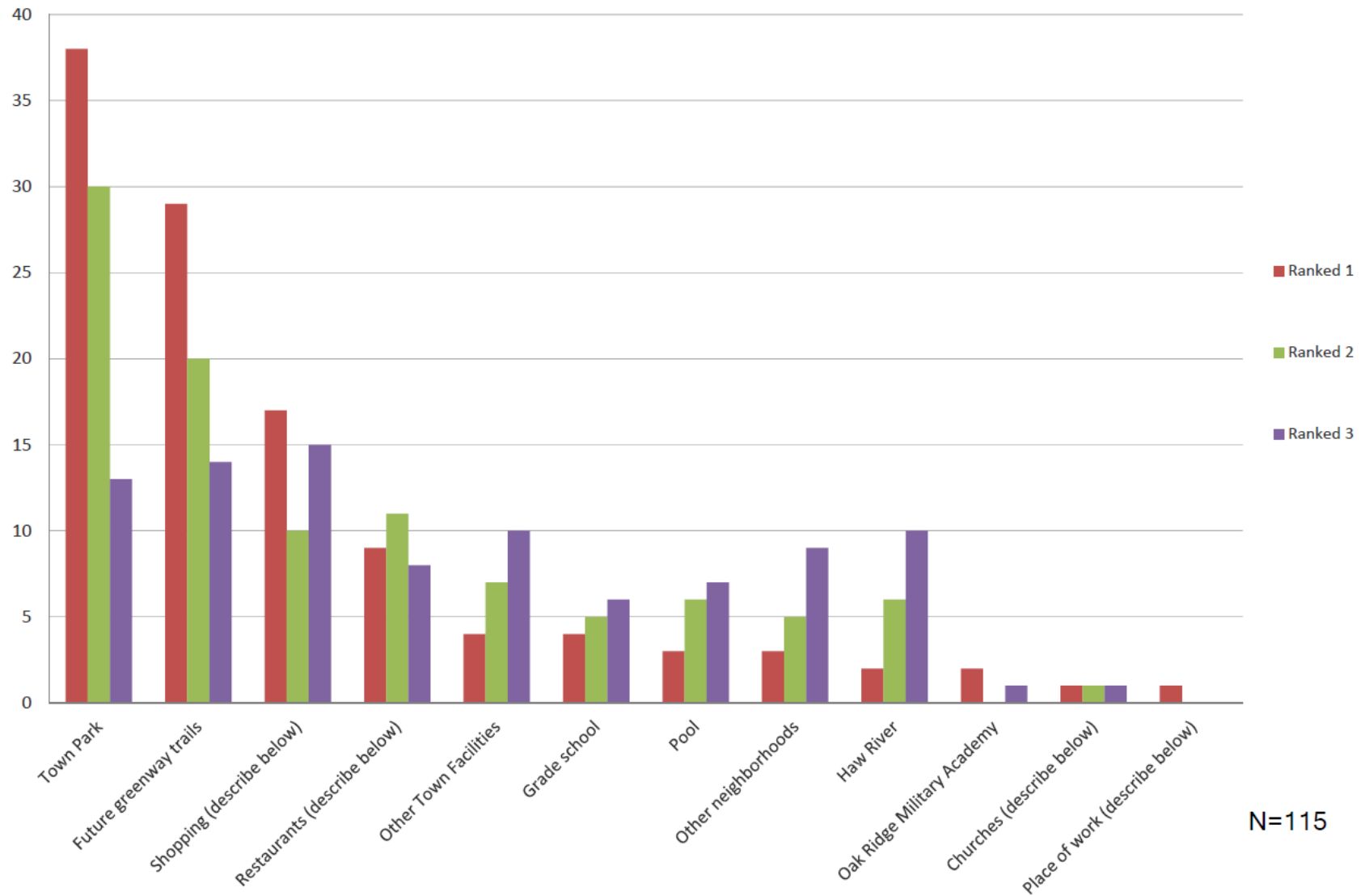


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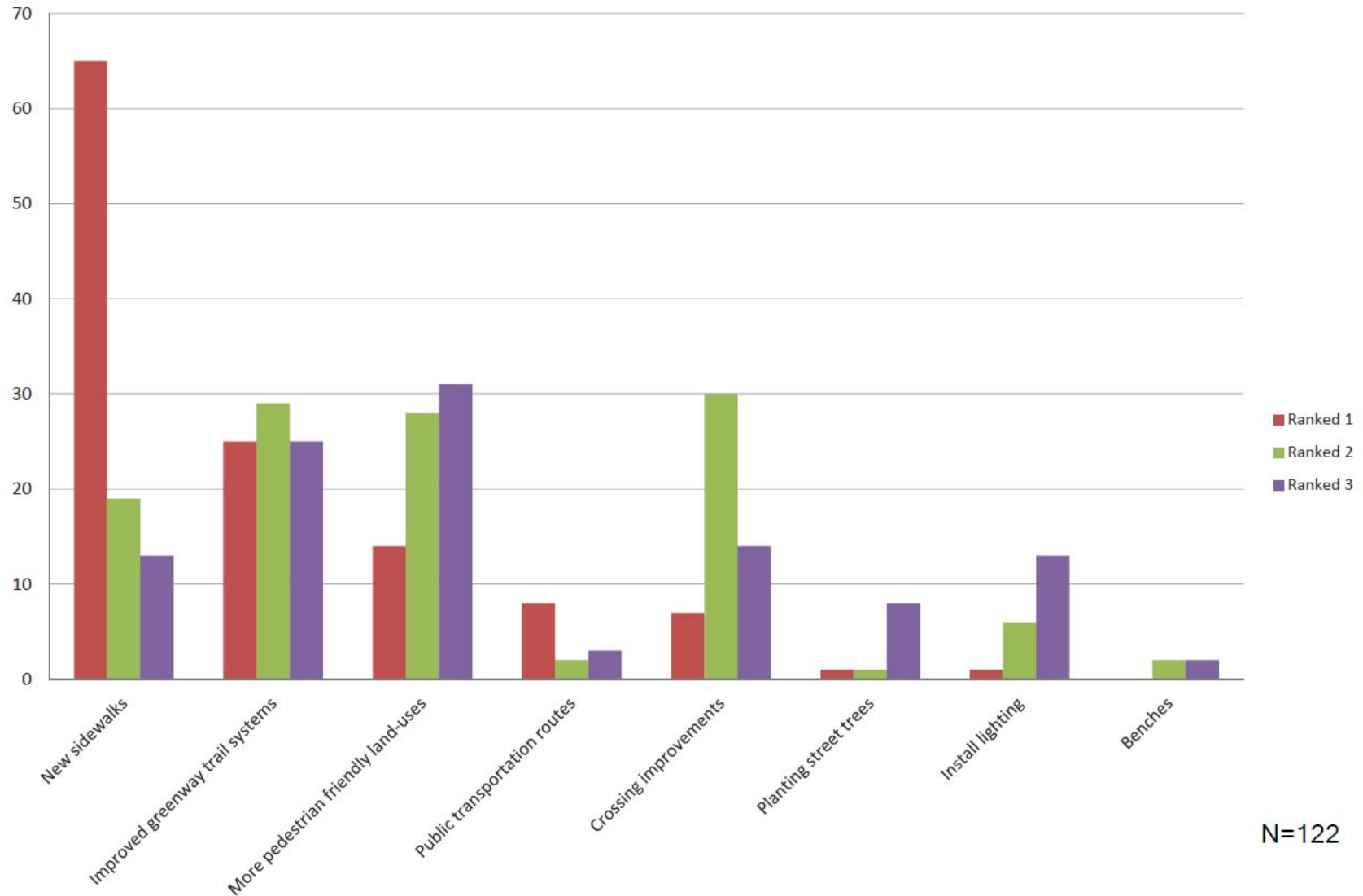
4. What are the biggest factors that discourage you from walking? (Please select your top 3, 1 being biggest)



