Town of Pleasant Garden

COMPREHENSIVE BICYCLE & PEDESTRIAN TRANSPORTATION PLAN

Piedmont Triad Regional Council

Pleasant Garden, N.C. Settled 1757 1997

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Division of Bicycle & Pedestrian Transportation
North Carolina Department of Transportation

Acknowledgements

Plan Sponsors

Division of Bicycle & Pedestrian Transportation

Town Council

Carla Strickland, Mayor

Steve Brandt, Mayor Pro-Tem

Alan Marshall

Ron Surgeon

Rick Wallace

Long Range Planning Board

David Seel, Chairman

Edgar Phillips

Pam Lemieux

Gregory Pearsall

Richard Winn

Bicycle and Pedestrian Plan Steering Committee

Anne Hice

Daniel Amstutz, Greensboro MPO

Eddy Patterson

Henry Tripp

Rob Pawlik

Roger Bardsley

Sandy Carmany, Town Clerk

Janet Mayer, Guilford County Health Dept.

Others

Citizens, businesses, NCDOT staff, Guilford County Parks and Recreation, Pleasant Garden Elementary School staff and PTA members; Southeast Guilford Business Association and others. Thanks for all your time and input into this planning process.

Staff and Consulting Support

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CHAPTER 1: INTRODUCTION

The Town of Pleasant Garden was originally founded in 1786 when pioneers from Pennsylvania, Maryland and Delaware established the Pleasant Garden United Methodist Church. The Town was officially incorporated in 1997. The Town of Pleasant Garden is 15 square miles in size, with a population of 4,545, development has historically been low-density in nature. The heart of Town has an elementary school and a mix of institutional, commercial, light and heavy industrial land uses. The study area includes the Town of Pleasant Garden municipal limits and its immediate surroundings.

Chapter Contents:

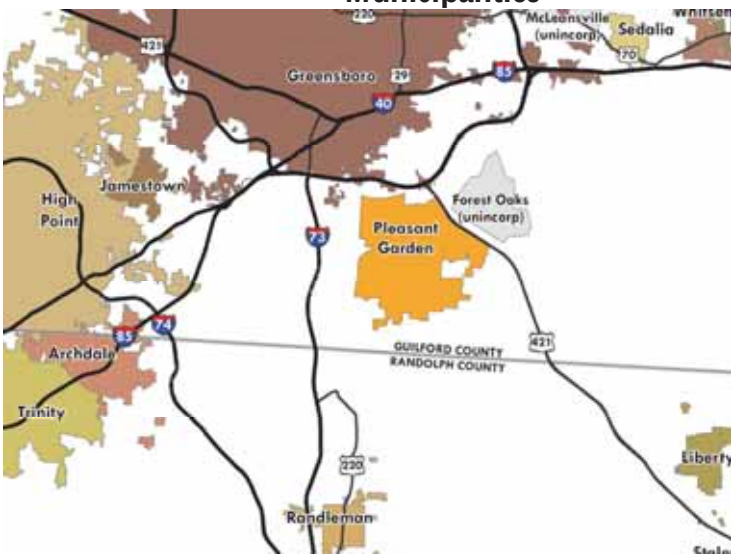
Planning Area Map

Scope and Purpose of the Plan

Vision Statement

5 & 10 Year Goals

Figure 1: Town of Pleasant Garden and Surrounding Municipalities



1.1 SCOPE AND PURPOSE

The Pleasant Garden Bicycle and Pedestrian Comprehensive Transportation Plan identifies strategies to make the Town more walkable and bikeable. Recognizing the value of investing in planning and building bicycle and pedestrian facilities as a boost to quality of life, economic development, physical health and transportation alternatives; the Town of Pleasant Garden used matching funds and secured a planning grant from the NCDOT Division of Bicycle and Pedestrian Transportation to complete this planning process. First analyzing existing bicycle and pedestrian facilities, programs and policies, the plan then utilizes public input; surveys, public meetings, association presentations, focus groups and events to develop and plan network recommendations. Design guidelines, implementation strategies, key action steps and additional resources are included in the plan document.

1.2 VISION AND GOALS

The steering committee outlined a vision and set of goals for pedestrian and bicycle transportation in Pleasant Garden. Public input and survey responses were used to refine the vision and goals. The 5 and 10 year goals include "likes" received at the May 20th public input workshop and the 4th of July Festival. Each person was given 3 "likes" to put next to their preferred goals.

Vision Statement

Pleasant Garden is a community that places great importance on the quality of life and health of its residents. By creating a network of bicycle facilities, trails, and sidewalks, the Town will encourage active lifestyles and promote transportation and recreational choices available to all citizens. Bicycle and pedestrian facilities will serve as safe and accessible connections between neighborhoods, recreational facilities, schools, and businesses. Pleasant Garden's downtown district will feature attractive streetscapes that are walkable and attractive to residents and visitors. Through connections to surrounding recreational facilities and greenways, Pleasant Garden will become a destination for cycling and outdoor recreation.

5-Year Goals

- Create dedicated pedestrian and bicycling spaces that are protected and separated from vehicular traffic: 1) Pleasant Garden Road and 2) Alliance Church Road (24 likes)
- Promote Pleasant Garden as a destination for outdoor recreation (18)
- Improve intersection of Neelley and Pleasant Garden Road for pedestrians through crosswalk improvements and signalization (8)
- Develop a downtown master plan to define the downtown district and lower travel speeds on Pleasant Garden Road through signage and corridor improvements (4)
- Hold educational workshops about bicycle and pedestrian safety for all age groups, with emphasis on youth and seniors (3)
- Participate in Safe Routes to School planning and opportunities (2)

10-Year Goals

- Construct greenway connections between local recreation facilities and regional parks and greenway systems: 1) Hagan Stone Park to Pleasant Garden Elementary School, Community Center and Town Hall (25 likes)
- Widen pavement widths to build paved shoulders through resurfacing plans (17)
- Sidewalks along primary roadways within ½ mile of Pleasant Garden Elementary (12)
- Improve key intersections identified for bicycle and pedestrian safety (7)
- Establish requirements in the subdivision ordinance to dedicate easements for proposed pedestrian and bicycle facilities in adopted plans (3).

CHAPTER 2: EXISTING CONDITIONS

2.1 OVERVIEW

This chapter analyzes the existing conditions in Pleasant Garden that relate to the bicycle and pedestrian transportation system. A review of relevant demographic factors, existing local and regional plans, transportation improvement program (TIP), crash data, ordinances and a summary of community concerns and issues are discussed.

Chapter Contents:

Demographics

Crash Data

Local and Regional Planning Efforts

TIP Review

Community Outreach and Survey Summary

Inventory of Existing Facilities

Existing Statutes and Ordinances

2.2 DEMOGRAPHICS SUMMARY

The following table summarizes the demographics in Pleasant Garden. The Appendix provides additional detail of demographics by census tract in and around Pleasant Garden and provides maps and tables on race and ethnicity, car ownership, income, education and other information.

Table 1: Town of Pleasant Garden Demographic Overview

Demographic Feature	Statistic
Population, 2012[1]	4,545
Land Area, 2012 (square miles)[1]	15.15
Persons per Square Mile, 2012[1]	300.0
Population lost, 2000-2012[1´2]	-169
Population Decline Rate, 2000-2012[1´2]	-3.6%
Percent Minority Residents, 2012[3]	22.3%
Median Age, 2012[3]	45.6
Average Household Size, 2012[3]	2.71
Homeownership Rate, 2012 [3]	86.8%
Percentage of Adults with a High School Diploma, 2012[3]	90.1%
Median Household Income, 2012[3]	$63,676
Poverty Rate, 2012 [3]	14.9%
Low Vehicle Ownership Households (0 or 1 vehicle)	10%

Sources:

[1]NC State Demographer 2012 Estimate (September 2013)

[2]U.S. Census Bureau (2000)

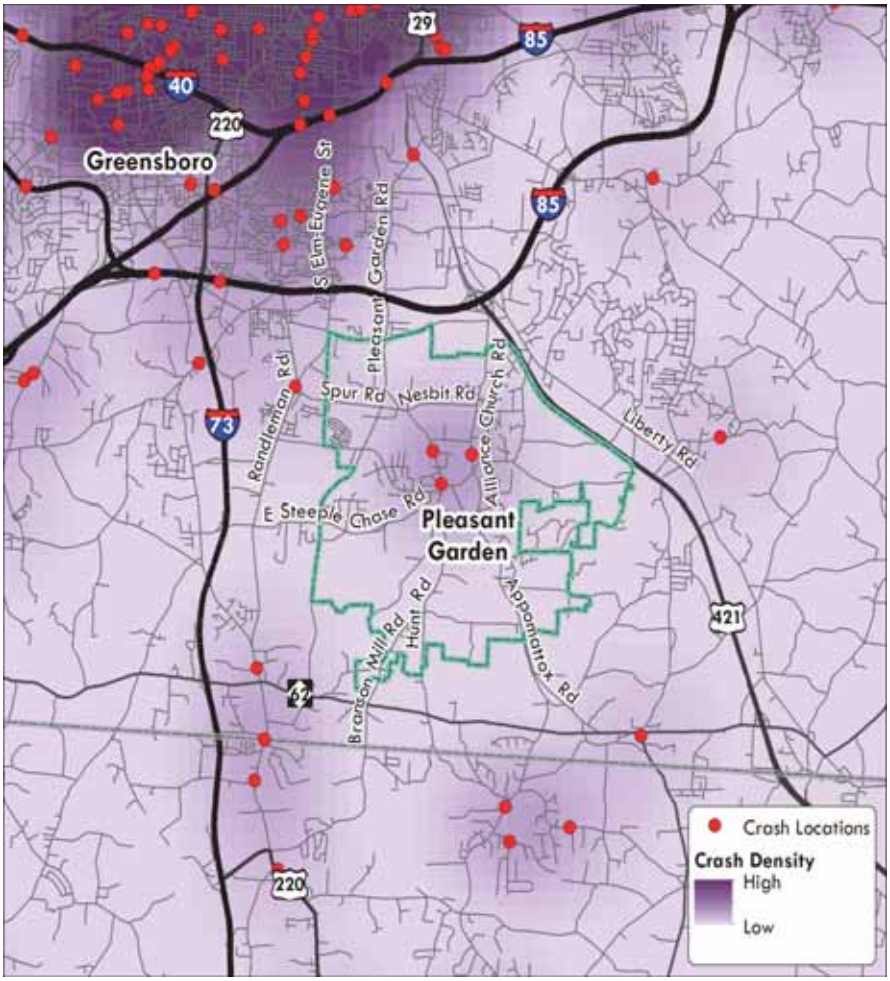
[3]ACS 5-year Estimates (2008-2012)

2.3 CRASH DATA

Crash data provides insight into problem areas or dangerous locations for pedestrians and bicyclists. However, it does not tell the whole story. Unsafe pedestrian or bicycle transportation environments discourage bicycle or pedestrian use and may reduce the total number of crashes, but through less use of non-motorized transportation. Specific pedestrian or bicycle safety improvements will reduce the likelihood of crashes, while encouraging more non-motorized transportation.

A review of the Highway Safety Research Center crash database and the North Carolina Department of Transportation (NCDOT) Division of Bicycle and Pedestrian Transportation reveals three bicycle crashes between 2006 and 2011 in the town limits of Pleasant Garden. One of these crashes occurred in 2006 on Alliance Church Road between Ryegate Drive and Neelley Road. The other two crashes occurred in 2008 along Pleasant Garden Road, one at the intersection of Forest Acres Circle and the other at the Neelley Road intersection. All three crashes resulted in evident injury to the cyclist. There were no recorded pedestrian crashes during the same time period.

Figure 2: Bicycle & Pedestrian Crashes, 2006-2011



Source: NCDOT 2006-2011

2.4 LOCAL & REGIONAL PLANNING EFFORTS

The Town of Pleasant Garden has participated in several plan processes and subsequent planning documents. The following are a list of relevant plans to bicycle and pedestrian transportation. Wherever possible, information related to specific bicycle or pedestrian recommendations included in the plans are provided. The map shown in *Figure 4: Assessment of Existing Facilities and Plans* below includes proposed bicycle and pedestrian facilities described in this section.

Greensboro Urban Area Comprehensive Bicycle, Pedestrian and Greenway Plan (BiPed Plan) 2006

The BiPed plan provides several recommendations for project development in Pleasant Garden to serve bicycle and pedestrian transportation and recreation needs.

Pedestrian Network Recommendations (Chapter 4 – 77)

1. Work with the North Carolina Department of Transportation (NCDOT) to implement a "Main Street Retrofit" project on Pleasant Garden Road between Ryegate Drive and Sheraton Park Drive.
    a. Construct sidewalks along both sides of Pleasant Garden Road.
    b. Construct Curb extensions across from Pleasant Garden Elementary School to shorten pedestrian crossing distance, improve pedestrian visibility, and reduce traffic speeds to make it safer for pedestrians to cross to the roadway.
    c. Stripe 10 foot wide travel lanes on Pleasant Garden Road to shorten pedestrian crossing distances and visually narrow the roadway.
2. Add sidewalks to both sides of the roadway serving the subdivision near Southeast Guilford High School. Give highest priority to sidewalks on Southeast School Road and Woody Mill Road near the school.
3. Add [paved] shoulders to Appomattox Road, and Liberty Road to provide better bicycle and pedestrian access to the park.
4. Construct a multi-use path/side-path along Hagan-Stone Park Road to provide pedestrian access to Hagan-Stone Park. This side-path should connect the multi-use trail that is recommended for the US Highway 421 roadway corridor.

Bicycle Network Recommendations (Map 4.4)

1. Provide paved shoulders (2-4 feet) along South Elm Eugene Street, Pleasant Garden Road, Hunt Road, Ritters Lake Road, Spur Road, Davis Mill Road, Neelley Road, Tabernacle Church Road, & Alliance Church Road.
2. Construct sidepaths on Appomattox and Hagan Stone Park Roads.
3. Construct a multi-use path from Tabernacle Church Road to Hagan-Stone Park.

Greenway Network Recommendations (Chapter 4-7, -24, -34)

1. Big Alamance Creek Greenway

The 22-mile Big Alamance Creek Greenway traverses the scenic countryside from Pleasant Garden eastward to Guilford Mackintosh Park. The majority of the trail would be hiking only with minimal surface disturbance and also provides a spur to Hagan-Stone Park and access to the Pleasant Garden Greenway. In a few locations, including along Ritter Lake Road from the Pleasant Garden Greenway the greenway may run along roads as a paved shoulder or sidepath, until it approaches the drainageway and open space corridor. It follows the drainageway and open space corridor for a majority of this trail's proposed alignment. A major obstacle for this trail is crossing US 421. Other roadway crossings, such as Alamance Church Road, will also need to be addressed. Wetlands and other environmental obstacles may also be associated with this proposed alignment.

2. Pleasant Garden Greenway

The 3.3-mile Pleasant Garden Greenway forms an important link between southern Greensboro and the town of Pleasant Garden along a drainageway / open space corridor. It runs north-south from the proposed South Buffalo Creek Greenway at the Interstate Industrial District to Ritters Lake Road and the proposed Big Alamance Creek Greenway. It utilizes linear city-owned open spaces and sections of a utility line corridor. The majority of this is planned as a multi-use paved trail with some on-road accommodations (sidepath / paved shoulder) necessary at the I-85 crossing along Pleasant Garden Road. The Pleasant Garden Greenway has a spur to the Brown Center Park.

3. Utility Line Greenway #2

This 11-mile, natural surface trail runs east-west from the proposed Reddicks Creek Greenway, near High Point, to the proposed Big Alamance Creek Greenway, near Hagan-Stone Park. It follows a major utility line corridor making negotiations with the power company necessary. Further investigation into topographic constraints will need to be conducted. It runs through Pleasant Garden and has a proposed short spur into Hagan-Stone Park. Roadway crossings are needed across many rural roadways and US 220. Negotiations with the utility company will need to be pursued.

Town of Pleasant Garden - Comprehensive Land Use Plan 2008 (Amended 2014)

The Land Use Plan provides a broad context for future land use, utilities and transportation in the Town. The Executive Summary provides key goals and objectives; the following are selected goals and objectives that relate to bicycle and pedestrian transportation.

Community Facilities

GOAL: To provide effective, efficient, and safe community facilities to sustain quality-of-life for Pleasant Garden residents.

Objectives:

CF3. Provide parks and recreational opportunities for all ages within walking distance to all neighborhoods, and increase access to recreational facilities with sidewalks, bikeways, and greenways.

CF4. Fully utilize Town Hall and Town owned property to provide a range of recreation and services to town citizens.

Transportation

GOAL: To ensure a safe and effective transportation network that efficiently moves traffic, provides both local and regional access, is environmentally sensitive, and encourages alternative modes of transportation while minimizing disruption to existing roads.

Objectives:

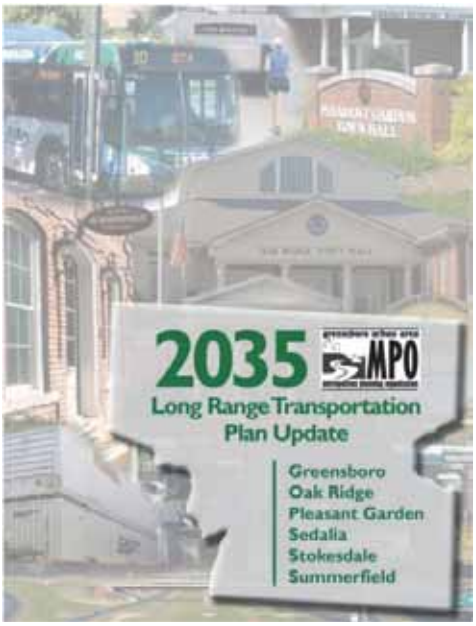
T1. Participate in regional transportation and public transit planning.

T2. Ensure that new development improves and does not negatively impact the existing transportation network.

T3. Develop an alternative transportation network for pedestrian and bicycle movement.

T4. Establish a method for keeping Pleasant Garden's roads maintained in the future.

Long Range Transportation Plan 2013



The Greensboro Urban Area MPO completed an update to their Long Range Transportation Plan in 2013. The LRTP provides a long range view of transportation improvements for the MPO, including Pleasant Garden. This federally required plan analyzes different modes in separate chapters and is used as a guide in selecting projects for funding in the Metropolitan Transportation Improvement Program. Chapter 6 - Bicycle and Pedestrian Element summarizes the following in regards to bicycle and pedestrian projects and safety in the MPO:

- Implement recommendations of Greensboro Urban Area Bicycle, Pedestrian and Greenway Master Plan (BiPed)
- Continued expansion and infill of the sidewalk network, focusing on high priority links, ADA compliance ramps, as well as removal of obstructions
- Implement a yearly sidewalk maintenance program to ensure accessibility
- Include sidewalks and bicycle facilities in all new roadway projects except controlled-access facilities
- Improve pedestrian crossing conditions through expanded pedestrian signals and high-visibility crosswalks at high volume locations
- Expand bicycle route system to connect with surrounding counties
- Factor bicycling into the street resurfacing program priorities
- Implement a greenway resurfacing program
- Cooperate with local partners (Greensboro, Guilford County, High Point, Winston-Salem and surrounding towns) to expand the use of shared-use paths (greenways) throughout the Triad
- Ensure roadways comply with the state Complete Streets standards to ensure pedestrian, bicycle and transit needs are met.

Specific projects identified in the LRTP for Pleasant Garden are as follows:

Paved Shoulders: S. Elm/Eugene St; Pleasant Garden Road; Hunt Rd, Alliance Church Rd, Appomatox Rd, Hagan Stone Park Rd, Tabernacle Church Rd, Neeley Rd, E. Steeple Chase Rd; Davis Mill and Spur Road.

Sidewalks: Pleasant Garden Road from Ryegate to Sheraton Park Road

Parks and Recreation Master Plan 2013

The Town of Pleasant Garden adopted its first ever Comprehensive Parks and Recreation Master Plan in November 2013. It was developed to determine the recreation objectives, needs and priorities of the citizens of Pleasant Garden and coordinate this input with the existing Guilford County Countywide Parks, Open Space and Trails Master Plan as well as the Town's future Bicycle-Pedestrian Plan. The planning document establishes the foundation for numerous funding opportunities available to the community through private, local, state and federal sources. The plan identifies and addresses the met and unmet recreation needs of the community and the surrounding recreation service area as they relate to parks and recreation programs and facilities for a planning period ending in 2025 and develop a funding strategy to realize the desired goals.

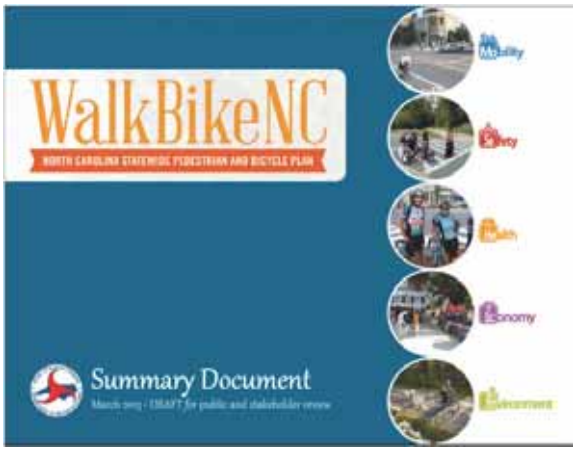
Southeast Guilford Trail Plan 2014

The Guilford County Open Space Program, with funding from the Community Transformation Grant completed a detailed trail plan for over 200 acres of open space (off of Company Mill Road) adjacent to Pleasant Garden and Hagan Stone Park. This plan also recommends broader bicycle connections in and around Forest Oaks and Pleasant Garden.

Piedmont Triad Regional Trail Plan and Inventory 2011

The Piedmont Triad Regional Trail Plan and Inventory identifies the Big Alamance Creek as a proposed regional trail through the eastern section of Pleasant Garden. In addition an off-road trail connection is identified going south from Town to connect with Climax and trails to the south in Randolph County.

WalkBikeNC Plan 2013



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 objectives, performance measures and strategies 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 principles and have been outlined for each of the 5 pillars:

Mobility: Expand the walking and bicycling network.

Safety: Improve public safety for walking and bicycling.

Health: Embrace health and wellness as a significant factor in transportation decisions.

Economy: Foster robust economic development by promoting walking and bicycling.

Environment: Encourage stewardship of North Carolina's natural and cultural resources.

2.5 TRANSPORTATION IMPROVEMENT PLAN PROJECT REVIEW

Reviewing the Metropolitan Transportation Improvement Program document for 2012-2020, published by the Greensboro Urban Area MPO, there is one major project affecting the Town of Pleasant Garden:

R-2612B – Grade separation of US 421 and Neelley / Williams Dairy Road. Construction began in 2014. Upon project completion, all existing access to US 421 between I-85 / 40 and Minden Road will be closed, which will likely increase traffic on Neelley Road, as other access points to US 421 will be eliminated.

2.6 COMMUNITY OUTREACH & INVOLVEMENT

Steering Committee Meetings

Dates: February, March, April, August and October 2014

These steering committee meetings were used to develop public input methods, project recommendations and other plan components. The steering committee provided critical and consistent feedback during the planning process.

Citizens Vote on Preferred Facilities and Goals during Public Input Workshop

Public Workshops

Dates: May 20 and September 23, 2014

The May 20 meeting was held at the Pleasant Garden Town Hall, where project recommendations, facility types and feedback on plan goals and vision were gathered. There were 21 people in attendance. Attendees had a chance to vote on facilities to improve walking and bicycling, top choices included sidepaths, multi-use paths, bicycle lanes, sidewalks and crosswalks.

Presentations

Group / Dates: Senior Adults (April 2014) – 40 Attendees, SEGCA (April 2014) – 8 Attendees, Pleasant Garden PTA Meeting (May 2014) – 40 Attendees, Southeast Business Association (October and November 2014) – 20 attendees each

The presentations consisted of a brief overview of the plan and a request for feedback on the survey and attendance at upcoming plan meetings.

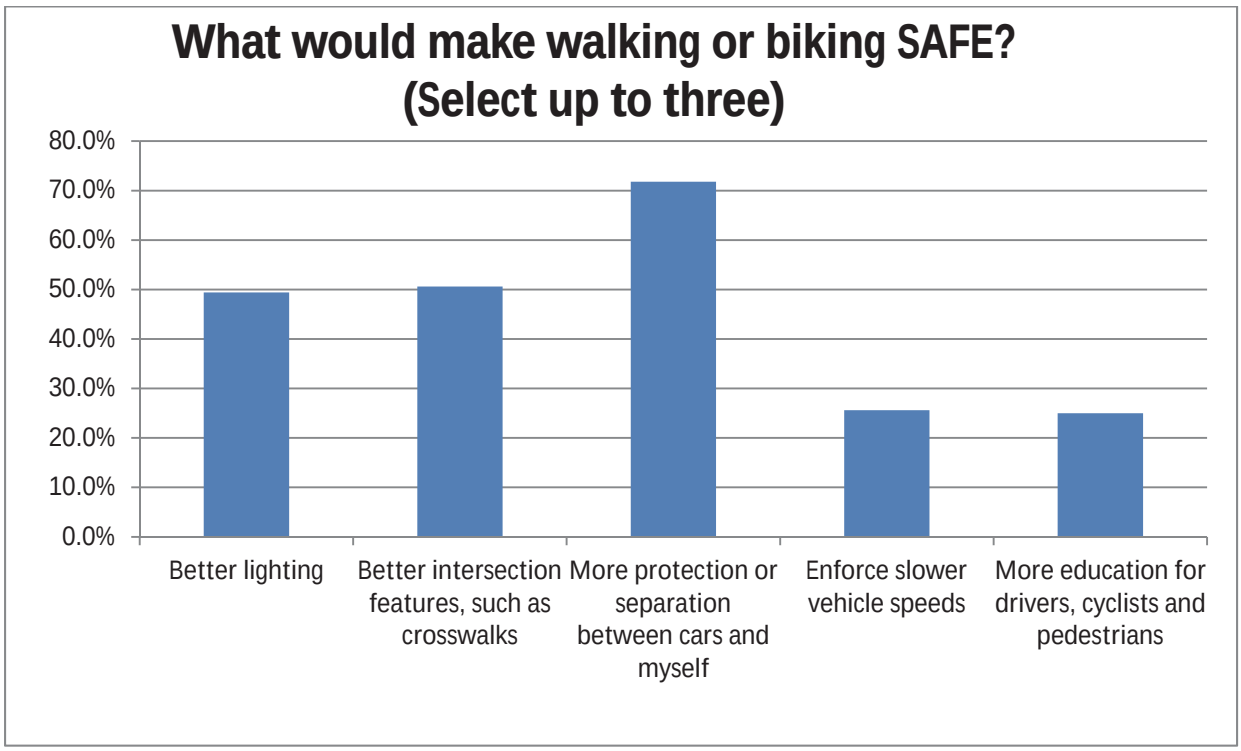
Events Attended

Name / Dates: Discover Good Living Expo (April 2014), 4th of July Event (June 2014)

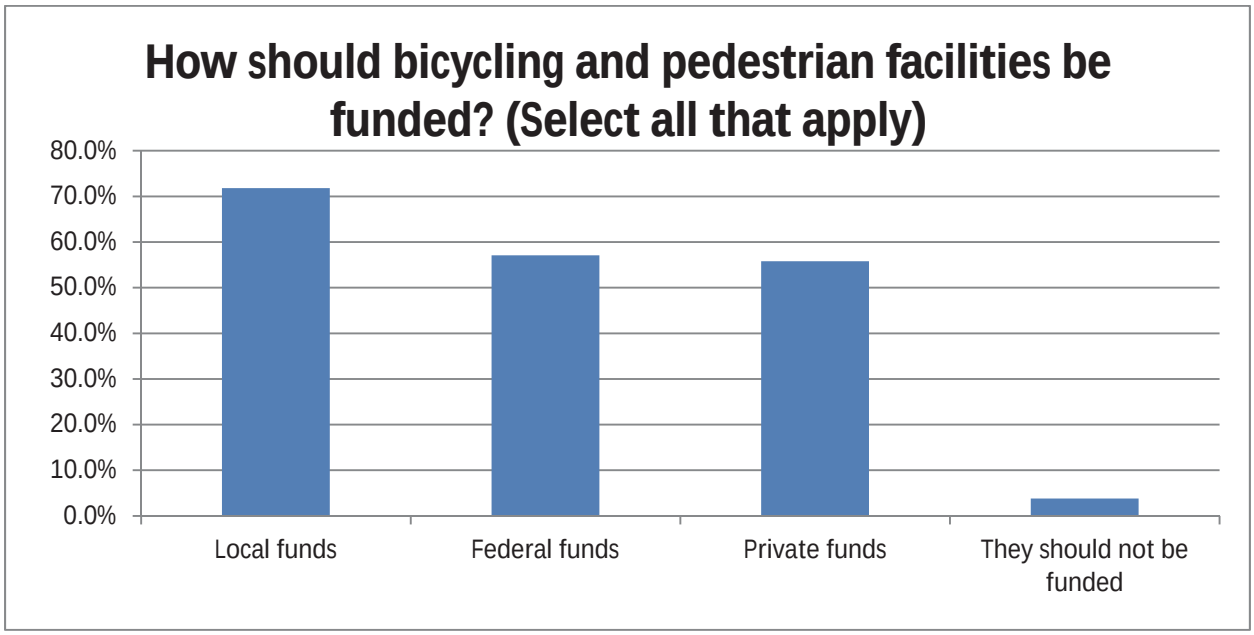
Survey Results

Distribution: Events, Town Newsletter, Email; Responses: 172 people started the survey and 168 finished at least part of the survey, 66% of respondents live in Pleasant Garden. The following are key questions and responses:

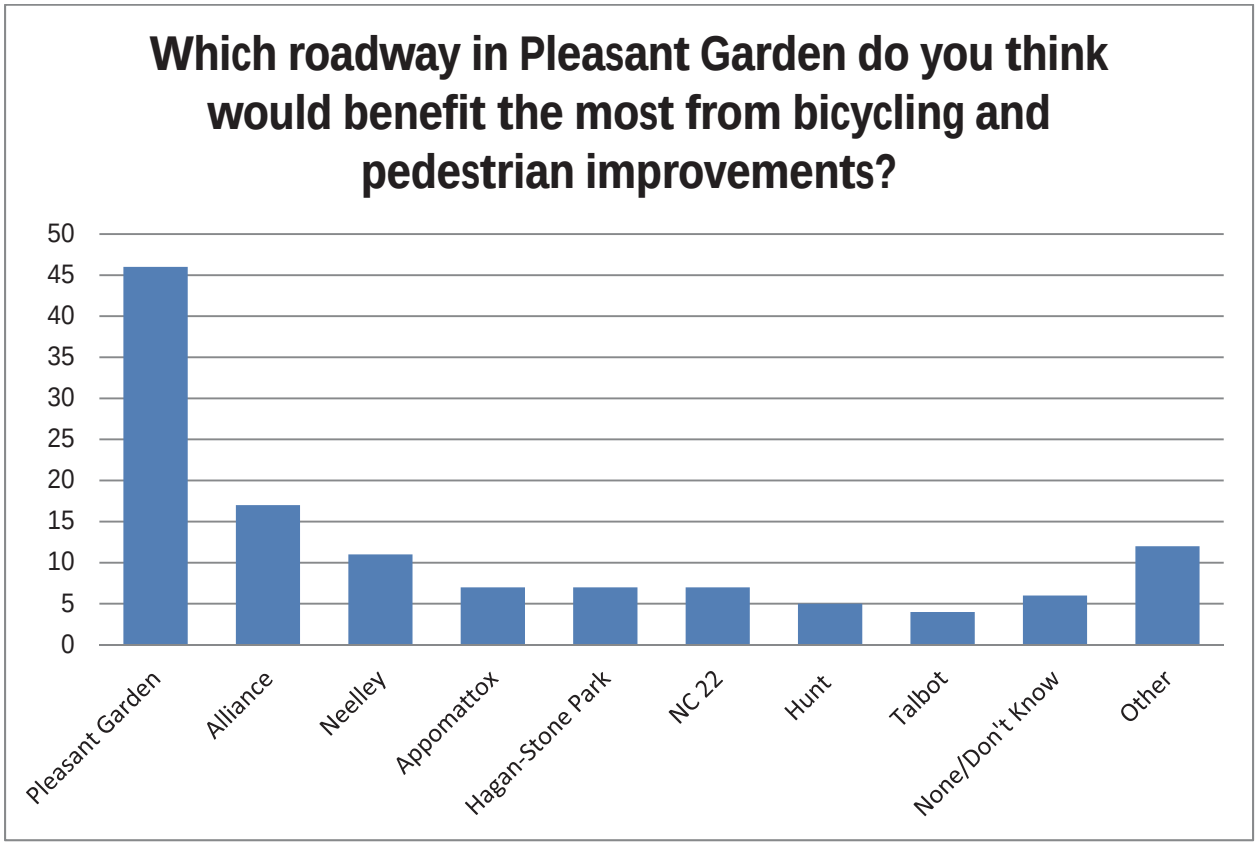
Figure 3: Bicycle and Pedestrian User Survey Summary



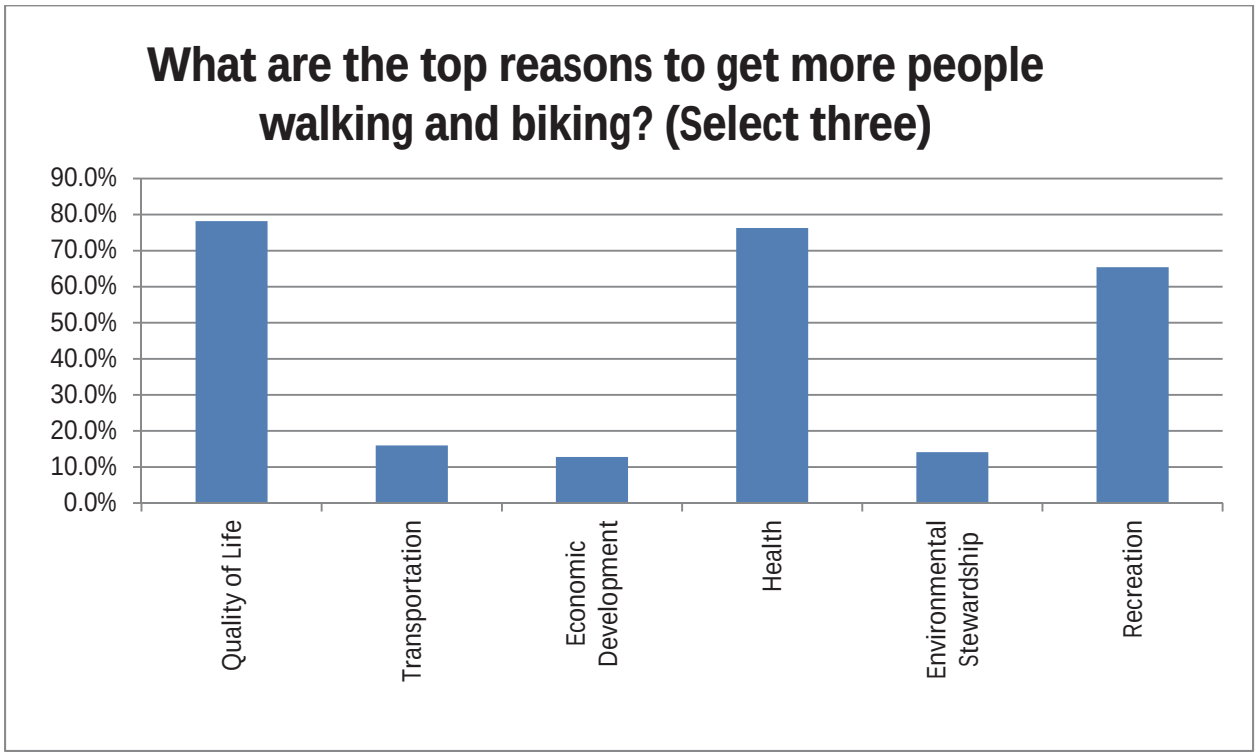
N= 163



N = 156



N = 101 (Multiple roadways for each responses may be included)



N = 163

2.7 INVENTORY & ASSESSMENT OF EXISTING FACILITIES

Pleasant Garden is a low-density bedroom community that relies almost exclusively on private vehicles and school buses to meet the transportation needs of its residents. The streets are maintained by NCDOT and the Town does not participate in street improvements currently. Existing roads do not have paved shoulders presently. The streets consist of a ditch and swale cross section, emblematic of other rural areas across Guilford County. There are currently no sidewalks in the Town of Pleasant Garden.

Eddy Patterson (steering committee member), NCDOT and MPO representatives assessing existing facilities

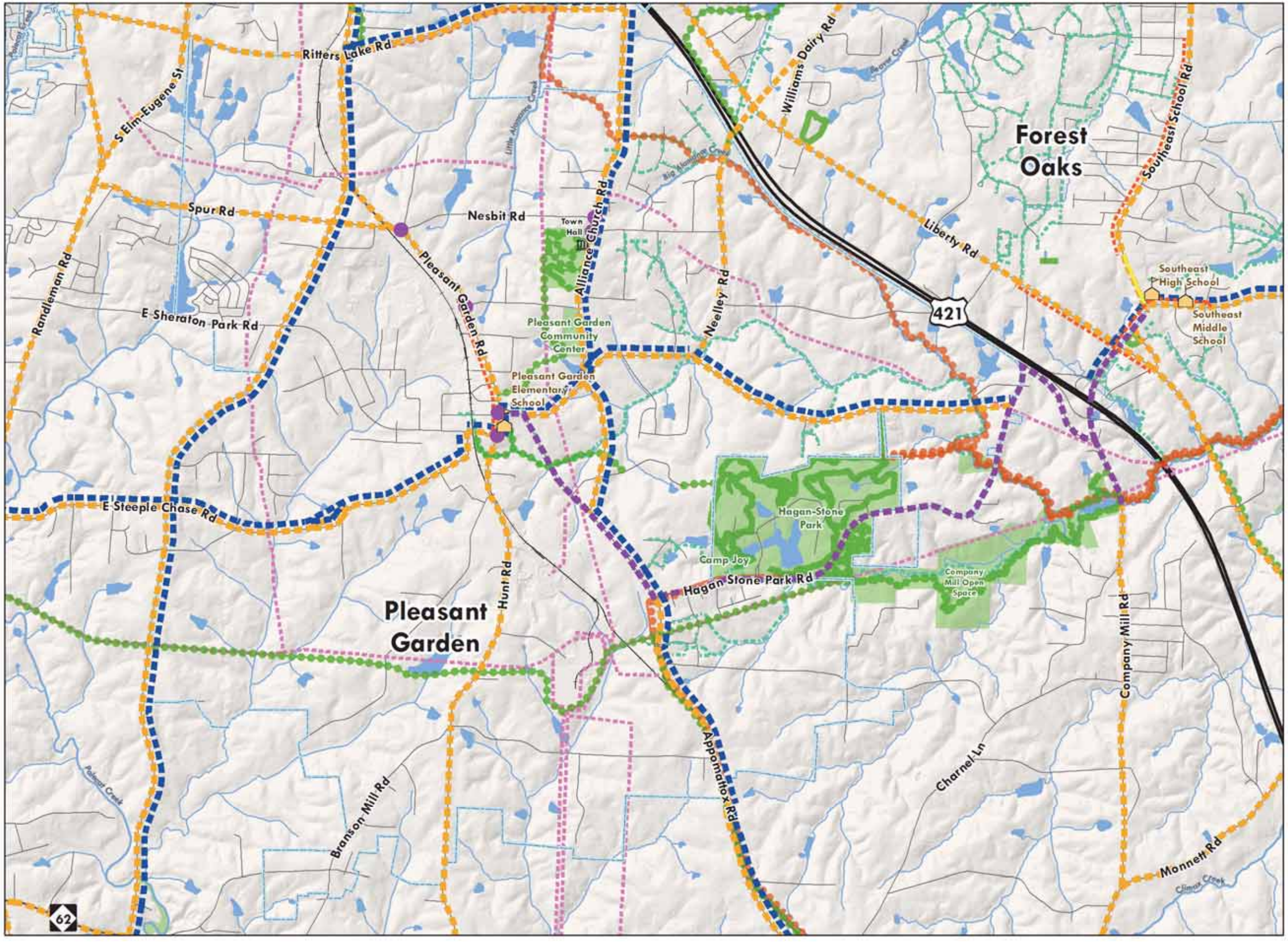
Guilford County Parks and Open Space Projects: The Town of Pleasant Garden and Guilford County Parks and Recreation have existing projects in development. First is the addition of bike lanes / paved shoulders to the main road through Hagan Stone Park. Bicyclists and pedestrians in 2014 now are able to enter the park from Hagan Stone Park Road on the East Side, travel through the park and exit the main entrance on the Southwest side. Second is the acquisition of two parcels of land that extend from Hagan Stone Park to Company Mill Road. A sewer line easement that runs the length of these properties will allow construction of a pedestrian route from Hagan Stone Park to Company Mill Road very near the Woody Mill / U.S. 421 interchange. A short section of side path on Company Mill and Woody Mill Road could connect Pleasant Garden to a shopping center and to Southeast Middle and High Schools. These improvements will be undertaken by Guilford County and partners.