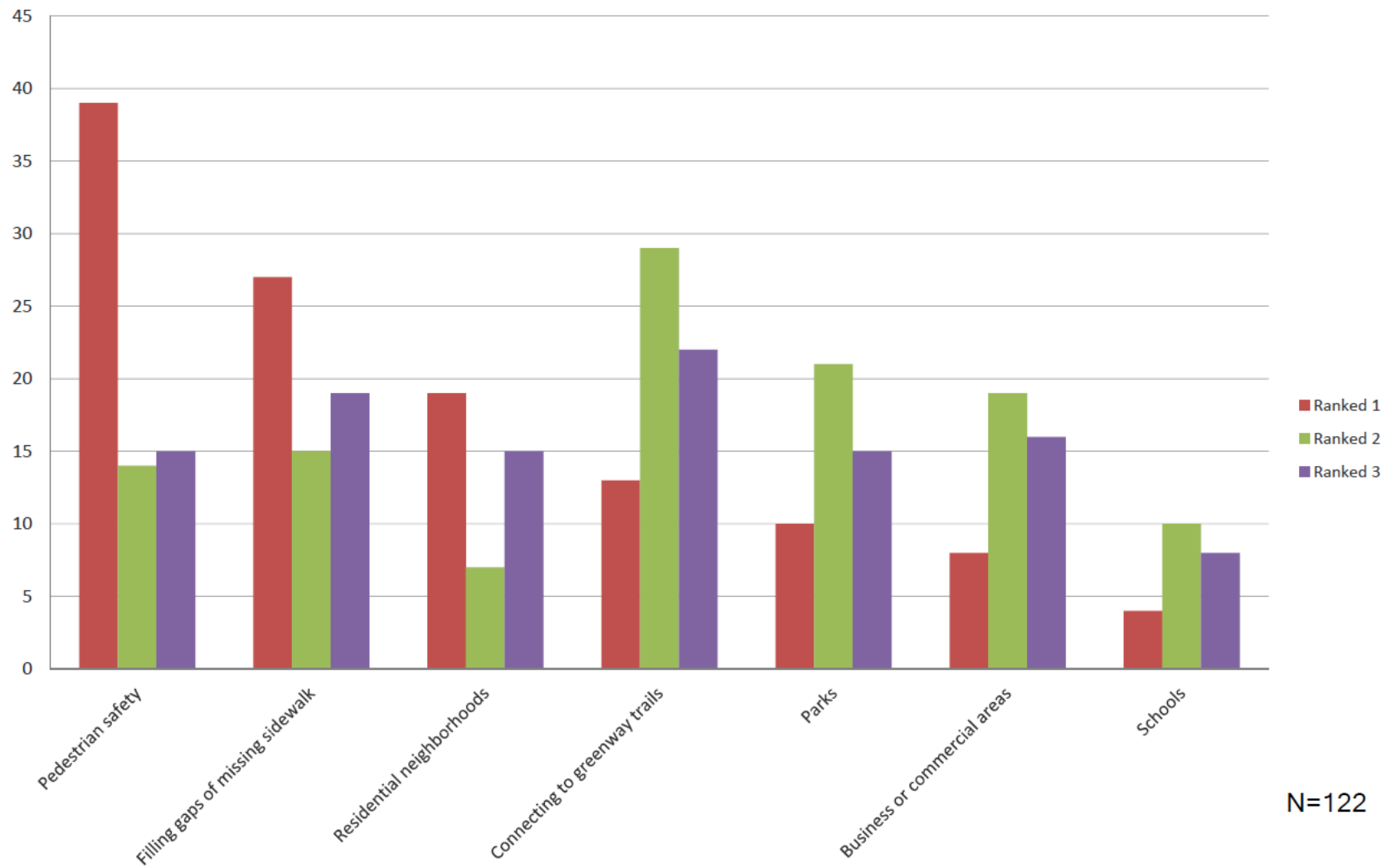
5. What walking destinations would you most like to get to? (Please select your top 3, 1 being best)



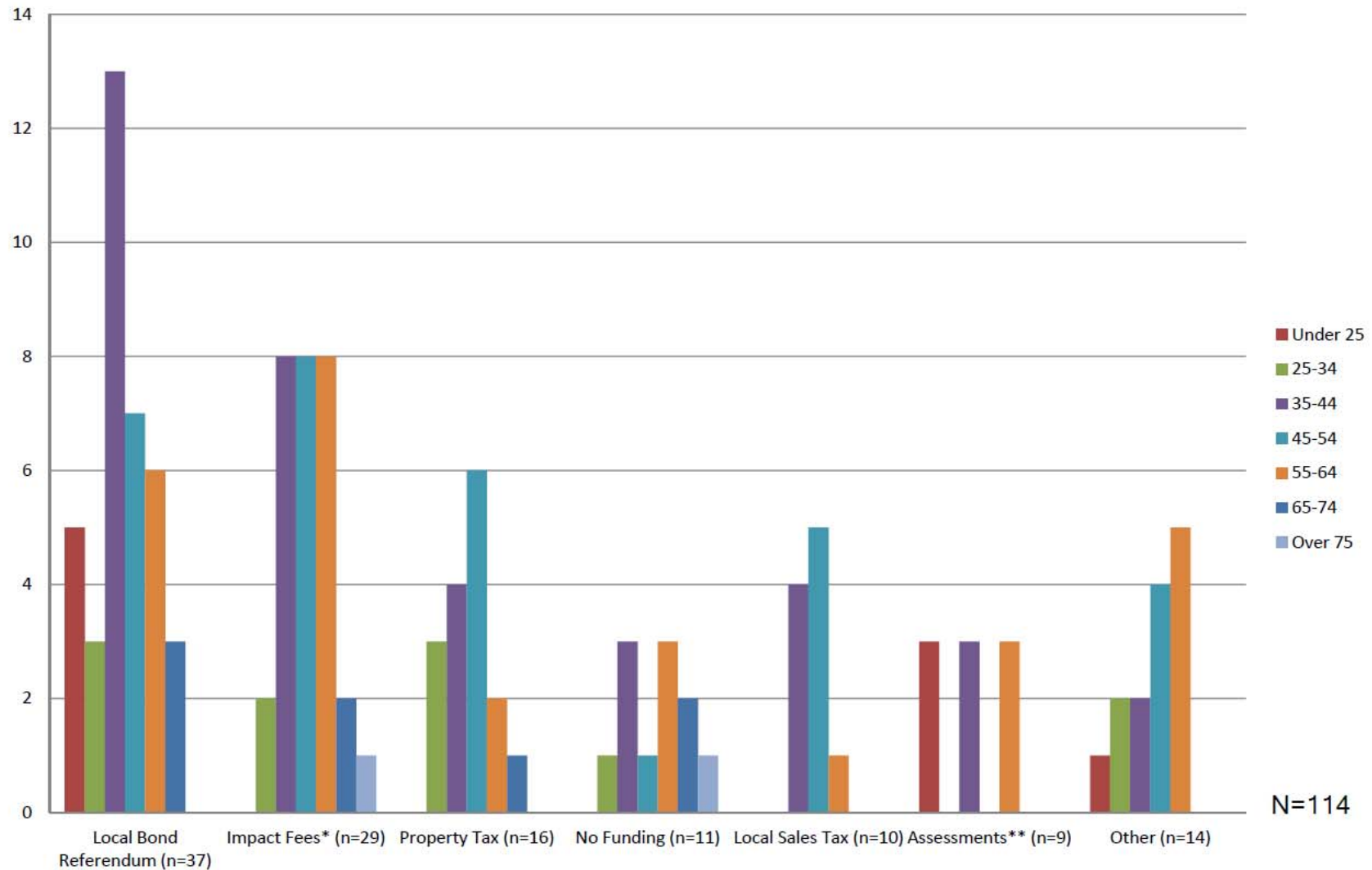
6. What is the most important action needed to increase walking in the community? (Please select your top 3, 1 being most important)



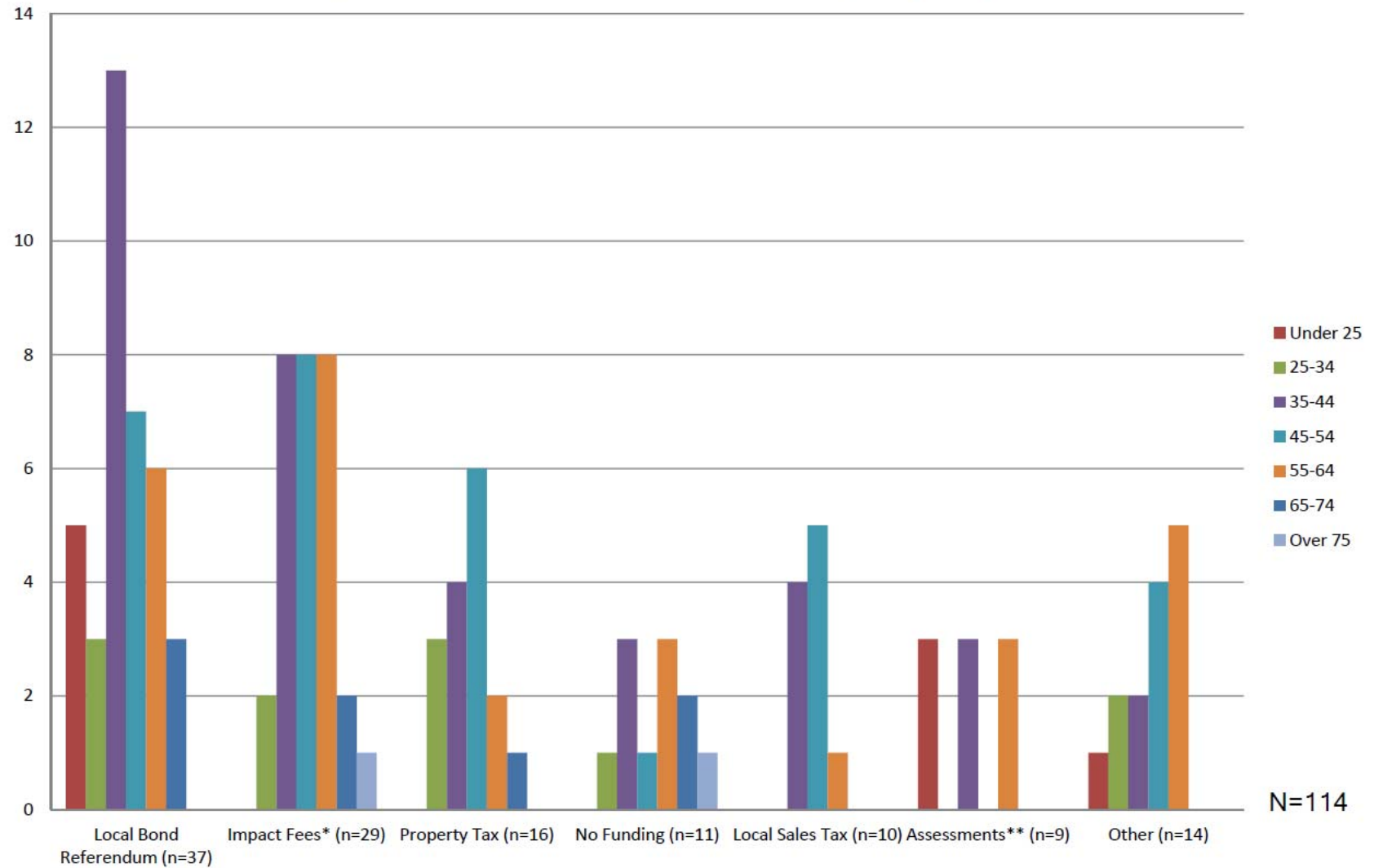
7. What is the most important consideration in determining locations for new sidewalks? (Please select your top 3, 1 being most important)



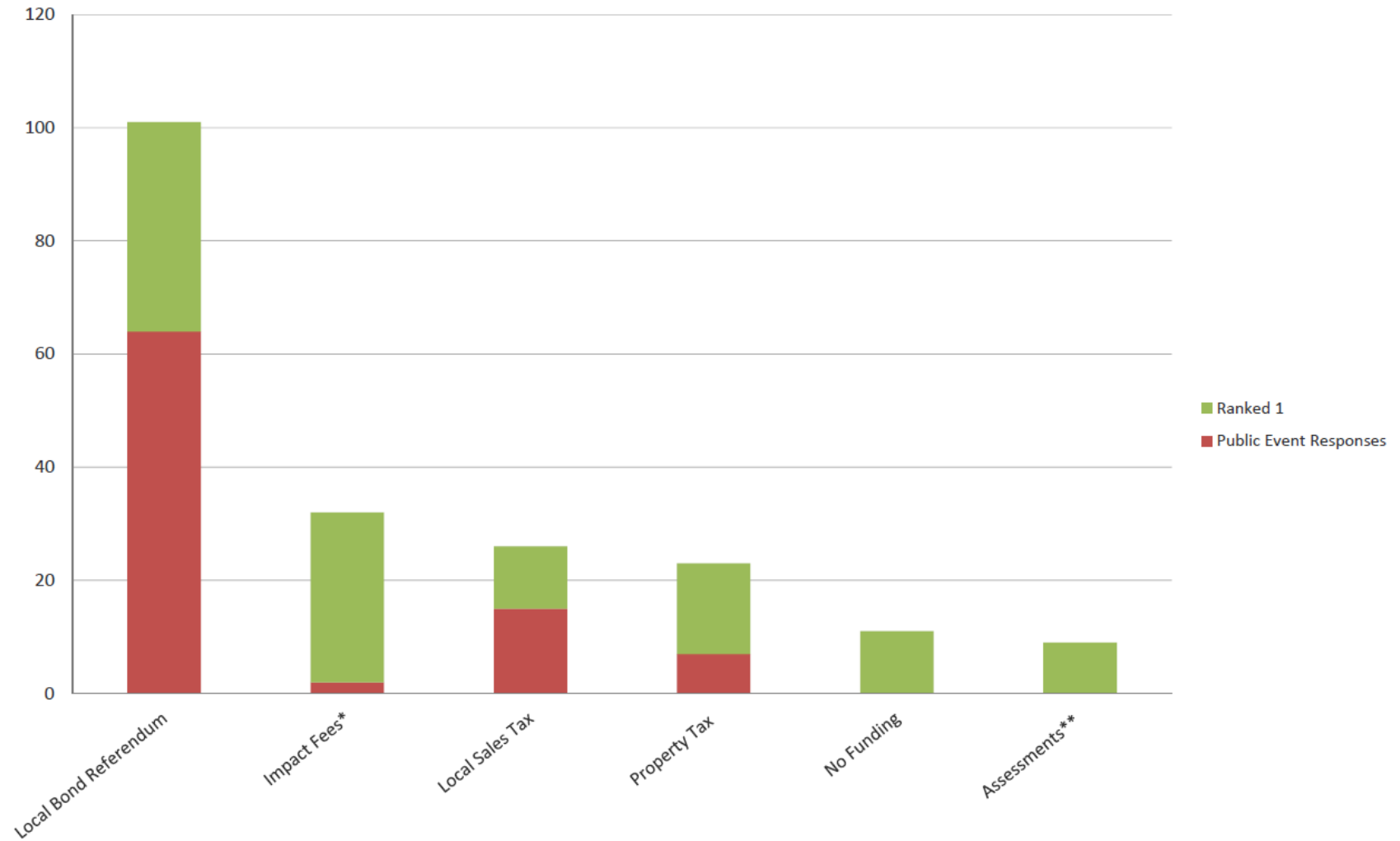
8. If grants, public/private partnerships and existing revenues are not sufficient, please indicate what you think should be the primary source of funding for sidewalks, multi-use trail and lighting improvements.



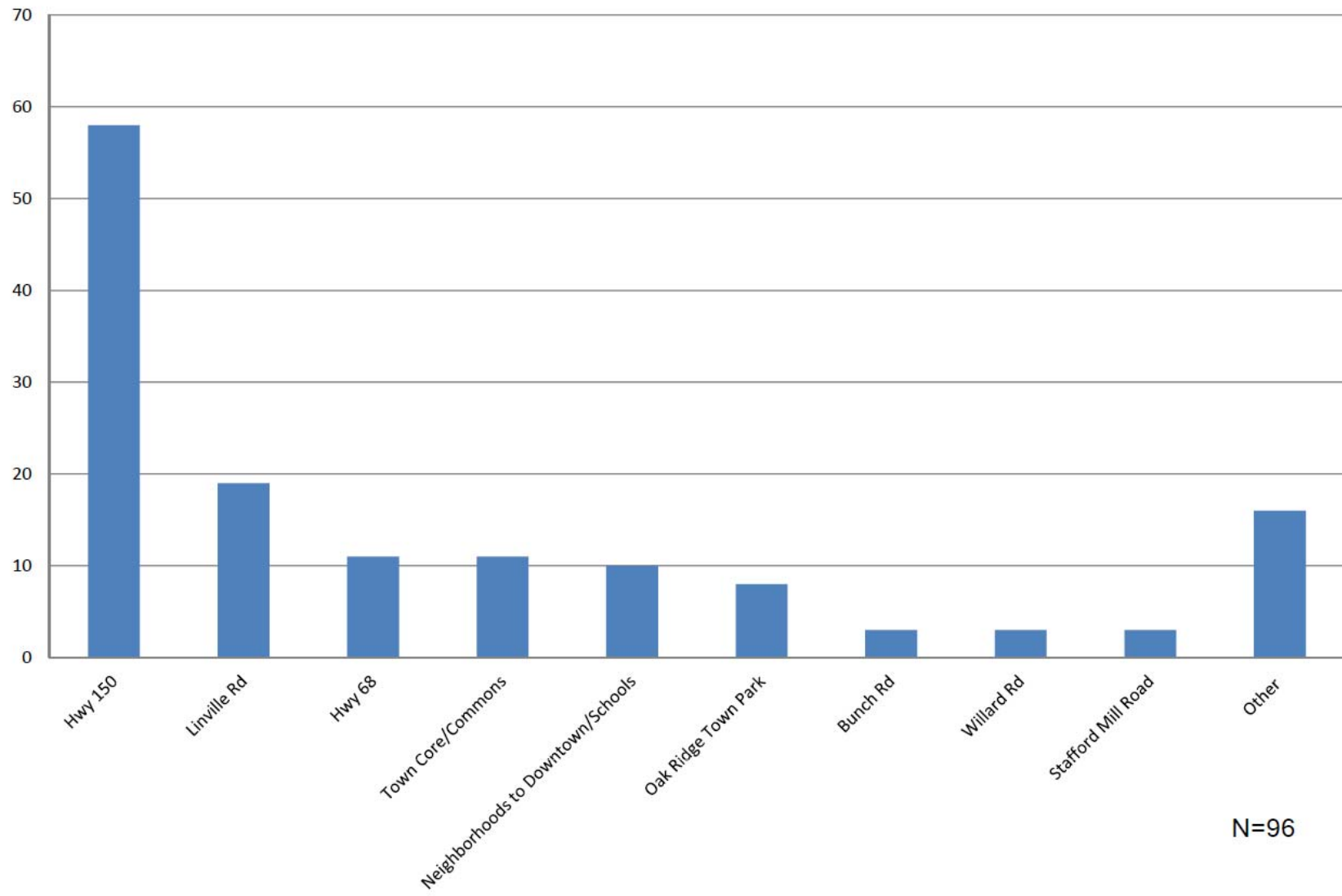
8. If grants, public/private partnerships and existing revenues are not sufficient, please indicate what you think should be the primary source of funding for sidewalks, multi-use trail and lighting improvements.