Town Hall Projects: The Town is currently working on two pedestrian projects within the 48-acre Town Hall complex. One is a greenway connector between Town Hall and the town's athletic / soccer fields to provide a pedestrian connection between the two facilities. The second project will make improvements to an existing nature trail once thinning of overgrown trees has been completed.

The Comprehensive Bicycle and Pedestrian Transportation plan provides the opportunity for the town residents and elected officials to decide on highest priority projects and determine how these can be funded. This process will put the Town in a leadership role looking forward, while developing projects and programs that reflect the Town of Pleasant Garden's values and interests.

Figure 4 Assessment of Existing Facilities and Plans provides an overview of existing and proposed facilities from completed plans described above in *Section 2.4 Local and Regional Planning Efforts.*

Figure 4: Assessment of Existing Facilities and Plans



2.8 PEDESTRIAN STATUTES & LOCAL ORDINANCES

This section highlights guidelines and statutes supporting pedestrian transportation at the federal, state, and local levels.

Federal & State Guidelines

The Federal Highway Administration (FHWA) provides guidance, information and regulation on bicycle and pedestrian accommodation in projects funded with federal funds. The Federal Transportation Authorization legislation is called MAP-21, information on how funds can be used in bicycle and pedestrian related projects is found here:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/

The FHWA Guidance & Information page provides A. Accessibility Guidance; B. Design Guidance and C. Financial Management:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/index.cfm

The USDOT provided a statement on Bicycle and Pedestrian Accommodation Regulations and Recommendation transportation in March of 2010:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/overview/policy_accom.cfm

The federal law for surface transportation gives lots of flexibility in how States and MPOs fund bicycle and pedestrian improvements.

The NCDOT has policies that specifically support non-motorized transportation, with specific guidance on how to support pedestrian and bicycling-friendly transportation, the specific policies are linked here: http://www.ncdot.gov/bikeped/lawspolicies/policies/ and listed below:

NCDOT Board of Transportation Resolutions and Policies

- Mainstreaming Non-Motorized Transportation (2000)
- Sidewalk and Pedestrian Policy (1993, with 2001 update)
- Complete Streets Policy (2009)

NCDOT Internal Policies and Guidance

- Incorporating Greenway Plans in the Highway Planning Process (1994, with 2009 Update)
- Bridge Policy (2000)
- Temporary Pedestrian Accommodations (2008)
- NCDOT Complete Streets Guidelines (2012)

There are additional policies and regulations including ADA accessibility, safety and other considerations that pertain to bicycle and pedestrian travel that should be included in the scoping process with all roadway projects. See *Appendix C: Design Guidelines* for more information.

Local Ordinance Review

In reviewing the Pleasant Garden zoning and subdivision ordinance, there are a few articles relating to the provision of sidewalks, trails and bicycle parking. Some general references to pedestrians include: defining pedestrians (Article 2-1), signage (Article 6-1) and outbuildings or accessory uses (Article 4-5) shall not block pedestrian rights of way or walkways where they exist. In addition, off-street parking loading and unloading shall not impede the free movement of vehicles and pedestrians (Article 6-2). Additional references:

Subdivision Standard

5-12.5. Sidewalks.

Except along controlled access facilities, sidewalks shall be required on all thoroughfare streets, and at other locations where a **pedestrian** traffic generator requires separation of **pedestrian** and vehicular traffic on collector, subcollector, and local residential streets. Where sidewalks are installed, they shall have a minimum width of five feet and be construed on one side of the right-of-way as determined by the Zoning Board.

Stormwater Management and Watershed Protection

7-1.9. Stream buffer required (Section A-6 Table of Uses).

The table of uses for access trails in stream and water buffer areas allows pedestrian access trails to be located. Trails that are less than 4ft in width are exempt from any rules and trails that are more than 4 ft in width are allowable, but require a review for riparian buffer impacts.

Off-Street Parking, Stacking and Loading Areas

6-2.2. Parking credits.

For every four **bicycle** parking spaces provided, there may be one regular parking space reduction. The section goes on to emphasize locating the **bicycle** racks close to the building and minimizing conflicts with motor vehicles.

CHAPTER 3: THE PATHWAYS PLAN

Chapter Contents:

Facilities Improvement List

Bicycle and Pedestrian Network Maps and Alternatives

Top Priority Project Summaries

Policy and Program Recommendations

Photo: A. Hice

Extensive community input was used to develop the recommendations found in this Chapter. As described in *Section 2.6 Community Outreach and Involvement*, there were a number of opportunities for the public to provide input into how to make Pleasant Garden more walkable and bikeable through meetings, surveys and events. The steering committee, long range planning board and Town Council provided continual feedback during the 10 month planning process.

The community has indicated support for improving walking and bicycling conditions; however the successful construction of facilities will take leadership, collaboration and creativity. The funding required to build the Pathways Plan may seem high, but continual investment stretched out over several years, using grants and incorporating facilities in larger developments as "incidental" projects, will develop the bicycle and pedestrian network.

Chapter 3: The Pathways Plan identifies facility improvements, planning level cost estimates as well as policy and program recommendations to improve the comfort, safety and access for bicycle and pedestrian transportation over the next 20 years. The bicycle and pedestrian projects prioritized by the steering committee balanced criteria such as roadway traffic and proximity to schools and parks with public comments and survey feedback. Top priority projects are highlighted in this chapter with detailed maps, proposed cross sections and examples of improvements. More detail of design guidelines for proposed project improvements and construction may be found in *Appendix C: Design Guidelines.*

Successful implementation of the plan will require continued support and coordination from the local community, in conjunction with regional, State and Federal resources. *Chapter 4: Implementation* includes an action plan and strategy that provides detailed steps to begin developing the *Pathways Plan* and laying the groundwork for walking and bicycling facilities in Pleasant Garden that improves transportation and recreation options.

3.1 BICYCLE AND PEDESTRIAN NETWORK

This section consists of a series of priority projects and alternatives to support bicycle and pedestrian transportation and recreation in Pleasant Garden. Also included are long term project opportunities to be developed over the next 20 years. As mentioned in the previous chapter, there are several good opportunities to construct facilities that tie the Pleasant Garden Community together, but also connect to other municipalities and destinations in Guilford County.

Pleasant Garden Road

The *Facility Improvement List & Prioritization Score* (Figure 5) catalogues all the proposed facilities for Pleasant Garden, objectively ranking them according to public comments and data related to land use, destinations, connectivity and safety. Planning level cost estimates and distances are included for capital planning, but these costs may need modification following feasibility, design and engineering studies. Each project in Figure 5 has a Map ID that corresponds to the *Proposed Facilities Network Maps* (Figures 6-9).

Section 3.2 Priority Projects shows detailed project descriptions, visualizations and alternatives identified for top priority bicycle and pedestrian projects. Where alternatives are proposed on the same corridor, the Map ID color and number will change from the *Proposed Facilities Network* (Figures 6 & 7) to the *Proposed Facilities Network with Alternatives* (Figures 8 & 9). Details of the corridor recommendations and alternatives can be found in *Section 3.2 Priority Projects* and also referenced in *Figure 5 - Facility Improvement List & Prioritization Score*.

The following figures describe in detail the proposed bicycle and pedestrian network in Pleasant Garden. The example legend to the right show the colors of different types of proposed facilities in dashed lines: sidepath – red, paved shoulder – orange, bike lane – light blue, sidewalk – yellow, signed route – dark blue, trail – green. The Map ID color corresponds to the type of improvement recommended.

Proposed Facilities Network Map Legend

Figure 5: Facility Improvement List and Prioritization Score

Shows all proposed facilities, distances and other detail in a table format for comparison.

Figure 6: Proposed Facilities Network

Shows all proposed facilities in Pleasant Garden and connections to other places in Southeast Guilford County.

Figure 7: Proposed Facilities Network Zoom

Shows all proposed facilities in the heart of Pleasant Garden, this map is zoomed in, so connections to other parts of Southeast Guilford County are not shown.

Figure 8: Proposed Facilities Network with Alternatives

Shows all proposed facilities in Pleasant Garden and connections to other places in Southeast Guilford County. Alternatives described in *Section 3.2 Priority Projects* are also shown. The alternatives in most cases will include a sidepath as an alternative to a paved shoulder.

Figure 9: Proposed Facilities Network with Alternatives - Zoom

Shows all proposed facilities in the heart of Pleasant Garden, this map is zoomed in, so connections to other parts of Southeast Guilford County are not shown. Alternatives described in *Section 3.2 Priority Projects* are also shown. The alternatives in most cases will include a sidepath as an alternative to a paved shoulder.

Figure 10: Recommended Bicycle Network

The recommended bicycle routes to primary destinations in and around Pleasant Garden and to neighboring jurisdictions are included. When repaving plans or other project opportunities affect these public roadways and corridors highlighted in pink, installation of paved shoulders, wider lanes that allow automobiles and vehicles to share the road safely or other improvements should be requested. Consideration of bicycle route signage along these corridors should be considered by NCDOT Division 7 and incorporated in the Greensboro Urban Area MPO bicycle and pedestrian planning efforts to ensure connectivity with existing or future signed bicycle routes.

Figure 5: Facility Improvement List and Prioritization Score

Map ID	Street	From	To	Corridor Distance (Miles)	Facility Distance (Feet)	Parcels Along Segment	Side	Improvement Type	Pavement Material	Curb and Gutter	Construction/ Engineering Cost LF	Additional Costs*	Total Estimated Cost	Width	Proximity to schools (Directly connects = 3; within 1/2 mile = 2; within 1 mile = 1)	Proximity to parks (Directly adjacent = 3; within 1/2 mile = 2; within 1 mile = 1)	Traffic Count (>5,000AADT = 3; 2,000 to 4,999 AADT = 2)	Connects to Business District	Crashes (1 ped/bike crash 2001-2010) = 2	Public Comments (10 or more = 3; 5 to 9 = 1; less than 5 = 0)	Prioritization Score
1	Pleasant Garden Rd	Ryegate Rd	E Sheraton Park Rd	0.74	3,929	27 parcels	W	Side Path	Asphalt	No	$125	Y	$576,825	10'	3	2	3	1	2	3	14
2	Pleasant Garden Rd	Ryegate Rd	E Sheraton Park Rd	0.74	7,858	53 parcels	E & W	Sidewalk	Concrete	No	$75	Y	$667,150	5'	3	2	3	1	2	3	14
3	Pleasant Garden Rd	Ryegate Rd	E Sheraton Park Rd	0.74	7,858	53 parcels	E & W	Bike Lane	Asphalt	No	$50	Y	$392,900	4'	3	2	3	1	2	3	14
4	Neelley Rd	School	Pleasant Garden Rd	0.07	393	3 parcels	S	Sidewalk	Concrete	No	$75	Y	$39,475	8'	3	2	3	1	2	3	14
5	Neelley Rd	Appomattox Rd	Pleasant Garden Rd	0.14	741	4 parcels	S	Side Path	Asphalt	No	$125		$92,625	10'	3	2	3	1	2	3	14
6	Neelley Rd	Appomattox Rd	School	0.07	696	4 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$174,000	4'	3	2	3	1	0	3	12
7	Pleasant Garden Rd	Nesbit Rd	Ryegate Rd	0.56	2,965	15 parcels	E	Side Path	Asphalt	No	$125	Y	$319,662	10'	1	2	3	1	0	3	10
8	Alliance Church Rd	Town Hall	Community Center	0.58	3,053	5 parcels	W	Side Path	Asphalt	No	$125	Y	$595,150	10'	1	3	0	0	2	3	9
9	Neelley Rd	US-421	Appomattox Rd	2.38	12,542	108 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$319,662	4'	2	2	2	0	0	3	9
10	Alliance Church Rd	Community Center	Appomattox Rd	0.93	9,834	19 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$595,150	4'	2	3	0	0	0	3	8
11	Pleasant Garden Rd	Gardengate Rd	Nesbit Rd	1.36	14,364	27 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$319,662	4'	0	1	3	0	0	3	7
12	Appomattox Rd	Neelley Rd	Hagan Stone Park Rd	1.25	13,172	37 parcels	E & W	Paved Shoulder	Asphalt	No	$250	Y	$3,294,700	4'	2	2	2	0	0	1	7
13	Appomattox Rd	Neelley Rd	Hagan Stone Park Rd	1.25	6,606	19 parcels	E	Side Path	Asphalt	No	$125	Y	$824,950	10'	2	2	2	0	0	1	7
14	Alliance Church Rd	Ritters Lake Rd	Town Hall	1.37	14,418	49 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$3,604,500	4'	0	3	0	0	0	3	6
15	Ryegate Dr	Pleasant Garden Rd	Alliance Church Rd	0.63	6,582	38 parcels	N & S	Paved Shoulder	Asphalt	No	$250	Y	$1,645,500	4'	1	3	0	1	0	0	5
16	Ryegate Dr	Pleasant Garden Rd	Alliance Church Rd	0.63	3,291	19 parcels	S	Side Path	Asphalt	No	$125		$411,375	10'	1	3	0	1	0	0	5
17	Appomattox Rd	Hagan Stone Park Rd	McClellan Rd	1.27	13,382	25 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$3,345,500	4'	0	2	2	0	0	1	5
18	Hagan Stone Park Rd	Hagan Stone Park	Minden Rd	2.25	23,736	37 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$5,934,000	4'	1	3	0	0	0	1	5
19	Hunt Rd	E Sheraton Park Rd	NC-62	3.16	33,432	100 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$8,358,000	4'	2	1	2	0	0	0	5
20	Hagan Stone Park Rd	Appomattox Rd	Hagan Stone Park	0.59	6,200	28 parcels	N & S	Paved Shoulder	Asphalt	No	$250	Y	$1,561,500	4'	0	3	0	0	0	1	4
21	Hagan Stone Park Rd	Appomattox Rd	Hagan Stone Park	0.59	3,123	10 parcels	N	Side Path	Asphalt	No	$125	Y	$389,200	10'	0	3	0	0	0	1	4
22	Hagan Stone Park Rd	Hagan Stone Park	Minden Rd	2.25	11,868	15 parcels	N	Side Path	Asphalt	No	$125		$1,483,500	10'	1	2	0	0	0	0	3
23	Minden Rd	Hagan Stone Park	Company Mill Rd	0.61	3,199	3 parcels	E	Side Path	Asphalt	No	$125		$399,875	10'	1	2	0	0	0	0	3
24	Ritters Lke Rd	S Elm-Eugene St	Alliance Church Rd	2.5	26,372	98 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$6,593,000	4'	0	0	3	0	0	0	3
25	E Steeple Chase Rd	E Sheraton Park Rd	Davis Mill Rd	1.93	20,416	70 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$5,104,000	4'	2	1	0	0	0	0	3
26	Rosswood Rd	Appomattox Rd	Road End	0.76	4,002	20 parcels	-	Signed Route	-	No					1	2	0	0	0	0	3
27	E Sheraton Park Rd	E Steeple Chase Rd	Pleasant Garden Rd	0.17	1,804	8 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$451,000	4'	2	1	0	0	0	0	3
28	Talbot Rd	Alliance Church Rd	Neelley Rd	0.72	7,586	38 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$1,896,500	4'	0	2	0	0	0	0	2
29	Tabernacle Church Rd	Neelley Rd	Hagan Stone Park Rd	1.88	19,838	63 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$4,959,500	4'	0	2	0	0	0	0	2
30	Spur Rd	S Elm-Eugene St	Pleasant Garden Rd	1.72	18,204	65 parcels	N & S	Paved Shoulder	Asphalt	No	$250		$4,551,000	4'	0	1	0	0	0	0	1
31	McClellan Rd	Appomattox Rd	Racine Rd	0.87	9,204	14 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$2,301,000	4'	0	0	0	0	0	0	0
21	Racine Rd	McClellan Rd	NC-62	0.44	4,664	21 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$1,166,000	4'	0	0	0	0	0	0	0
33	Davis Mill Rd	Pleasant Garden Rd	NC-62	4.55	48,040	132 parcels	E & W	Paved Shoulder	Asphalt	No	$250		$12,010,000	4'	0	0	0	0	0	0	0

Figure 6: Proposed Facilities Network

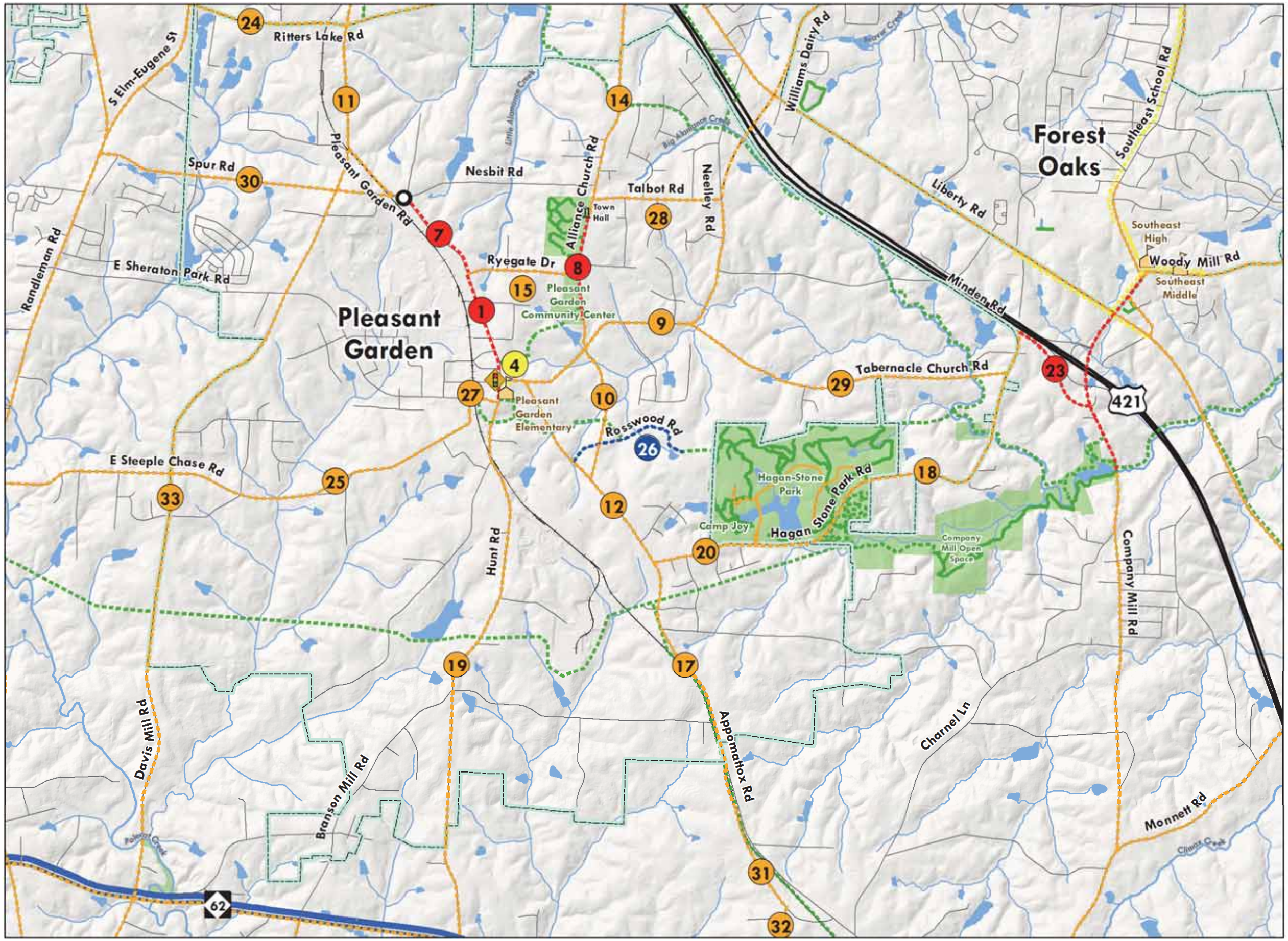


Figure 7: Proposed Facilities Network Zoom

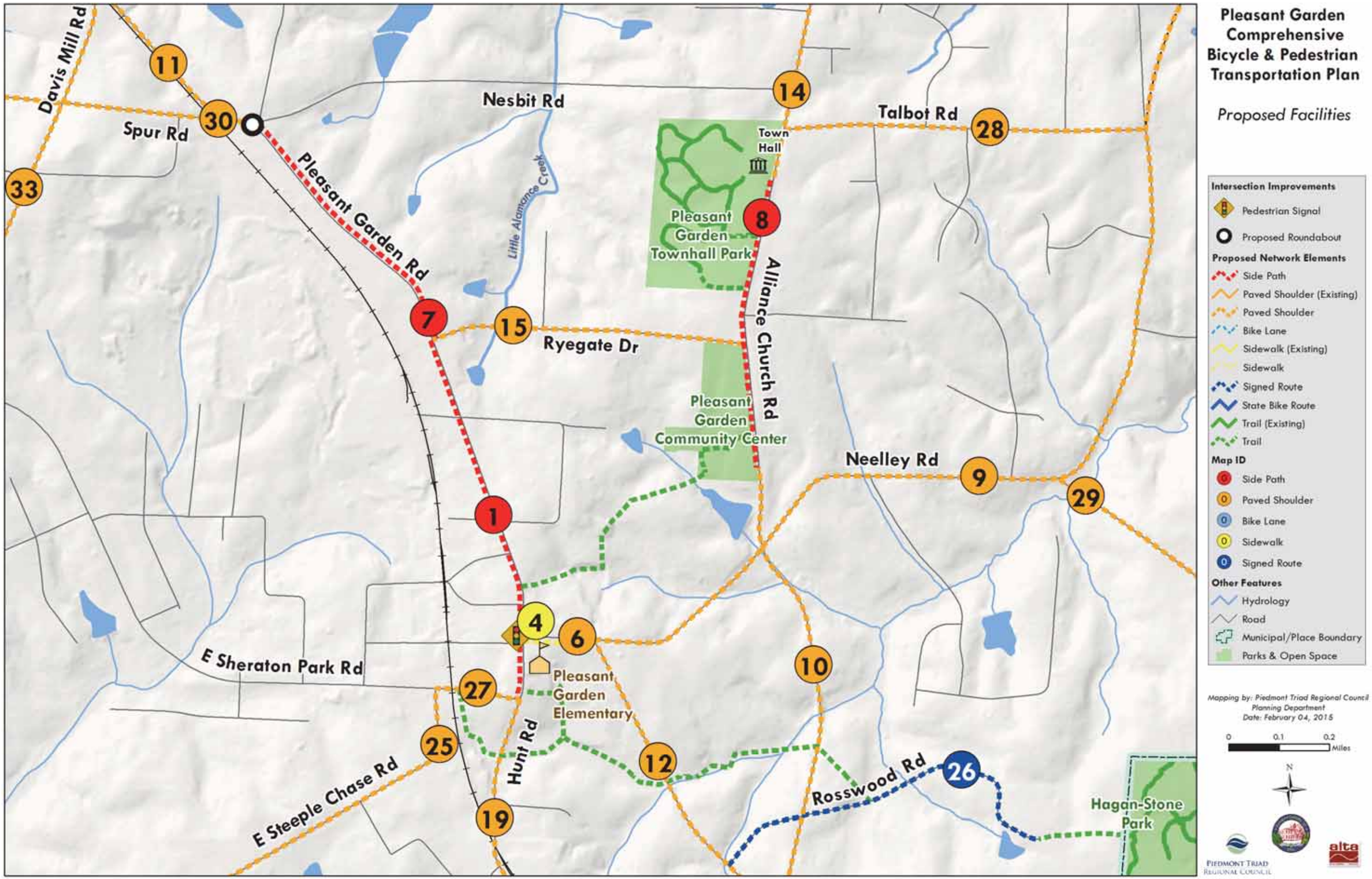


Figure 8: Proposed Facilities Network with Alternatives

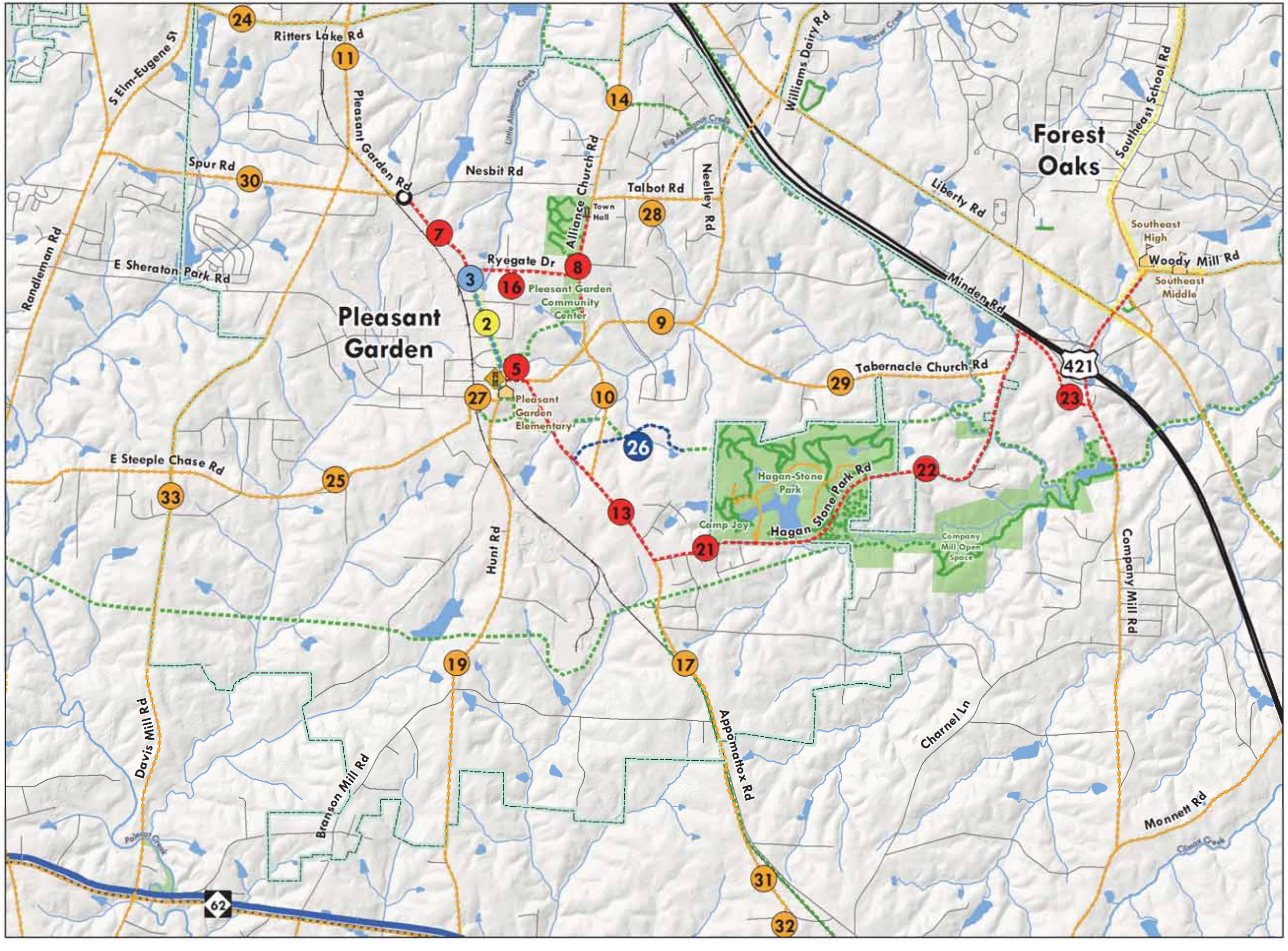


Figure 9: Proposed Facilities Network with Alternatives Zoom

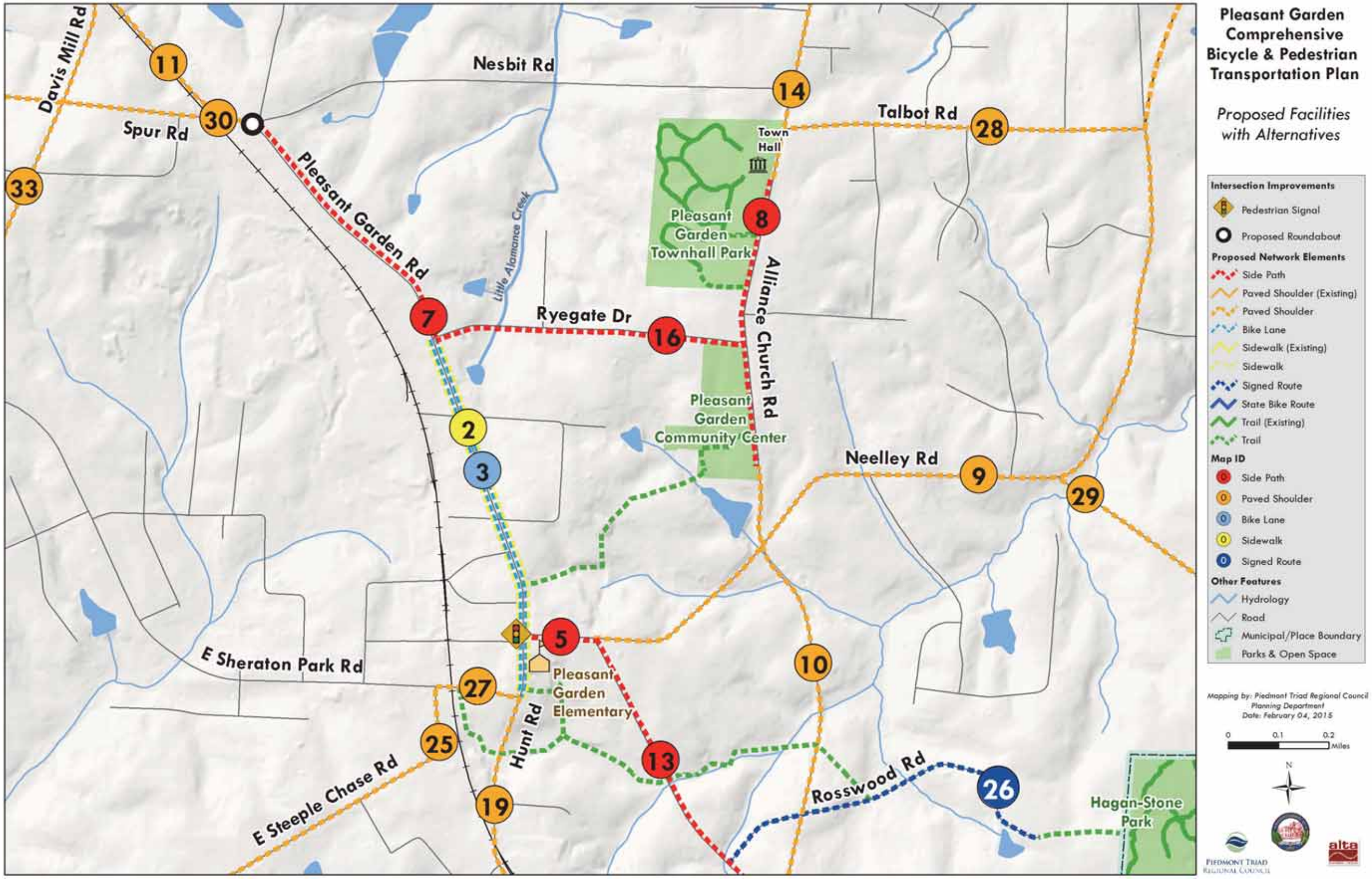
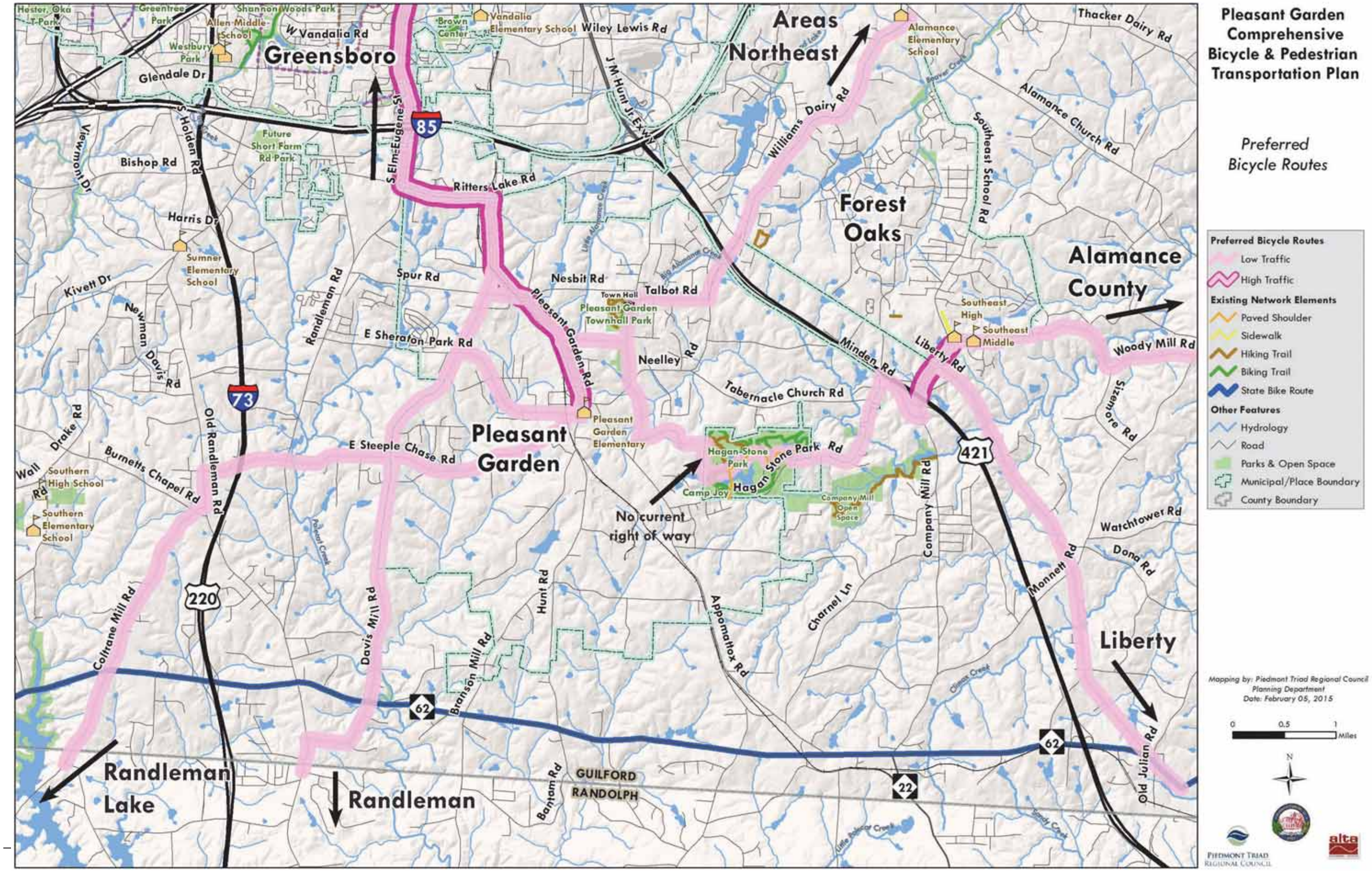


Figure 10: Preferred Bicycle Routes



3.2 PRIORITY PROJECTS

The priority projects in this section address important corridors for bicycle and pedestrian transportation. Many of the improvements have been identified in previous planning efforts and will help connect destinations, address safety concerns and increase bicycle and pedestrian access for Town residents and visitors alike. On the Pleasant Garden, Ryegate, Appomattox and Hagan Stone Park Road corridors there are alternatives proposed and described below. Illustrative cross sections are included with each priority project to demonstrate how to accommodate facility improvements.

Here is a list of the projects identified in this section, with more detailed descriptions on the following pages (the Map ID corresponds to the project list in Figure 5 and maps in Figures 6-9):

(Map ID 1) Pleasant Garden Road from Ryegate Dr to E. Sheraton Park Rd
Improvement Summary: *Sidepath, relocation of traffic signal to Neelley Rd and pedestrian timers for crossing assistance*

(Map ID 2, 3) Pleasant Garden Road from Ryegate Dr to E. Sheraton Park Rd (Alternative)
Improvement Summary: *Sidewalks and bicycle lanes, relocation of traffic signal to Neelley Rd and pedestrian timers for crossing assistance*

(Map ID 7) Pleasant Garden Road from Spur Rd to Ryegate Dr
Improvement Summary: *Sidepath, rectangular Rapid Flashing Beacon, speed limit reduction and proposed roundabout (not included in cost estimates)*

(Map ID 8) Town Hall to Community Center Greenway Corridor
Improvement Summary: *Sidepath, wheelchair ramps and high visibility crosswalk/signage at Ryegate Dr*

(Map ID 15) Ryegate Dr
Improvement Summary: *Paved shoulders (Alternative is a sidepath, Map ID 16)*

(Map ID 12) Appomattox Road from Neelley Rd to Hagan Stone Park Rd
Improvement Summary: *Paved shoulder, wayfinding signage*

(Map ID 13) Appomattox Road from Neelley Rd to Hagan Stone Park Rd (Alternative)
Improvement Summary: *Sidepath, wayfinding signage*

(Map ID 20) Hagan Stone Park Road from Appomattox to Hagan Stone Park
Improvement Summary: *Paved shoulder, wayfinding signage*

(Map ID 21) Hagan Stone Park Road from Appomattox to Hagan Stone Park (Alternative)
Improvement Summary: *Sidepath, wayfinding signage*

Also included below is a proposed roundabout at Spur and Pleasant Garden Road and crossing improvements at the Pleasant Garden Elementary School on Neelley Rd. The location of these improvements can also be found in the *Proposed Facilities Network Maps* (Figures 6 -9).

The cost estimates for the priority project descriptions below typically include additional intersection treatments (e.g. pedestrian activated timers, wheelchair ramps), signage, lighting, crosswalk striping and other devices as described in each corridor summary.