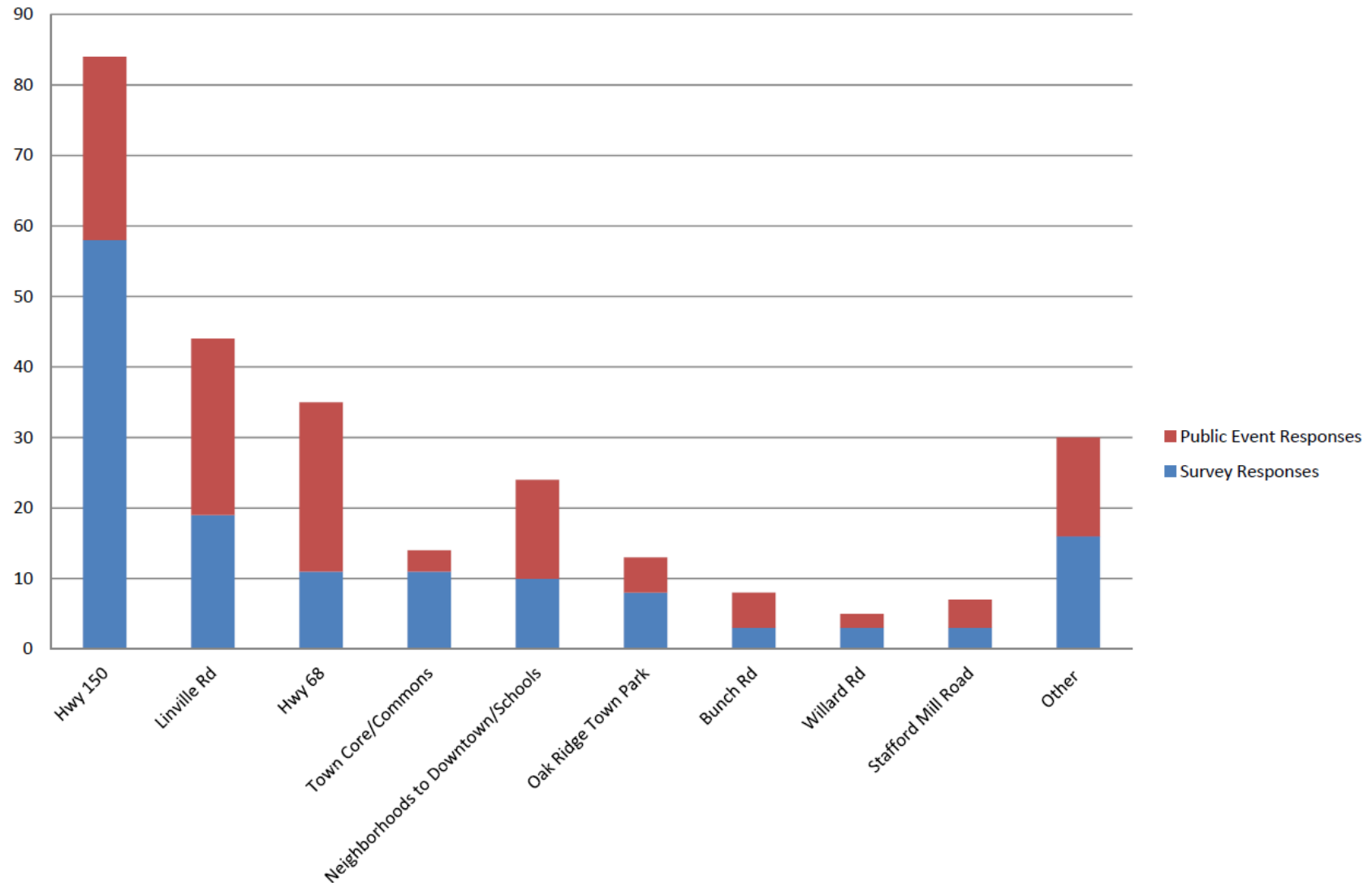
8. If grants, public/private partnerships and existing revenues are not sufficient, please indicate what you think should be the primary source of funding for sidewalks, multi-use trail and lighting improvements. (survey and public event response)

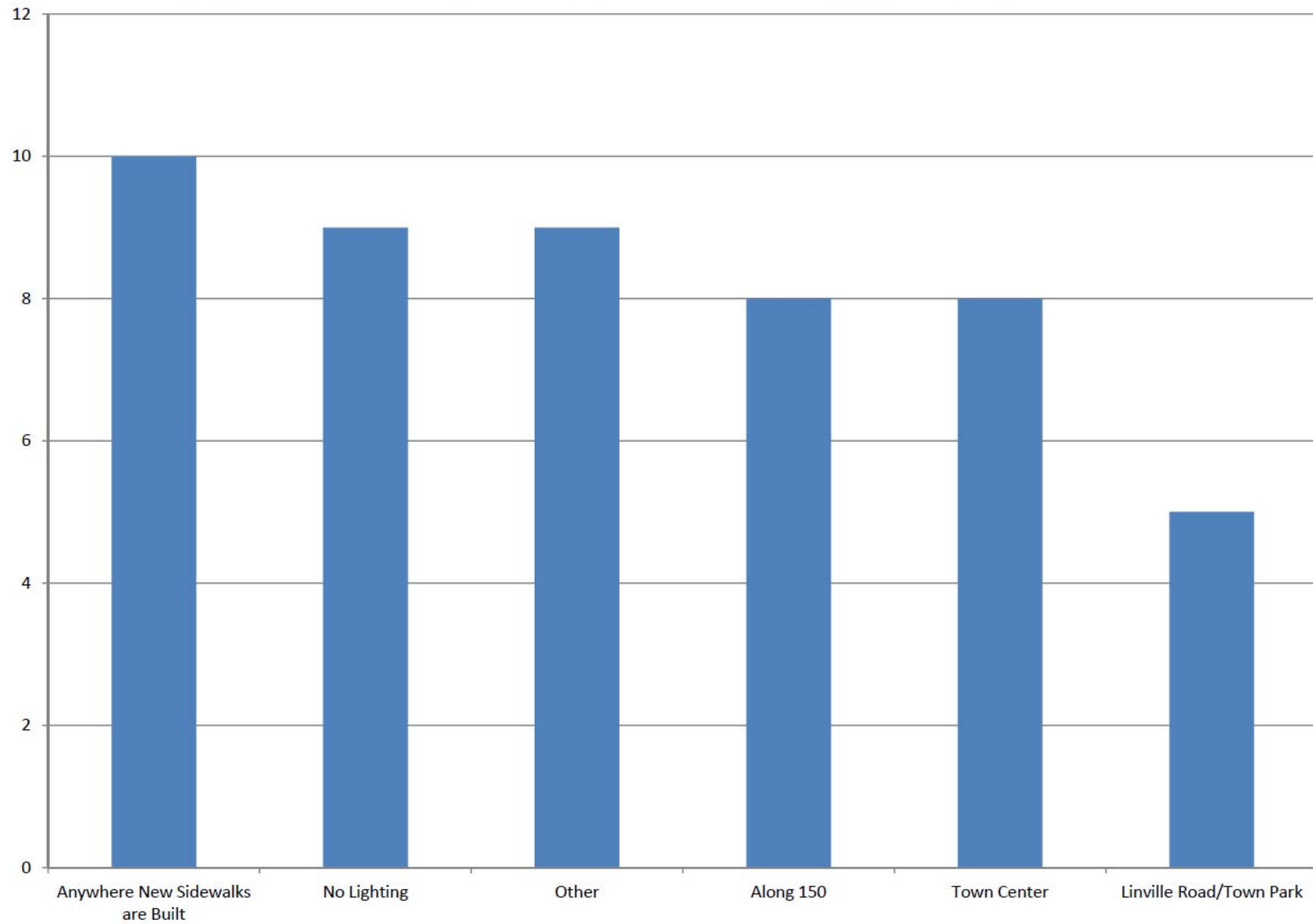


9. (a) What are the top roadway corridors needing sidewalk or trail improvements? (survey only)

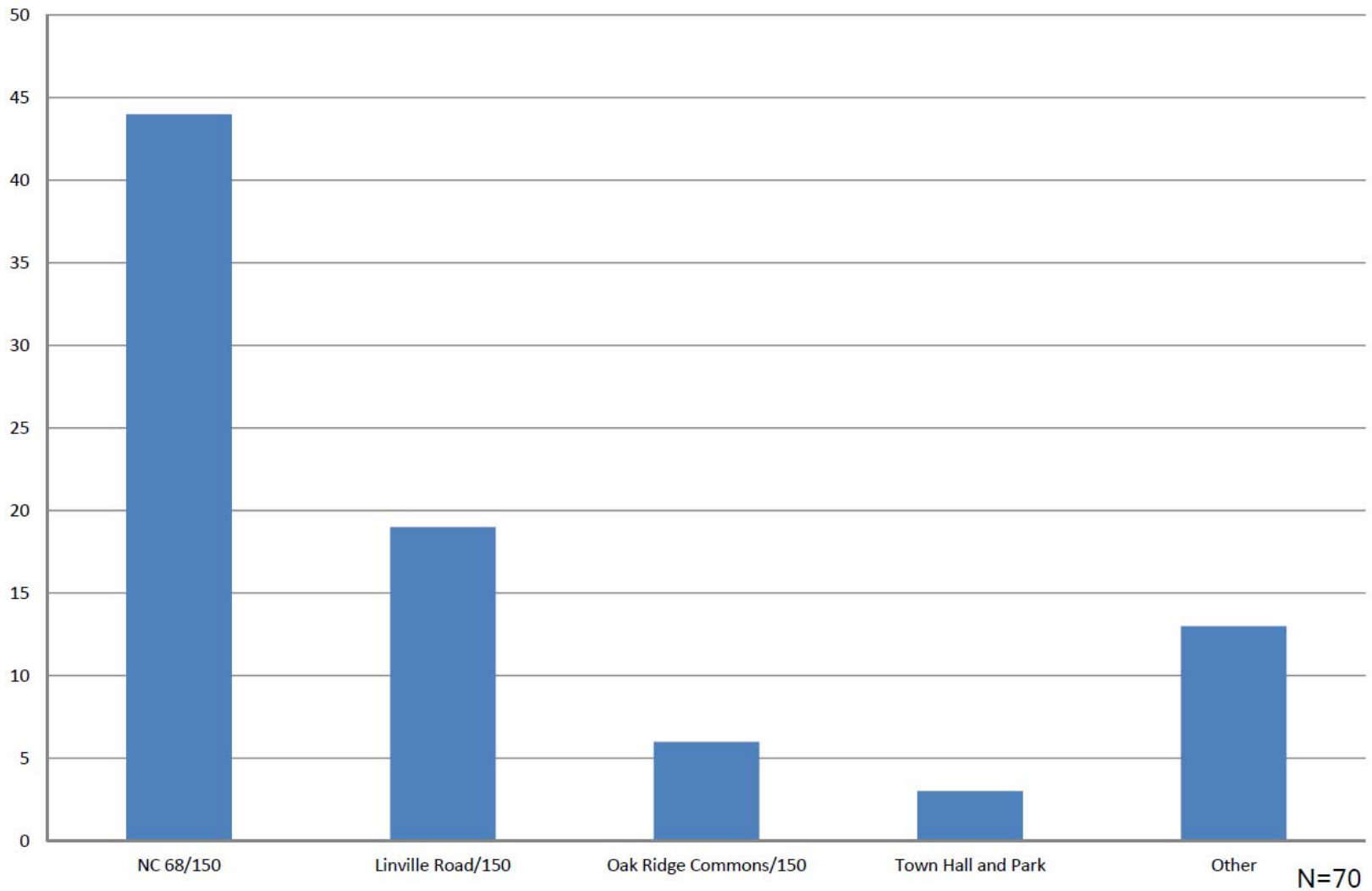


9. (a) What are the top roadway corridors needing sidewalk or trail improvements? (survey and public event response)

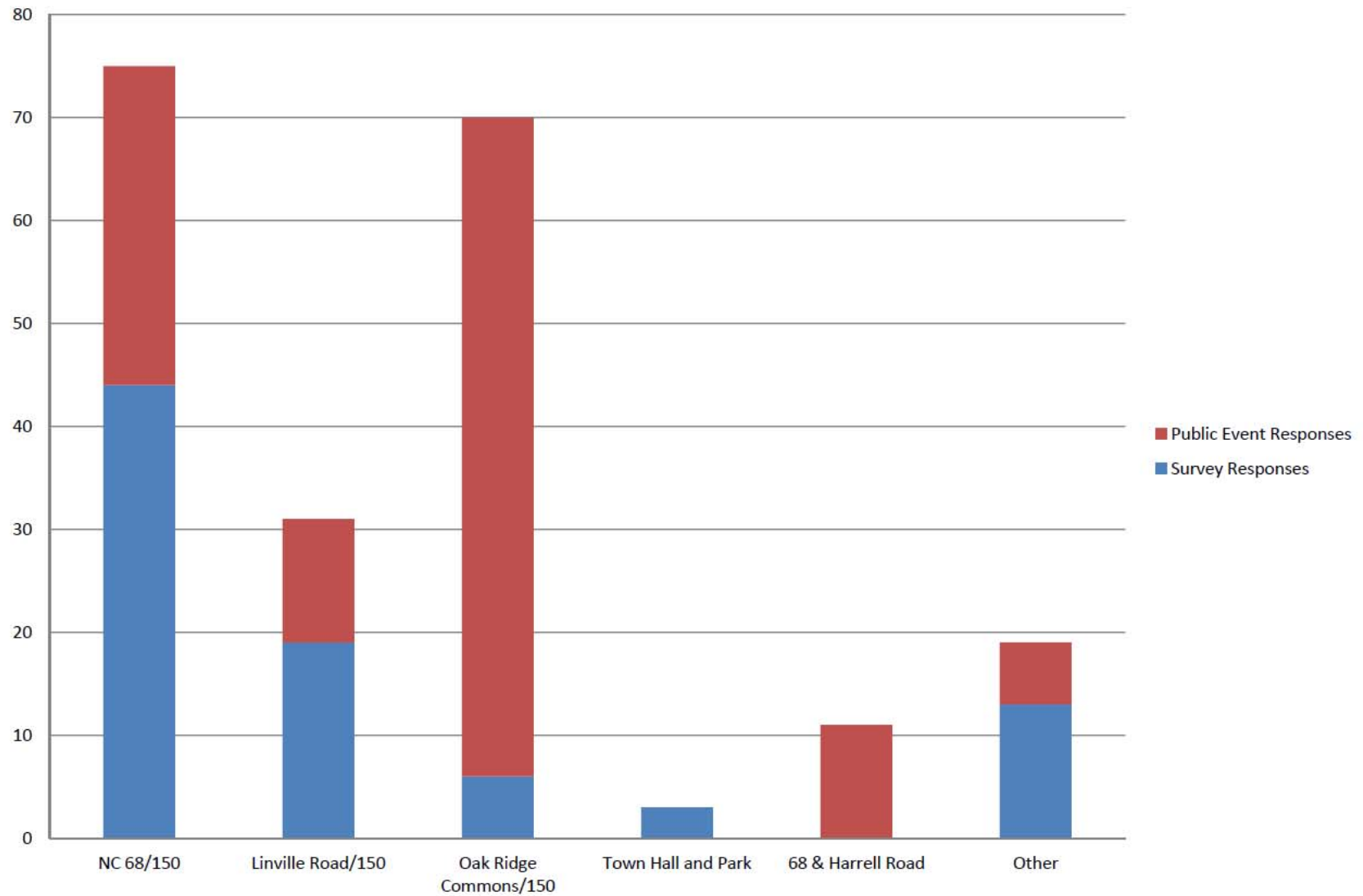


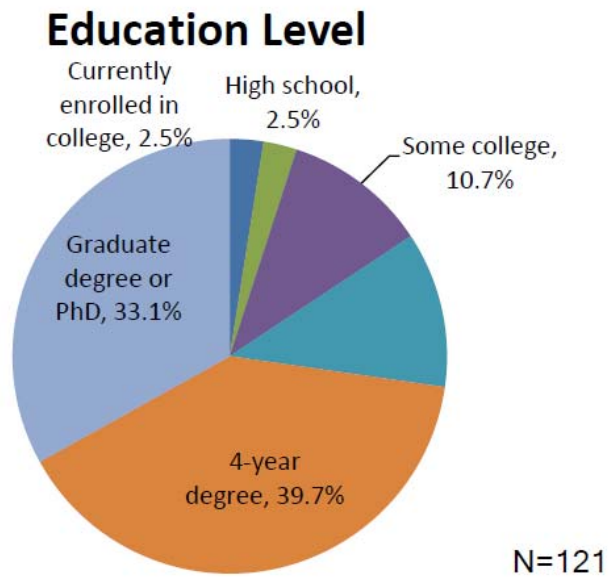
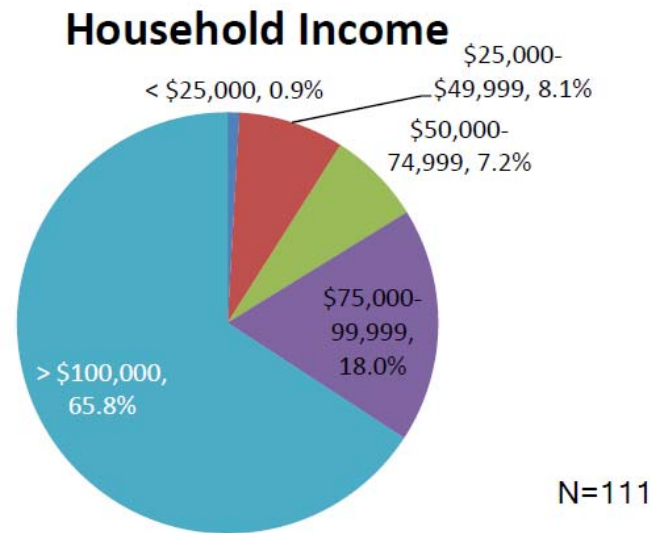
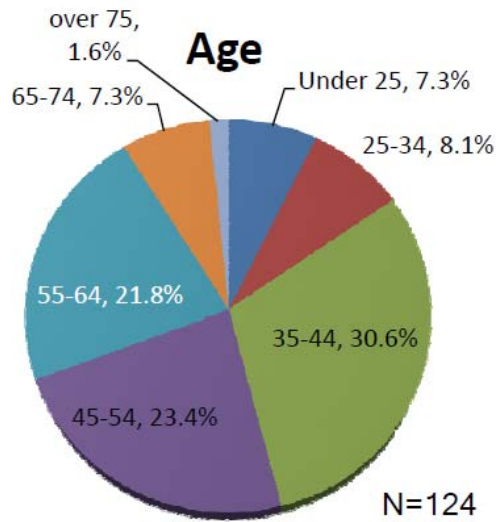
9. (b) What are the top roadway corridors needing lighting improvements?

9. (c) What are the top roadway corridors needing crossing or intersection improvements?



9. (c) What are the top roadway corridors needing crossing or intersection improvements?