A map with a legend and scale show the location of specific improvements, buildings and some idea of right of way in the corridor. The proposed improvements follow the same symbology as the *Proposed Facilities Network Maps* (Figures 6-9).

Example Priority Project Description and Cross Section – Pleasant Garden Road

Illustrative Cross Sections

During design and construction the roadway cross sections illustrated below for each priority project may need to be modified to match typical NCDOT cross sections or receive a design exception due to land use or environmental constraints. In some cases, speed limits could be reduced to accommodate sidepaths or sidewalks that are located closer to the roadway than typical cross sections require for the existing posted speed limit. See typical NCDOT cross sections here: https://connect.ncdot.gov/projects/planning/TPB%20Documents/highwaycrosssections.pdf.

NCDOT Complete Street Guidelines http://www.completestreetsnc.org/resources/ should also be referenced during the detailed design phase of projects. The Complete Streets design guidelines, adopted in 2012 are effective at safely accommodating all modes of traffic and vary depending adjacent land use and corridor characteristics. Please also reference *Appendix C: Design Guidelines* to access best practices from around the State and Country that serve to improve bicycle and pedestrian safety and access.

1 PRIORITY PROJECT: PLEASANT GARDEN ROAD FROM RYEGATE DR. TO E. SHERATON PARK RD.

Continuing from Ryegate Dr., Pleasant Garden Rd. begins to feel more like a commercial corridor with local businesses on the west side of Pleasant Garden Rd. To consolidate the haphazard parking that is occurring along the west side of Pleasant Garden Rd., and to provide bicycle and pedestrian access to the small shops, the sidepath is recommended to extend along the west side of the roadway. Parallel parking will be available in front of the shops. The corridor length is 3,929 linear feet. At Pleasant Garden Elementary School, a traffic signal exists between Thrower Rd. and E. Sheraton Park Rd. It is recommended that the signal be relocated to the intersection of NeelleyRd. to more effectively control traffic and provide a safer location for bicycle and pedestrian crossing to the school. High visibility crosswalks and wheelchair ramps will need to be installed at this location.

WHY IT'S IMPORTANT:

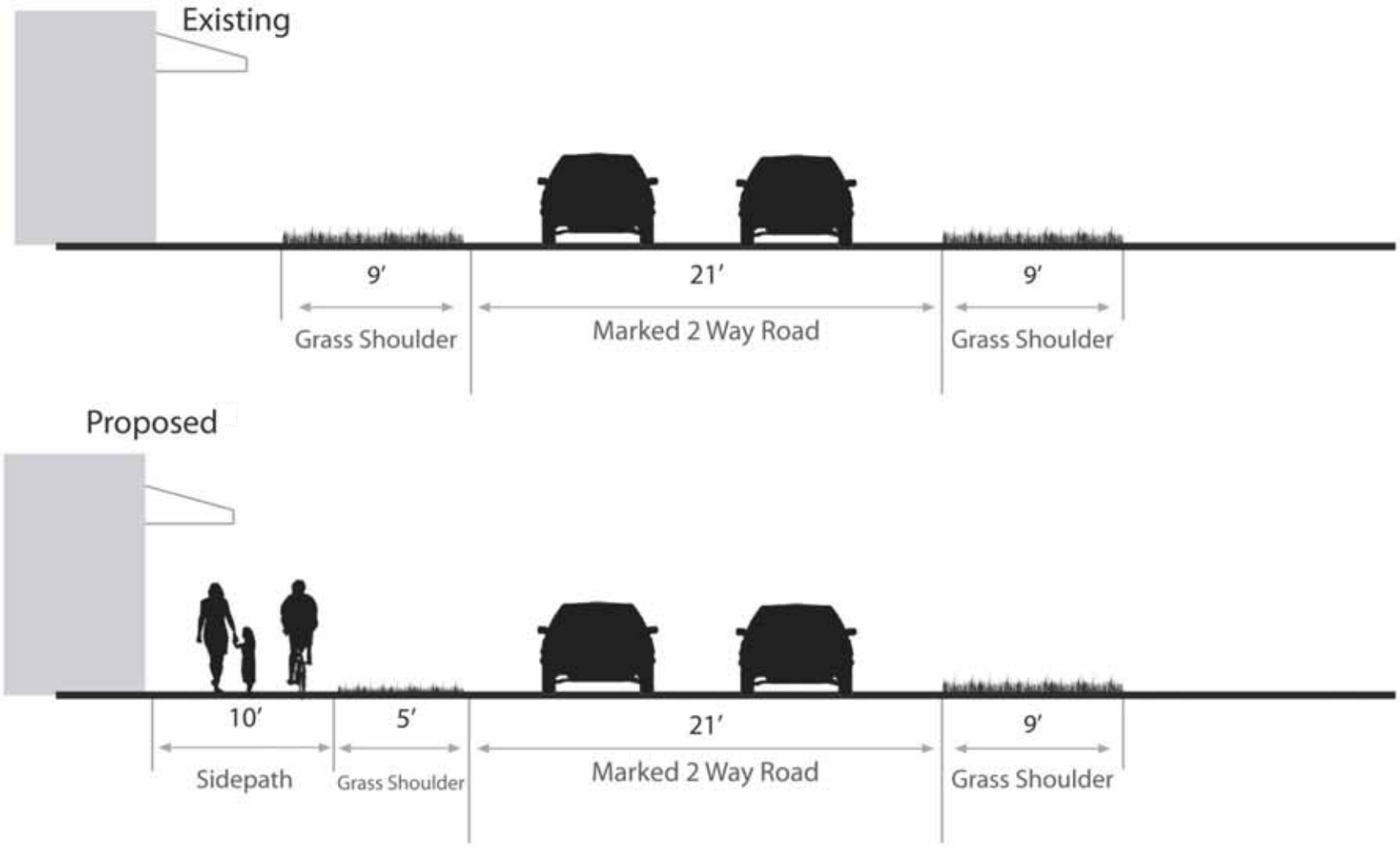
- No existing bicycle or pedestrian access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to businesses, residences, and Pleasant Garden Elementary School
- Sidepath can be installed in roadway/utility ROW
- Consolidates parking
- Improves aesthetic of commercial corridor/town center

Example of a high visibility crosswalk

ESTIMATED COST:

- $576,825.00

Pleasant Garden
PLEASANT GARDEN ROAD FROM RYEGATE DR. TO E. SHERATON PARK RD.



2 3 PRIORITY PROJECT (ALTERNATIVE): PLEASANT GARDEN ROAD FROM RYEGATE DR. TO E. SHERATON PARK RD.

An alternative treatment along Pleasant Garden Rd. would be to construct bicycle lanes and sidewalk on both sides of the corridor within the roadway ROW. This facility type would continue past the elementary school and change to paved shoulder at E. Sheraton Park Rd. The horizontal clearance is limited for this treatment so easements ay be necessary to accommodate both facility types.

WHY IT'S IMPORTANT:

- No existing bicycle or pedestrian access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to businesses, residences, and Pleasant Garden Elementary School
- Provides access from both directions with reduced roadway crossings
- Consolidates parking
- Improves aesthetic of commercial corridor/town center

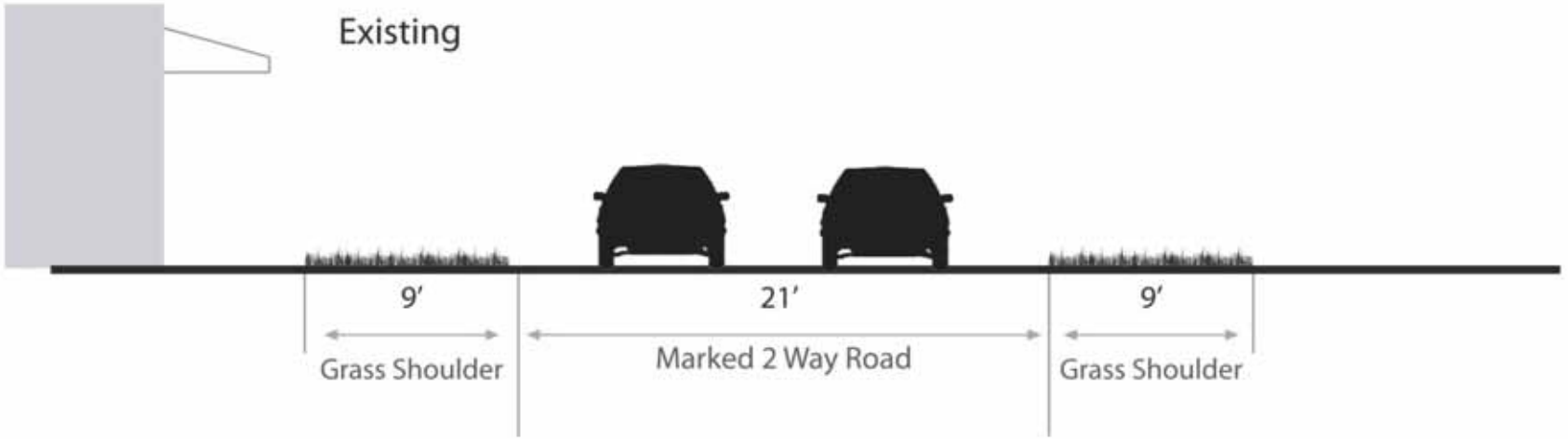
ESTIMATED COSTS:

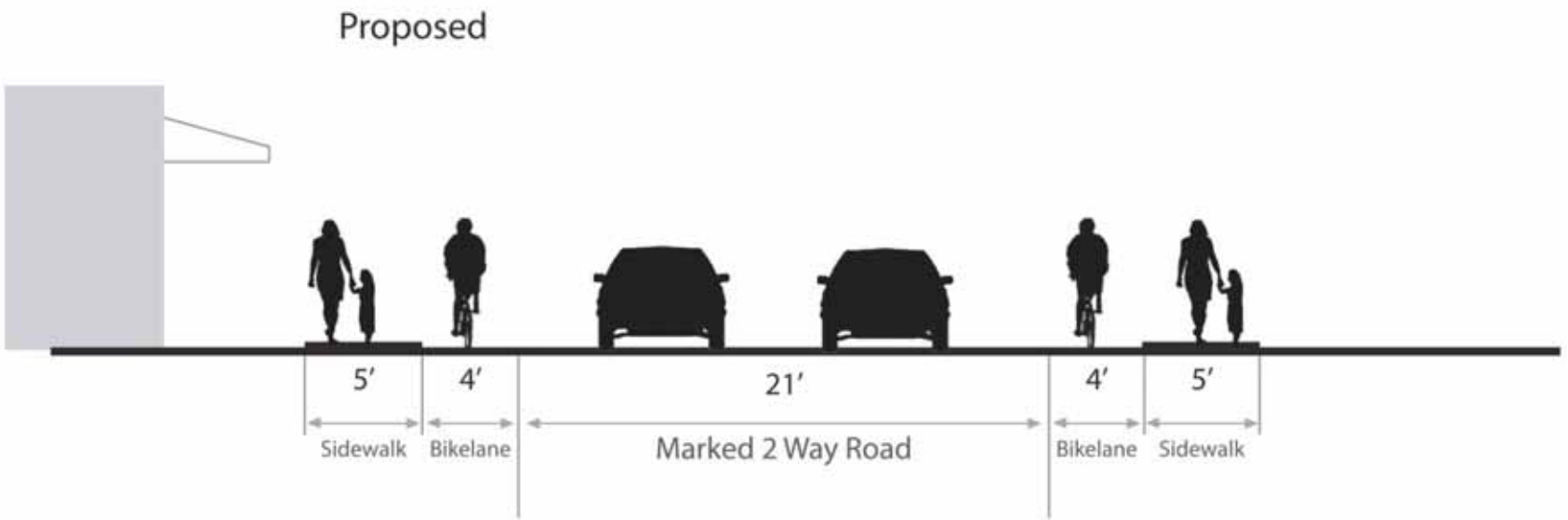
- $1,060,050.00

Example of a bicycle lane

Pleasant Garden

PLEASANT GARDEN ROAD FROM RYEGATE DR. TO E. SHERATON PARK RD.





7 PRIORITY PROJECT: PLEASANT GARDEN ROAD FROM SPUR RD. TO RYEGATE DR.

This **2,300-foot** corridor is the gateway to Pleasant Garden. The town's welcome sign is located along the corridor and businesses located along the roadway serve as the commercial center of Pleasant Garden. The intersection of Weatherly Rd., Nesbit Rd., Pleasant Garden Rd., and Spur Rd. provides great potential for a traffic circle to improve intersection angles for pedestrian, bicycle, and automobile safety. Due to the varied use, the preliminary recommendation is a 10-foot-wide sidepath on the east side of Pleasant Garden Road from Nesbit Rd. to Ryegate Dr. At the intersection of Ryegate Dr., a signalized crossing is recommended where the sidepath shifts to the west side of Pleasant Garden Rd. Motorists typically exceed the 35 MPH limit. It's recommended that the speed limit be reduced from 35 to 25 MPH.

WHY IT'S IMPORTANT:

- Gateway to Pleasant Garden
- No existing bicycle or pedestrian access
- Improvements will increase motorist, bicycle, and pedestrian safety
- Provides direct access to businesses and residences along Pleasant Garden Rd.
- Sidepath can be installed in roadway/utility ROW

ESTIMATED COST:

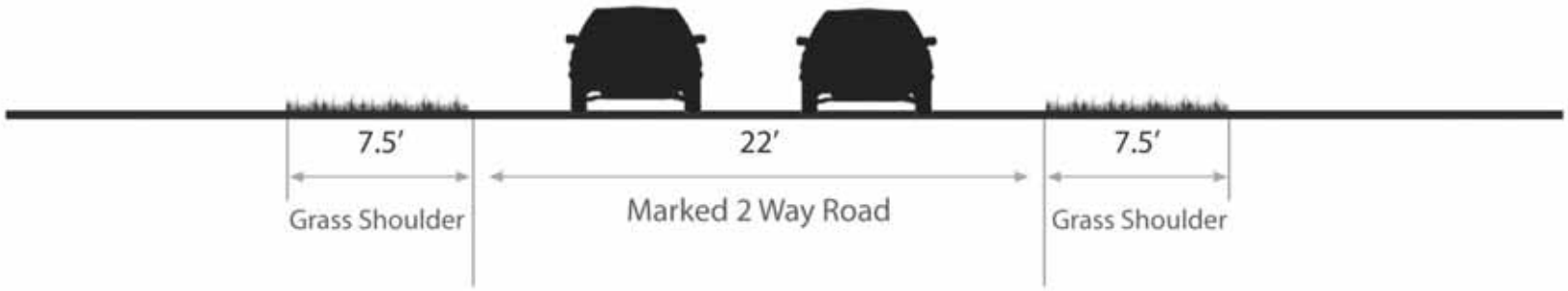
- $319,662.00

An RRFB crossing device

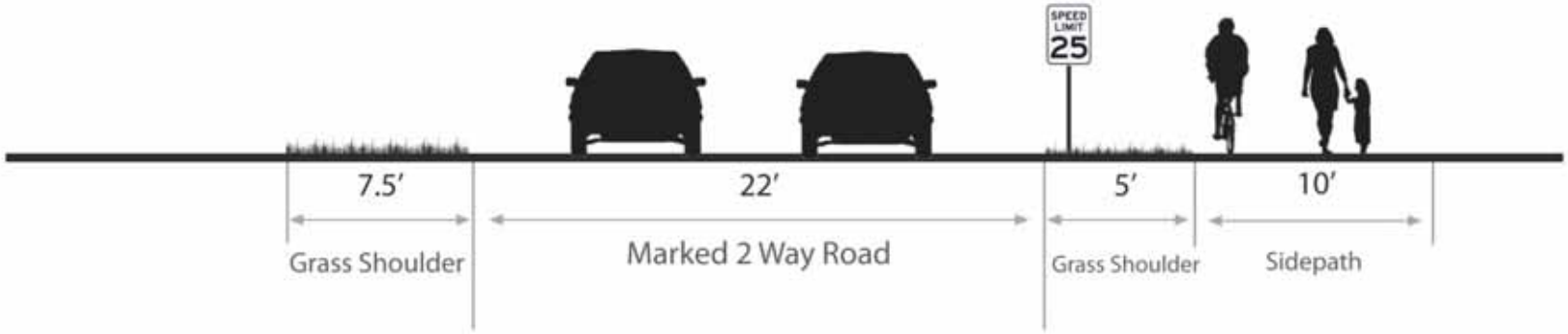
Pleasant Garden

PLEASANT GARDEN ROAD FROM SPUR RD. TO RYEGATE

Existing



Proposed*



* Will require 7.5′ additional easement to accommodate the 10′ sidepath and maintain a 5′ grass shoulder for safety.

8 PRIORITY PROJECT: TOWN HALL TO COMMUNITY CENTER GREENWAY CORRIDOR

A shared-use trail is designed to connect Pleasant Garden Town Hall and Volunteer Park. Just south of the entrance to this facility is the Pleasant Garden Community Center where recreational ball fields and a restroom building are present. Providing a sidepath connection along Alliance Church Rd. would link recreation and provide non-motorized transportation opportunities between the two parks. High visibility crosswalk, signage, and wheelchair ramps are recommended across Ryegate Dr. where the sidepath extends on the west side of Alliance Church Rd. Due to the evening meetings at Town Hall and the Community Center, pedestrian scale lighting is recommended along the sidepath between theses uses. The sidepath extends for approximately 3,098 linear feet.

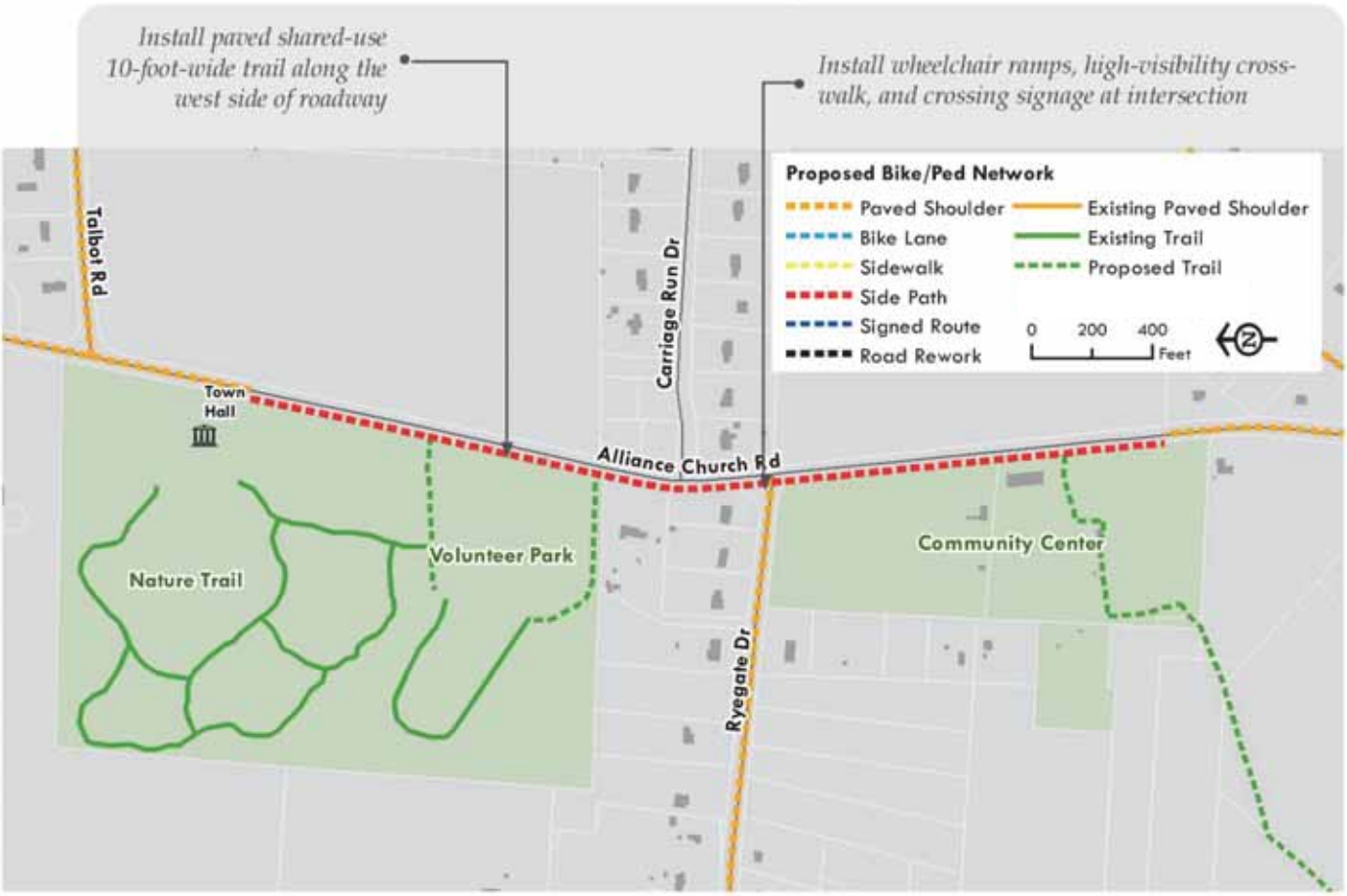
WHY IT'S IMPORTANT:

- Encourages bicycle/pedestrian access between parks
- Provides shared use access for bicyclists and pedestrians between public facilities
- Provides facility continuity with the Ryegate Dr. sidepath alternative

ESTIMATED COSTS:

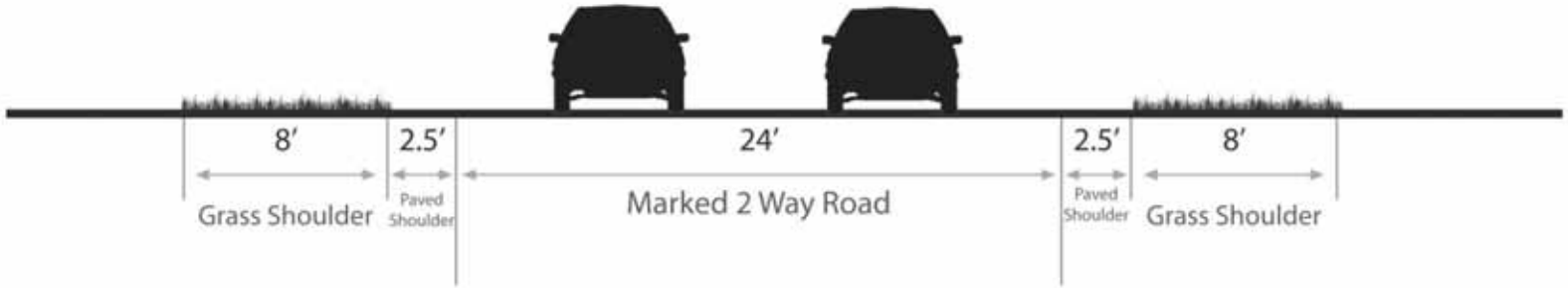
- $595,150.00

Example of a shared-use trail

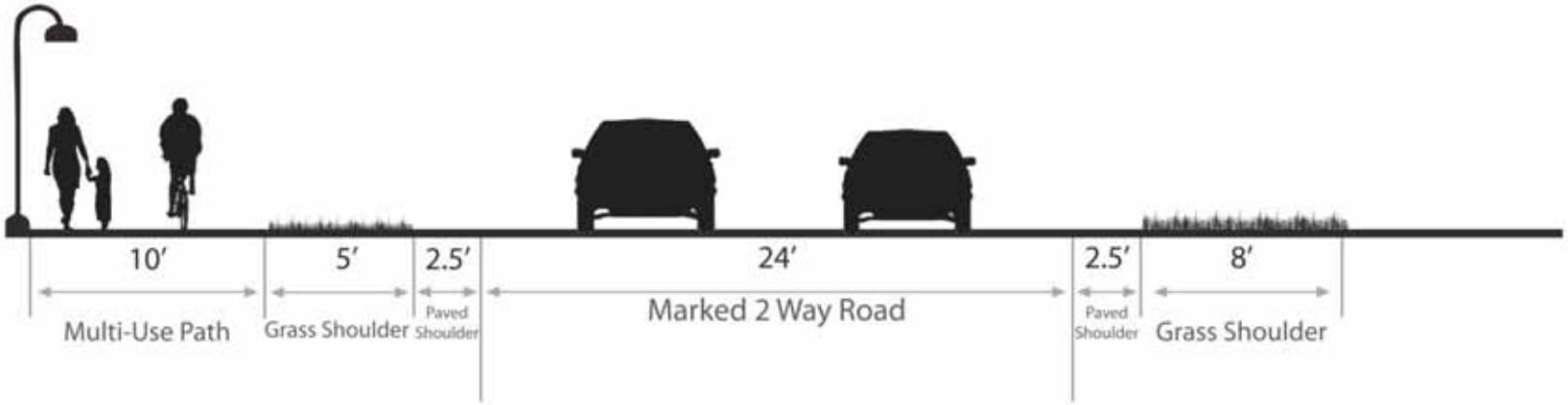


Pleasant Garden
TOWN HALL TO COMMUNITY CENTER GREENWAY CORRIDOR

Existing



Proposed*



* Will require 7' additional easement to accommodate the 10' multi-use path and maintain a 5' grass shoulder for safety.

15 PRIORITY PROJECT: RYEGATE DRIVE

Ryegate Drive is a critical corridor that connects the commercial area of Pleasant Garden to existing parks, trails, and Town Hall. Paved shoulders are proposed in this recommendation, which would provide bicycle access from the sidepath proposed on Pleasant Garden Rd. to the proposed greenway trail connecting to Townhall Park and the Community Center. A paved shoulder on both sides of Ryegate would provide continuity in facility type east to Alliance Church Rd. The project extends for approximately 3,291 linear feet.

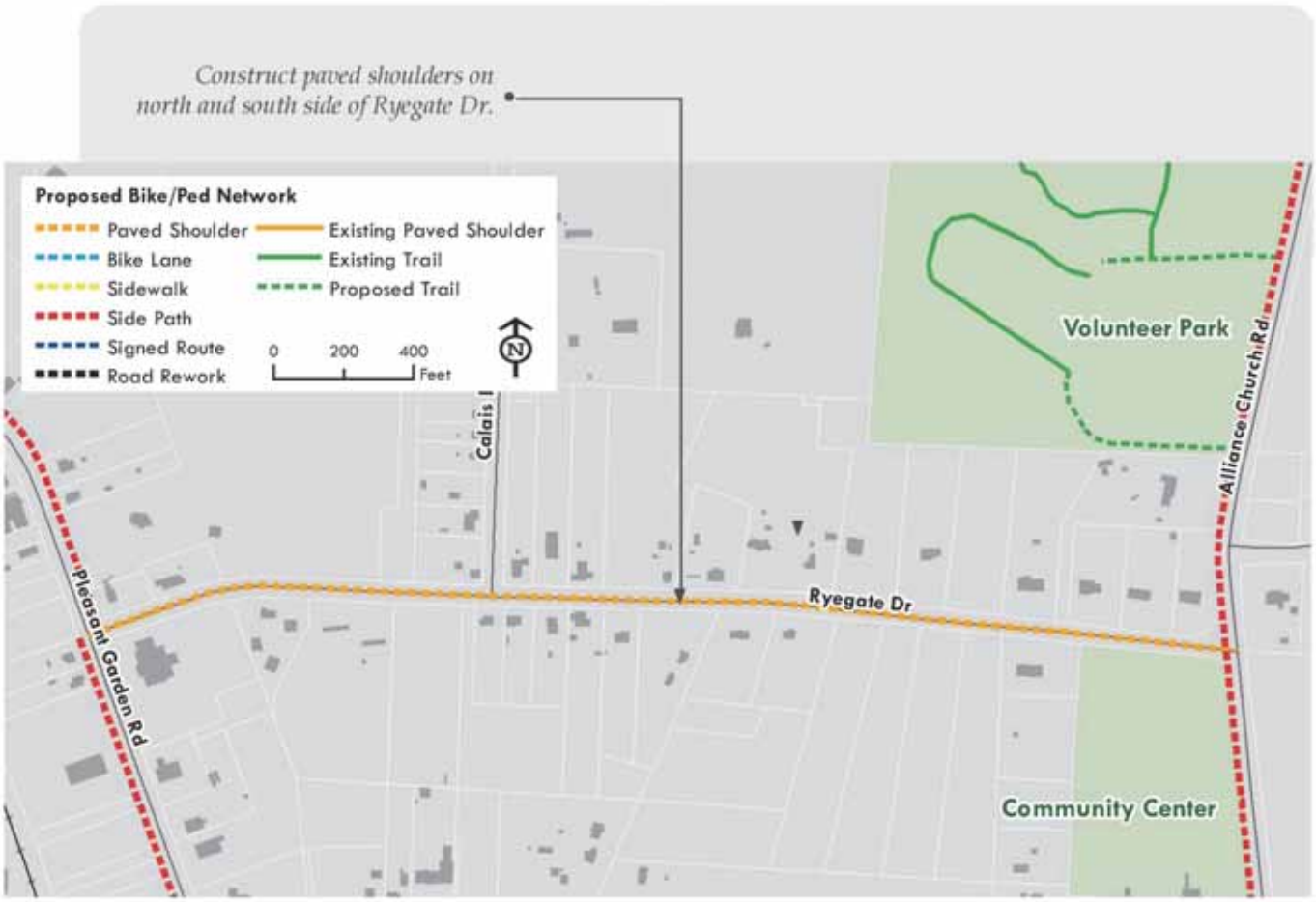
WHY IT'S IMPORTANT:

- Important connection between park facilities and commercial corridor/town center
- Short corridor means improvements would be cost effective
- Closes gap between two highly travelled north/south roadways

ESTIMATED COSTS:

- $1,645,500.00

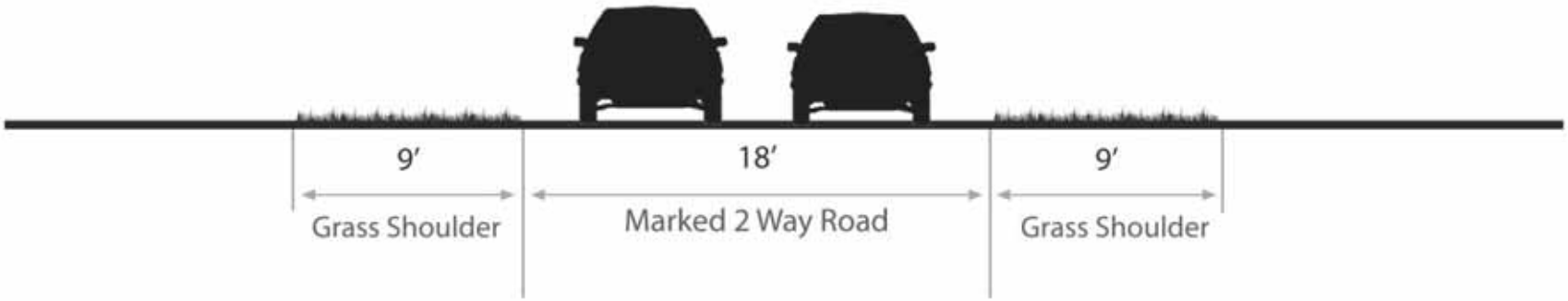
Example of a paved shoulder



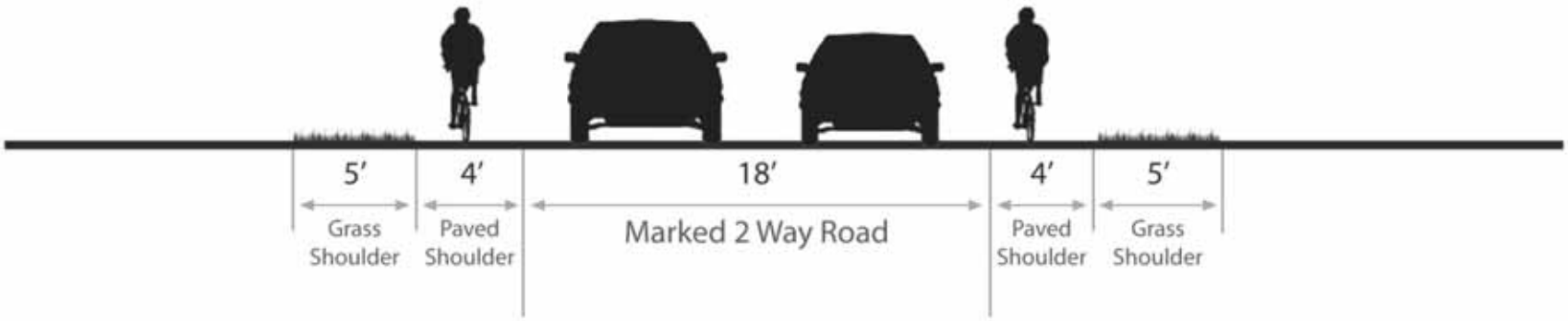
Pleasant Garden

RYEGATE DRIVE

Existing



Proposed



12 PRIORITY PROJECT: APPOMATTOX ROAD FROM NEELLEY RD. TO HAGAN STONE PARK RD.

This 6,586 linear foot corridor provides an important east/west connection from the elementary school and commercial district to Hagan Stone Park. Appomattox Rd. is a low volume road and used by motorists as a short cut to Neelley Rd. Preliminary recommendations include a paved shoulder on either side of the roadway which will be appreciated by experienced bicyclists. Based on the distance from Neelley Rd. (over 1 mile) this corridor would not benefit from sidewalk.

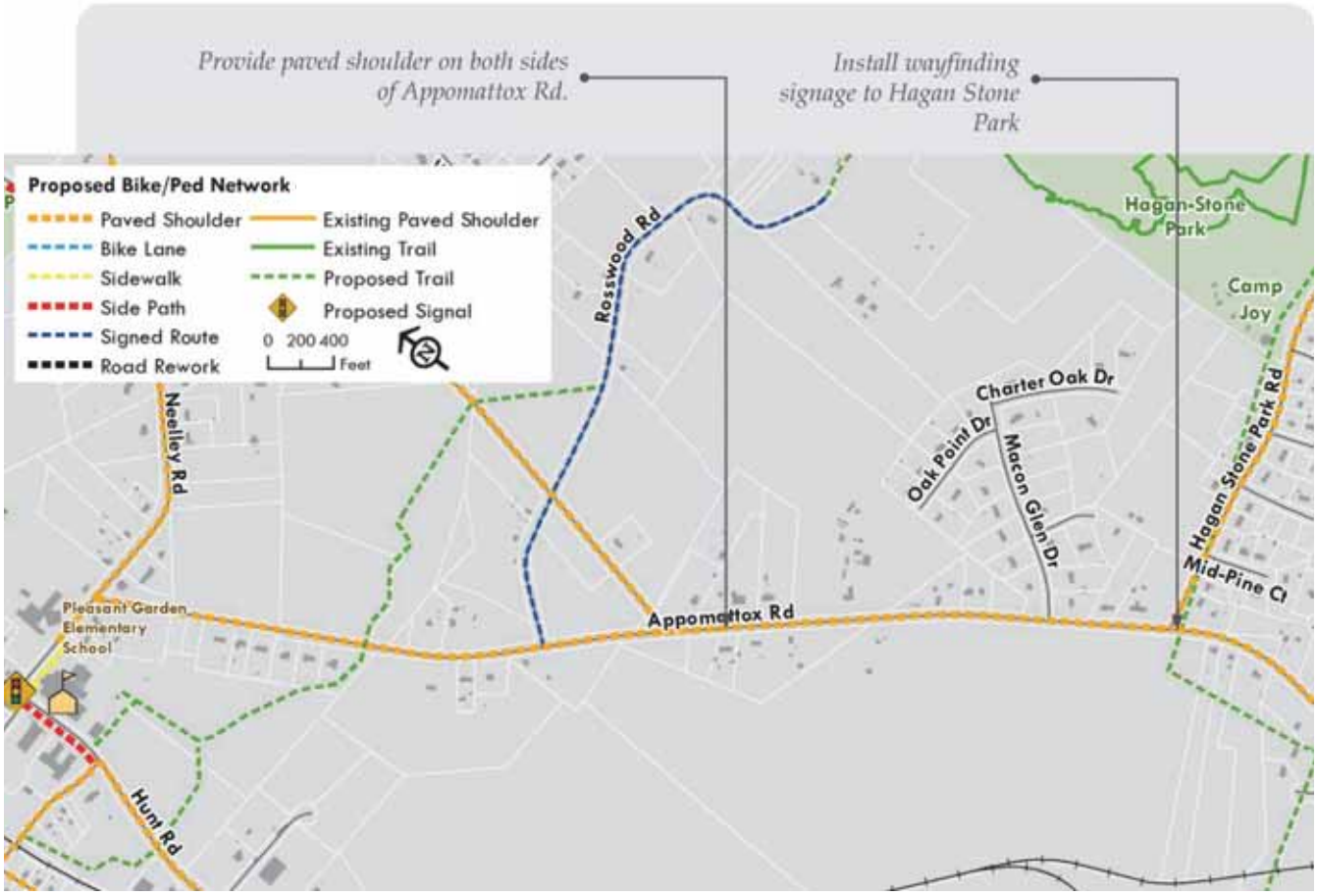
WHY IT'S IMPORTANT:

- Provides east/west connection from commercial center/town center, eventually to Hagan Stone Park.
- Rural, scenic roadway already travelled by bicyclists
- Paved shoulder is a relatively cost effective treatment

ESTIMATED COSTS:

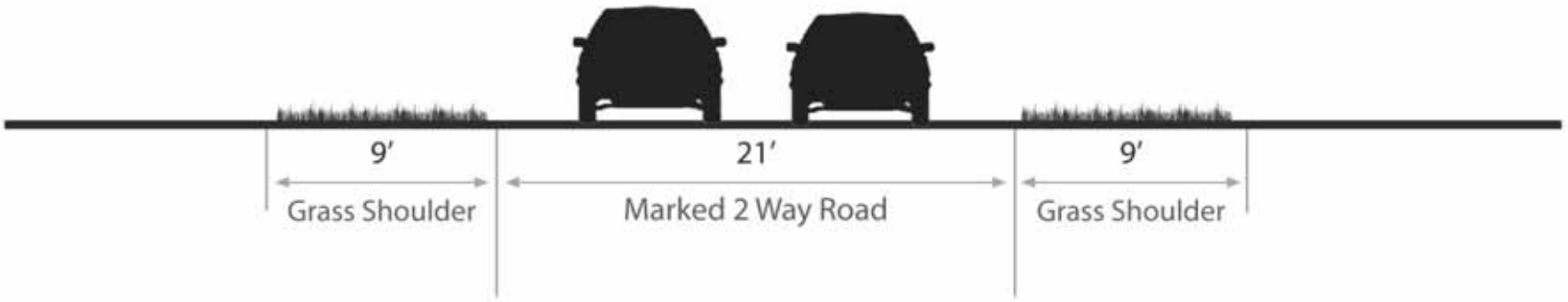
- $3,294,700.00

Example of wayfinding signage



Pleasant Garden
APPOMATTOX ROAD FROM NEELLEY RD. TO HAGAN STONE PARK RD.