APPENDIX C. REFERENCES

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NC DOT Division of Bicycle and Pedestrian Transportation Shared-use Pathway Design Manual
http://www.ncdot.org/transit/bicycle/projects/project_types/Multi_Use_Pathways2.pdf

NCDOT Guidelines for Accommodating Greenways with Road Improvement Projects
http://www.ncdot.org/transit/bicycle/laws/laws_greenway_admin.html

NCDOT Pedestrian Policy for Pedestrian Accommodation.
http://ncdot.org/transit/bicycle/laws/laws_pedpolicy.html

NCDOT's Traditional Neighborhood Development Street Design Guidelines
<http://www.ncdot.org/doh/preconstruct/altern/value/manuals/tnd.pdf>

North Carolina DOT Safe Routes to School Program
<http://www.ncdot.org/transit/bicycle/saferoutes/SafeRoutes.html>

Pedestrian and Bicycling Information Center - Developing Pedestrian Plans and Policies
www.walkinginfo.org/develop/

PEDSAFE – Pedestrian and Bicycling Information Center
www.walkinginfo.org/pedsafe/

Project for Public Spaces
www.pps.org

Victoria Transport Policy Institute: Streetscape Improvements Enhancing Urban Roadway Design
<http://www.vtpi.org/tdm/tdm122.htm>

Walkability Checklist – Pedestrian and Bicycle Information Center
<http://drusilla.hsrb.unc.edu/cms/downloads/walkabilitychecklist.pdf>

APPENDIX D. FUNDING SOURCES

Local, state, federal, and private funding is available to support the planning, construction, right of way acquisition and maintenance of bicycle and pedestrian facilities. Available funding sources are related to a variety of purposes including transportation, water quality, hazard mitigation, recreation, air quality, wildlife protection, community health, and economic development. This list identifies some of the bicycle and pedestrian facility funding opportunities available through federal, state, local, foundation and corporate sources. An important key to obtaining funding is for local governments to have adopted plans for greenway, bicycle, pedestrian or multi-use path systems in place prior to making an application for funding.

FUNDING ALLOCATED BY STATE AGENCIES

Funding Opportunities for Transportation:

Bicycle and Pedestrian Independent Projects Funded Through the Transportation Improvement Program (TIP):

In North Carolina, the Department of Transportation, Division of Bicycle and Pedestrian Transportation (DBPT) manages the Transportation Improvement Program (TIP) selection process for bicycle and pedestrian projects in consultation with the Metropolitan and Rural Planning Organizations.

Projects programmed into the TIP are independent projects – those which are not related to a scheduled highway project. Incidental projects – those related to a scheduled highway project – are handled through other funding sources described in this section.

Each year, the DBPT regularly sets aside TIP funding for the department to fund projects such as training workshops, pedestrian safety and research projects, and other pedestrian needs statewide. Those interested in learning about training workshops, research and other opportunities should contact the DBPT for information.

A total of --- million dollars of TIP funding is available for funding various bicycle and pedestrian independent projects, including the construction of multi-use paths, the striping of bicycle lanes, and the construction of paved shoulders, among other facilities. Prospective applicants are encouraged to contact the DBPT regarding funding assistance for bicycle and pedestrian projects. For a detailed description of the TIP project selection process, visit: <http://www.ncdot.gov/performance/reform/prioritization/>

Incidental Projects – Bicycle and pedestrian accommodations such as bike lanes, widened paved shoulders, sidewalks and bicycle-safe bridge design are frequently included as incidental features of highway projects. In addition, bicycle-safe drainage grates are a standard feature of all highway construction. Most bicycle and pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of National Highway System funds and State Highway Trust Funds.

Sidewalk Program – Each year, a total of \$1.4 million in STP-Enhancement funding is set aside for sidewalk construction, maintenance and repair. Each of the 14 highway divisions across the state

allocates \$100,000 annually from each division's budget for this purpose. Funding decisions are made by the district engineer. Prospective applicants are encouraged to contact their district engineer for information on how to apply for funding.

Governor's Highway Safety Program (GHSP) – The mission of the GHSP is to promote highway safety awareness and reduce the number of traffic crashes in the state of North Carolina through the planning and execution of safety programs. GHSP funding is provided through an annual program, upon approval of specific project requests. Amounts of GHSP funds vary from year to year, according to the specific amounts requested. Communities may apply for a GHSP grant to be used as seed money to start a program to enhance highway safety. Once a grant is awarded, funding is provided on a reimbursement basis. Evidence of reductions in crashes, injuries, and fatalities is required. For information on applying for GHSP funding, visit: www.ncdot.org/programs/ghsp/.

Funding Available Through North Carolina Metropolitan Planning Organizations (MPOs)

MPOs in North Carolina which are located in air quality nonattainment or maintenance areas have the authority to program Congestion Mitigation Air Quality (CMAQ) funds. CMAQ funding is intended for projects that reduce transportation related emissions. Some NC MPOs have chosen to use the CMAQ funding for bicycle and pedestrian projects. Local governments in air quality nonattainment or maintenance areas should contact their MPO or RPO for information on CMAQ funding opportunities for bicycle and pedestrian facilities. Check for MAP-21 detail changes on funding formula amounts.

Transportation Alternatives, NCDOT

Funds are allocated based on an equity formula approved by the Board of Transportation. The formula is applied at the county level and aggregated to the regional level. Available fund amount varies. In previous Calls, the funds available ranged from \$10 million to \$22 million.

A Call for projects has not taken place since 2005. For more information, visit:

www.ncdot.gov/bikeped/funding/

Bicycle and Pedestrian Planning Grant Initiative, managed by NCDOT, DBPT

To encourage the development of comprehensive local bicycle plans and pedestrian plans, the NCDOT Division of Bicycle and Pedestrian Transportation (DBPT) and the Transportation Planning Branch (TPB) have created a matching grant program to fund plan development. This program was initiated through a special allocation of funding approved by the North Carolina General Assembly in 2003 along with federal funds earmarked specifically for bicycle and pedestrian planning by the TPB. The planning grant program was launched in January 2004, and it is currently administered through NCDOT-DBPT and the Institute for Transportation Research and Education (ITRE) at NC State University. Over the past three grant cycles, 48 municipal plans have been selected and funded from 123 applicants. A total of \$ 1,175,718 has been allocated. Funding is secured for 2008 at \$400,000. Additional annual allocations will be sought for subsequent years. For more information, visit:

<https://connect.ncdot.gov/municipalities/PlanningGrant/Pages/default.aspx>

Safe Routes to School Program, managed by NCDOT, DBPT

The NCDOT Safe Routes to School Program is lumped in with Transportation Alternatives. There may be \$20 Million of unobligated funds as of the end of SAFETEA-LU; the last federal

transportation appropriation bill. The Division of Bicycle and Pedestrian Transportation at NCDOT is charged with disseminating SRTS funding.

The state of North Carolina has been allocated \$15 million in Safe Routes to School funding for fiscal years 2005 through 2009 for infrastructure or non-infrastructure projects. All proposed projects must relate to increasing walking or biking to and from an elementary or middle school. An example of a non-infrastructure project is an education or encouragement program to improve rates of walking and biking to school. An example of an infrastructure project is construction of sidewalks around a school. Infrastructure improvements under this program must be made within 2 miles of an elementary or middle school. The state requires the completion of a competitive application to apply for funding. For more information, visit: www.ncdot.gov/bikeped/funding/

Small Urban Funds managed by NCDOT Highway Division Offices

Small Urban Funds are available for small improvement projects in urban areas. Each NCDOT Highway Division has \$2 million of small urban funds available annually. Although not commonly used for bicycle facilities, local requests for small bicycle projects can be directed to the NCDOT Highway Division office for funding through this source. A written request should be submitted to the Division Engineer providing technical information, such as location, improvements being requested, timing, etc. for thorough review.

Hazard Elimination Program by NCDOT Highway Division Offices

This program focuses on projects intended for locations that should have a documented history of previous crashes. Bicycle and pedestrian projects are eligible for this program, although the funds are not usually used for this purpose. This program is administered through the NCDOT Division of Highways. Similar to the Small Urban Funds, it is a significantly limited funding source.

The North Carolina Conservation Tax Credit (managed by NCDENR)

This program, managed by the North Carolina Department of Environment and Natural Resources, 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 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, visit: http://www.openspaceprotection.org/tax_nc.htm

Land and Water Conservation Fund (LWCF)

MAP-21 combined this with Transportation Alternatives. The Land and Water Conservation Fund (LWCF) program is a reimbursable, 50/50 matching grants program to states for conservation and recreation purposes, and through the states to local governments to address "close to home" outdoor recreation needs. LWCF grants can be used by communities to build a trail within one park site, if the local government has fee-simple title to the park site. Grants for a maximum of \$250,000 in LWCF assistance are awarded yearly to county governments, incorporated municipalities, public authorities and federally recognized Indian tribes. The local match may be provided with in-kind services or cash. 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 small fraction of this amount. The allotted money for the year 2007 is \$632,846.

The Land and Water Conservation Fund (LWCF) has historically been a primary funding source of the US Department of the Interior for outdoor recreation development and land acquisition by local governments and state agencies. In North Carolina, the program is administered by the Department of Environment and Natural Resources. Since 1965, the LWCF program has built a permanent park legacy for present and future generations. In North Carolina alone, the LWCF program has provided more than \$63 million in matching grants to protect land and support more than 800 state and local park projects. More than 37,000 acres have been acquired with LWCF assistance to establish a park legacy in our state. For more information, visit: http://www.ncparks.gov/About/grants/lwcf_grant.php

NC Adopt-A-Trail Grant Program

This program, operated by the Trails Section of the NC Division of State Parks, offers annual grants to local governments to build, renovate, maintain, sign and map and create brochures for pedestrian trails. Grants are generally capped at about \$10,000 per project and do not require a match. A total of \$108,000 in Adopt-A-Trail money is awarded annually to government agencies. Applications are due during the month of January. For more information, visit: http://www.ncparks.gov/About/trails_AAT.php

Recreational Trails Program

The Recreational Trails Program (RTP) is a grant program funded by Congress with money from the federal gas taxes paid on fuel used by off-highway vehicles. This program's intent is to meet the trail and trail-related recreational needs identified by the Statewide Comprehensive Outdoor Recreation Plan. Grant applicants must be able contribute 20% of the project cost with cash or in-kind contributions. The program is managed by the State Trails Program, which is a section of the N.C. Division of Parks and Recreation.