Existing



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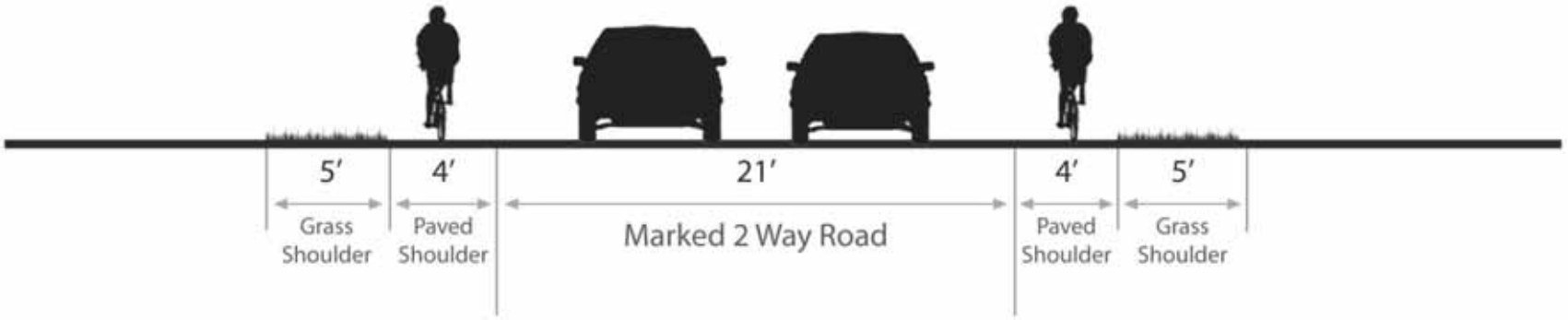


13 PRIORITY PROJECT: (ALTERNATIVE) APPOMATTOX ROAD FROM NEELLEY RD. TO HAGAN STONE PARK RD.

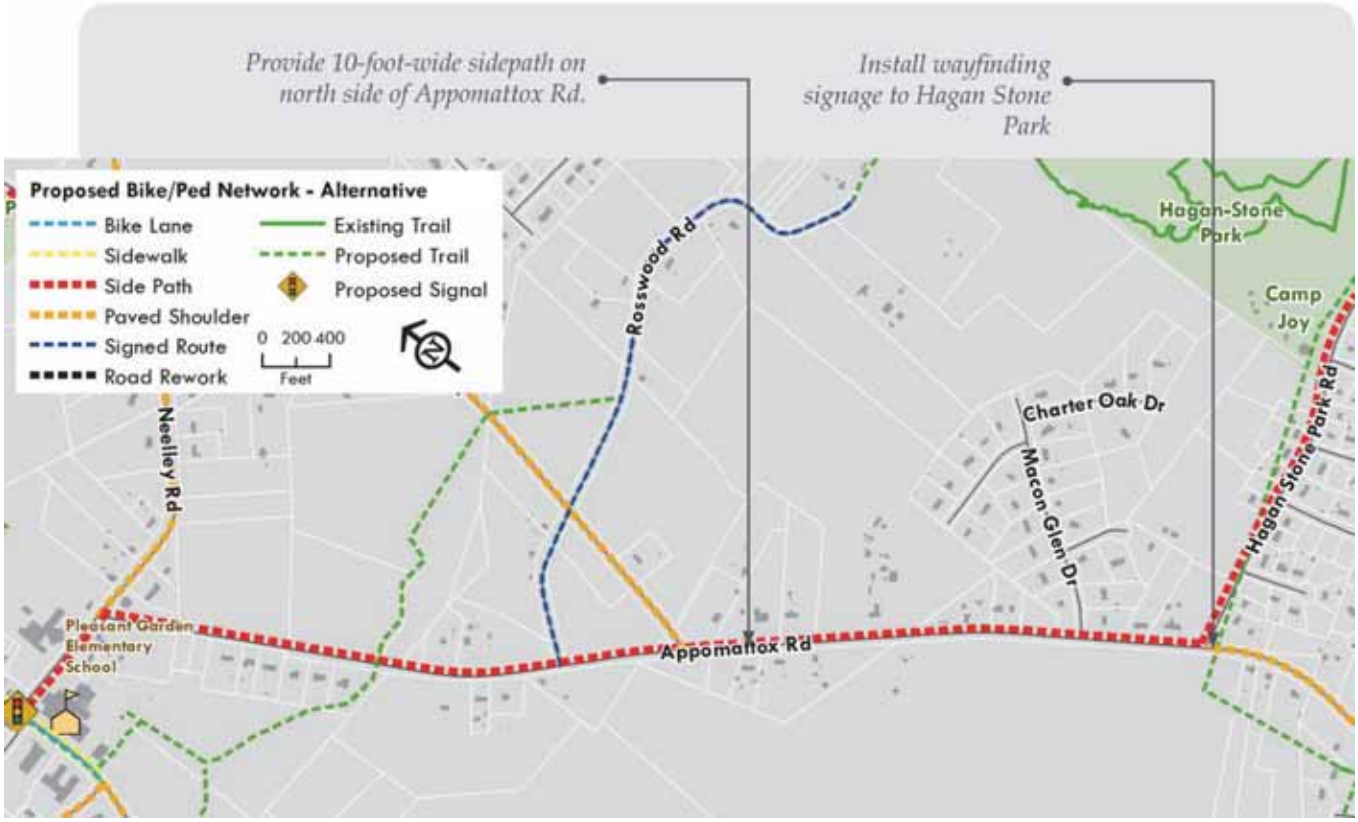
An alternative facility along Appomattox Rd. would be the installation of a sidepath on the north side of the roadway. A sidepath would extend from the elementary school on the south side of Neelley Rd., cross Appomattox Rd., and connect to Hagan Stone Park Rd. This option would provide opportunities to the greatest range of users, including bicyclists with little experience on roadways. If a sidepath is constructed it is likely that easements would need to be acquired from adjacent property owners.

WHY IT'S IMPORTANT:

- Sidepaths provide biking and walking opportunities to the widest range of users
- Adjacent neighborhoods will have access to walking and bicycling opportunities for fitness
- Eventually connects to Hagan Stone Park

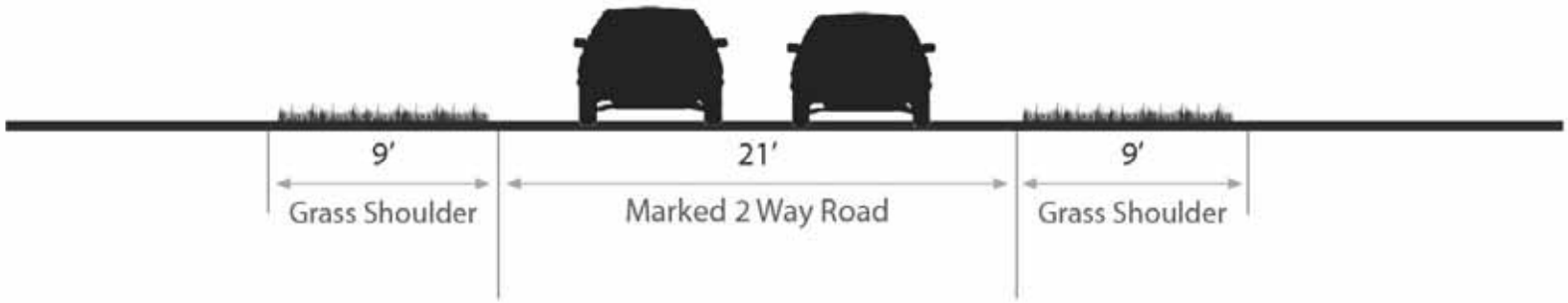
ESTIMATED COSTS:

- $824,950.00



Pleasant Garden
APPOMATTOX ROAD FROM NEELLEY RD. TO HAGAN STONE PARK RD.

Existing



Proposed

* Will require 6' additional easement to accommodate the 10' sidepath and maintain a 5' grass shoulder for safety.

20 PRIORITY PROJECT: HAGAN STONE PARK ROAD FROM APPOMATTOX RD. TO HAGAN STONE PARK

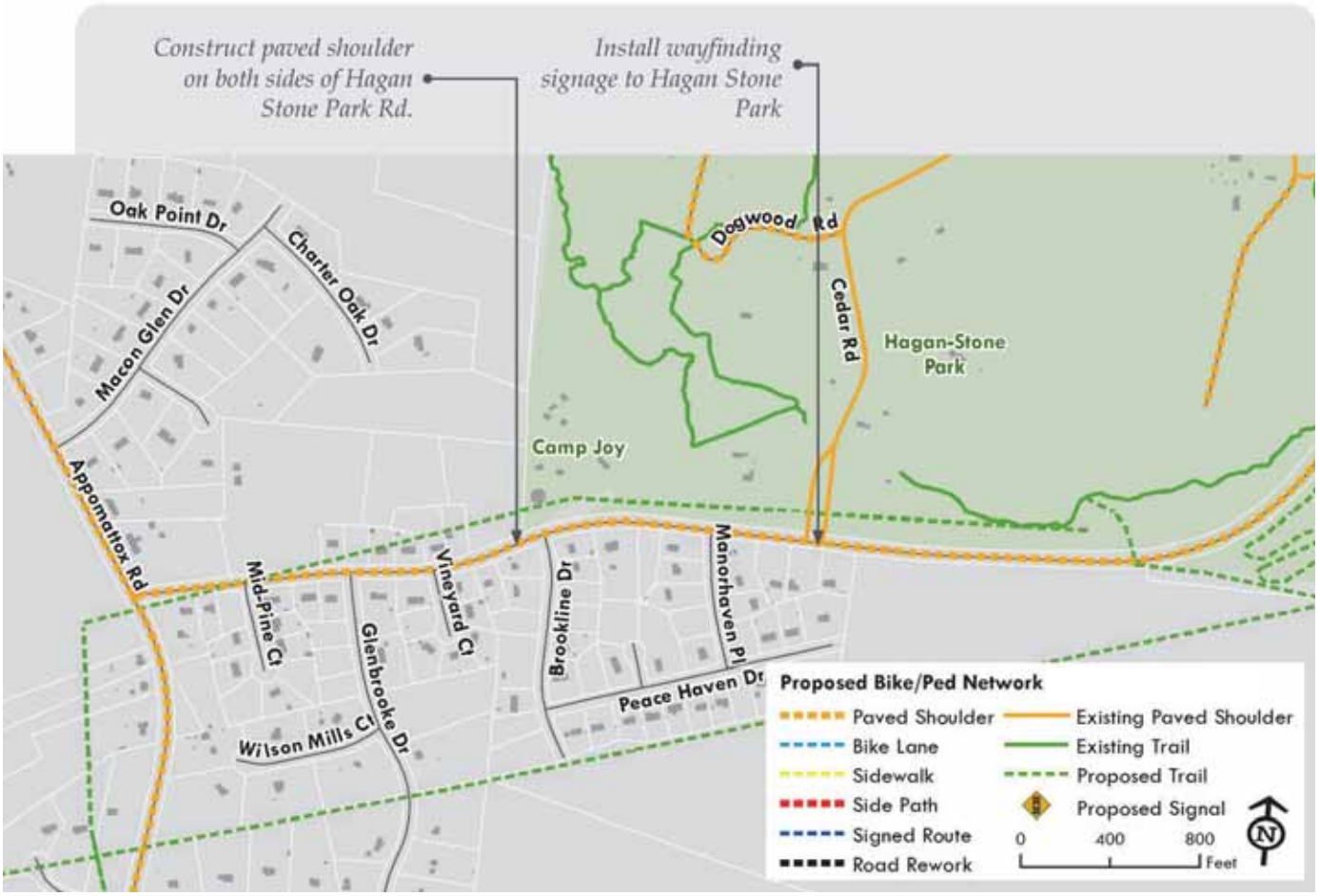
Hagan Stone Park Rd. provides direct access to Hagan Stone Park. Preliminary recommendations include a paved shoulder on both sides of the roadway, which will provide recreational bicyclists opportunities to connect to public facilities or other trails in the park. Hagan Stone Park is the furthest corridor from the commercial center of Pleasant Garden and extends 3,100 linear feet.

WHY IT'S IMPORTANT:

- Provides important connection to largest park in Pleasant Garden
- Already used by recreational bicyclists
- Paved shoulder is cost effective treatment for bicycle facilities

ESTIMATED COSTS:

- $1,551,700.00

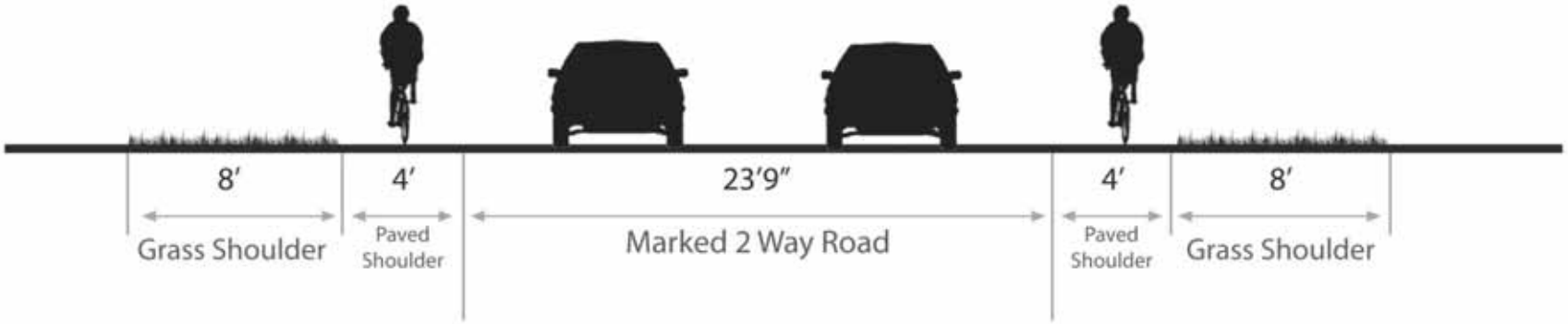


Pleasant Garden

HAGAN STONE PARK ROAD FROM APPOMATTOX RD. TO HAGAN STONE PARK

Existing

Proposed



21 PRIORITY PROJECT: (ALTERNATIVE) HAGAN STONE PARK ROAD FROM APPOMATTOX RD. TO HAGAN STONE PARK

An alternative bicycle and pedestrian treatment is recommended as a sidepath along Hagan Stone Park Rd. The north side of the roadway is feasible for construction of a paved sidepath and would provide comfortable facilities for families and less experienced bicyclists.

WHY IT'S IMPORTANT:

- Provides important connection to largest park in Pleasant Garden
- Provides increased opportunity to serve bicyclists and pedestrians or extend biking and walking trips
- Separated facilities are most safe for users

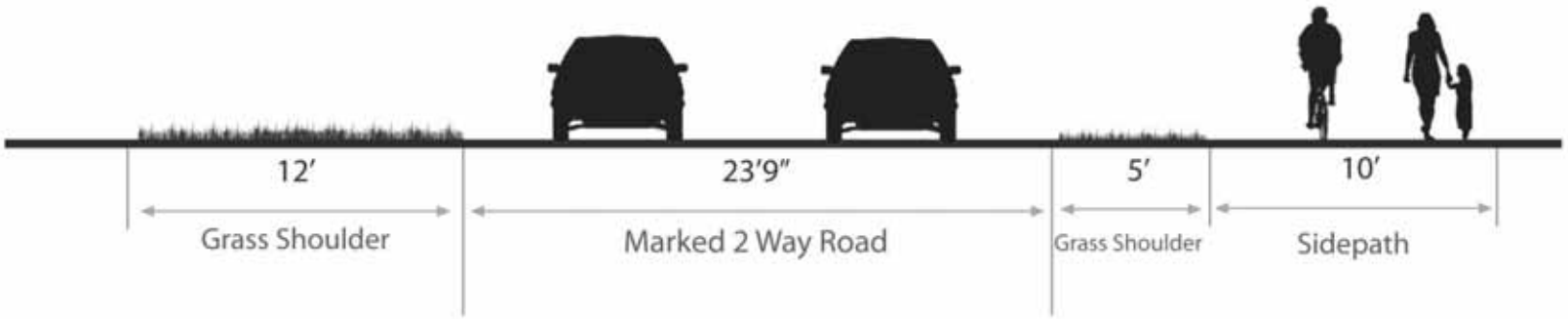
ESTIMATED COSTS:

- $389,200.00

Pleasant Garden
HAGAN STONE PARK ROAD FROM APPOMATTOX RD. TO HAGAN STONE PARK

Existing

Proposed*



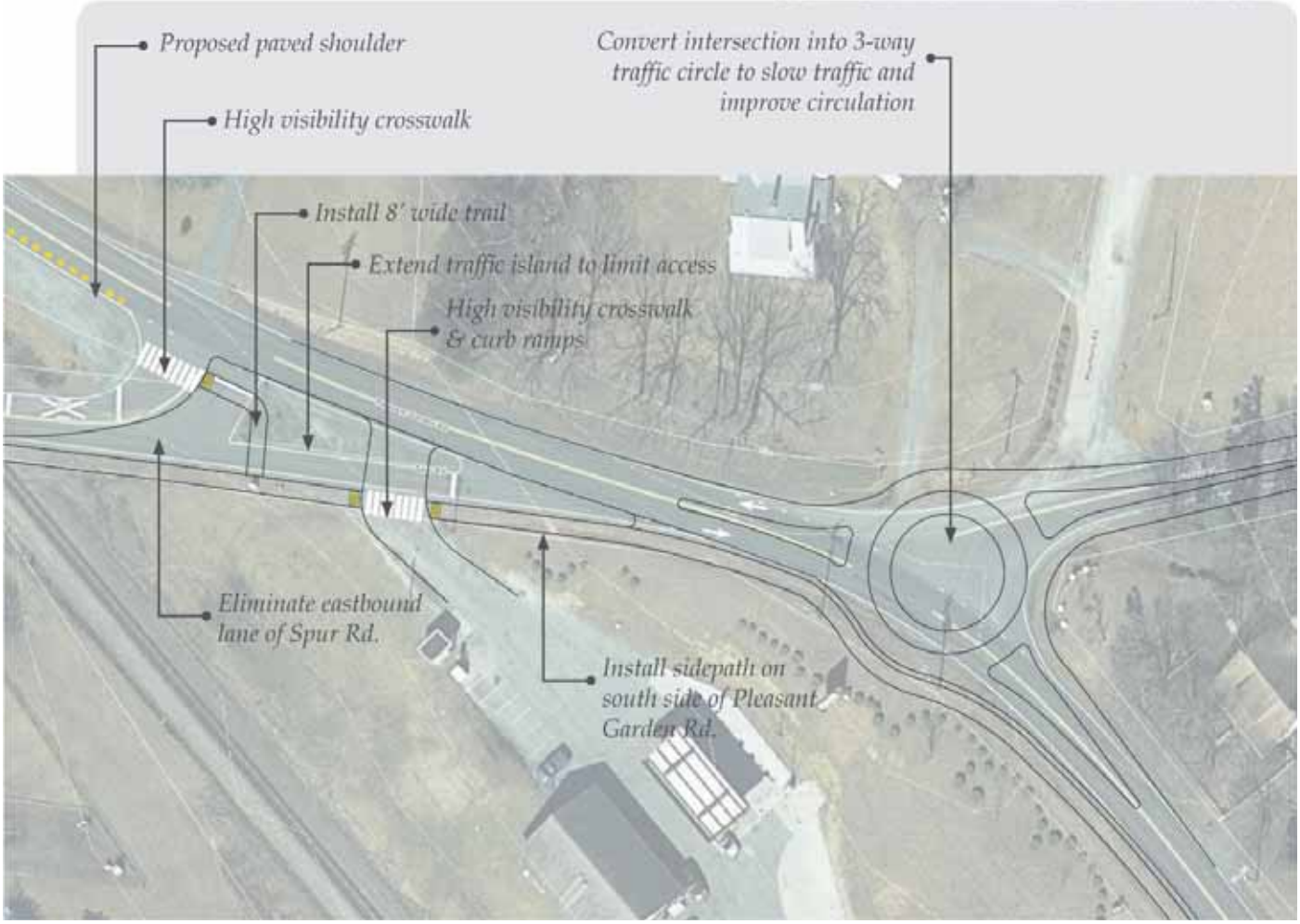
* Will require 3′ additional easement to accommodate the 10′ sidepath and maintain a 5′ grass shoulder for safety.

ENLARGEMENT: TRAFFIC CIRCLE

The intersection of Weatherly Rd., Nesbit Rd., Pleasant Garden Rd., and Spur Rd. provides great potential for a traffic circle to improve intersection angles for pedestrian, bicycle, and automobile safety. On the north and east side of the proposed roundabout, there is adequate right-of-way to expand the traffic circle without private property encroachment. On the south side of the proposed traffic circle, an easement will be required where the diameter of the traffic circle and sidepath encroach along private property. An 8-foot sidepath is proposed along the south side of Pleasant Garden Rd. Engineering study is recommended to determine ADT, truck volumes and other traffic impacts.

WHY IT'S IMPORTANT:

- Provides traffic calming at three-way intersection
- Provides safer traffic circulation patterns
- Increases safety for bicyclists and pedestrians at this location

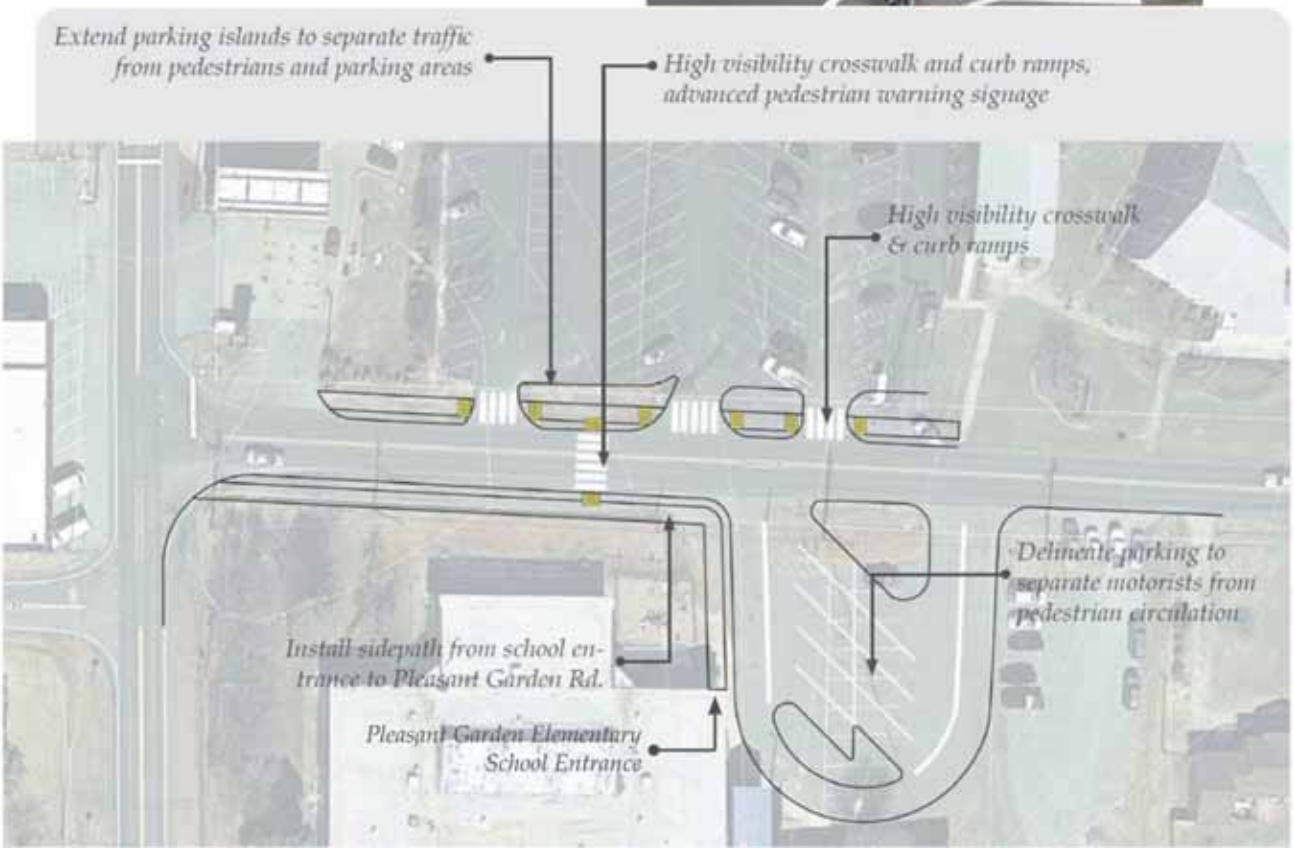


ENLARGEMENT: MID-BLOCK CROSSING AT PLEASANT GARDEN ELEMENTARY

Roadways adjacent to Pleasant Garden Elementary (Pleasant Garden Rd. and Neeley Rd.) experience heavy volumes of traffic during pick up and drop off school hours. As such, these roads should include improvements to pedestrian facilities and vehicular circulation to enhance pedestrian safety. Parents and young schoolchildren were observed using the north entrance of the school and crossing Neeley to the parking area across the roadway during before and after school hours. A mid-block crossing to the west of the school's north entrance would provide safer pedestrian crossing facilities where none exist today. Additional high visibility crosswalks should be installed at driveway access areas for pedestrians traveling east or west along the north side of Neeley. Improvements could also be made to vehicle circulation and parking on the north side of the building as shown in the diagram. A sidepath is proposed that would continue from the entrance to the building along the south side of Neelley Rd., and extend to the roadway intersection. While some of these improvements are not specific to bicyclists and pedestrians, the separation of motorized circulation and pedestrian circulation will greatly improve safety for families and children who are currently walking through parking areas and across roadways with no facilities.

WHY IT'S IMPORTANT:

- Heavily used areas by pedestrians
- No facilities currently present
- Will provide more direct vehicle circulation



3.3 POLICY AND PROGRAM RECOMMENDATIONS

This section will offer a framework for ordinances, internal policies and programs that will enhance the active 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 Pleasant Garden moves toward a vision of more infrastructure for pedestrian and bicycle safety, access and comfort.

Policies

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: Require reasonable pedestrian infrastructure for most new residential and commercial developments within the town. Ensure that this new infrastructure will connect to existing or planned pedestrian infrastructure. Explore funding sources to construct sidewalks, trails and sidepaths along existing development on major roadways, connecting existing Town or community based facilities and destinations. All stormwater runoff must be mitigated with stormwater practices such as rain gardens or swales. These stormwater features should be constructed by the requirements of the NC DENR BMP and NCDOT's guidelines. Funding sources could be a combination of grants, donations, local revenue and state / federal transportation funding. Powell Bill and property assessment funding may be a potential use of funds for improving sidewalks and building new sidewalks.

Stormwater Treatment & Sidewalks, PTRC 2012

B. Public Access Easements

Recommended Policy: Where sidewalks are required in new developments, the stormwater conveyance (e.g. swale) should be between the sidewalk and the road, buffering pedestrians from traffic and optimally treating runoff from the road.

Engineered stormwater swales, NCSU Biological & Agricultural Engineering, 2012

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.

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.

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.

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 adopted by NCDOT provide for specific "Complete Street" cross sections for different land use and transportation needs. Pleasant Garden Road should be studied for Streetscape Enhancement, and a Complete Street cross section adopted.

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.

G. Sidewalk Requirements for Redevelopment

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 could be included for certain roads in the Central Business District.

H. Sidewalk Construction Standards and Access

Recommended Policy: Adopt sidewalk and greenway standards for sidewalk and trail development in Pleasant Garden. Some small towns in Guilford County have adopted the City of Greensboro's standards. While these standards are suitable, some sidewalk and trail development may be more context sensitive to the Town of Pleasant Garden. For example, sidewalk design in the Pleasant Garden central business district could be stamped concrete or brick, while other parts of the community would require a public access easement for future trail or sidewalk development near the roadway as denser development occurs. For example a 2 acre lot outside the central business district may not require a sidewalk, but dedication of a paved shoulder or future trail easement. In addition, require that any 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.

I. Subdivision Pedestrian Connectivity

Recommended Policy: Provide requirements for new development to accommodate pedestrians by connecting cul-de-sacs or dead end streets 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 development or subdivision, a non-motorized public access right-of-way for 20-30ft should be set aside to connect with future cul-de-sacs, streets or pathways during the subdivision process.

Cul-de-sac connection (Oregon)

Programs

A. 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 Pleasant Garden, 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.

B. Sidewalk and Trail Construction Fund

Create a capital improvement plan in the Town budget to fund construction of sidewalks and trails. The fund could support a 50/50 cost sharing agreement between property owners who want to construct sidewalk or sidepath, 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. Large projects (e.g. >$150,000 total project cost) for sidewalk, trail or sidepath could utilize this fund to match federal support, making the fund stretch further.

C. Coordination with other municipalities on bicycle and pedestrian transportation

Pleasant Garden 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.

D. Establish Streetscape Committee

Establish a streetscape committee to target specific routes identified in this plan for lighting, tree and landscaping improvements along existing streets and roads in the Central Business District. 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.

E. Watch for Me NC

The "Watch for Me NC" program aims to reduce pedestrian and bicycle injuries and deaths through a comprehensive, targeted approach of public education and police enforcement. The project website www.watchformenc.org has several resources where you can learn more about how to be a safer driver, bicyclist, and pedestrian, and ultimately, reduce the number of people hit or killed by vehicles on North Carolina streets. We all share the responsibility to make sure North Carolina roads are safe for everyone, including pedestrians and bicyclists. Safe places to walk and bike are important for supporting active, vibrant communities.

F. 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.

G. 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/

H. Adopt a Trail / 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 Pleasant Garden can begin a similar program for its future pedestrian or bicycle facilities. This

program could also be used as a means for the community to alert the Town government or facility sponsor when there is a maintenance issue.

I. Safe Routes to School (SRTS) and Active Routes to School

The Safe Routes to School and Active 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. The 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 is administered by the North Carolina Department of Transportation Bicycle and Pedestrian Transportation Division. In cooperation with the NC Division of Public Health, a local coordinator has also been designated at a regional level to help administer, fund and support programs – Jennifer Delcourt jennifer.delcourt@wakegov.com or (919) 212-8465. 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.

J. Tree Programs

Explore enhanced tree planting and preservation programs for the Town of Pleasant Garden. 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.

Tree Buffered Sidewalk D. Burden, 2006

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.

CHAPTER 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 Pleasant Garden citizens. The planning efforts to date have reinforced the interest of citizens in creating more trails, sidewalks, open space, bicycle routes and safe road crossings. Continued effort in implementing action items will create the momentum needed to carry out plans outlined for the next 20 years. *Figure 11: Organization Framework for Implementation* on page 59 identifies partners and communication pathways for implementing the plan recommendations. *Figure 12: Key Action Steps for Implementation* beginning on p. 61 outlines how the highest priority action items can be implemented and the entities with primary responsibility for carrying out each action item.

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Organizational Framework for Implementation

Implementation Action Steps Table

Key Action Step Descriptions

Key Partners in Implementation

Performance Measures (Evaluation and Monitoring)

Facility Development Methods

4.1 OVERVIEW

This chapter defines a structure for managing the implementation of the Town of Pleasant Garden Comprehensive Bicycle and Pedestrian Transportation Plan. Implementing the recommendations within this plan will require leadership and dedication to pedestrian and bicycle facility development on the part of a variety of agencies. Equally critical, and perhaps more challenging, will be meeting the need for a recurring source of revenue. Even small amounts of local funding could be very useful and beneficial when matched with outside sources. Most importantly, the town need not accomplish the recommendations of this plan by acting alone; success will be realized through collaboration with regional and state agencies, the private sector, and non-profit organizations.

As an example of a possible funding source, federal Transportation Alternative Programs requires a 20% local match. The Parks and Recreation Trust Fund (PARTF), a State program, requires 50% match. 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. Funding opportunities from state and federal agencies and non-profits are listed in *Appendix A: Funding Sources*.

Given the present day economic challenges faced by local governments (as well as state, federal, and private sector partners), it is difficult to know what financial resources will be available at different time frames during the implementation of this plan. However, there are still important actions to take in advance of major investments, including key organizational steps, the initiation of education and safety programs, and the development of strategic, lower-cost sidewalk and on-road bicycle facilities. Following through on these priorities will allow key stakeholders to prepare for larger pedestrian and trail projects over time, while taking advantage of strategic opportunities as they arise.

In five years a broader assessment and evaluation of efforts should be performed to both re-prioritize 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 and Bicycle Transportation Plan Update and may modify a number of sections of this current Plan.

Figure 11: Organizational Framework for Implementation

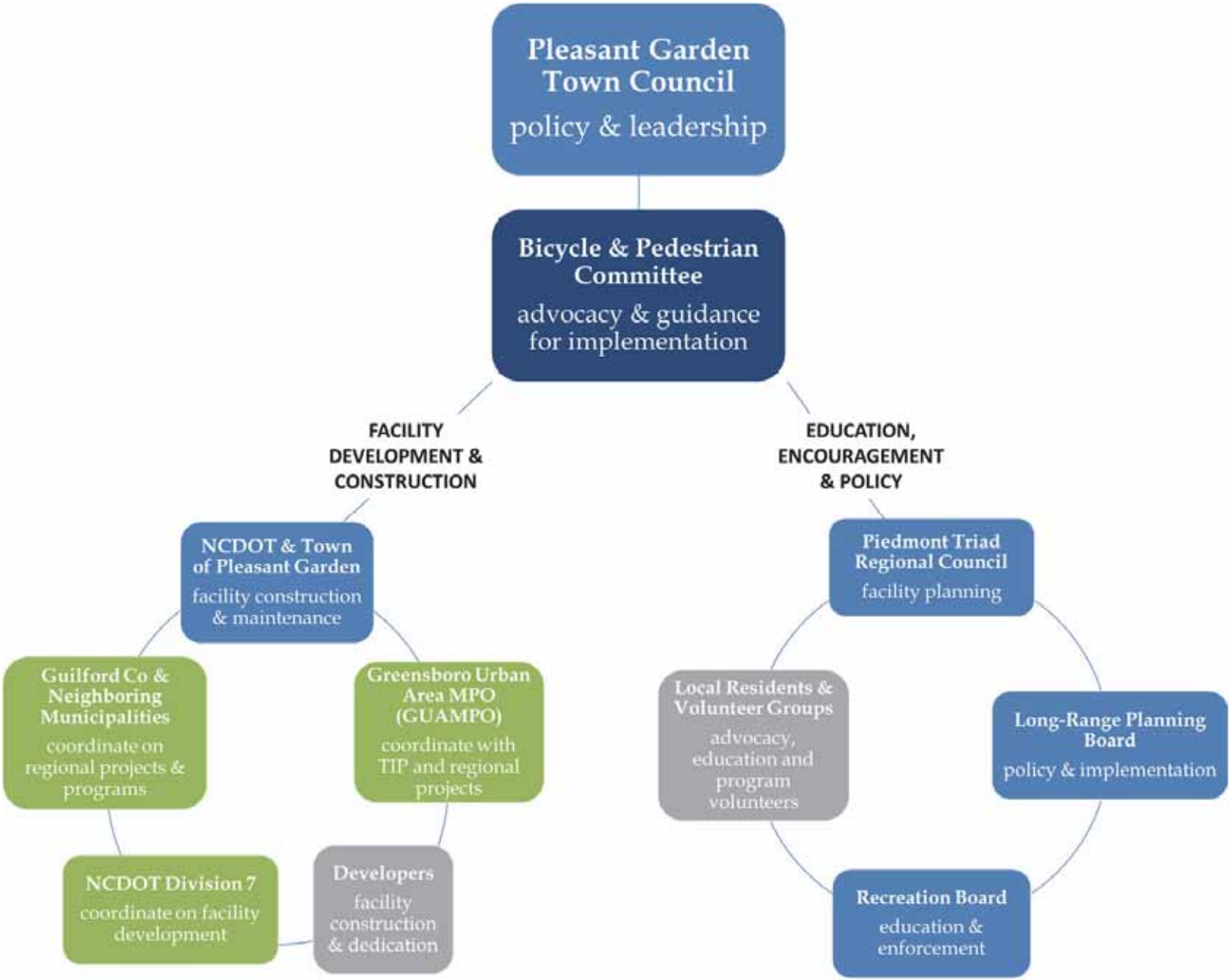


Figure 12: Key Action Steps for Implementation

TASK	LEAD	SUPPORT	DETAILS	TIME FRAME
Present Plan to Town Council	Project Consultants	Long-Range Planning Board	Presentation to Town Council	Short-term
Approve this plan	NCDOT Bike / Ped Division	Project Consultants	Official letter of approval	Short-term
Adopt this plan	Town Council	Planning & Code Enforcement, Project Consultants	Through adoption, the Plan becomes an official planning document of the Town. Adoption shows that the Town of Pleasant Garden has undergone a successful, supported planning process.	Short-term
Designate Staff and Key Volunteers	Town Council	Planning and Recreation Boards	Designate staff and key volunteers to oversee the implementation of this plan and the proper maintenance of the facilities that are developed.	Short-term
Form and confirm the goals of the Bicycle and Pedestrian Advisory Committee (BPAC)	Town Council	Town Long-Range Planning and Recreation Boards, Bicycling in Greensboro (BIG)	Form the Bicycle and Pedestrian Advisory Committee and confirm the goals of the BPAC to include the implementation of this plan. Coordinate with Bicycling in Greensboro and other key partners	Short-term
Submit and apply to MPO for funding of top priority project	Town Council, GUAMPO	BPAC, Planning Board	Confirm top priority project and pursue implementation	Short-term
Establish a Complete Streets policy	Town Council	BPAC, Planning Board	Create policy that explicitly includes the accommodation of pedestrians and bicycles on new road projects	Short-term
Establish a sidewalk maintenance agreement and policy for property owners in advance of sidewalk construction	Long Range Planning Board	Town Council, BPAC	Create an agreement that clearly articulates who will maintain sidewalks, sidepaths or trails. If sidewalks are built within the public right of way, establish an agreement on preventing obstruction of the sidewalk by bushes, trees or otherwise	Short-term
Present this plan to other local and regional bodies and agencies	Planning Board	BPAC	Present this plan to other local and regional bodies and agencies, such as the GUAMPO, regional transportation planners, Guilford County Parks, local cycling / walking / running clubs, advocacy groups, and homeowners associations.	Ongoing, beginning in 2015

TASK	LEAD	SUPPORT	DETAILS	TIME FRAME
Begin Annual Meeting With Key Project Partners	BPAC, Planning Board	NCDOT, BPAC, and local & regional stakeholders	Key project partners (see org. chart) should meet on an annual basis to evaluate the implementation of this Plan. Meetings could also occasionally include on-site tours of priority project corridors.	Ongoing, begin in 2015
Coordinate with regional partners on funding, programming, and regional trail/ bike route connections when possible	BPAC, Planning Board	GUAMPO, Guilford County, neighboring municipalities, NCDOT	Combining resources and efforts with surrounding municipalities, regional entities, and stakeholders is mutually beneficial. Communicate and coordinate with regional partners on regional trails, bicycle, and pedestrian facilities; partner for joint-funding opportunities. After adoption by the Town, this document should also be recognized in future updates to the Guilford County CTP.	Ongoing, begin in 2015
Policy Orientation	All Stakeholders	NCDOT Bike / Ped Division	Become familiar with State and Federal bicycle and pedestrian policies.	Ongoing, begin in 2015
Apply for Safe Routes to School Grants and Infrastructure Funding	BPAC	GUAMPO, NCDOT Division 7, Guilford County Schools	Establish 'bike-to-school' groups, 'walking school buses' or other similar activities for children through the Safe Routes to School Program. Inquire about bicycle and pedestrian infrastructure funding for projects through NCDOT Division 7.	Ongoing, begin in 2015
Improve Existing Programs and Launch New Programs	BPAC	Planning Board, Recreation Board, Guilford County Public Health, Guilford County Sheriff, Bicycling in Greensboro (BIG)	These groups should coordinate to improve existing bicycle and pedestrian programs and to launch new programs, such as those described in Chapter 3. Utilize available WatchForMeNC materials, and request that Pleasant Garden be included when WatchForMeNC is integrated statewide.	Ongoing, begin in 2015
Establish a Monitoring Program	Planning Board, BPAC	local advocates, general public	The Planning Board and the BPAC should brainstorm specific benchmarks to track through a monitoring program and honor the completion of projects with public events and media coverage.	Ongoing, begin 2015

TASK	LEAD	SUPPORT	DETAILS	TIME FRAME
Encourage Enforcement and Education Training for Police Officers	Guilford County Sheriff	NCDOT Bike/Ped Division	Provide police officers with training through free online resources available from the National Highway Traffic Safety Administration, and through webinars available through the Association of Pedestrian and Bicycle Professionals. Provide police officers with an informational handout to be used during bicycle and pedestrian-related citations and warnings.	Ongoing, begin in 2015
Develop a long term funding strategy	BPAC, Planning Board	Town Council and Administration	To allow continued development of the overall system, capital funds for bicycle and pedestrian facility construction should be set aside every year. Powell Bill funds should be programmed for facility construction. Funding for an ongoing maintenance program should also be included in the Town's operating budget.	Ongoing, begin in 2015
Communication & Outreach	BPAC, local bike shops, local advocacy groups	Parks & Recreation Committee, Southeast Guilford Community Association	The BPAC should establish a communication campaign to celebrate successes and raise awareness of the benefits of walking and bicycling. One option is to redesign the plan website that provides information to residents and tourists on bicycling and walking in town. To begin, the website can include the maps from this plan and a link to the Facebook page set up for the plan.	Aim to launch the website/ page by end 2015
Seek designation as a Walk-Friendly and Bicycle-Friendly Community	Planning Board, BPAC	Town Council, Recreation Board	The development and implementation of this plan is an essential first step toward becoming a designated Walk-Friendly or Bicycle-Friendly Community. With ongoing efforts and the short- term work program recommended here, the Town should be in a position to apply for and receive recognition within a few years.	2016 or 2017
Design Orientation	NCDOT Division 7	NCDOT Bike/Ped , BPAC, GUAMPO	Become familiar with the standards set forth in Appendix C of this Plan, as well as state and national standards for bicycle and pedestrian facility design.	On-going

TASK	LEAD	SUPPORT	DETAILS	TIME FRAME
Maintain Bicycle and Pedestrian Facilities	Town of Pleasant Garden	NCDOT, BPAC, general public (for reporting maintenance needs), Planning Board	The Town of Pleasant Garden should establish a maintenance plan for sidewalks and sidepaths. NCDOT should ensure crosswalks, ramps and shoulders are in good condition and are sufficient for current bicycle and pedestrian travel.	Ongoing, begin 2015
Notify Town of Pleasant Garden Clerk of all upcoming roadway reconstruction/resurfacing/restriping projects no later than the design phase	NCDOT Division 7 District Engineer	Planning Board, BPAC, NCDOT Bike / Ped Division	Provide sufficient time for comments; Incorporate recommendations from this Plan into future project design plans. If a compromise to the original recommendation is needed, contact NCDOT Division of Bicycle and Pedestrian Transportation for guidance on appropriate alternatives.	Ongoing, begin 2015
Develop wayfinding system with directional signage	Planning and Recreation Boards	BPAC, GUAMPO	Develop a wayfinding system for Pleasant Garden to direct bicyclists & pedestrians to destinations and to safe places to cross busier roads. Place signage along sidepaths with bicycle and pedestrian travel times to destinations. The Town could consider working with 'Walk [Your City]' as an innovative and low-cost solution to wayfinding: walkyourcity.org	2016 or when sidewalk and trail system begins to take shape
Identify new action steps and next infrastructure projects based on the projects completed to-date and the overall network recommendations in Chapter 3.	BPAC	Town Council, Planning Board and Parks and Recreation Committee	When priority projects are near completion, identify the next priorities for bicycle and pedestrian infrastructure development.	Ongoing, as appropriate. Consider a full Bicycle & Pedestrian plan update in 2020.

4.2 KEY ACTION STEPS DESCRIPTIONS

Policy Action Steps

Several policy steps are crucial to the success of future facility development. These steps will legitimize the recommendations found in this plan and enable the right-of-way acquisition necessary to carry out those recommendations.

Adopt This Plan

Before any other action takes place, the Town of Pleasant Garden should adopt this plan. This should be considered the first step in implementation. Through adoption of this plan and its accompanying maps as the Town's official pedestrian and bicycle plan, Pleasant Garden will be better able to shape transportation and development decisions so that they fit with the goals of this plan. Most importantly, having an adopted plan is extremely helpful in securing funding from state, federal, and private agencies. Adopting this plan does not commit the Town of Pleasant Garden to dedicate or allocate funds, but rather indicates intent to implement this plan over time, starting with these action steps.

The Planning Board should review and recommend the plan to the Town Council, which in turn must consider and officially incorporate the recommended infrastructure improvements of this plan into its land-use plans. The following entities should adopt this plan:

- The Town of Pleasant Garden
- GUAMPO

Adoption of this plan also signifies that the design guidelines provided in Appendix C are established as pedestrian and bicycle facility standards. This will establish consistency in design across jurisdictional boundaries, ensuring that future facilities will be developed with consistency and will accommodate a variety of user types.

This plan and its recommended on- and off-road facilities should be approved by the NCDOT, and they should be included in the future planning of NCDOT. This plan's recommendations should be integrated into an update to the Comprehensive Transportation Plan for Guilford County. NCDOT should refer to this document when assessing the impact for future projects and plans.

Coordinate Development Plans

The Town of Pleasant Garden should ensure that adopted bicycle, pedestrian, and multi-use path recommendations from this plan are included in future residential and commercial developments that connect with such proposed facilities.

Program Action Steps

While policies provide a legal basis for on- and off-road facility development, the program recommendations included in Chapter 3 of this plan will build community support for the creation of new facilities and establish a strong bicycling and walking culture.

Designate Staff

Designate staff to oversee the implementation of this plan and the proper maintenance of the facilities that are developed. It is recommended that a combination of existing staff and key volunteers oversee the day-to-day implementation of this plan. In many municipalities, a full-time bicycle and pedestrian coordinator covers this task, but in smaller towns, such as Pleasant Garden, it makes more sense to fold these responsibilities into current staff and committee responsibilities.

Form a Bicycle and Pedestrian Advisory Committee

The Town of Pleasant Garden should form a bicycle and pedestrian advisory committee (BPAC) to assist in the implementation of this plan. This committee could be formed out of this Plan's steering committee, or the members could be sought and appointed through the Town Council or Planning Board. The BPAC should have representation from active pedestrians and commuting and recreational cyclists and should champion the recommendations of this plan. The formation of this group would be a significant step in becoming designated as a Walk- and Bicycle Friendly Community (see information below). The committee would provide a communications link between the citizens of the community and local government. They should also continue to meet periodically, and be tasked with assisting the Town of Pleasant Garden staff in community outreach, marketing, and educational activities recommended by this plan.

Become Designated as a Walk-Friendly and Bicycle Friendly Community

A goal for Pleasant Garden should be to seek a "Bicycle Friendly Community" (BFC) designation from the League of American Bicyclists. The BFC campaign is an award program that recognizes municipalities that actively support bicycling activities and safety. A Bicycle Friendly Community provides safe accommodation for bicycling and encourages its residents to bicycle for transportation and recreation. Greensboro, Wilmington, and Davidson are examples of North Carolina communities that have become designated as Bicycle Friendly Communities.

Similarly, Pleasant Garden should apply for a "Walk Friendly Community" (WFC) designation. The WFC Campaign is an awards program that recognizes municipalities that actively support pedestrian activity and safety. A Walk Friendly Community provides safe accommodation for walking and encourages its residents to walk for transportation and recreation. The program is maintained by the UNC Highway Safety Research Center's Pedestrian and Pedestrian Information Center, with support from a variety of national partners.

Becoming designated as a Bicycle- and Walk-Friendly Community signals to current residents, potential residents, and visitors that the town is a safe and welcoming place for individuals and

families to live and recreate. The development and implementation of this plan is an essential first step toward becoming a Walk- and Bicycle Friendly Community. With ongoing efforts and the short-term work program recommended here, the Town should be in a position to apply for and receive BFC and WFC status within a few years.

Communication and Outreach

The BPAC should lead the effort to establish a communication campaign to celebrate successes as facilities are developed and otherwise raise awareness of the overall pedestrian and bicycle network and its benefits. A key first task of this group is to design and launch a one-stop website.

Many current and potential pedestrians and bicyclists do not know where to turn to find out about traffic laws, events, maps, tips, and groups. Developing a "Walk and Bike Central" website provides information to a wide audience and encourages people to walk and bicycle. A one-stop website is not usually difficult to set up, but it will only be successful if the site is both easy to use and updated frequently. All website content should be reviewed regularly for accuracy. Walking groups, the bicycling community, and volunteer organizations interested in safety and health can assist in keeping the site up to date.

Establish a Monitoring Program

From the beginning, and continuously through the life of a pedestrian or bicycle facility project, the BPAC should brainstorm specific benchmarks to track through a monitoring program and honor the completion of projects with public events and media coverage. Benchmarks should be revisited and revised periodically as the pedestrian and bicycle facility network evolves.

Begin Annual Meeting With Key Project Partners

Coordination between key project partners will establish a system of checks and balances, provide a level of accountability, and ensure that recommendations are implemented. This meeting should be organized by the designated Town staff, and should include representatives from *Figure 11: Organizational Framework for Implementation shown on page 60*. The purpose of the meeting should be to ensure that this plan's recommendations are integrated with other transportation planning efforts in the region, as well as long-range and current land use planning, economic development planning, and environmental planning. Attendees should work together to identify and secure funding necessary to immediately begin the first year's work, and start working on a funding strategy that will allow the Town to incrementally complete each of the suggested physical improvements, policy changes and programs over a 5-10 year period. A brief progress benchmark report should be a product of these meetings, and participants should reconfirm the plan's goals each year. The meetings could also occasionally feature special training sessions on bicycle, pedestrian, and trail issues.

Seek Multiple Funding Sources and Facility Development Options

Multiple approaches should be taken to support pedestrian and bicycle facility development and programming. It is important to secure the funding necessary to undertake priority projects

but also to develop a long-term funding strategy to allow continued development of the overall system. The recommendations of this plan should be evaluated against transportation projects that are currently programmed in the State Transportation Improvement Program (STIP) to see where projects overlap, compliment, or conflict with each other. The Town should also evaluate which of the proposed projects could be added to future STIP updates.

Capital and local funds for bicycle and pedestrian facilities and trail construction should be set aside every year, even if only for a small amount. Small amounts of local funding can be matched to outside funding sources or could be used to enhance NCDOT projects with bicycle or pedestrian features that may otherwise not be budgeted for by the state. A variety of local, state, and federal options and sources exist and should be pursued. These funding options are described in *Appendix A: Funding Sources*.

Develop Bicycle and Pedestrian Facility Designs and Specifications for Proposed Projects

Town of Pleasant Garden staff could collaborate with the MPO to save resources, using the design guidelines of this plan and the project cut-sheets as starting points. The public should have an opportunity to comment on the design of new facilities.

Improve Existing Programs and Launch New Programs

The program recommendations found in Chapter 3 provide a set of programmatic resources that will support the goals of the Pleasant Garden Bicycle and Pedestrian Plan. The Town should reference the recommendations to expand and improve upon existing programs, as well as to develop new programs that promote bicycling and walking.

Through cooperation between the Town, the BPAC, and groups such as walking, running, and bicycling clubs, strong education, encouragement, and enforcement campaigns could also occur as new facilities are built. When an improvement has been made, the roadway environment has changed and proper interaction between motorists, bicyclists, and pedestrians is critical for the safety of all users. A campaign through local television, on-site enforcement, education events, and other methods will bring attention to the new facility, and educate, encourage, and enforce proper use and behavior. Chapter 3 provides program ideas to choose from, many of which are also included in *Figure 12: Key Action Steps for Implementation on page 61.*

Provide Enforcement and Education Training for Police Officers

Law enforcement officers have many important responsibilities, yet pedestrians and bicyclists remain the most vulnerable forms of traffic. The Guilford County Sheriff has been aware of this planning process, and should be involved in implementation. In many cases, citizens (and even sometimes officers) are not fully aware of state and local laws related to bicyclists and pedestrians. Training on this topic can lead to additional education and enforcement programs that promote safety. Training for Guilford County Sherriff deputies could be done through free online resources available from the National Highway Traffic Safety Administration (NHTSA) (see links at www.bicyclinginfo.org/enforcement/training.cfm) and through webinars available through the Association of Pedestrian and Bicycle Professionals (APBP).

Infrastructure Action Steps

While establishing the policies and programs described, Pleasant Garden should move forward with the design and construction of priority projects. They should also work to identify funding for long-term, higher-cost projects.

Identify Funding

Achieving the vision defined within this plan will require, among other things, a stable and recurring source of funding. Communities across the country that have successfully engaged in pedestrian and bicycle programs have relied on multiple funding sources to achieve their goals. No single source of funding will meet the recommendations identified in this Plan. Instead, stakeholders will need to work cooperatively with municipal, County, MPO, state, and federal partners to generate funds sufficient to implement the program.

A stable and recurring source of revenue is needed that can then be used to leverage grant dollars from state, federal, and private sources. The ability of local agencies to generate a source of funding for pedestrian and bicycle facilities depends on a variety of factors, such as taxing capacity, budgetary resources, voter preferences, and political will. It is very important that these local agencies explore the ability to establish a stable and recurring source of revenue for facilities.

Donations from individuals and private organizations or companies are another potential source of funding. The BPAC should establish an "Adopt a Trail" program as a mechanism to collect these donations for the development of trail and sidepath recommendations discussed in *Chapter 3*. Organizations and clubs could also sponsor fund-raising events for specific projects. In addition to a formalized program, the town's website should be set up as an easy way for individuals to donate smaller amounts.

Federal and state grants should be pursued along with local funds to pay for necessary right-of-way acquisition and project design, construction, and maintenance expenses. "Shovel-ready" designed projects should be prepared in the event that future federal stimulus funds become available. Additional recommended funding sources may be found in *Appendix A: Funding Sources*.

Complete Short-Term Priority Projects

By quickly moving forward on priority projects, Pleasant Garden will demonstrate its commitment to carrying out this plan and will better sustain the enthusiasm generated during the public outreach stages of the planning process. Refer to *Chapter 3: The Pathways Plan* for priority project ranking and the prioritization methodology.

4.3 KEY PARTNERS IN IMPLEMENTATION

Role of the Pleasant Garden Town Council

The Town Council is responsible for adopting this plan. Through adoption, the Town's leadership is further recognizing the value of bicycle and pedestrian transportation and is putting forth a well-thought out set of recommendations for improving public safety and overall quality of life. By adopting this plan, the Town Council is also signifying that they are prepared to support the efforts of other key partners in the plan's implementation, including the work of the Town, Greensboro Urban Area MPO and NCDOT.

Adoption of this plan is in line with public support. Pleasant Garden's comment form for the planning process yielded over 170 responses and showed strong support for improving walking and bicycling conditions.

Role of the Pleasant Garden Long Range Planning Board

The Town of Pleasant Garden Long Range Planning Board serves as an advisory board to the Council on matters of planning and should be prepared to:

- Adopt this plan and recommend adoption by the Town Council.
- Become familiar with the recommendations of this plan, and support its implementation.
- Become experts on pedestrian-related policies in North Carolina. (see: www.ncdot.gov/bikeped/lawspolicies/policies/)

Role of the Town of Pleasant Garden

The Town administrative staff handles the responsibility for the construction and maintenance of pedestrian and bicycle facilities in collaboration with NCDOT, MPO and key consultants when needed and should be prepared to:

- Communicate and coordinate with the BPAC on priority bicycle and pedestrian projects.
- Become familiar with the standards set forth in *Appendix C* of this plan, as well as state and national standards for bicycle and pedestrian facility design.
- Secure encroachment agreements for work on NCDOT-owned and maintained roadways.
- Design, construct, and maintain pedestrian and bicycle facilities.
- Communicate and coordinate with Guilford County, GUAMPO and neighboring municipalities on regional facilities; and partner for joint-funding opportunities, such as Safe Routes to School.
- Communicate and coordinate with NCDOT Division 7 on this plan's recommendations for NCDOT-owned and maintained roadways. Provide comment and reminders about this plan's recommendations no later than the design phase.

- Work with developers through the subdivision process to ensure bicyclists and pedestrians are accommodated in future construction projects.

Work with NCDOT Division 7 to ensure that when NCDOT-owned and maintained roadways in Pleasant Garden are resurfaced or reconstructed, that this plan's adopted recommendations for bicycle and pedestrian facilities are included on those streets. If a compromise to the original recommendation is needed, then contact NCDOT Division of Bicycle and Pedestrian Transportation for guidance on appropriate alternatives.

Role of the Bicycle and Pedestrian Advisory Committee

The Committee should be prepared to:

- Meet with staff to evaluate progress of the plan's implementation and offer input regarding pedestrian, bicycle, and trail-related issues; assist Town of Pleasant Garden staff in applying for grants and organizing bicycle- and pedestrian-related events and educational activities.
- Build upon current levels of local support for pedestrian and bicycle issues and advocate for local project funding.

Role of the Local NCDOT Division 7

NCDOT is expected to work with the Town to construct and maintain pedestrian and bicycle facilities on NCDOT-owned and maintained roadways in the Town of Pleasant Garden, with encroachment agreements as necessary. Division 7 should be prepared to:

- Recognize this plan not only as an adopted plan of the Town of Pleasant Garden, but also as an approved plan of the NCDOT.
- Become familiar with the bicycle and pedestrian facility recommendations for NCDOT roadways in this plan (Chapter 3); take initiative in incorporating this plan's recommendations into the Division's schedule of improvements whenever possible.
- Become familiar with the standards set forth in Appendix C of this plan, as well as state and national standards for facility design; construct and maintain recommended facilities using the highest standards allowed by the State (including the use of innovative treatments on a trial basis).
- Notify the Town of Pleasant Garden Clerk of all upcoming roadway reconstruction or resurfacing/restriping projects in town, no later than the design phase. Provide sufficient time for comments from staff.
- If needed, seek guidance and direction from the NCDOT Division of Bicycle and Pedestrian Transportation on issues related to this plan and its implementation.

Role of Guilford County

Guilford County Sheriff, Planning, Parks and Recreation and Schools may play a supportive role in providing the community high quality bicycle and pedestrian facilities and safety; different County departments should be prepared to:

- Become experts on bicycle- and pedestrian-related laws in North Carolina and provide community education about the laws. (see: www.ncdot.gov/bikeped/lawspolicies/laws/)
- Continue to enforce not only bicycle- and pedestrian-related laws, but also motorist laws that affect walking and bicycling, such as speeding, running red lights, aggressive driving, etc.
- Review safety considerations with Town Staff as projects are implemented.
- Greensboro Urban Area MPO could work with the Town of Pleasant Garden on populating the Transportation Improvement Program (TIP) with pedestrian and bicycle infrastructure projects.
- Parks and Recreation and Schools could coordinate with the Town on trail development and Safe Routes to School grants.
- Planning could assist the Town in revising development ordinances to support bicycle and pedestrian transportation through existing contracted planning services.

Role of Developers

Developers in Pleasant Garden can play an important role in facility development whenever a project requires the enhancement of transportation facilities or the dedication and development of on-road bicycle facilities, sidewalks, trails or crossing facilities. Developers should be prepared to:

- Become familiar with the benefits, both financial and otherwise, of providing amenities for walking and biking (including trails) in residential and commercial developments.
- Become familiar with the standards set forth in *Appendix C* of this plan, as well as state and national standards for facility design.
- Be prepared to account for bicycle and pedestrian circulation and connectivity in future developments.

Role of Local & Regional Stakeholders

Stakeholders for bicycle and pedestrian facility development and related programs play important roles in the implementation of this plan. Local and regional stakeholders should be prepared to:

- Become familiar with the recommendations of this plan, and communicate & coordinate with the Town for implementation, specifically in relation to funding opportunities, such as grant writing and developing local matches for facility construction.

- Business owners and organizations should look for opportunities to partner for sponsorship of specific projects, such as streetscape improvements, or comprehensive signage and wayfinding projects.

Role of Local Residents, Clubs and Advocacy Groups

Local residents, clubs, and advocacy groups play a critical role in the success of this plan. They should be prepared to:

- Continue offering input regarding pedestrian and bicycling issues in Pleasant Garden.
- Assist Town staff and the BPAC by volunteering for bicycle- and pedestrian-related events and educational activities and / or participate in such activities.
- Assist Town of Pleasant Garden staff and the BPAC by speaking at Town Council meetings and advocating for local pedestrian and bicycle project and program funding.

Role of Homeowner Associations

Homeowner associations should have leaders that are prepared to:

- Learn about the benefits of a walkable and bicycle-friendly community.
- Learn about the recommendations of this Plan, and how they serve and affect their respective neighborhoods.
- Listen to the bicycle- and pedestrian-related needs of your members and communicate them to the Town through BPAC.
- Consider developing a strategy to partner with the Town, as appropriate, for the improvement of association-maintained sidewalks and trails that need widening, resurfacing or rebuilding.

Role of Volunteers

Services from volunteers, student labor, and seniors, or donations of material and equipment may be provided in-kind, to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail / greenway or adopt-a-highway can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as needed with senior class projects, scout projects, interested organizations, clubs or a neighborhood's community service to provide for many of the program ideas outlined in *Chapter 3* of this plan. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and personal connections to the town's trail, bicycle, and pedestrian networks.

4.4 FACILITY DEVELOPMENT METHODS

This section describes different construction methods for the proposed pedestrian and bicycle facilities outlined in *Chapter 3*. Note that many types of transportation facility construction and maintenance projects can be used to create new bicycle and pedestrian facilities. It is much more cost-effective to provide bicycle and pedestrian facilities during roadway construction and re-construction projects than to initiate the improvements later as "retrofit" projects.

To take advantage of upcoming opportunities and to incorporate bicycle and pedestrian facilities into routine transportation and utility projects, the Town of Pleasant Garden should keep track of NCDOT's projects and any other local transportation improvements. While doing this, town staff should be aware of the different procedures for state and local roads and interstates.

North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program

The NCDOT's State Transportation Improvement Program is based on the Strategic Transportation Investments Bill, signed into law in 2013. The new Strategic Transportation Investments Initiative is scheduled to be fully implemented by July 1, 2015. Projects scheduled for construction before then will proceed as scheduled under the current Equity Formula. Projects slated for construction after that time will be ranked and programed according to the new formula. The new Strategic mobility formula assigns projects for all modes into one of three categories: 1) Statewide Mobility, 2) Regional Impact, and 3) Division Needs. All independent bicycle and pedestrian projects are placed in the "Division Needs" category, and are ranked using the following criteria:

- Safety
- Access
- Demand or density
- Constructability
- Benefit / cost ratio

These rankings largely determine which projects will be included in NCDOT's State Transportation Improvement Program (STIP). The STIP is a federally mandated transportation planning document that details transportation planning improvements prioritized by the stakeholders for inclusion in NCDOT's Work Program over the next 10 years. The STIP is updated every 2 years. The STIP contains funding information for various transportation divisions of NCDOT, including, highways, rail, bicycle and pedestrian, public transportation and aviation.

These rankings largely determine which projects will be included in NCDOT's State Transportation Improvement Program (STIP). The STIP is a federally mandated transportation planning document that details transportation planning improvements prioritized by the

stakeholders for inclusion in NCDOT's Work Program over the next 10 years. The STIP is updated every 2 years. The STIP contains funding information for various transportation divisions of NCDOT, including, highways, rail, bicycle and pedestrian, public transportation and aviation.

For more information on STIP: www.ncdot.gov/strategictransportationinvestments/

To access the STIP: https://connect.ncdot.gov/projects/planning

For more about the STIP process: www.ncdot.org/performance/reform/

Local Roadway Construction or Reconstruction

Pedestrians and bicyclists should be accommodated any time a new road is constructed or an existing road is reconstructed. In the longer-term, all new roads with moderate to heavy motor vehicle traffic should have sidewalks, bicycle facilities, and safe intersections. However, side paths can be an acceptable solution when a road has few driveways and high-speed, high-volume traffic.

Also, case law surrounding the ADA has found that roadway resurfacing constitutes an alteration, which requires the addition of curb ramps at intersections where they do not yet exist. The Department of Justice and the Federal Highway Administration recently released guidance on the Title II of the Americans with Disabilities Act requirement to provide curb ramps when streets, roads, or highways are altered through resurfacing. More information is available on the following website:

www.ada.gov/doj-fhwa-ta.htm

Residential and Commercial Development

The construction of sidewalks, bicycle facilities, trails, and safe crosswalks should be required during development. Construction of facilities that corresponds with site construction is more cost-effective than retrofitting. In commercial development, emphasis should also be focused on safe pedestrian and bicyclist access into, within, and through large parking lots. This ensures the future growth of the pedestrian and bicycle networks and the development of safe communities.

Removing Parking

Some neighborhood collector roadways are wide enough to add pedestrian and bicycle facilities, but they may be used by residents for on-street parking, especially in the evening. In locations like this, removing parking is likely to create considerable controversy and is not recommended unless there is no other solution (unless the parking is rarely used). In the rare case that removing parking is being considered, the parking should not be removed unless there is a great deal of public support for the facilities on that particular roadway and a full

public involvement process with adjacent residents and businesses is undertaken prior to removing parking.

If it is not practical to add a bike lane, edgelines and shared lane markings may be considered. On roads where the outside lane and parking area combined are more than 17 feet wide, 10 foot wide travel lanes can be striped with an edgeline, leaving the rest of the space on either side for parking. The stripe would help slow motor vehicles and provide extra comfort for bicyclists, especially during the daytime when fewer cars would be parked along the curb. On roads with outside lane and parking areas that are narrower than 17 feet wide, shared lane markings can be provided every 100 to 200 meters on the right side of the motor vehicle travel lane to increase the visibility of the bike route.

Repaving

Repaving projects provide a clean slate for revising pavement markings. When a road is repaved, the roadway should be restriped to create narrower lanes and provide space for bike lanes and shoulders, where feasible.

In addition, if the spaces on the sides of non-curb and gutter streets have relatively level grades and few obstructions, the total pavement width can be widened to include paved shoulders.

Retrofit Roadways with New Bicycle and Pedestrian Facilities

There may be critical locations in the pedestrian and bicycle network that have safety issues or are essential links to destinations. In these locations, it may be justifiable to add new pedestrian and bicycle facilities before scheduling a roadway to be repaved or reconstructed. In some other locations, it may be relatively easy to add sidewalk or to add extra pavement for shoulders, but other segments may require removing trees, relocating landscaping or fences, or re-grading ditches. Retrofitting roadways with side paths creates similar challenges.

Bridge Construction or Replacement

Provisions should always be made to include walking and bicycling facilities as a part of vehicular bridges. All new or replacement bridges should accommodate two-way travel for all users. Even though bridge construction and replacement does not occur regularly, it is important to consider these policies for long-term bicycle and pedestrian planning. NCDOT bridge policy states that sidewalks shall be included on new NCDOT road bridges with curb and gutter approach roadways. A determination of providing sidewalks on one or both sides is made during the planning process. Facility design standards such as widths of facilities and heights of handrails are presented in *Appendix C: Design Guidelines.*

Signage and Wayfinding Projects

A relatively low-cost, short-term action that the Town of Pleasant Garden can pursue immediately is to develop and adopt a wayfinding signage style policy and procedure, to be applied throughout the entire community, to make it easier for people to find destinations. Bicycle route signs are one example of these wayfinding signs, and should be installed along

routes independently of other signage projects or as a part of a more comprehensive wayfinding improvement project. Posting signage that includes bicycle and walk travel times to major destinations can help to increase awareness of the ease and efficiency of bicycle and pedestrian travel. The Town could consider working with 'Walk [Your City]' as an innovative and low-cost solution to wayfinding: https://walkyourcity.org. See *Appendix C: Design Guidelines* for more detailed guidance on signage and wayfinding improvements.

For a step-by-step guide to help non-professionals participate in the process of developing and designing a signage system, as well as information on the range of signage types, visit the Project for Public Places website: www.pps.org/info/amenities_bb/signage_guide .

Town Easements

The Town of Pleasant Garden should explore opportunities to revise existing easements to accommodate public access greenway trail facilities. Similarly, as new easements are acquired in the future, the possibility of public access should be considered. Easements along riparian corridors and utility corridors such as sewer lines are commonly used for this purpose, offering corridors that can easily accommodate trails and are generally void of development pressures.

Further information can be found on the American Trails website which provides sample easements, licenses, and other agreements for trail-rights-of-way. http://www.americantrails.org/resources/land/easements.html.

North Carolina Recreational Use Statute

Another key resource specific to greenway trails and easements is the "Landowner Limited Liability Law" enacted by the North Carolina legislature. The law encourages owners and managers to allow public access for recreation use on their lands. Many landowners are willing to allow people to pass through their property for this purpose, but have liability concerns. This law limits liability for landowners by not requiring them to keep their premises safe or to warn visitors of hazardous conditions, structures, or activities on their property (landowners only cannot deliberately endanger people). Further information can be found at: http://www.nps.gov/ncrc/programs/rtca/helpfultools/recusebrochures/northcarolinarecliabbrochure.pdf.

APPENDIX A: 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 of 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

There are multiple sources for state funding of bicycle and pedestrian transportation projects. However, beginning July 1, 2015, state transportation funds cannot be used to match federally-funded transportation projects, according to a law passed by the North Carolina Legislature.

Funding Opportunities for Transportation:

North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program (STIP):

The NCDOT's State Transportation Improvement Program is based on the Strategic Transportation Investments Bill, signed into law in 2013. The Strategic Transportation Investments (STI) Initiative introduces the Strategic Mobility Formula, a new way to fund and prioritize transportation projects.

The new Strategic Transportation Investments Initiative is scheduled to be fully implemented by July 1, 2015. Projects scheduled for construction before then will proceed as scheduled under the current Equity Formula. Projects slated for construction after that time will be ranked and programed according to the new formula. The new Strategic mobility formula assigns projects for all modes into one of three categories: 1) Statewide Mobility, 2) Regional Impact, and 3) Division Needs. All independent bicycle and pedestrian projects are placed in the "Division Needs" category, and are ranked using the following criteria:

1) SAFETY, 2) ACCESS, 3) DEMAND OR DENSITY, 4) CONSTRUCTABILITY, and 5)BENEFIT/COST RATIO

These rankings largely determine which projects will be included in NCDOT's State Transportation Improvement Program (STIP). The STIP is a federally mandated transportation planning document that details transportation planning improvements prioritized by the stakeholders for inclusion in NCDOT's Work Program over the next 10 years. The STIP is updated every 2 years. The STIP contains funding information for various transportation

divisions of NCDOT, including, highways, rail, bicycle and pedestrian, public transportation and aviation.

Access to federal funds require that projects be incorporated into the STIP. The STIP is the primary method of allocating state and federal transportation funds. Starting in 2015, state funds will not be available to use to match with federal funds. As a result, local governments should plan to use local or Powell Bill funds to secure federal dollars to fund bicycle and pedestrian projects.

For a detailed description of the Strategic Transportation Investments law and process, visit:
www.ncdot.gov/strategictransportationinvestments/
For information on the Draft STIP, visit:
https://connect.ncdot.gov/projects/planning/Pages/Draft-STIP.aspx

Incidental Projects – Bicycle and Pedestrian accommodations such as; bike lanes, wide paved shoulders, sidewalks, intersection improvements, bicycle and pedestrian safe bridge design, etc. are frequently included as "incidental" features of larger highway/roadway projects. This is increasingly common with the adoption of NCDOT's "Complete Streets" Policy.

In addition, bicycle safe drainage grates and handicapped accessible sidewalk ramps are now a standard feature of all NCDOT highway construction. Most pedestrian safety accommodations built by NCDOT are included as part of scheduled highway improvement projects funded with a combination of federal and state roadway construction funds, and usually with a local match. On-road bicycle accommodations, if warranted, typically do not require a local match.

"Incidental Projects" are often constructed as part of a larger transportation project, when they are justified by local plans that show these improvements as part of a larger, multi-modal transportation system. Having a local bicycle or pedestrian plan is important, because it allows NCDOT to identify where bike and pedestrian improvements are needed, and can be included as part of highway or street improvement project. The plan also helps local government identify what their priorities are and how they might be able to pay for these projects. Under "Complete Streets" local governments may be responsible for a portion of the costs for bicycle and pedestrian projects.

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 about and a link to applying for GHSP funding, visit: www.ncdot.org/programs/ghsp/

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 TPB. Over 157 communities have been funded and nearly $4 million has been allocated through this grant initiative, including Pleasant Garden in the 2014 planning grant cycle. 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.

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.

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 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: www.ncparks.gov/About/grants/lwcf_grant.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 25% 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 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 was originally funded by the State's portion of the real estate deed transfer tax, but is now controlled out of the General Fund.

The trust fund has historically been 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: www.ncparks.gov/About/grants/partf_eligibility.php

Powell Bill Program

Annually, State street-aid (Powell Bill) allocations are made to incorporated municipalities that maintain public roads. Pleasant Garden does not currently maintain any roadways and therefore does not participate in the program. 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, sidewalks or trails. Funding for this program is collected from fuel taxes. Amount of funds are based on population and mileage of municipal-maintained streets. For more information, visit: https://connect.ncdot.gov/municipalities/State-Street-Aid/Pages/default.aspx

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: 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: 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.

Funding Available Through North Carolina Metropolitan Planning Organizations (MPOs)

Metropolitan Planning Organizations (MPOs) are responsible for long range transportation planning in metropolitan areas that are greater than 50,000 in population. Some MPOs in North Carolina are located in air quality nonattainment or maintenance areas and 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. Guilford County is in air quality nonattainment or maintenance and qualifies for this funding source. Additional funding available through large MPOs (greater than 200,000 in population) may be used for bicycle and pedestrian improvements, including Surface Transportation Program Direct Attributable (STP-DA) and Transportation Alternatives Program funding.

Funding Allocated by Federal Agencies

Agricultural Conservation Easement Program (ACEP)

This United States Department of Agriculture (USDA) federal funding source provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, Natural Resources Conservation Service (NRCS) helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands. ACEP is a new program that consolidates three former programs – the Wetlands Reserve Program, Grassland Reserve Program and Farm and Ranch Land Protection Program. For more information, visit: www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/easements/acep/

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: https://www.hudexchange.info/cdbg-state or visit http://www.nccommerce.com/rd/community-assistance.

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 contact Deirdre Hewitt, Program Manager deirdre_hewitt@nps.gov (404) 507-5691

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: 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 Pleasant Garden 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 'transportation 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.

People for Bikes

The People for Bikes 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 272 grants to municipalities and non-profit groups in 49 states and the District of Columbia, investing nearly $2.5 million in community bicycling projects and leveraging more than $650 million in federal, state, and private funding; for more information please visit: www.peopleforbikes.org/

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: 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: 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: 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: 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: 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

APPENDIX B: DEMOGRAPHICS

This section explores population, growth, density, race, ethnicity, age, income, disability, educational attainment, work commute patterns and travel time for the Town of Pleasant Garden.

POPULATION & GROWTH

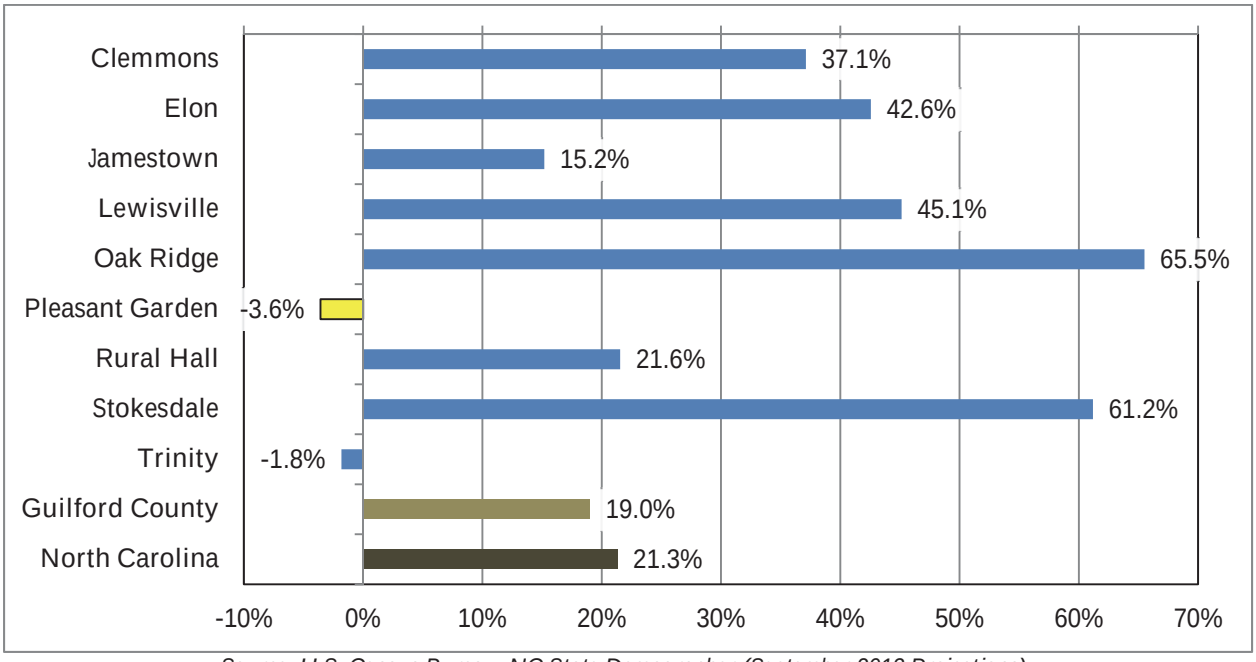
Pleasant Garden's current population is 4,545 residents, making it the sixth largest municipality in Guilford County and the 57th largest in North Carolina. The land area in Pleasant Garden is just over 15 square miles. In some of the demographics found below, Pleasant Garden is compared to peer communities that reflect development trends in similar sized communities in the Piedmont Triad. Each of the peer communities are considered residential (bedroom) communities in which most residents work in neighboring urban areas. In the last 20 years, Pleasant Garden has seen a slight decline in population. Most of the peer communities as well as Guilford County and North Carolina have all seen a population growth rate of at least 15% since 2000.