The grant application is available and instruction handbook is available through the State Trails Program website at http://www.ncparks.gov/About/trails_RTP_project.php. Pre-Applications are due in November and, if invited, final applications are due January 31st. For more information, call (919) 715-8699.

North Carolina Parks and Recreation Trust Fund (PARTF)

The fund was established in 1994 by the North Carolina General Assembly and is administered by the Parks and Recreation Authority. Through this program, several million dollars each year are available to local governments to fund the acquisition, development and renovation of recreational areas. Applicable projects require a 50/50 match from the local government. Grants for a maximum of \$500,000 are awarded yearly to county governments or incorporated municipalities. The fund is fueled by money from the state's portion of the real estate deed transfer tax for property sold in North Carolina.

The trust fund is allocated three ways:

- 65 percent to the state parks through the N.C. Division of Parks and Recreation.
- 30 percent as dollar-for dollar matching grants to local governments for park and recreation purposes.
- 5 percent for the Coastal and Estuarine Water Access Program.

For information on how to apply, visit:

http://www.ncparks.gov/About/grants/partf_eligibility.php

Powell Bill Program

Annually, State street-aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as provided by statute. This program is a state grant to municipalities for the purposes of maintaining, repairing, constructing, reconstructing or widening of local streets that are the responsibility of the municipalities or for planning, construction, and maintenance of bikeways or sidewalks along public streets and highways. Funding for this program is collected from fuel taxes. Amount of funds are based on population and mileage of City-maintained streets. For more information, visit:

<https://connect.ncdot.gov/municipalities/State-Street-Aid/Pages/default.aspx>

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. The fund has been significantly reduced in recent years. 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. CWMTF funds may be used to establish a network of riparian buffers and greenways for environmental, educational, and recreational benefits. The fund has provided funding for land acquisition of numerous greenway projects featuring trails, both paved and unpaved. For a history of awarded grants in North Carolina and more information about this fund and applications, visit: www.cwmf.net/

Natural Heritage Trust Fund

This trust fund, managed by the NC Natural Heritage Program, has contributed millions of dollars to support the conservation of North Carolina's most significant natural areas and cultural heritage sites. The NHTF is used to acquire and protect land that has significant habitat value. Some large wetland areas may also qualify, depending on their biological integrity and characteristics. Only certain state agencies are eligible to apply for this fund, including the Department of Environment and Natural Resources, the Wildlife Resources Commission, the Department of Cultural Resources and the Department of Agriculture and Consumer Services. As such, municipalities must work with State level partners to access this fund. Additional information is available from the NC Natural Heritage Program. For more information and grant application information, visit: www.ncnhtf.org/

North Carolina Conservation Tax Credit Program

North Carolina has a unique incentive program to assist land-owners to protect the environment and the quality of life. A credit is allowed against individual and corporate income taxes when real property is donated for conservation purposes. Interests in property that promote specific public benefits may be donated to a qualified recipient. Such conservation donations qualify for a substantial tax credit. For more information, visit:

<http://www.onencnaturally.org/web/cpca/conservation-incentives>

Urban and Community Forestry Assistance Program

This program 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. The program operates as a cooperative partnership between the NC Division of Forest Resources and the USDA Forest Service, Southern Region. 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://ncforestservice.gov/Urban/urban_grant_overview.htm

The North Carolina Division of Forest Resources

Urban and Community Forestry Grant can provide funding for a variety of projects that will help toward planning and establishing street trees as well as trees for urban open space. For more information visit: http://ncforestservice.gov/Urban/urban_grant_overview.htm

Ecosystem Enhancement Program

Developed in 2003 as a new mechanism to facilitate improved mitigation projects for NC highways, this program offers funding for restoration projects and for protection projects that serve to enhance water quality and wildlife habitat in NC. Information on the program is available by contacting the Natural Heritage Program in the NC Department of Environment and Natural Resources (NCDENR). For more information, visit:

www.nceep.net/pages/partners.html or call 919-715-0476.

Conservation Reserve Enhancement Program (CREP)

This program is a joint effort of the North Carolina Division of Soil and Water Conservation, the NC Clean Water Management Trust Fund, the Ecosystem Enhancement Program (EEP), and the Farm Service Agency - United States Department of Agriculture (USDA) to address water quality problems of the Neuse, Tar-Pamlico and Chowan river basins as well as the Jordan Lake watershed area.

CREP is a voluntary program that seeks to protect land along watercourses that is currently in agricultural production. The objectives of the program include: installing 100,000 acres of forested riparian buffers, grassed filter strips and wetlands; reducing the impacts of sediment and nutrients within the targeted area; and providing substantial ecological benefits for many wildlife species that are declining in part as a result of habitat loss. Program funding will combine the Federal Conservation Reserve Program (CRP) funding with State funding from the Clean Water Management Trust Fund, Agriculture Cost Share Program, and North Carolina Wetlands Restoration Program.

For more information, please visit: http://www.ncaswcd.org/?page_id=90

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 Agriculture administers this program through local Soil and Water Conservation Districts (SWCD). For more information, visit:

<http://www.ncagr.gov/SWC/costshareprograms/ACSP/index.html>

Water Resources Development Grant Program

The NC Division of Water Resources offers cost-sharing grants to local governments on projects related to water resources. Of the seven project application categories available, the category which relates to the establishment of greenways is “Land Acquisition and Facility Development for Water-Based Recreation Projects.” Applicants may apply for funding for a greenway as long as the greenway is in close proximity to a water body. For more information, see:

www.ncwater.org/Financial_Assistance or call 919-733-4064.

Small Cities Community Development Block Grants

State level funds are allocated through the NC Department of Commerce, Division of Community Assistance to 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: portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/stateadmin or access State procedures at www.nctreasurer.com/LGC/compsup2009/federal/14.228-2009.pdf or call 919-733-2853.

North Carolina Community Transformation Grant

In 2011, CDC awarded \$103 million to 61 state and local government agencies, tribes and territories, and nonprofit organizations in 36 states, along with nearly \$4 million to 6 national networks of community-based organizations. \$7.4 Million was awarded to North Carolina. Awardees are engaging partners from multiple sectors, such as education, transportation, and business, as well as faith-based organizations to improve the health of their communities' approximately 120 million residents. Awardees also provide funding to community-based organizations to ensure broad participation in creating community change. Administered by health direction regions, more info: www.cdc.gov/communitytransformation/

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.

Fit Community grants are designed to support innovative strategies that help a community meet its goal to becoming a Fit Community

For more information, visit: www.healthwellnc.com

FUNDING ALLOCATED BY FEDERAL AGENCIES**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. For more information, visit: <http://www.nrcs.usda.gov/PROGRAMS/wrp/>.

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. For more information, visit:

www.hud.gov/offices/cpd/communitydevelopment/programs/.

USDA Rural Business Enterprise Grants

Public and private nonprofit groups in communities with populations under 50,000 are eligible to apply for grant assistance to help their local small business environment. \$1 million is available for North Carolina on an annual basis and may be used for sidewalk and other community facilities. For more information from the local USDA Service Center, visit:

http://www.rurdev.usda.gov/BCP_rbeg.html

Rivers Trails and Conservation Assistance Program (RTCA)

The Rivers, Trails, and Conservation Assistance Program, also known as the Rivers & Trails Program or RTCA, is the community assistance arm of the National Park Service. RTCA staff provide technical assistance to community groups and local, State, and federal government agencies so they can conserve rivers, preserve open space, and develop trails and greenways. The RTCA program implements the natural resource conservation and outdoor recreation mission of the National Park Service in communities across America

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. For more information, visit: www.nps.gov/ncrc/programs/rtca/ or call Chris Abbett, Program Leader, at 404-562-3175 ext. 522.

Public Lands Highways Discretionary Fund

The Federal Highway Administration administers discretionary funding for projects that will reduce congestion and improve air quality. The FHWA issues a call for projects to disseminate this funding. The FHWA estimates that the PLHD funding for the 2007 call will be \$85 million. In the past, Congress has earmarked a portion of the total available funding for projects. For information on how to apply, visit: <http://www.fhwa.dot.gov/discretionary/>

Community Forest Program

The Community Forest Program (CFP) protects forests that are important for people and the places they call home. Community forests provide many benefits such as places to recreate and enjoy nature; they protect habitat, water quality and other environmental benefits, and they can provide economic benefits through timber resources. Community Forests have also long been sites for environmental and cultural education, for more information please visit:

www.fs.fed.us/spf/coop/programs/loa/cfp.shtml

Community Facilities Grants

Community Programs provides grants to assist in the development of essential community facilities in rural areas and towns of up to 20,000 in population. Grant funds may be used to assist in the development of essential community facilities. Grant funds can be used to construct, enlarge, or improve community facilities for health care, public safety, and community and public services; for more information please visit:

www.rurdev.usda.gov/HAD-CF_Grants.html

Partners for Fish and Wildlife NC

The Partners for Fish and Wildlife Program is the U.S. Fish and Wildlife Service's primary mechanism for delivering voluntary on-the-ground habitat improvement projects on private lands for the benefit of Federal trust species. Biologists provide technical and financial assistance to landowners who want to restore and enhance fish and wildlife Partners for Fish and Wildlife works in a diversity of habitat types throughout the state. Some Partners for Fish and Wildlife Projects are educational in nature, providing the necessary materials and opportunities for children and adults to learn the significance of the State's natural resources. Habitat types protected in NC

- Forested Wetlands (Bottomland Hardwoods, Non-alluvial swamp forest, Pocosins)
- Longleaf Pine
- Piedmont Prairies
- Streams and Riparian Areas

for more information e-mail: JohnAnn_Shearer@fws.gov or call 919/856 4520 ext. 17

Web site: <http://www.fws.gov/raleigh/pfw.html>

Division of Water Quality 319 Grant Program

The FY2013 319 Grant RFP is soliciting restoration or implementation projects in impaired watersheds. The purpose of this funding is to *restore* waters impaired by nonpoint source (NPS) pollution. A list of the state's impaired waterbody segments is available at this link: <http://portal.ncdenr.org/web/wq/ps/mtu/assessment>. 319 grant watershed restoration funds must be used to implement a Watershed Restoration Plan for a waterbody or watershed that is impaired. A list of North Carolina 9-element watershed restoration plans associated with the 319 program that can be used to guide restoration efforts is available at this link: <http://portal.ncdenr.org/web/wq/ps/nps/319program/nc-watershed-plans>.

LOCAL FUNDING SOURCES

Municipalities often plan for the funding of pedestrian facilities or improvements through development of Capital Improvement Programs (CIP). 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. CIPs should include all types of capital improvements (water, sewer, buildings, streets, etc.) versus programs for single purposes. This allows municipal decision-makers to balance all capital needs. Typical capital funding mechanisms include the following: capital reserve fund, capital protection ordinances, municipal service district, tax increment financing, taxes, fees, and bonds. Each of these categories are described below.

Capital Reserve Fund

Municipalities have statutory authority to create capital reserve funds for any capital purpose, including pedestrian facilities. The reserve fund must be created through ordinance or resolution that states the purpose of the fund, the duration of the fund, the approximate amount of the fund, and the source of revenue for the fund. Sources of revenue can include general fund allocations, fund balance allocations, grants and donations for the specified use.

Capital Project Ordinances

Municipalities can pass Capital Project Ordinances that are project specific. The ordinance identifies and makes appropriations for the project.

Municipal Service District

Municipalities have statutory authority to establish municipal service districts, to levy a property tax in the district additional to the citywide property tax, and to use the proceeds to provide services in the district. Downtown revitalization projects are one of the eligible uses of service districts.

Tax Increment Financing

Tax increment financing (TIF) is a tool to use future gains in taxes to finance the current improvements that will create those gains. When a public project, such as the construction of a greenway, is carried out, there is an increase in the value of surrounding real estate. Oftentimes, new investment in the area follows such a project. This increase in value and investment creates more taxable property, which increases tax revenues. These increased revenues can be referred to as the “tax increment.” Tax Increment Financing dedicates that increased revenue to finance debt issued to pay for the project. TIF is designed to channel funding toward improvements in distressed or underdeveloped areas where development would not otherwise occur. TIF creates funding for public projects that may otherwise be unaffordable to localities. The large majority of states have enabling legislation for tax increment financing.

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.

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 Allegheny 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. Examples include:

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.

Occupancy Tax

The NC General Assembly may grant towns the authority to levy occupancy tax on hotel and motel rooms. The act granting the taxing authority limits the use of the proceeds, usually for tourism-promotion purposes.

Fees

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

Stormwater Utility Fees

Greenway sections may be purchased with stormwater fees, if the property in question is used to mitigate floodwater or filter pollutants. Stormwater charges are typically based on an estimate of the amount of impervious surface on a user's property. Impervious surfaces (such as rooftops and paved areas) increase both the amount and rate of stormwater runoff compared to natural conditions. Such surfaces cause runoff that directly or indirectly 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.

Streetscape Utility Fees

Streetscape Utility Fees could help support streetscape maintenance of the area between the curb and the property line through a flat monthly fee per residential dwelling unit. Discounts would be available for senior and disabled citizens. Non-residential customers would be charged a per foot fee based on the length of frontage on streetscape improvements. This amount could be capped for non-residential customers with extremely large amounts of street frontage. The revenues raised from Streetscape Utility fees would be limited by ordinance to maintenance (or construction and maintenance) activities in support of the streetscape.

Impact Fees

Developers can be required to provide greenway impact fees through local enabling legislation. 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 Holly Springs 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.

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).

OTHER LOCAL OPTIONS

Facility Maintenance Districts

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

The municipality can manage maintenance responsibilities either through its own staff or through private contractors.

Partnerships

Another 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. Major employers and developers should be identified and provided with a “Benefits of Walking”-type handout for themselves and their employees. Very specific routes that make critical connections to place of business would be targeted for private partners’ monetary support following a successful master planning effort. Potential partners include major employers which are located along or accessible to pedestrian facilities such as shared-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.

Local Trail Sponsors

A sponsorship program for trail amenities allows smaller donations to be received from both individuals and businesses. Cash donations could be placed into a trust fund to be accessed for certain construction or acquisition projects associated with the greenways and open space system. Some recognition of the donors is appropriate and can be accomplished through the placement of a plaque, the naming of a trail segment, and/or special recognition at an opening ceremony. Types of gifts other than cash could include donations of services, equipment, labor, or reduced costs for supplies.

Volunteer Work

It is expected that many citizens will be excited about the development of a greenway corridor. Individual volunteers from the community can be brought together with groups of volunteers form church groups, civic groups, scout troops and environmental groups to work on greenway

development on special community work days. Volunteers can also be used for fund-raising, maintenance, and programming needs.

PRIVATE FOUNDATIONS AND ORGANIZATIONS

Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are a few examples of private funding opportunities available in North Carolina.

Bikes Belong

The Bikes Belong Grants Program strives to put more people on bicycles more often by funding important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S. These projects include bike paths, lanes, and routes, as well as bike parks, mountain bike trails, BMX facilities, and large-scale bicycle advocacy initiatives.

Since 1999, Bikes Belong has awarded over 175 grants to municipalities and grassroots groups in 44 states and the District of Columbia, investing over \$1.5 million in community bicycling projects and leveraging more than \$500 million in federal, state, and private funding; for more information please visit:

<http://www.bikesbelong.org/bikes-belong-foundation/>

Blue Cross Blue Shield Foundation

The foundation has provided support for a number of projects ranging from local community equipment grants to collaboration on large statewide initiatives that work to improve health and lower obesity rates through healthy eating and active living; for more information please visit:

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

Creating New Economies Fund

Small grant program supports innovative triple bottom line (Environmental Stewardship, Economic Development and Social justice) projects, providing communities with resources to address multiple issues simultaneously. Grants average \$8,000 to \$12,000, with the maximum award being \$15,000. Pre-Proposals due in December; for more information please visit:

<http://www.conservationfund.org/our-conservation-strategy/major-programs/resourceful-communities-program/investing-in-communities/>

Kate B. Reynolds Foundation

The Winston-Salem based Foundation has funded Community Transformation Catalyst positions in 4 Tier 1 counties, including Rockingham County . The Community Transformation Catalyst program is funded under the Health Care Division of the foundation. Grant deadlines are February and August. Check the website here for updated information:

<http://kbr.org/content/health-care-division>

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.land4tomorrow.org/>

National Trails Fund

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

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. For more information please visit: <http://www.americanhiking.org/gear-resources/grant-opportunities/>

North Carolina Community Foundation

The North Carolina Community Foundation, established in 1988, is a statewide foundation seeking gifts from individuals, corporations, and other foundations to build endowments and ensure financial security for nonprofit organizations and institutions throughout the state. Based in Raleigh, North Carolina, the foundation also manages a number of community affiliates throughout North Carolina that make grants in the areas of human services, education, health, arts, religion, civic affairs, and the conservation and preservation of historical, cultural, and environmental resources. In addition, the foundation manages various scholarship programs statewide. For more information please visit: www.nccommunityfoundation.org

The Trust for Public Land

Land conservation is central to the mission of the Trust for Public Land (TPL). 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.

The following are TPL's Conservation Services:

- Conservation Vision: TPL helps agencies and communities define conservation priorities, identify lands to be protected, and plan networks of conserved land that meet public need.
- Conservation Finance: TPL helps agencies and communities identify and raise funds for conservation from federal, state, local, and philanthropic sources.
- Conservation Transactions: TPL helps structure, negotiate, and complete land transactions that create parks, playgrounds, and protected natural areas.
- Research & Education: TPL acquires and shares knowledge of conservation issues and techniques to improve the practice of conservation and promote its public benefits.

Since 1972, TPL has worked with willing landowners, community groups, and national, state, and local agencies to complete more than 3,000 land conservation projects in 46 states, protecting more than 2 million acres. Since 1994, TPL has helped states and communities craft and pass over 330 ballot measures, generating almost \$25 billion in new conservation-related funding. 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. The foundation has two grant cycles per year and generally does not fund land acquisition. However, the foundation may be able to support municipalities in other areas of greenways development. More information is available at: www.zsr.org.