Table B-1: Historical Population Comparison

Place	2012	2010	2000	1990
Clemmons	18,960	18,627	13,827	6,020
Elon	9,620	9,419	6,748	4,448
Jamestown	3,557	3,382	3,088	2,662
Lewisville	12,810	12,639	8,826	n/a
Oak Ridge	6,600	6,185	3,988	n/a
Pleasant Garden	4,545	4,489	4,714	n/a
Rural Hall	2,995	2,937	2,464	1,652
Stokesdale	5,266	5,047	3,267	2,134
Trinity	6,568	6,614	6,690	n/a

Source: U.S. Census Bureau; NC State Demographer (September 2013 Projections)

Figure B-1: Growth Rate Comparison, 2000-2012

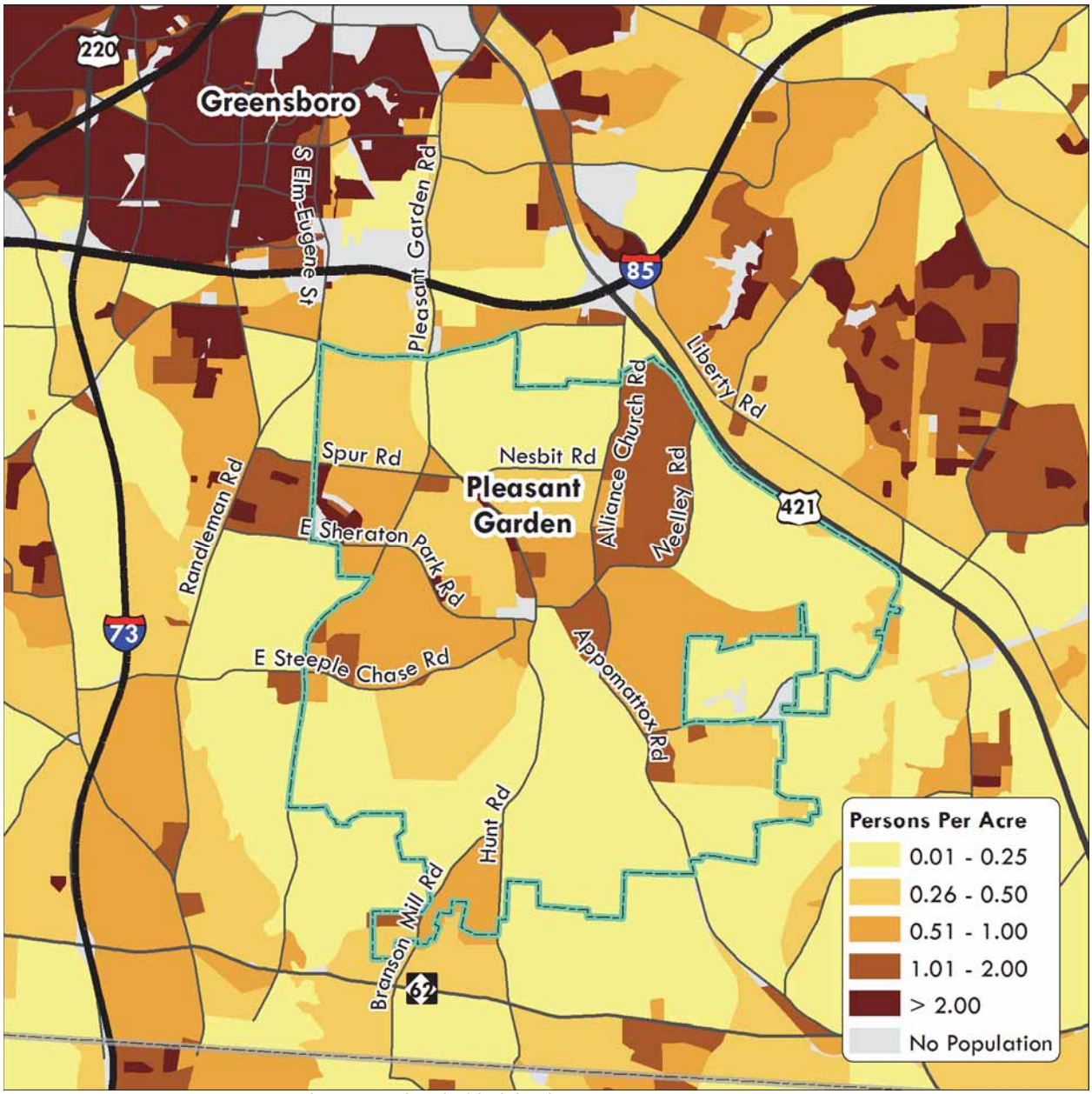


Source: U.S. Census Bureau; NC State Demographer (September 2013 Projections)

POPULATION DENSITY

Most areas within Pleasant Garden are typically very low density with less than 1 person per acre. Areas between Sheraton Park Road & Spur Road and also between Neelley Road & Alliance Church Road are more dense due to residential subdivisions with lots about one acre in size.

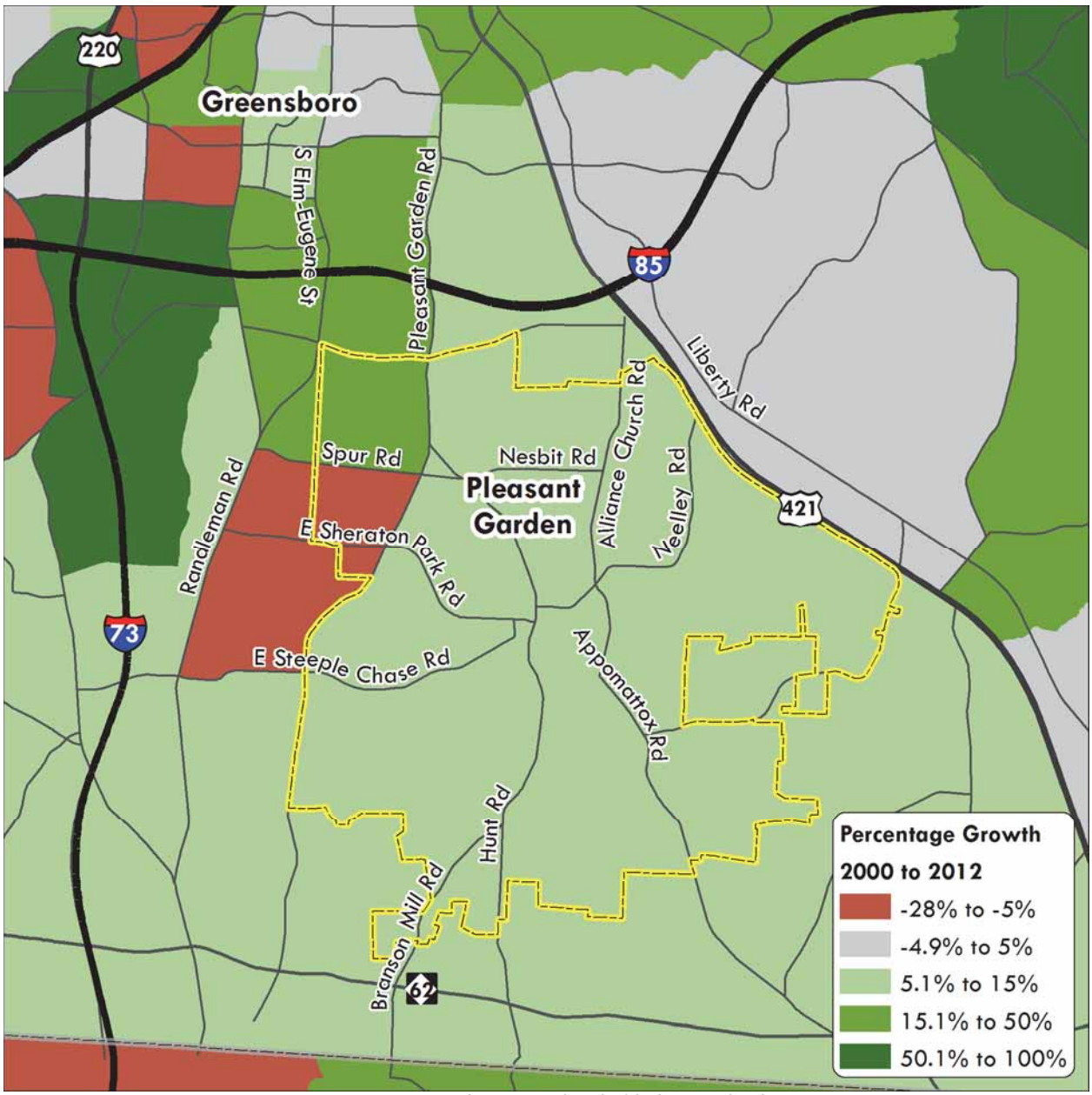
Figure B-2: Population Density



Source: U.S. Census Bureau, 2010, data mapped at the block level.

The majority of Pleasant Garden experienced low to moderate population growth between 2000 and 2012. A small portion on the western part of Town, south of Spur Road and west of Pleasant Garden Road, experienced a decline in population growth. The northwest part of Town, north of Spur Road and west of Pleasant Garden Road, experienced a higher growth rate than the rest of Town.

Figure B-3: Population Growth Rate, 2000-2012



Source: U.S. Census Bureau 2000 & ACS 2008-2012; data mapped at the block group level.

RACE & ETHNICITY

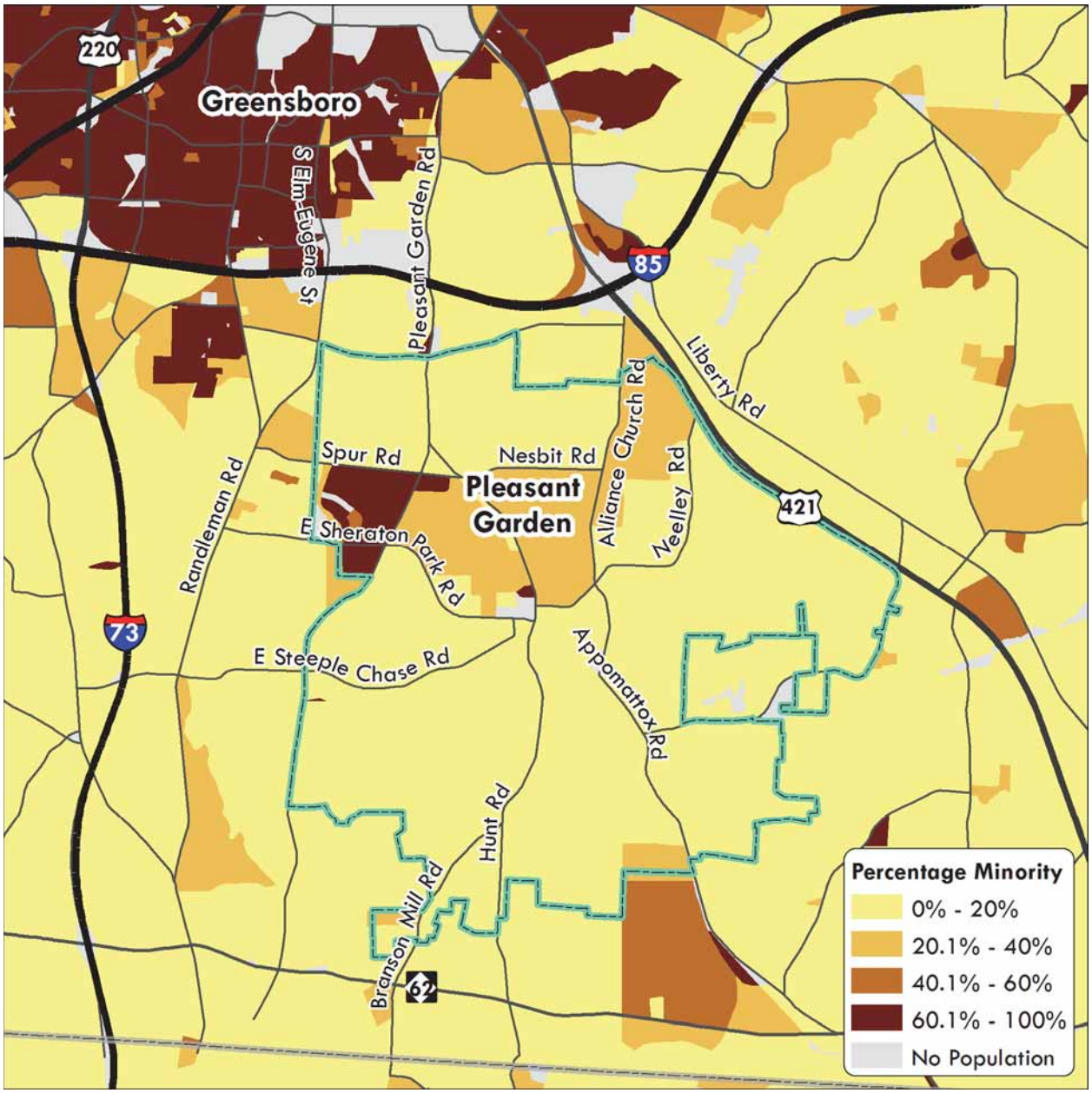
Just under one-fourth of the residents in Pleasant Garden are minority residents. Almost 78% of residents are non-Hispanic whites. The African American population is the largest minority group in Pleasant Garden, representing close to 16% of the population. Most of the minority population is located in the area of higher population density between Sheraton Park Road & Spur Road.

Table B-2: Pleasant Garden Population by Race and Ethnicity, 2012

RACE & ETHNICITY		
Not Hispanic or Latino	4,414	97.4%
White	3,522	77.7%
Black or African American	683	15.1%
American Indian and Alaska Native	20	0.4%
Asian	80	1.8%
Two or more races:	109	2.4%
Hispanic or Latino	120	2.6%
White	89	2.0%
Black or African American	31	0.7%

Source: ACS 5-year estimates (2008-2012) Table B03002

Figure B-4: Percentage Minority by Block, 2010

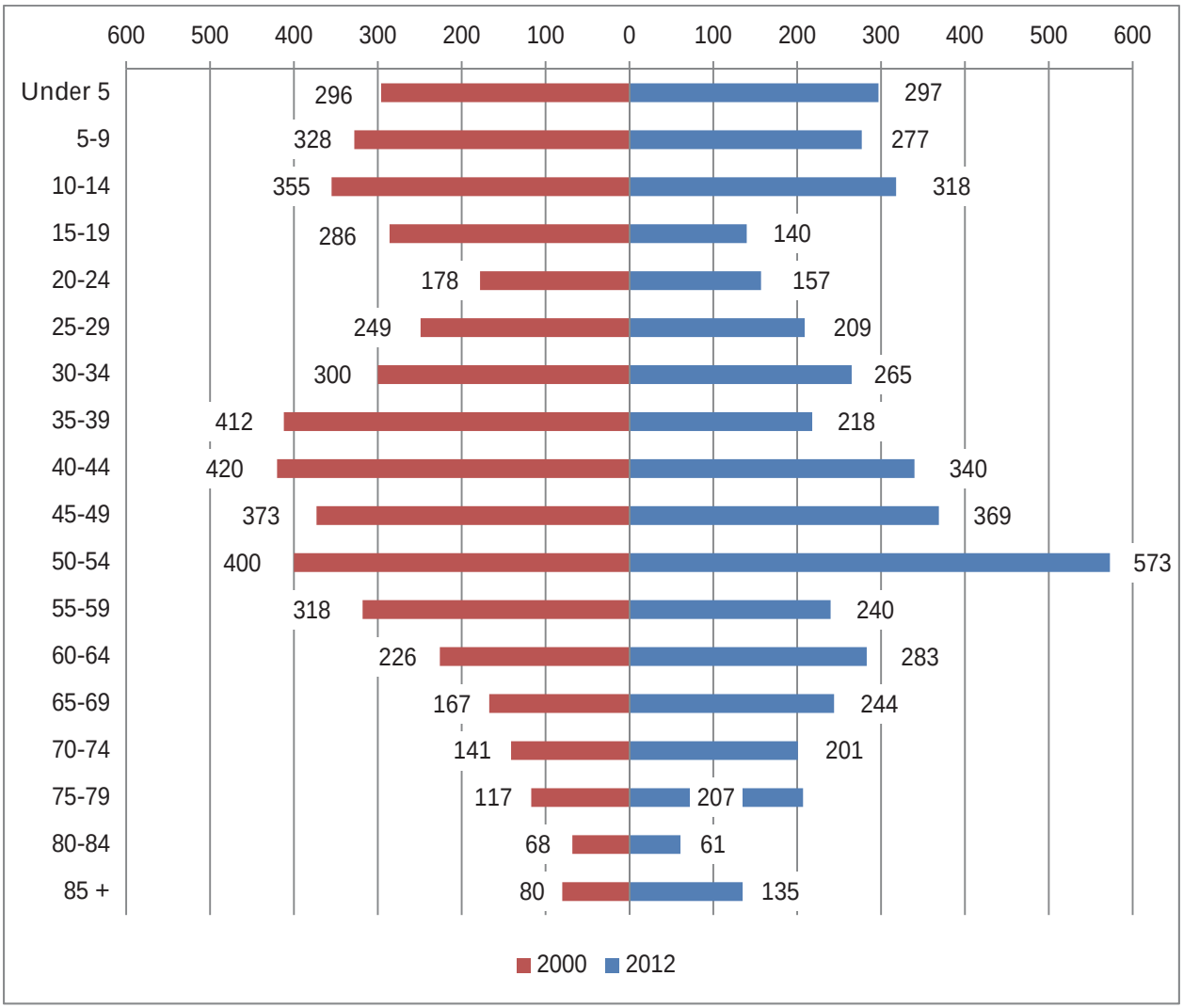


Source: U. S. Census Bureau, 2010; mapped at block level

AGE

In 2012, the largest single age group within Pleasant Garden was persons age 50-54, followed by persons age 45-49, and 40-44. Between 2000 and 2012, the persons age 35-39 and 15-19 were the two age groups that lost the most population.

Figure B-5: Age Group Distribution, 2000 & 2012



Source: U.S. Census Bureau 2000; ACS 5-year estimates (2008-2012) Table B01001

INCOME

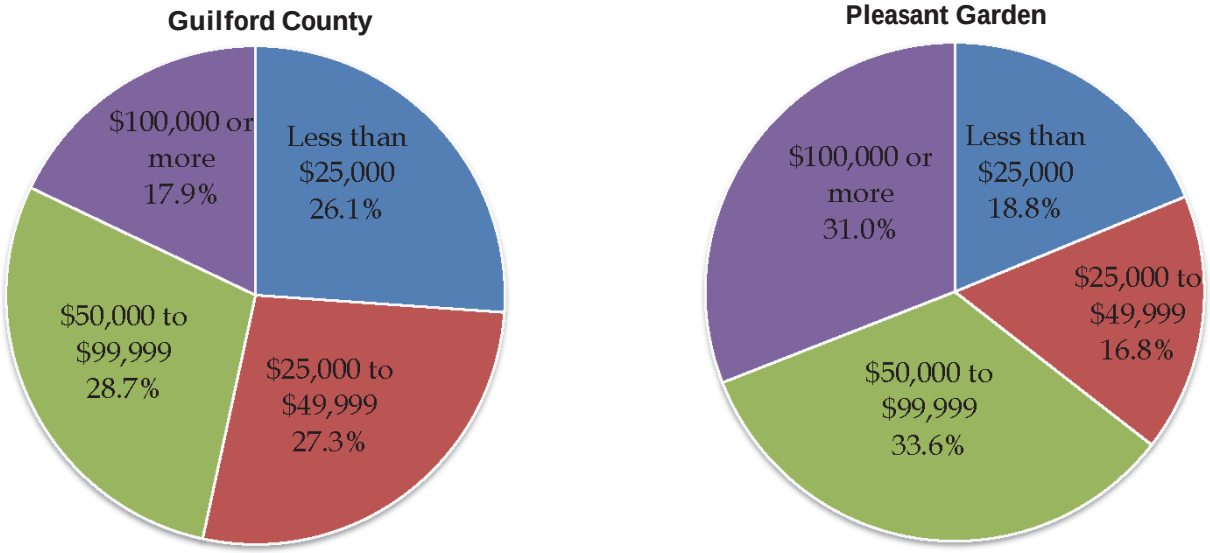
The median household, family and per capita incomes in Pleasant Garden are higher than the county and state figures. However, Pleasant Garden has median incomes lower than most of the other comparison places, except for Trinity, Rural Hall and Elon.

Table B-3: Income Comparison, 2012

Place	Per Capita	Median Household	Median Family
Clemmons	$33,890	$65,344	$83,567
Elon	$18,417	$49,554	$79,231
Jamestown	$36,534	$81,250	$90,882
Lewisville	$35,284	$69,883	$85,500
Oak Ridge	$43,900	$106,625	$120,000
Pleasant Garden	$29,437	$63,676	$70,250
Rural Hall	$27,500	$46,352	$60,909
Stokesdale	$32,292	$69,188	$79,028
Trinity	$22,354	$45,112	$53,354
Guilford County	$25,747	$46,223	$59,244
North Carolina	$24,828	$46,450	$57,146

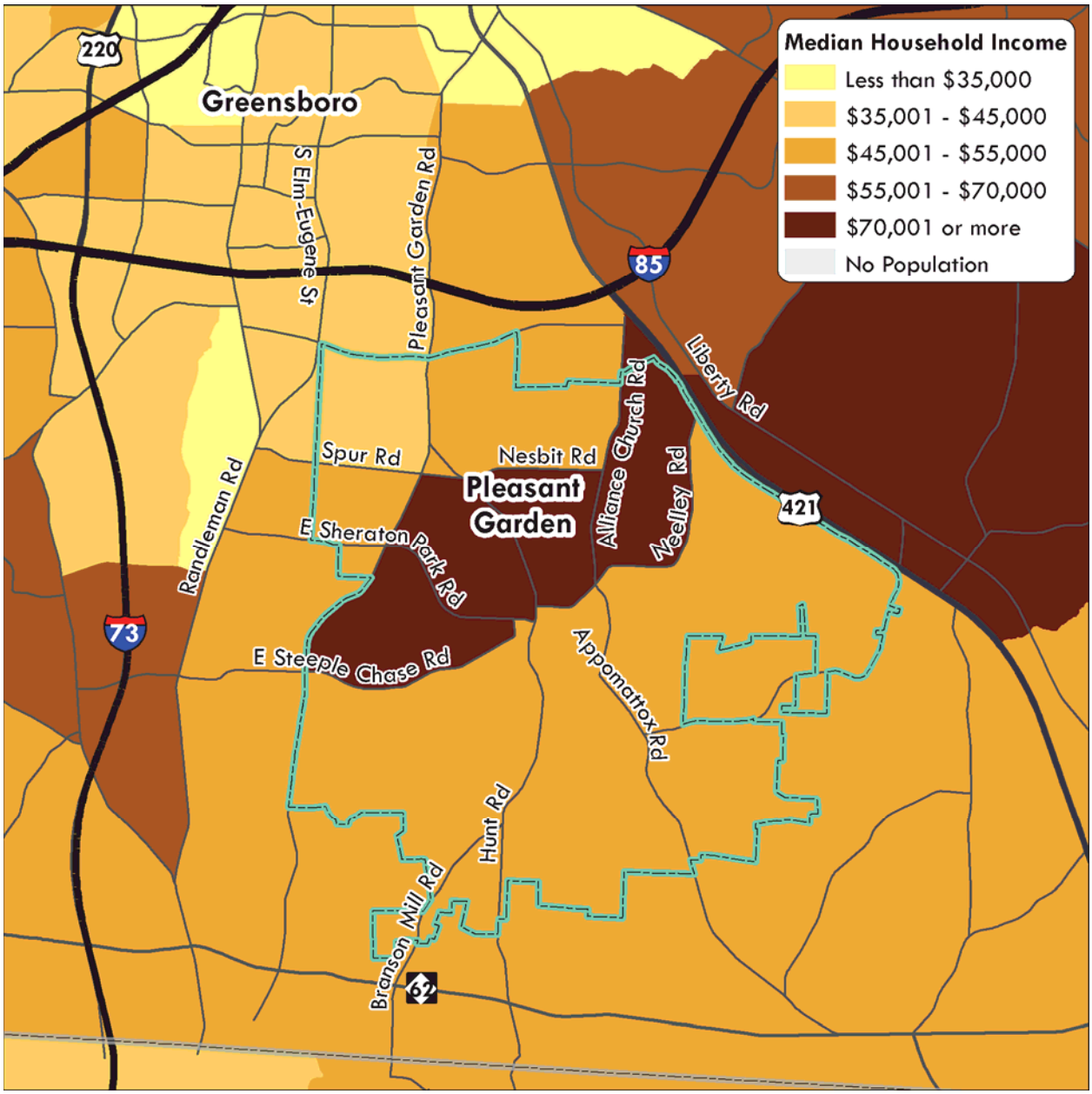
Source: ACS 5-year estimates (2008-2012) Table DP03, B06011

Figure B-6: Household Income Comparison, 2012



Source: ACS 5-year estimates (2008-2012) Table S1901

Figure B-7: Median Household Income, 2012



Source: ACS 5-year estimates (2008-2012) Table B06011

POVERTY

The overall poverty rate in Pleasant Garden is above the overall poverty rate among the comparison cities. The poverty rate among children in Pleasant Garden is higher than most of the comparison cites, all except Stokesdale and Trinity. The elderly poverty rate (ages 65 years and over) in Pleasant Garden is much higher than all the comparison cities and higher than both the County and State elderly poverty rates.

Table B-4: Poverty Rate Comparison, 2012

Place	Overall	Children	Elderly
Clemmons	8.9%	12.8%	2.2%
Elon	19.8%	0.8%	1.9%
Jamestown	10.8%	13.6%	4.7%
Lewisville	8.9%	12.7%	0.6%
Oak Ridge	3.2%	1.9%	7.1%
Pleasant Garden	14.9%	20.1%	12.2%
Rural Hall	3.8%	0.0%	4.0%
Stokesdale	13.7%	24.3%	2.6%
Trinity	13.9%	25.9%	3.8%
Guilford County	16.9%	23.7%	8.5%
North Carolina	16.8%	23.8%	10.2%

Source: ACS 5-year estimates (2008-2012) Table S1701

DISABILITY

The disability rate in Pleasant Garden is higher for children and the elderly population when compared to the disability rates for the County and the State. The disability rate for the population ages 18 to 64 is lower than both the County and the State disability rate. The overall disability rate in Pleasant Garden is higher than the County rate, but lower than the State rate.

Table B-5: Disability Status Comparison, 2012

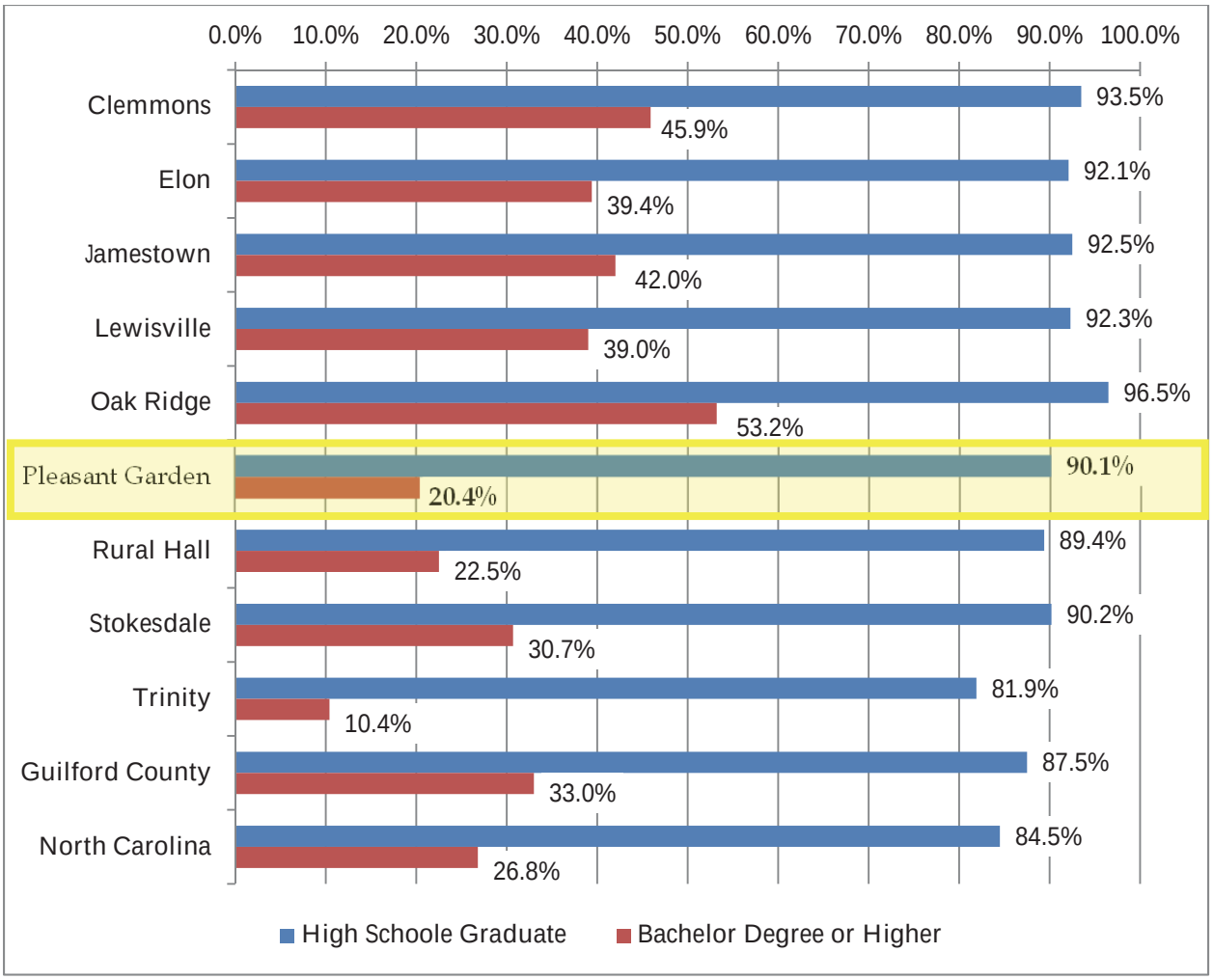
Age Range	Pleasant Garden		Guilford County		North Carolina	
	With a Disability	% Disabled	With a Disability	% Disabled	With a Disability	% Disabled
Under 18	55	5.0%	3,452	3.0%	98,600	4.3%
18 to 64	154	5.8%	26,338	8.4%	665,654	11.4%
65+	331	42.5%	20,061	34.0%	462,760	38.4%
Total Population	540	12.1%	49,851	10.3%	1,227,014	13.1%

Source: ACS 5-year estimates (2008-2012) Table DP02

EDUCATIONAL ATTAINMENT

Pleasant Garden's educational attainment rates among adults are slightly lower than the other comparison cities, County and State. The percentage of adults in Pleasant Garden with a Bachelor degree or higher is roughly half the rate of many of the comparison cities.

Figure B-8: High School & College Graduation Comparison, 2012



Source: ACS 5-year estimates (2008-2012) Table DP02

TRANSPORTATION TO WORK & TRAVEL TIME

Of Pleasant Garden's population aged 16 years or over, almost 62% (or 2,200 people) are in the labor force. A large majority of residents in the labor force drive to work alone. These residents have a mean travel time to work of almost 27 minutes, which is higher than the average County and State travel times to work. A larger proportion of residents in Pleasant Garden work from home compared to the County and State population.

Table B-6: Journey to Work Mode Share & Travel Time, 2012

Mode	Pleasant Garden	Guilford County	North Carolina
Car, truck, or van -- drove alone	83.6%	82.2%	80.9%
Car, truck, or van – carpooled	6.4%	9.2%	10.7%
Public transportation (including taxicab)	0.0%	1.7%	1.1%
Walk	0.0%	1.8%	1.8%
Other	0.9%	1.2%	1.3%
Worked at home	9.1%	3.9%	4.3%
Mean travel time to work (minutes)	26.8	21.0	23.5

Source: ACS 5-year estimates (2008-2012) Table DP03

nly 2% of the labor force in Pleasant Garden is employed within the Town. Almost 59% of workers commute to Greensboro. Of the 474 jobs available within the Town, only 7.6% are held by a Pleasant Garden resident, whereas almost 24% are held by a worker living in Greensboro.

Table B-7: Places Where Pleasant Garden Residents Are Employed, 2011

Place	% of Labor Force
Greensboro	58.8%
High Point	9.1%
Winston Salem	4.3%
Burlington	2.8%
Pleasant Garden	2.1%
Asheboro	1.8%
Randleman	1.0%
Other	19.9%

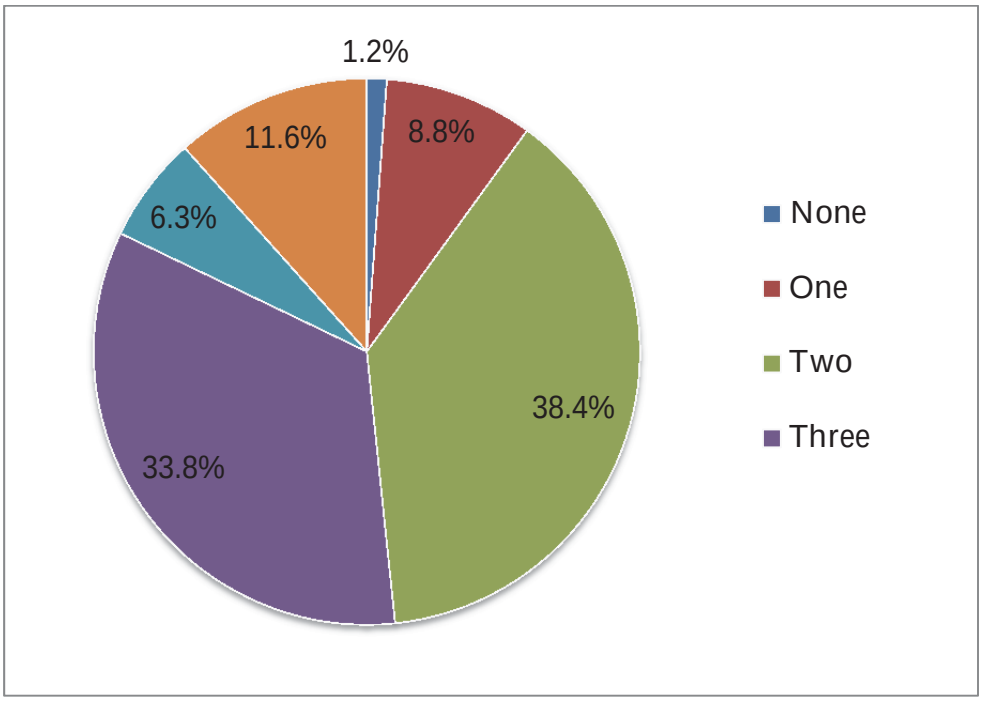
Table B-8: Places Where Pleasant Garden Workers Live, 2011

Place	% of Labor Force
Greensboro	23.6%
Pleasant Garden	7.6%
High Point	4.4%
Asheboro	2.1%
Charlotte	1.3%
Thomasville	1.3%
Winston Salem	1.3%
Burlington	1.1%
Forest Oaks (CDP)	1.1%
Other	56.2%

Source: LEHD, Inflow/Outflow Job Counts, 2011

Only 1.2% of households in Pleasant Garden do not have access to a vehicle. Another 9% have one vehicle available, while 90% have access to two or more vehicles.

Figure B-9: Vehicles Available Per Household, 2012



Source: ACS 5-year estimates (2008-2012) Table B08014

C DESIGN GUIDELINES

Chapter Contents:

Overview

Design Needs of Pedestrians

Sidewalks

Pedestrians at Intersections

Signalization

Pedestrian Signs and Wayfinding

Design Needs of Bicyclists

Types of Bicyclists

Shared Roadways

Separated Bikeways

Separated Bikeways at Intersections

Signage Programs

Retrofitting Existing Streets to Add Bikeways

Bikeway Support and Maintenance

Multi-Use Trails

Multi-Use Trail Crossings

Traffic Calming Measures

Standards Compliance

OVERVIEW

The sections that follow serve as an inventory of pedestrian and bicycle design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating a pedestrian and bicycle-friendly, safe, accessible community. The guidelines are not, however, a substitute for a more thorough evaluation by a landscape architect or engineer upon implementation of facility improvements. Some improvements may also require cooperation with the NCDOT for specific design solutions. The following standards and guidelines are referred to in this guide:

- The Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) – the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings
- American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (2012) provides guidance on dimensions, use, and layout of specific bicycle facilities
- The AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities (2004) provides guidelines for the planning, design, operation, and maintenance of pedestrian facilities, including signals and signing
- The National Association of City Transportation Officials' (NACTO) 2012 Urban Bikeway Design Guide is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs (all of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US)
- Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project – the United States Access Board's proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) and the 2010 ADA Standards for Accessible Design (2010 Standards) contain standards and guidance for the construction of accessible facilities
- The North Carolina Department of Transportation (NCDOT) houses a number of design guidelines that are referenced here – the Bicycle Facilities Planning and Design Guidelines (1994), Traditional Neighborhood Development Guidelines (TND) (2000), and the Complete Streets Planning and Design Guidelines (2012)

Should the national standards be revised in the future and result in discrepancies with this chapter, the national standards should prevail for all design decisions. A qualified engineer or landscape architect should be consulted for the most up to date and accurate cost estimates at the time of project implementation.

DESIGN NEEDS OF PEDESTRIANS

Types of Pedestrians

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. Table A-1 below summarizes common pedestrian characteristics for various age groups.

The MUTCD recommends a normal walking speed of three and a half feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to three feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.

Table A1: Pedestrian Characteristics by Age

Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "dart out" intersection dash
	Poor judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Poor judgment
19-40	Active, fully aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind Could become disoriented or have limited cognitive abilities

SIDEWALKS

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped planting strip area. Sidewalks are a common application in both urban and suburban environments. Attributes of well-designed sidewalks include the following:

- Accessibility: A network of sidewalks should be accessible to all users.
- Adequate width: Two people should be able to walk side-by-side and pass a third comfortably. Different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should accommodate a high volume of walkers.
- Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.
- Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.
- Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users, and be designed in a manner that contributes to the safety of people.
- Drainage: Sidewalks should be well graded to minimize standing water.
- Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.
- Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.

This Section Includes:

- Sidewalk Widths
- Sidewalk Obstructions and Driveway Ramps
- Pedestrian Amenities

Sidewalk widths

Sidewalk obstructions and driveway ramps

Pedestrian amenities

Sidewalk Widths

Description

The width and design of sidewalks will vary depending on street context, functional classification, and pedestrian demand. Below are preferred widths of each sidewalk zone according to general street type. Standardizing sidewalk guidelines for different areas of the city, dependent on the above listed factors, ensures a minimum level of quality for all sidewalks.

Discussion

It is important to provide adequate width along a sidewalk corridor. Two people should be able to walk side-by-side and pass a third comfortably. In areas of high demand, sidewalks should contain adequate width to accommodate the high volumes and different walking speeds of pedestrians. The Americans with Disabilities Act requires a 4 foot clear width in the pedestrian zone plus 5 foot passing areas every 200 feet.

STREET CLASSIFICATION	PARKING LANE/EN-HANCEMENT ZONE	FURNISHING/ GREEN ZONE	PEDESTRIAN THROUGH ZONE	FRONTAGE ZONE	TOTAL SIDEWALK AREA
Local Streets	7 feet	4 - 8 feet	5 - 6 feet	N/A	9 - 12 feet
Commercial Areas	8 - 10 feet	6 - 8 feet	6 - 12 feet	2 - 8 feet	14- 28 feet
Arterials and Collectors	8 - 10 feet	6 - 8 feet	4 - 12 feet	2 - 4 feet	12 -24 feet

Six feet enables two pedestrians (including wheelchair users) to walk side-by-side, or to pass each other comfortably

Total sidewalk area excludes parking dimensions

Recommended dimensions shown here are based on the NCDOT Complete Streets Planning and Design Guidelines. Exact dimensions should be selected in response to local context and expected / desired pedestrian volumes.

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped boulevard. Surfaces must be firm, stable, and slip resistant.

Additional References

USADOT. (2010). ADA Standards for Accessible Design.

United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

NCDOT. (2012). Complete Streets Planning and Design Guidelines.

Sidewalk Obstructions and Driveway Ramps

Description

Obstructions to pedestrian travel in the sidewalk corridor typically include driveway ramps, curb ramps, sign posts, utility and signal poles, mailboxes, fire hydrants and street furniture.

Guidance

- Reducing the number of accesses reduces the need for special provisions. This strategy should be pursued first.
- Obstructions should be placed between the sidewalk and the roadway to create a buffer for increased pedestrian comfort.

Dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade. This is the least-preferred driveway option.

Where constraints preclude a planter strip, wrapping the sidewalk around the driveway allows the sidewalk to still remain level.

When sidewalks abut hedges, fences, or buildings, an additional two feet of lateral clearance should be added to provide appropriate shy distance.

Planter strips allow sidewalks to remain level, with the driveway grade change occurring within the planter strip.

When sidewalks abut angled on-street parking, wheel stops should be used to prevent vehicles from overhanging in the sidewalk.

Discussion

Driveways are a common sidewalk obstruction, especially for wheelchair users. When constraints only allow curb-tight sidewalks, dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade. However, this may be uncomfortable for pedestrians and could create drainage problems behind the sidewalk.

Materials and Maintenance

Excessive cracks, gaps, pits, settling, and lifting of the sidewalk creates a pedestrian tripping hazard and reduces ADA accessibility; damages sidewalks should be repaired.

Additional References

USDOT. (2010). ADA Standards for Accessible Design.
United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

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

Pedestrian Amenities

Description

A variety of streetscape elements can define the pedestrian realm, offer protection from moving vehicles, and enhance the walking experience. Pedestrian amenities should be placed in the furnishing zone on a sidewalk corridor. Signs, meters, and tree wells should go between parking spaces. Key features are presented below.

Street Trees

In addition to their aesthetic and environmental value, street trees can slow traffic and improve safety for pedestrians. Trees add visual interest to streets and narrow the street's visual corridor, which may cause drivers to slow down. It is important that trees do not block light or the vision triangle.

Street Furniture

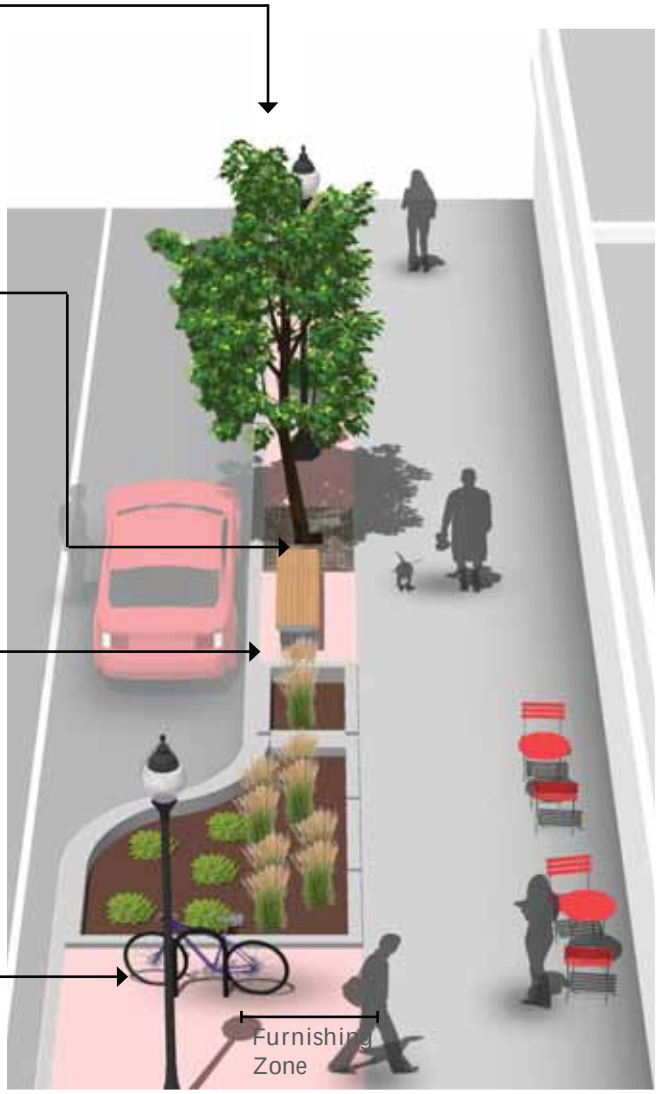
Providing benches at key rest areas and viewpoints encourages people of all ages to use the walkways by ensuring that they have a place to rest along the way. Benches should be 20" tall to accommodate elderly pedestrians comfortably. Benches can be simple (e.g., wood slats) or more ornate (e.g., stone, wrought iron, concrete). If alongside a parking zone, street furniture must be 3 feet from the curbface.

Green Features

Green stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers). Bioswales are natural landscape elements that manage water runoff from a paved surface. Plants in the swale trap pollutants and silt from entering a river system.

Lighting

Pedestrian scale lighting improves visibility for both pedestrians and motorists - particularly at intersections. Pedestrian scale lighting can provide a vertical buffer between the sidewalk and the street, defining pedestrian areas.



Materials and Maintenance

Establishing and caring for your young street trees is essential to their health. Green features may require routine maintenance, including sediment and trash removal, and clearing curb openings and overflow drains.

Additional References

United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

NCDOT. (2012). Complete Streets Planning and Design Guidelines.

PEDESTRIANS AT INTERSECTIONS

Attributes of pedestrian-friendly intersection design include:

- *Clear Space:* Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.
- *Visibility:* It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.
- *Legibility:* Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.
- *Accessibility:* All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.
- *Separation from Traffic:* Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.
- *Lighting:* Adequate lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, suburban and rural intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.

This Section Includes:

- Marked / Raised Crosswalks
- Median Refuge Islands
- At-grade Railroad Crossings
- Minimizing Curb Radii
- Curb Extensions
- ADA Compliant Curb Ramps

Minimizing curb radii

Marked/raised crosswalks

Curb extensions

Median refuge islands

ADA compliant curb ramps

Marked Crosswalks

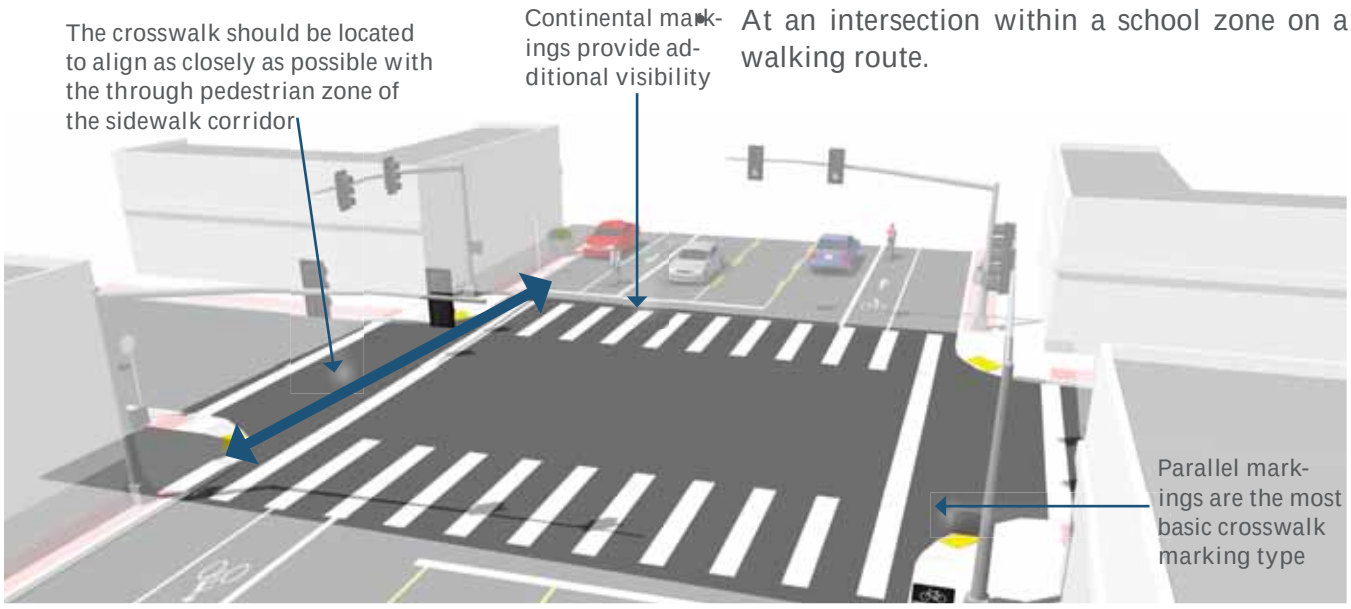
Description

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer especially on multi-lane roadways.

At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Guidance

- At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:
- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.



Discussion

Continental crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections where there is expected high pedestrian use and the crossing is not controlled by signals or stop signs.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability compared to conventional paint.

Additional References

FHWA. (2009). Manual on Uniform Traffic Control Devices. (3B.18)

FHWA. (2005). Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations.

FHWA. (2010). Crosswalk Marking Field

ADA Compliant Curb Ramps

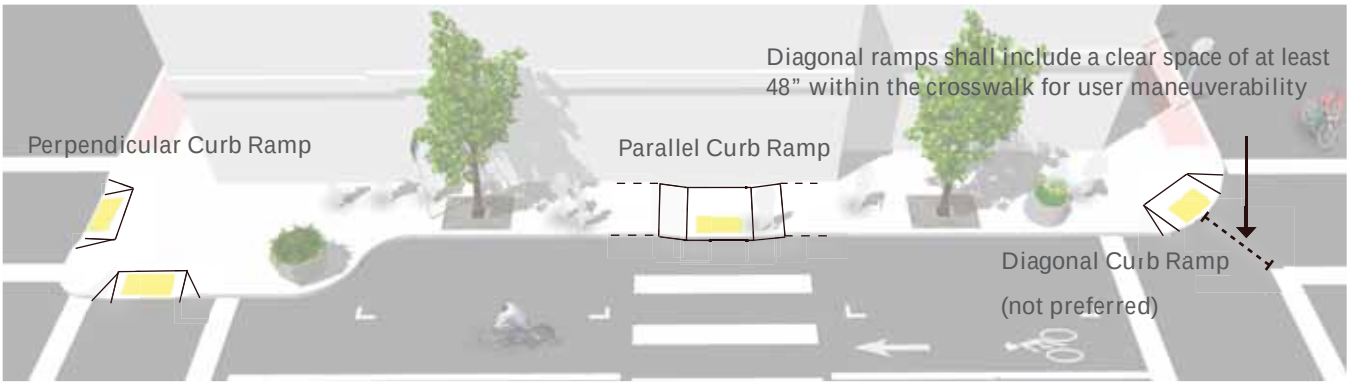
Description

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

Although diagonal curb ramps might save money, they create potential safety and mobility problems for pedestrians,including reduced maneuverability and increased interaction with turning vehicles, particularly in areas with high traffic volumes. Diagonal curb ramp configurations are the least preferred of all options.

Guidance

- The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.
- The ramp shall slope no more than 1:50 (2.0%) in any direction.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5'-0" long and at least as wide as the ramp, although a width of 5'-0" is preferred.



Crosswalk spacing not to scale. For illustration purposes only.

Discussion

The edge of an ADA compliant curb ramp will be marked with a tactile warning device (also known as truncated domes) to alert people with visual impairments to changes in the pedestrian environment. Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident. These devices are most effective when adjacent to smooth pavement so the difference is easily detected. The devices must provide color contrast so partially sighted people can see them.

Materials and Maintenance

It is critical that the interface between a curb ramp and the street be maintained adequately. Asphalt street sections can develop potholes at the foot of the ramp, which can catch the front wheels of a wheelchair.

Additional References

United States Access Board. (2002). Accessibility Guidelines for Buildings and Facilities.

United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

USDOT. (2010). ADA Standards for Accessible Design.

SIGNALIZATION

Crossing beacons and signals facilitate crossings of roadways for pedestrians and bicyclists. Beacons make crossing intersections safer by clarifying when to enter an intersection and by alerting motorists to the presence of pedestrians and bicyclists.

Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Push buttons, signage, and pavement markings may be used to highlight these facilities for pedestrians, bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, traffic volumes, and the anticipated levels of pedestrian and bicycle crossing traffic.

An intersection with crossing beacons may reduce stress and delays for crossing users, and discourage illegal and unsafe crossing maneuvers.

This Section Includes:

- Pedestrians at Signalized Crossings
- Pedestrian Hybrid Beacon

Pedestrians at signalized crossings

Pedestrian hybrid beacon

Pedestrians at Signalized Crossings

Description

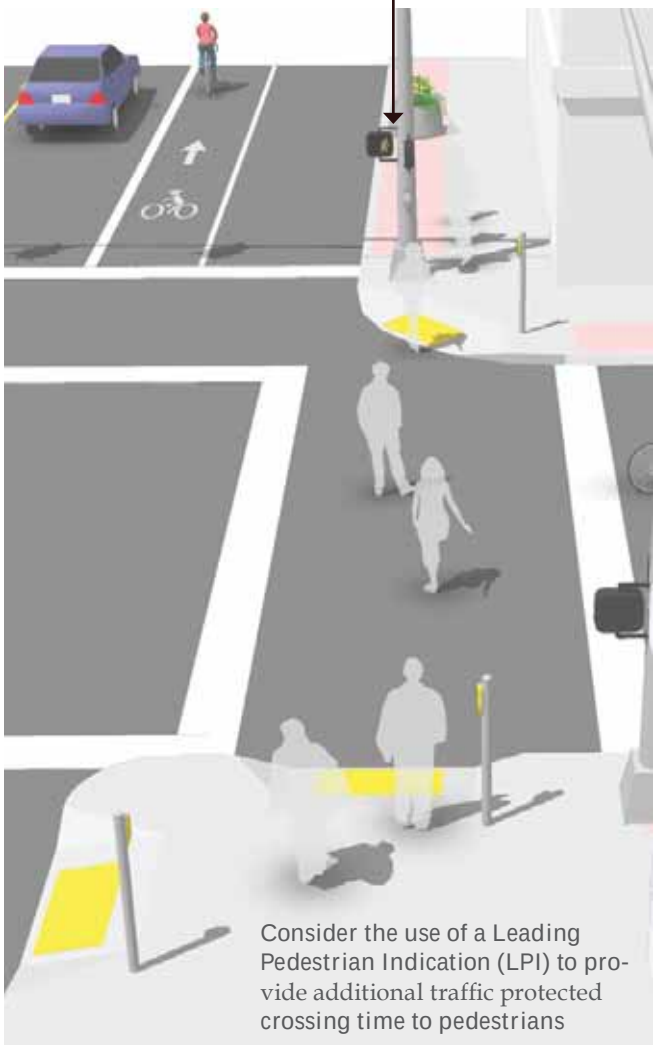
Pedestrian Signal Head

- All traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage.
- Countdown signals should be used at all signalized intersections to indicate whether a pedestrian has time to cross the street before the signal phase ends.

Signal Timing

- Providing adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The MUTCD recommends traffic signal timing to assume a pedestrian walking speed of 3.5' per second, meaning that the length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street.
- At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3' per second may be assumed.
- In busy pedestrian areas such as downtowns, the pedestrian signal indication should be built into each signal phase, eliminating the requirement for a pedestrian to actuate the signal by pushing a button.

Audible pedestrian traffic signals provide crossing assistance to pedestrians with vision impairment at signalized intersections



Consider the use of a Leading Pedestrian Indication (LPI) to provide additional traffic protected crossing time to pedestrians

Discussion

When push buttons are used, they should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk, and marked (for example, with arrows) so that it is clear which signal is affected. In areas with very heavy pedestrian traffic, consider an all-pedestrian signal phase to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped.

Materials and Maintenance

It is important to repair or replace traffic control equipment before it fails. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and loop detectors.

Additional References

United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

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

NCDOT. (2012). Complete Streets Planning and Design Guidelines.

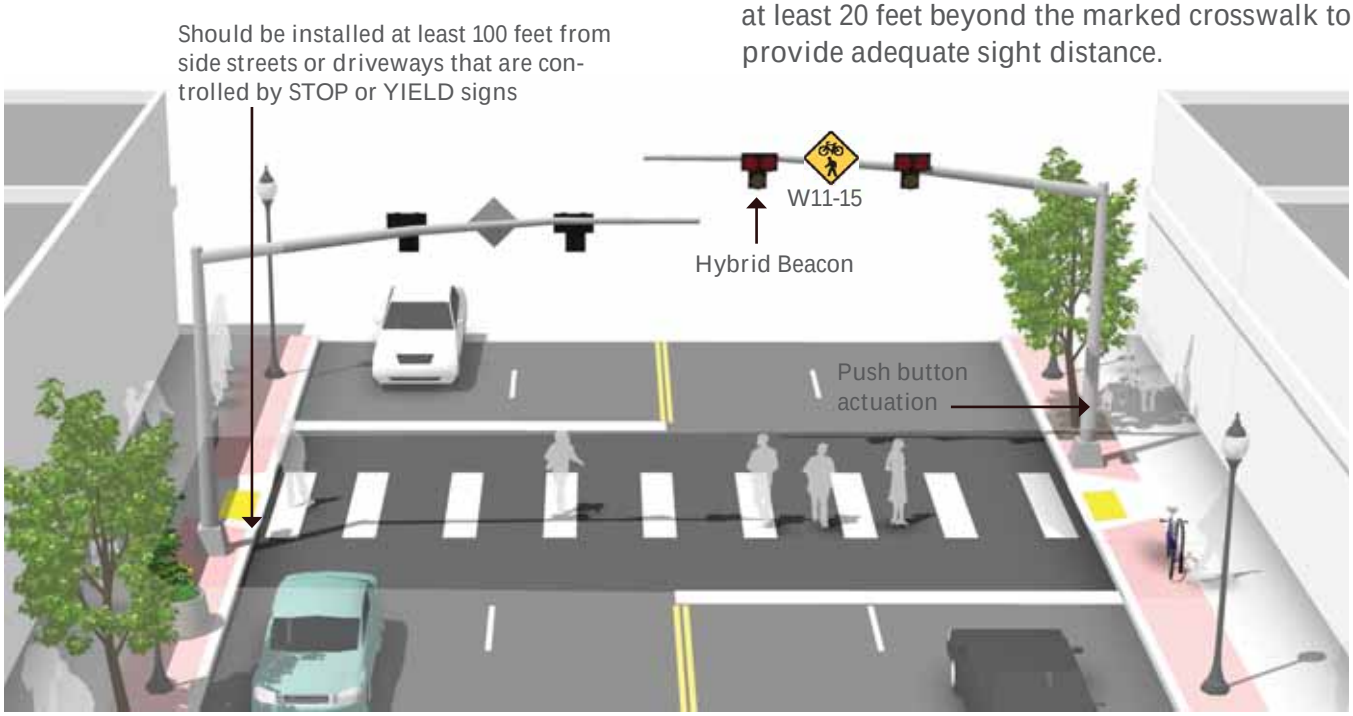
Pedestrian Hybrid Beacon

Description

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk

Guidance

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.



Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices.

NACTO. (2012). Urban Bikeway Design Guide.

NCDOT. (2012). Complete Streets Planning and Design Guidelines.

Active Warning Beacons

Description

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or rectangular rapid flash beacons (RRFB).

Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.

Discussion

Rectangular rapid flash beacons have the highest compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent. Additional studies over long term installations show little to no decrease in yielding behavior over time.

Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs can run for years without issue.

Additional References

NACTO. (2012). Urban Bikeway Design Guide.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

FHWA. (2008). MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11).

PEDESTRIAN SIGNS AND WAYFINDING

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

Regulatory Signage

Regulatory signage is used to inform motorists or pedestrians of a legal requirement and should only be used when a legal requirement is not otherwise apparent (AASHTO, 2004: Guide for the Planning, Design, and Operation of Pedestrian Facilities).

Warning Signage

Warning signage is used to inform motorists and pedestrians of unexpected or unusual conditions. When used, they should be placed to provide adequate response times. These include school warning signs and pedestrian crossing signs.

Informational and Wayfinding Signage

Informational and wayfinding signage can provide information providing guidance to a location along a trail or other pedestrian facility. Wayfinding signage should orient and communicate in a clear, concise and functional manner. It should enhance pedestrian circulation and direct visitors and residents to important destinations.

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

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

Regulatory signs

S1-1 S3-1 W11-2 W15-1 I-4

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

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

For a step-by-step guide to help non-professionals participate in the process of developing and designing a signage system, as well as information on the range of signage types, visit the Project for Public Places website: http://www.pps.org/reference/signage_guide/

DESIGN NEEDS OF BICYCLISTS

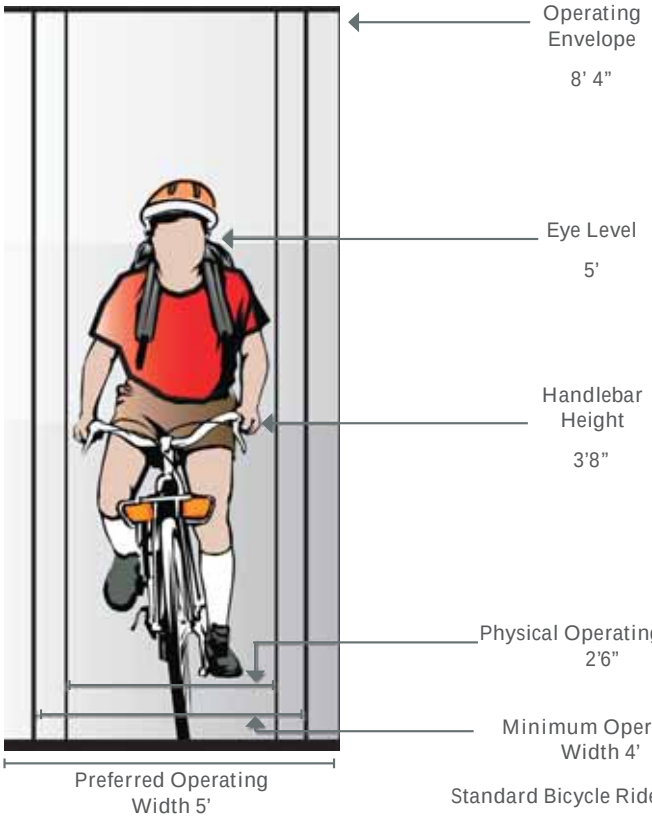
The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction, and maintenance practices than motor vehicle drivers. Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

Bicycle as a Design Vehicle

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

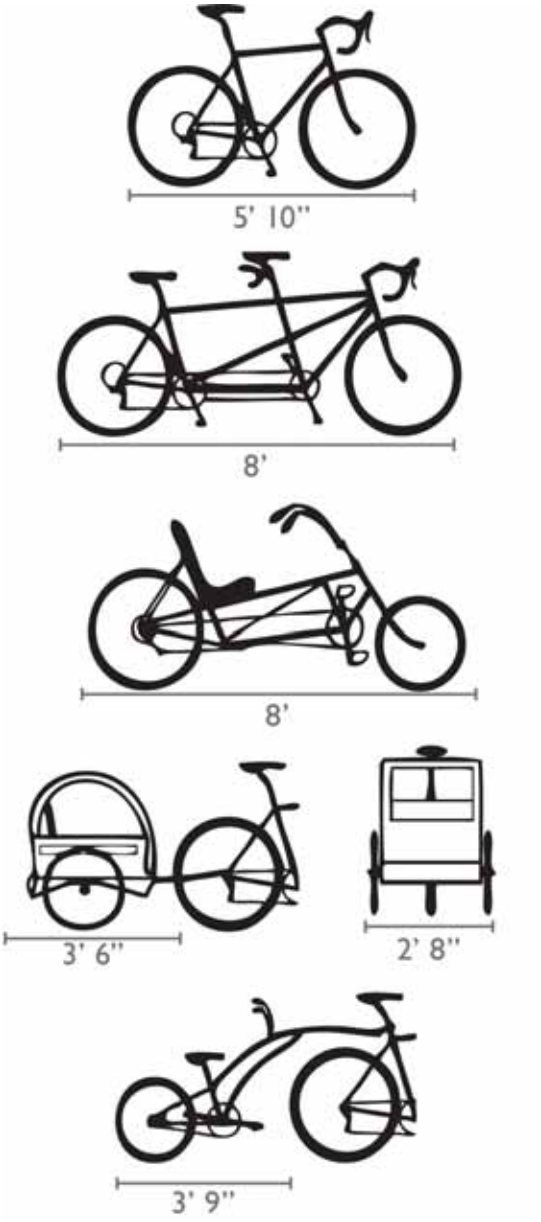
The figure below illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure and table below summarize the typical dimensions for bicycle types.



Standard Bicycle Rider Dimensions

Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition



Bicycle as Design Vehicle - Typical Dimensions

*Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition *AASHTO does not provide typical dimensions for tricycles.*

Design Speed Expectations

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as multi-use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

Bicycle as Design Vehicle - Typical Dimensions

Bicycle Type	Feature	Typical Dimensions
Upright Adult Bicyclist	Physical width	2 ft 6 in
	Operating width (Minimum)	4 ft
	Operating width (Preferred)	5 ft
	Physical length	5 ft 10 in
	Physical height of handlebars	3 ft 8 in
	Operating height	8 ft 4 in
	Eye height	5 ft
	Vertical clearance to obstructions (tunnel height, lighting, etc)	10 ft
	Approximate center of gravity	2 ft 9 in - 3 ft 4 in
Recumbent Bicyclist	Physical length	8 ft
	Eye height	3 ft 10 in
Tandem Bicyclist	Physical length	8 ft
Bicyclist with child trailer	Physical length	10 ft
	Physical width	2 ft 8 in

Bicycle as Design Vehicle - Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	15 mph
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

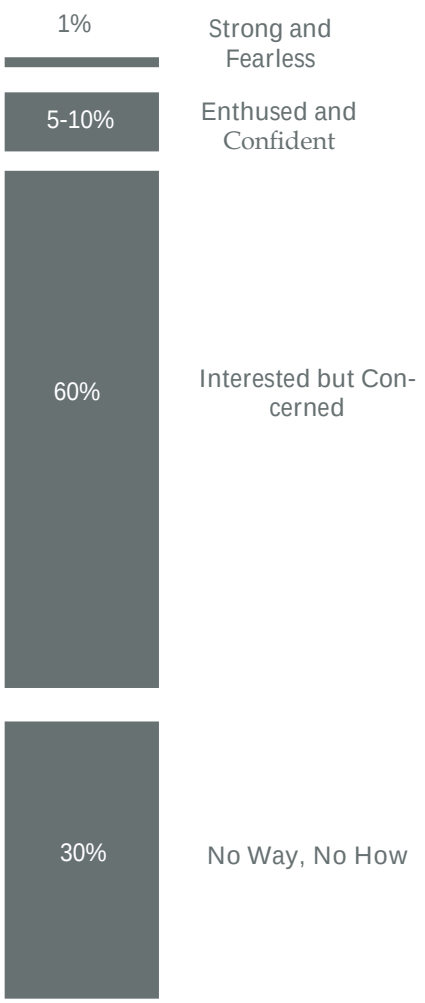
*Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.

TYPES OF BICYCLISTS

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people.

The bicycle planning and engineering professions currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the "design cyclist" as Advanced, Basic, or Child1. A more detailed understanding of the US population as a whole is illustrated in the figure below. Developed by planners in Portland, OR2 and supported by data collected nationally since 2005, this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- **Strong and Fearless** (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as multi-use trails.
- **Enthused and Confident** (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or multi-use trails when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.
- **Interested but Concerned** (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.
- **No Way, No How** (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will never ride a bicycle other than on rare occasions or under special circumstances (e.g., in a park, with a child).



Typical Distribution of Bicyclist Types

1 *Selecting Roadway Design Treatments to Accommodate Bicycles. (1994). Publication No. FHWA-RD-92-073*

2 *Four Types of Cyclists. (2009). Roger Geller, City of Portland Bureau of Transportation.*

http://www.portlandonline.com/transportation/index.cfm?&a=237507

SHARED ROADWAYS

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Signed Shared Roadway

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.


Marked Shared Roadway

This section Includes:

- Signed Shared Roadway
- Marked Shared Roadway

SIGNED SHARED ROADWAYS

Description

Signed Shared Roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Guidance

Lane width varies depending on roadway configuration.

Bicycle Route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:

- Beginning or end of Bicycle Route.
- At major changes in direction or at intersections with other bicycle routes.
- At intervals along bicycle routes not to exceed ½ mile.

Discussion

Signed Shared Roadways serve either to provide continuity with other bicycle facilities (usually bike lanes) or to designate preferred routes through high-demand corridors.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities. FHWA. (2009). Manual on Uniform Traffic Control Devices.

MARKED SHARED ROADWAY

Description

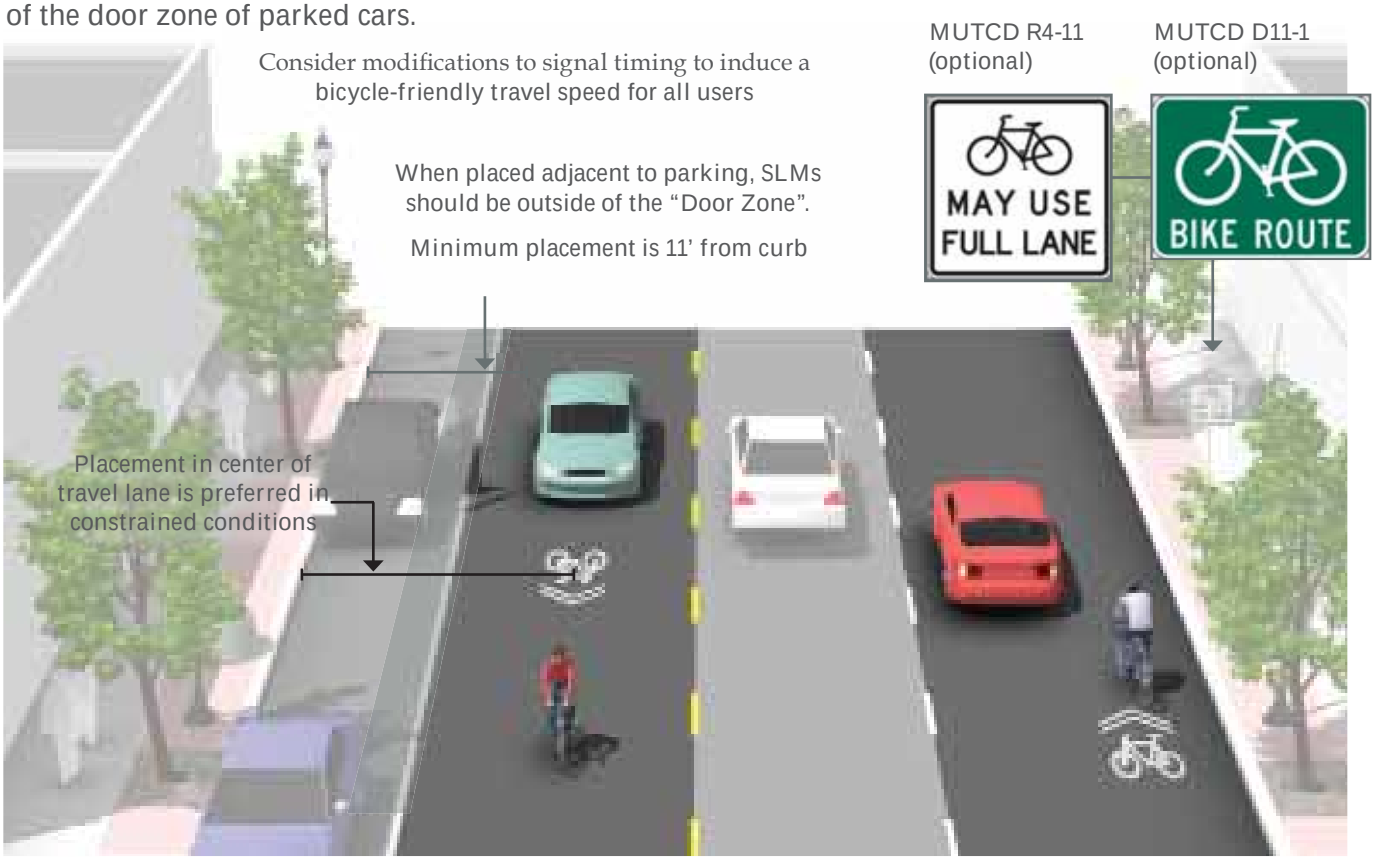
A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.

In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles.

In all conditions, SLMs should be placed outside of the door zone of parked cars.

Guidance

- In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.
- Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present, 4 feet from edge of curb with no parking. If parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.



Discussion

Bike lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated bike lanes, or to designate bicycle detection at signalized intersections. (MUTCD 9C.07)

Materials and Maintenance

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

SEPARATED BIKEWAYS

Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Shoulder Bikeways

Bicycle Lanes

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.

This Section Includes:

- Shoulder Bikeways
- Bicycle Lanes

SHOULDER BIKEWAYS

Description

Typically found in less-dense areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. Shoulder bikeways should be considered a temporary treatment, with full bike lanes planned for construction when the roadway is widened or completed with curb and gutter. This type of treatment is not typical in urban areas and should only be used where constraints exist.

Guidance

- 4 foot minimum width. Greater widths preferred.
- If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.

Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a marked shared roadway in these locations. Where feasible, roadway widening should be performed with pavement resurfacing jobs.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NCDOT. (1994). Bicycle Facilities Planning and Design Guidelines.

BICYCLE LANES

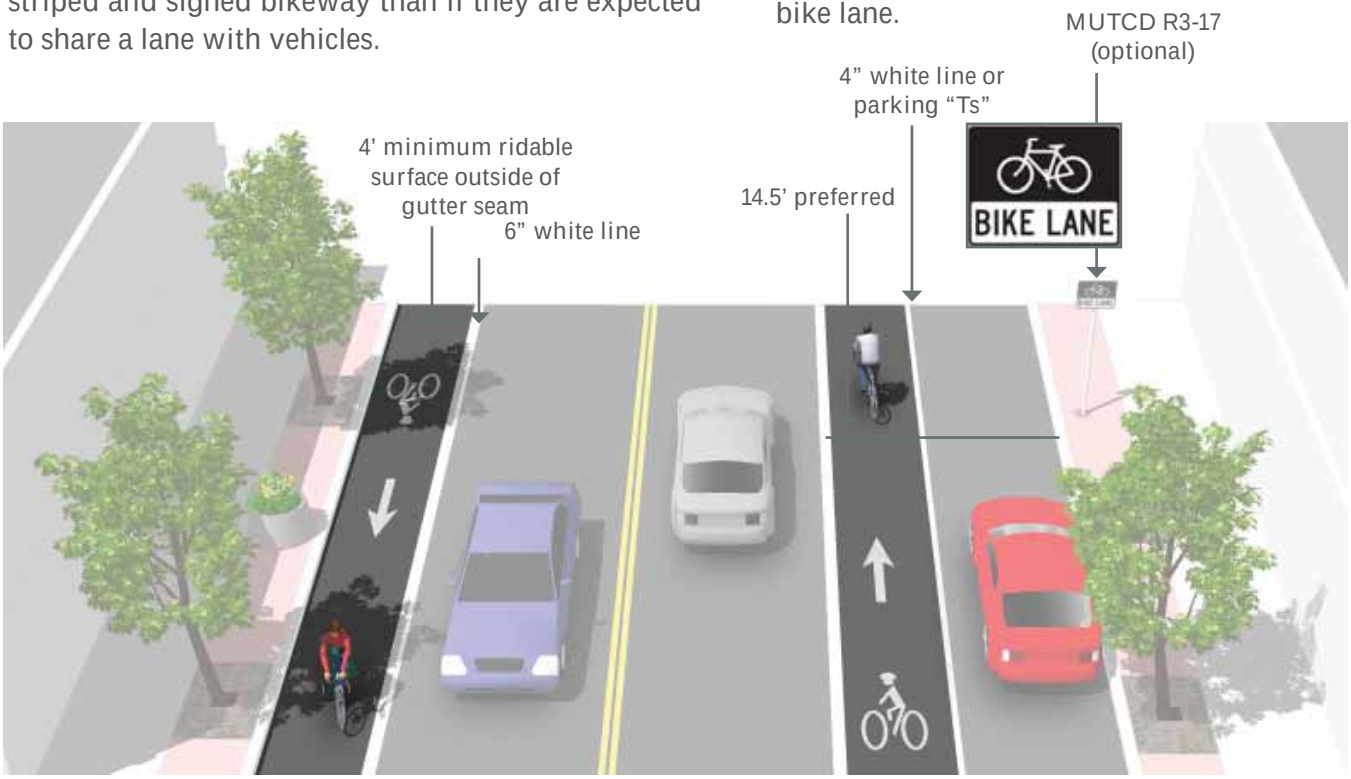
Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum).
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.
NCDOT. (2000). Traditional Neighborhood Development (TND) Guidelines.
NCDOT. (1994). Bicycle Facilities Planning and Design Guidelines.

SEPARATED BIKEWAYS AT INTERSECTIONS

Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

This Section Includes:

- Bike Lanes at Right Turn Only Lanes
- Combined Bike Lane / Turn Lane
- Intersection Crossing Markings
- Bicycles at Single Lane Roundabouts

Bike Lanes at Right Turn Only Lanes

Combined Bike Lane/Turn Lane


Intersection Crossing Markings


Bicyclists at Single Lane Roundabouts

BIKE LANES AT RIGHT TURN ONLY LANES

Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane / turn lane.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.

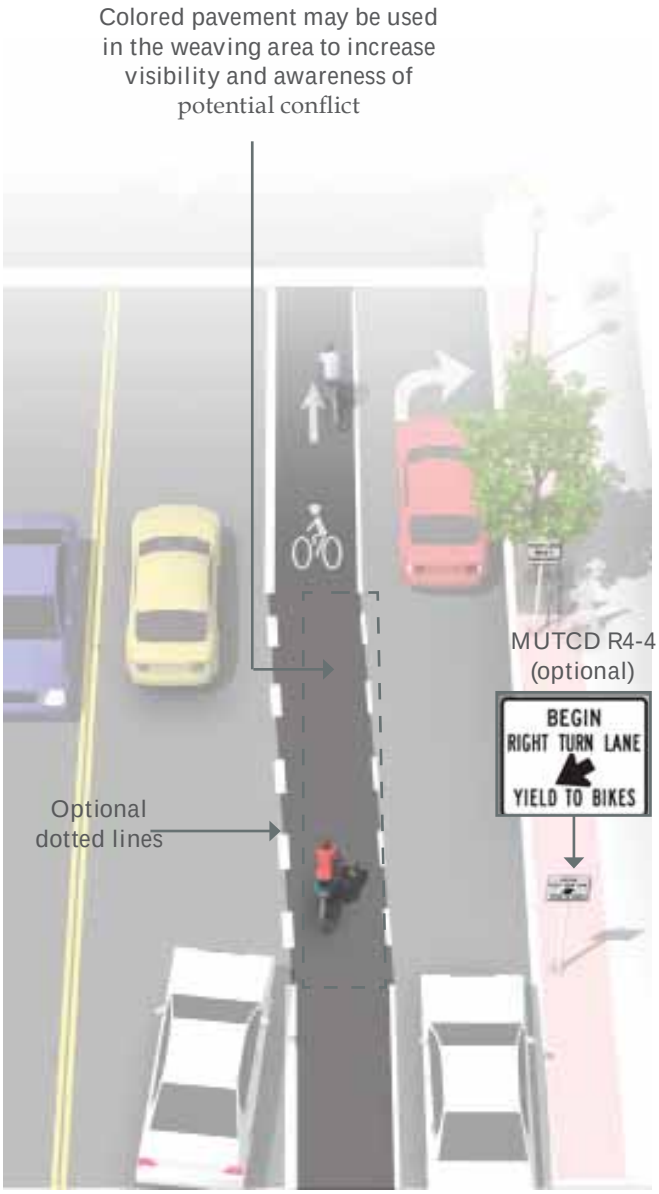
Guidance

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dotted line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.



Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see Combined Bike Lane / Turn Lane on the following page.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

Additional References

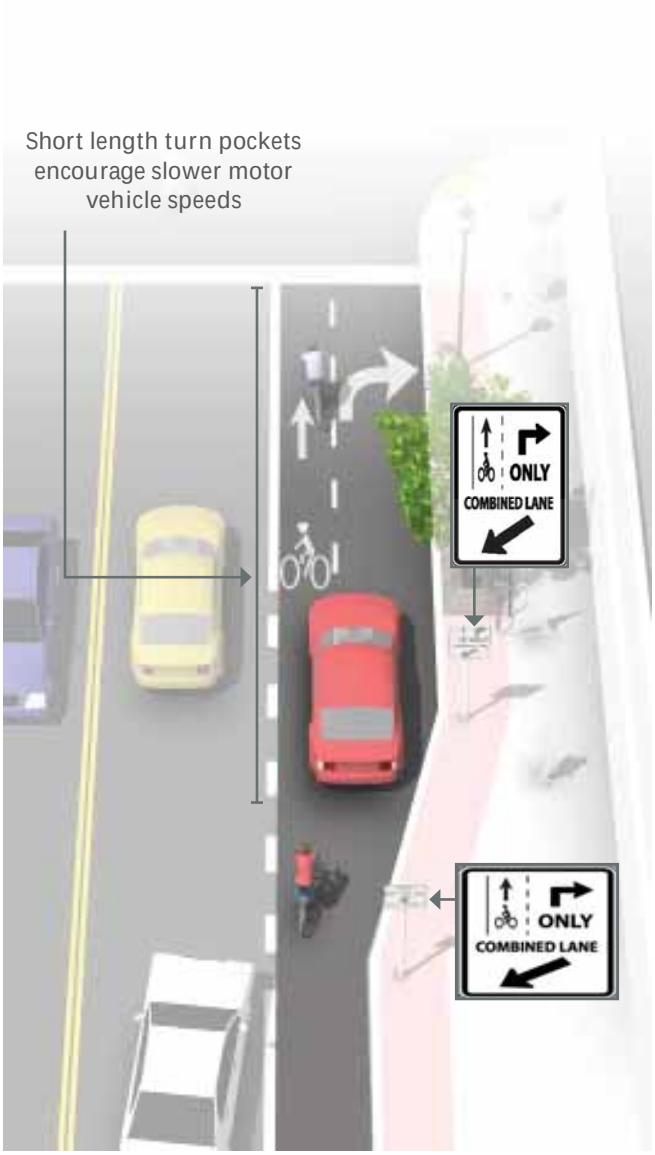
AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

COMBINED BIKE LANE / TURN LANE

Description

The combined bicycle/right turn lane places a standard-width bike lane on the left side of a dedicated right turn lane. A dotted line delineates the space for bicyclists and motorists within the shared lane. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane.

This treatment is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.



Guidance

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Bike Lane pocket should have a minimum width of 4 feet with 5 feet preferred.
- A dotted 4 inch line and bicycle lane marking should be used to clarify bicyclist positioning within the combined lane, without excluding cars from the suggested bicycle area.
- A "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.

Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less). May not be appropriate for high-speed arterials or intersections with long right turn lanes. May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

Materials and Maintenance

Locate markings out of tire tread to minimize wear. Because the effectiveness of markings depends on their visibility, maintaining markings should be a high priority.

Additional References

NACTO. (2012). Urban Bikeway Design Guide.
This treatment is currently slated for inclusion in the next edition of the AASHTO Guide for the Development of Bicycle Facilities

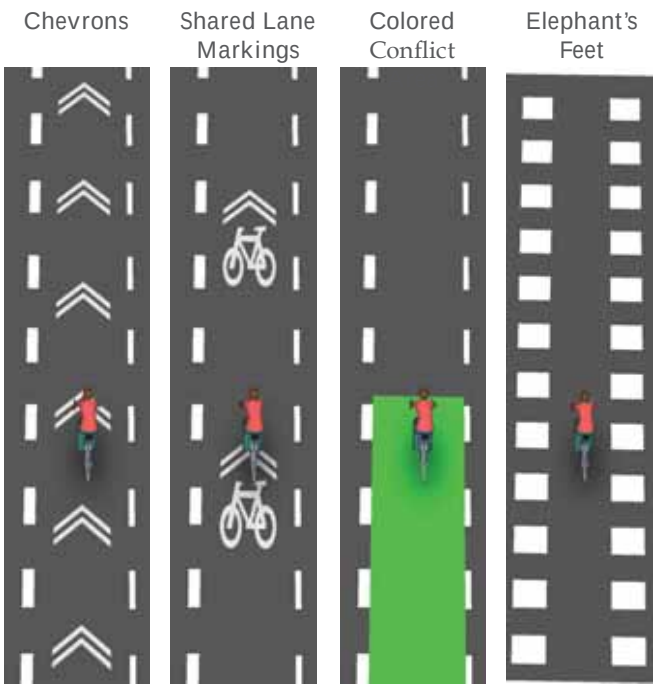
INTERSECTION CROSSING MARKINGS

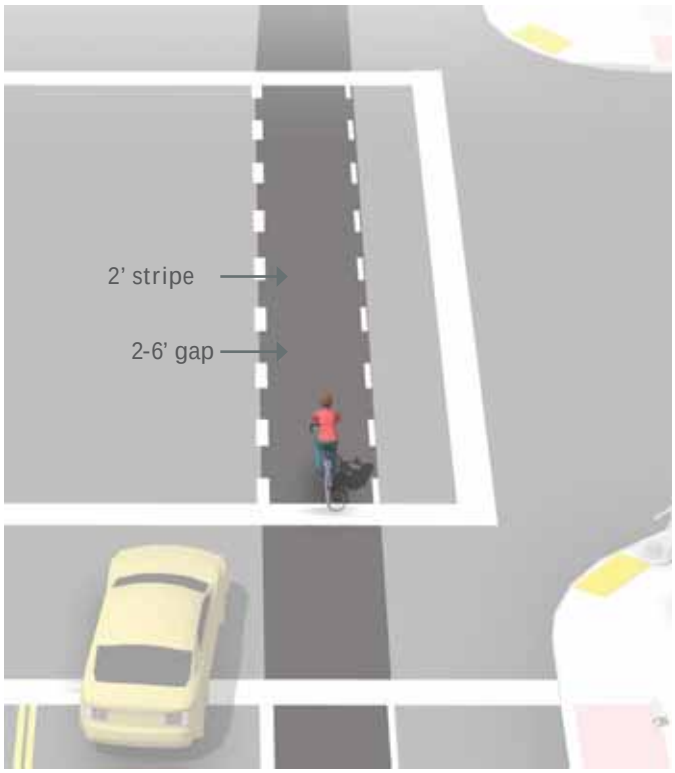
Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dotted lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, or colored bike lanes may be used to increase visibility within conflict areas or across entire intersections. Elephant's Feet markings are common in Canada, and in use in Chicago, IL.





Discussion

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices. (3A.06)
NACTO. (2012). Urban Bikeway Design Guide.

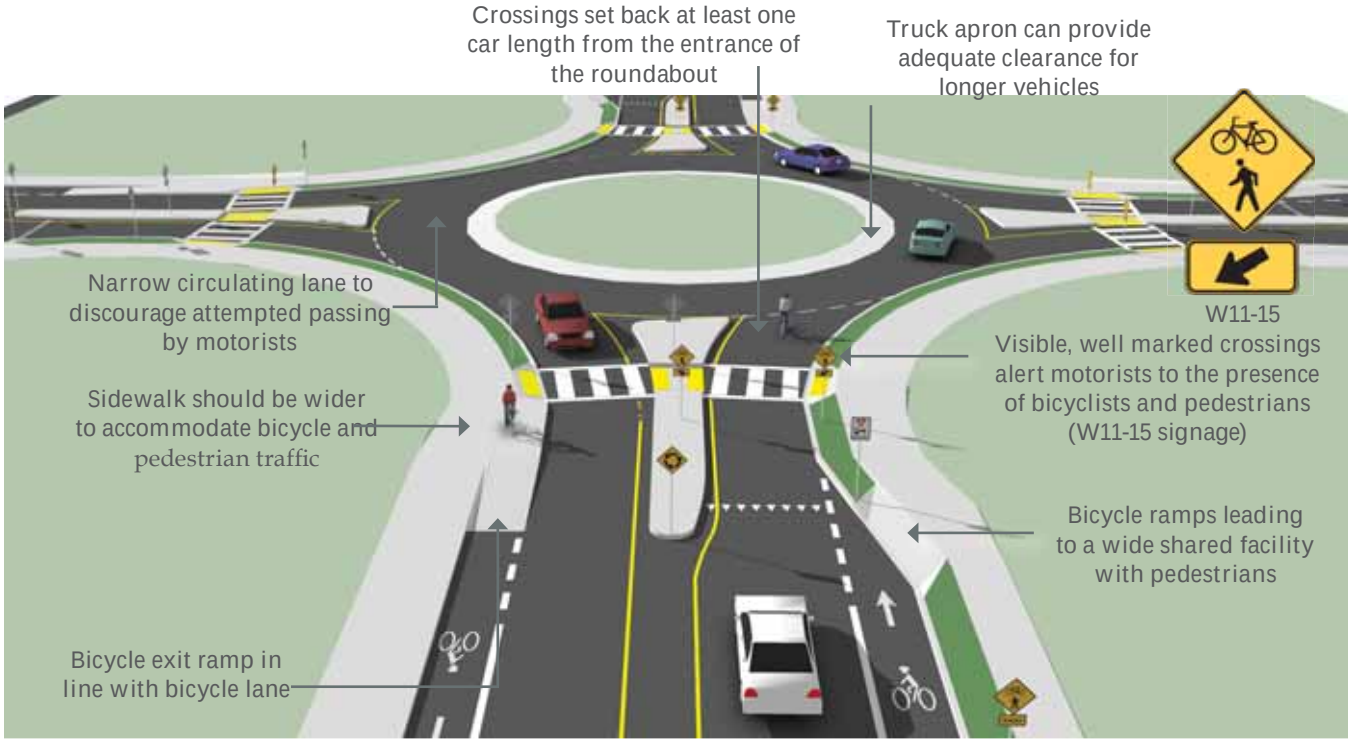
BICYCLISTS AT SINGLE LANE ROUNDABOUTS

Description

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

Guidelines

- 25 mph maximum circulating design speed.
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to "take the lane."
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.



Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

Materials and Maintenance

Signage and striping require routine maintenance.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2000). Roundabouts: An Informational Guide
FHWA. (2010). Roundabouts: An Informational Guide, Second Edition. NCHRP 672

SIGNAGE PROGRAMS

A comprehensive system of signage ensures that information is provided regarding the safe and appropriate use of all facilities, both on-road and on multi-use trails. The bicycle network should be signed seamlessly with other alternative transportation routes, such as bicycle routes from neighboring jurisdictions, trails, historic and/or cultural walking tours, and wherever possible, local transit systems.

Signage includes post- or pole-mounted signs and pavement striping. Signage is further divided into information signs, directional/wayfinding signs, regulatory signs and warning signs. Trail signage should conform to the Manual on Uniform Traffic Control Devices and the American Association of State Highway Transportation Official Guide for the Development of Bicycle Facilities. Bicycle signage should also be coordinated with local colleges and universities.

Share the Road signs remind motorists that bicyclists have the right to ride on the roadway.

The "Bikes Allowed Use of Full Lane" sign is currently used on an experimental basis in several cities.

Directional Signs

Implementing a well-planned and attractive system of signing can greatly enhance bikeway facilities by signaling their presence and location to both motorists and existing or potential bicycle users. Effective signage can encourage more bicycling by leading people to bikeways, and by creating a safe and efficient transportation option for local residents and visitors.

The signage examples on page C-31 show a number of different signs and markings, both on poles and on the roadway. Wayfinding signs such as these improve the clarity of travel direction while illustrating that destinations are only a short ride away. The signs shown are provided only as a point of reference for the purposes of these guidelines.

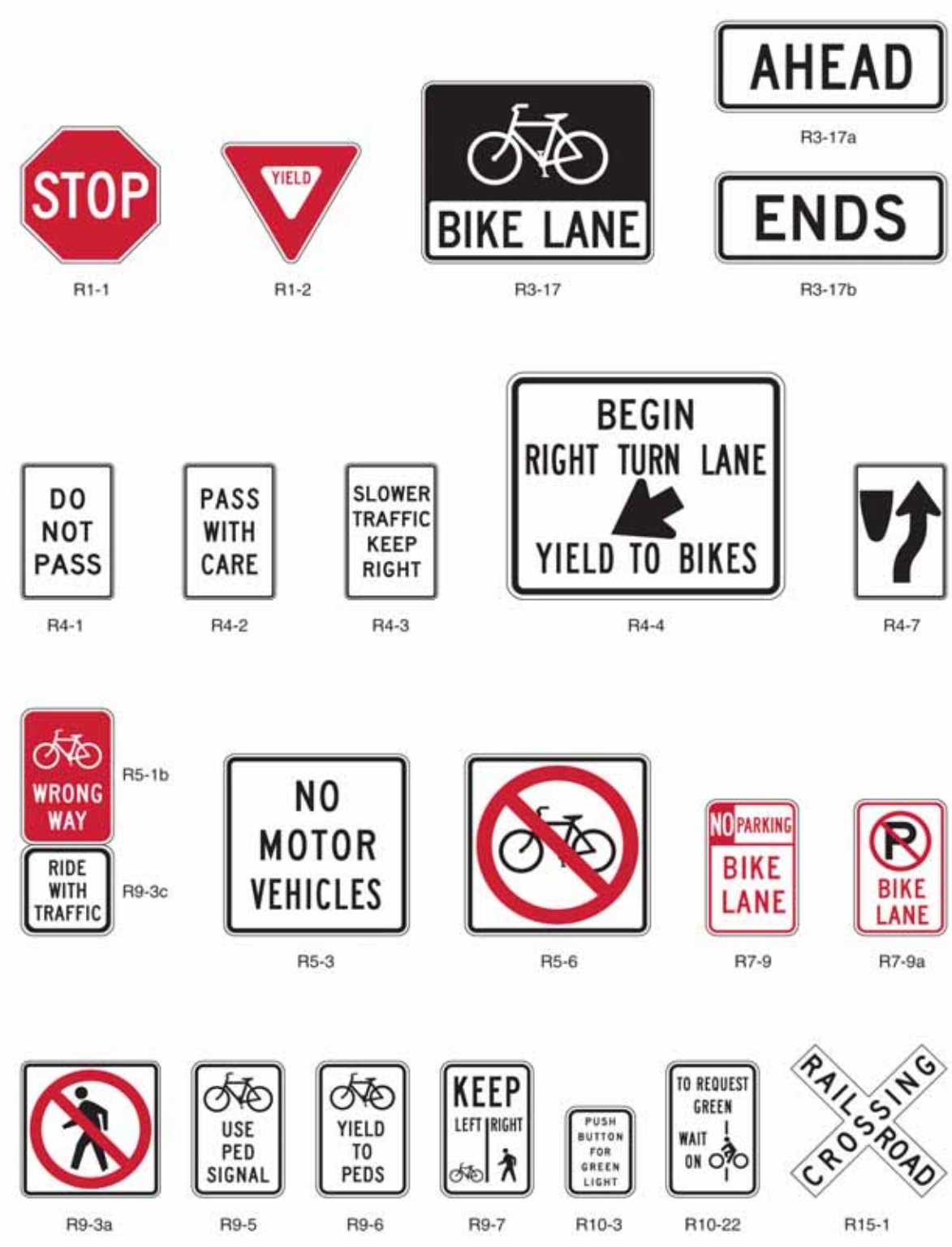
Regulatory/Warning Signs

Regulatory and warning bicycle signage like the examples shown on page C-31 should conform to the Manual on Uniform Traffic Control Devices (their labels are sign reference numbers for the MUTCD).

Special Purpose Signage

The "Share the Road" sign (to the left), is designed to advise motorists that bicyclists are allowed to share and have the right to cycle on narrow roadways with motor vehicles. For more on the "Share the Road Initiative" go to: www.ncdot.org/transit/bicycle/safety/programs_initiatives/share.html

Innovative signage is often developed to increase bicycle awareness and improve visibility (such as 'Bikes Allowed Use of Full Lane', bottom left). Special purpose signs to be installed on public roadways in North Carolina must be approved by NCDOT's Traffic Control Devices Committee and/or the Town of Pleasant Garden. New designs can be utilized on an experimental basis with NCDOT approval.


STOP
R1-1
YIELD
R1-2
BIKE LANE
R3-17
AHEAD
R3-17a
ENDS
R3-17b
DO NOT PASS
R4-1
PASS WITH CARE
R4-2
SLOWER TRAFFIC KEEP RIGHT
R4-3
BEGIN RIGHT TURN LANE
YIELD TO BIKES
R4-4
R4-7
WRONG WAY
R5-1b
RIDE WITH TRAFFIC
R9-3c
NO MOTOR VEHICLES
R5-3
R5-6
NO PARKING
BIKE LANE
R7-9
P
BIKE LANE
R7-9a
R9-3a
USE PED SIGNAL
R9-5
YIELD TO PEDS
R9-6
KEEP
LEFT RIGHT
R9-7
PUSH BUTTON FOR GREEN LIGHT
R10-3
TO REQUEST GREEN
WAIT ON
R10-22
RAIL ROAD CROSSING
R15-1

BIKEWAY SIGNING

The ability to navigate through a town is informed by landmarks, natural features and other visual cues. Signs throughout the town should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time / distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and travel time to each destination

Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.

Sign Types

Sign Placement

This Section Includes:

- Sign Types
- Sign Placement

SIGN TYPES

Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route. This signage can include destinations and distance/time, but does not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. This signage can be used with pavement markings, and does include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways and informs bicyclists of the designated bike route to access key destinations. Destinations and arrows, distances and travel times are optional but recommended.

Alternative Designs

A customized alternative design may be used to include pedestrian-oriented travel times, local town logos, and sponsorship branding.

Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

SIGN PLACEMENT

Guidance

Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Confirmation Signs

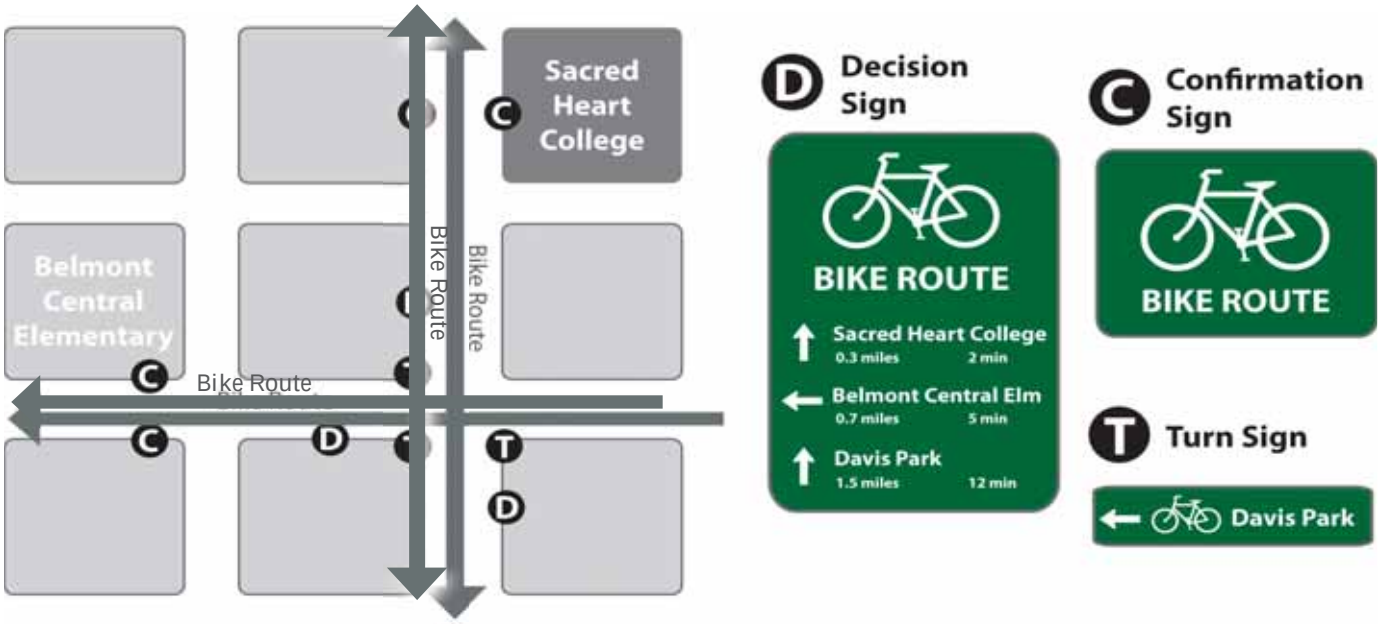
- Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign).
- Should be placed soon after turns to confirm destination(s). Pavement markings can also confirm that a bicyclist is on a preferred route.

Decision Signs

- Near-side of intersections in advance of a junction with another bicycle route.
- Along a route to indicate a nearby destination.

Turn Signs

- Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through).
- Pavement markings can also indicate the need to turn to the bicyclist.



Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to five miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

RETROFITTING EXISTING STREETS TO ADD BIKEWAYS

Most major streets are characterized by conditions (e.g., high vehicle speeds and/or volumes) for which dedicated bike lanes are the most appropriate facility to accommodate safe and comfortable riding. Although opportunities to add bike lanes through roadway widening may exist in some locations, many major streets have physical and other constraints that would require street retrofit measures within existing curb-to-curb widths. As a result, much of the guidance provided in this section focuses on effectively reallocating existing street width through striping modifications to accommodate dedicated bike lanes.

Although largely intended for major streets, these measures may be appropriate for any roadway where bike lanes would be the best accommodation for bicyclists.

This Section Includes:

- Roadway Widening
- Lane Narrowing
- Lane Reconfiguration
- Parking Reduction

Roadway Widening

Lane Narrowing

Lane Reconfiguration

Parking Reduction

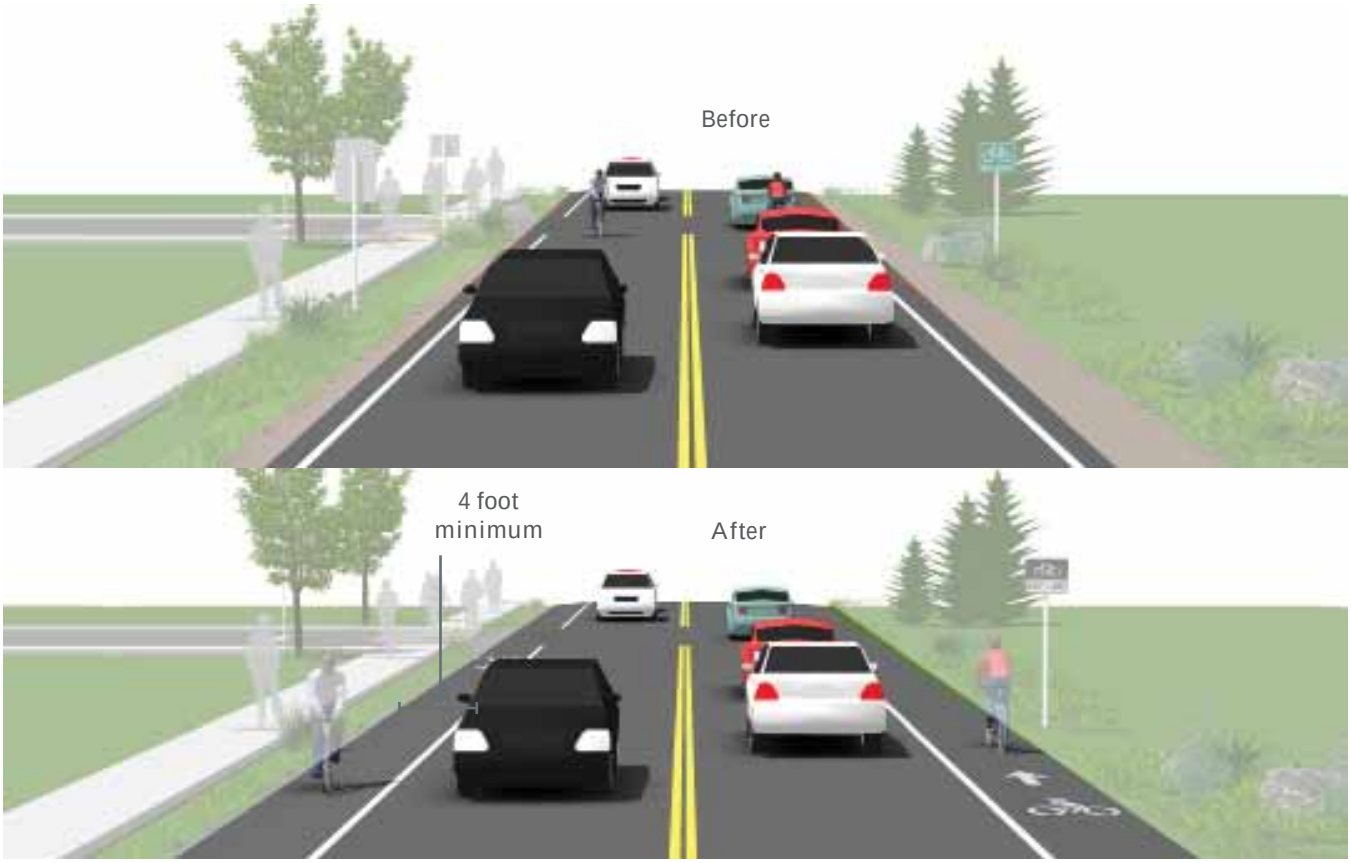
ROADWAY WIDENING

Description

Bike lanes can be accommodated on streets with excess right-of-way through shoulder widening. Although roadway widening incurs higher expenses compared with re-striping projects, bike lanes can be added to streets currently lacking curbs, gutters and sidewalks without the high costs of major infrastructure reconstruction.

Guidance

- Guidance on bicycle lanes applies to this treatment.
- 4 foot minimum width when no curb and gutter is present.
- 6 foot width preferred.



Discussion

Roadway widening is most appropriate on roads lacking curbs, gutters and sidewalks.

If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.

Materials and Maintenance

The extended bicycle area should not contain any rough joints where bicyclists ride. Saw or grind a clean cut at the edge of the travel lane, or feather with a fine mix in a non-ridable area of the roadway.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

LANE NARROWING

Description

Lane narrowing utilizes roadway space that exceeds minimum standards to provide the needed space for bike lanes. Many roadways have existing travel lanes that are wider than those prescribed in local and national roadway design standards, or which are not marked. Most standards allow for the use of 11 foot and sometimes 10 foot wide travel lanes to create space for bike lanes.

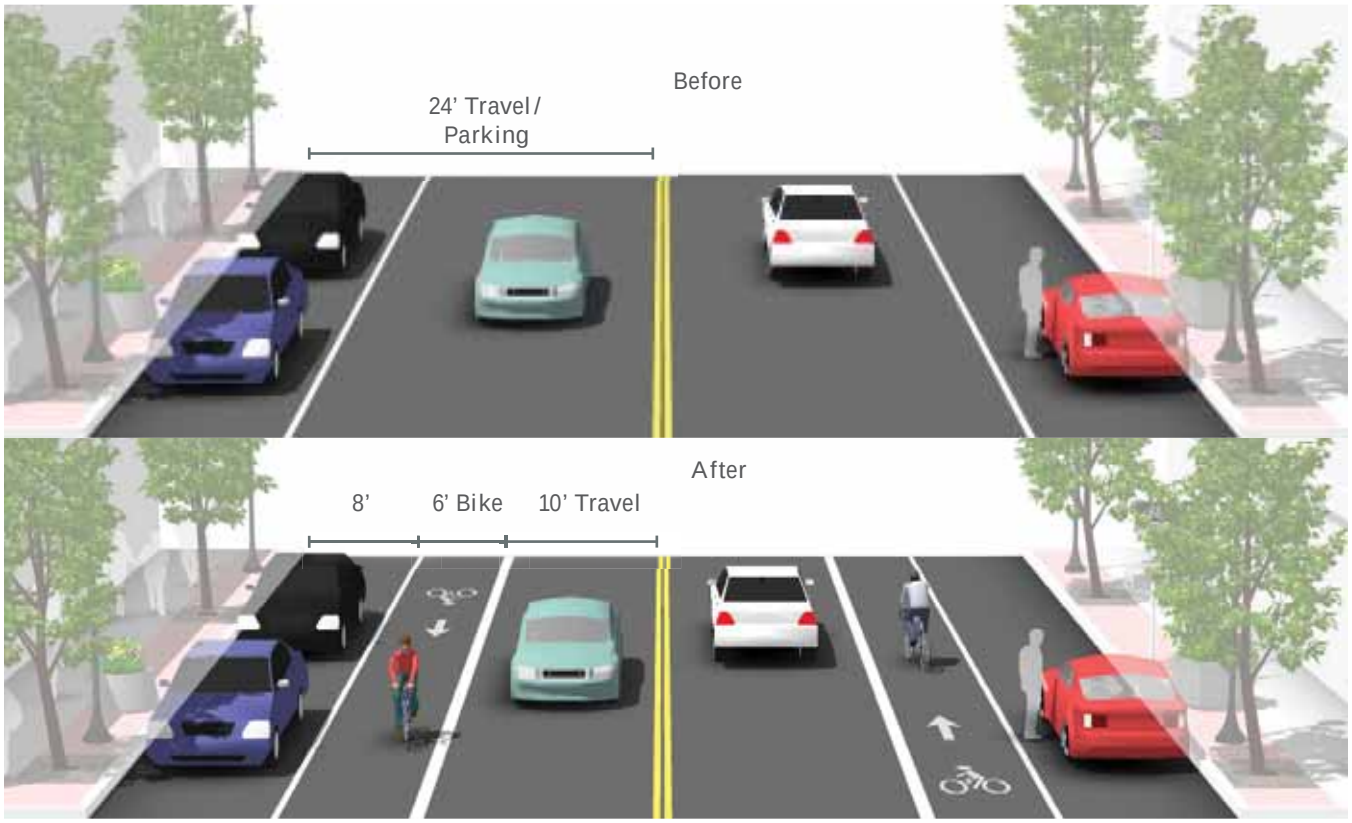
Guidance

Vehicle lane width:

- Before: 10-15 feet
- After: 10-11 feet

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment.



Discussion

Special consideration should be given to the amount of heavy vehicle traffic and horizontal curvature before the decision is made to narrow travel lanes. Center turn lanes can also be narrowed in some situations to free up pavement space for bike lanes. AASHTO supports reduced width lanes in A Policy on Geometric Design of Highways and Streets: "On interrupted-flow operation conditions at low speeds (45 mph or less), narrow lane widths are normally adequate and have some advantages."

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

LANE RECONFIGURATION

Description

The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects.

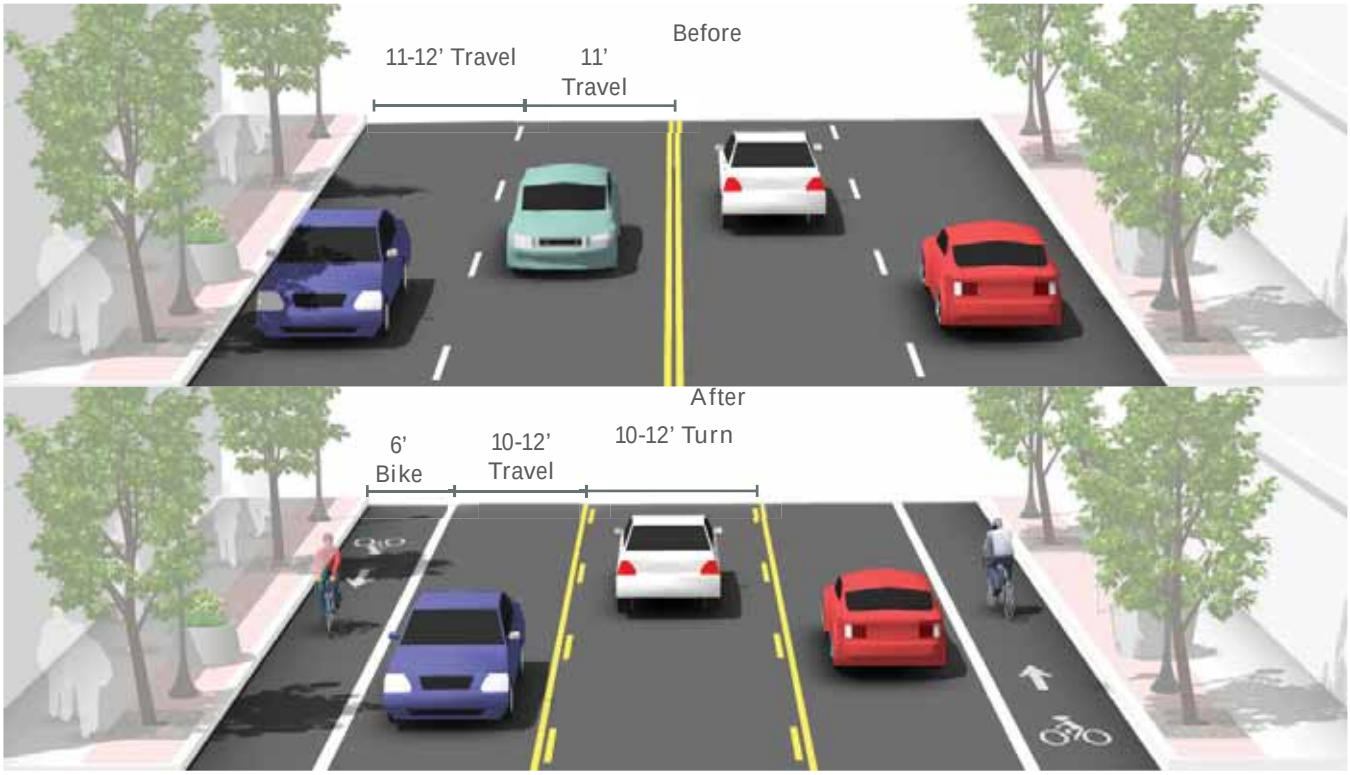
Guidance

Vehicle lane width:

- Width depends on project. No narrowing may be needed if a lane is removed.

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment.



Discussion

Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations may apply. For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes. Prior to implementing this measure, a traffic analysis should identify potential impacts.

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2010). Evaluation of Lane Reduction "Road Diet" Measures on Crashes. Publication Number: FHWA-HRT-10-053

PARKING REDUCTION

Description

Bike lanes can replace one or more on-street parking lanes on streets where excess parking exists and / or the importance of bike lanes outweighs parking needs. For example, parking may be needed on only one side of a street. Eliminating or reducing on-street parking also improves sight distance for bicyclists in bike lanes and for motorists on approaching side streets and driveways.

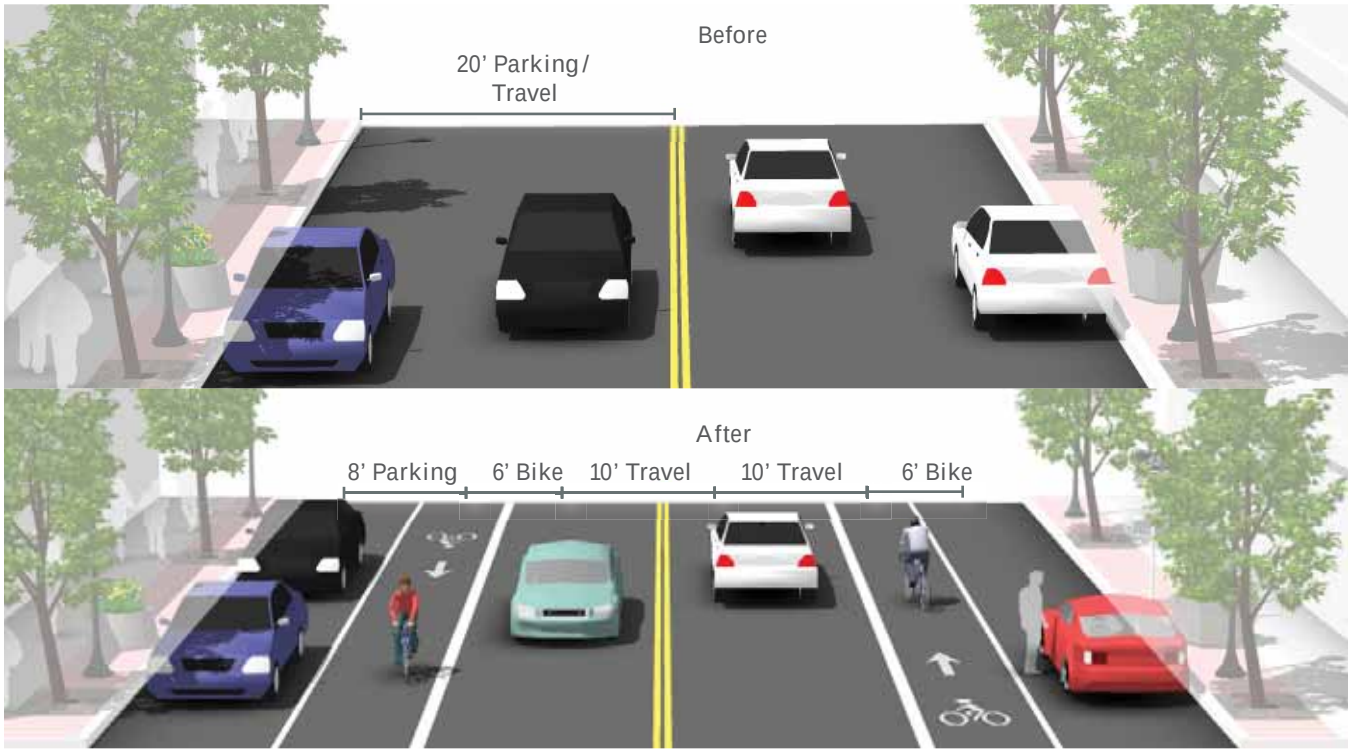
Guidance

Vehicle lane width:

- Parking lane width depends on project. No travel lane narrowing may be required depending on the width of the parking lanes.

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment.



Discussion

Removing or reducing on-street parking to install bike lanes requires comprehensive outreach to the affected businesses and residents. Prior to reallocating on-street parking for other uses, a parking study should be performed to gauge demand and to evaluate impacts to people with disabilities.

Materials and Maintenance

Repair rough or uneven pavement surface. Use bicycle compatible drainage grates. Raise or lower existing grates and utility covers so they are flush with the pavement.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

BIKEWAY SUPPORT AND MAINTENANCE

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

Bicycle Racks

Maintenance

Regular bicycle facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flat, and installing bicycle-friendly drainage grates. Pavement overlays are a good opportunity to improve bicycle facilities.

Sweeping

Recommended Bikeway Maintenance Activities

Maintenance Activity	Frequency
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping / blowing	As needed, with higher frequency in the early Spring and Fall
Pavement sealing	5 - 15 years
Pothole repair	1 week – 1 month after report
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	As needed
Signage replacement	As needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

This Section Includes:

- Bicycle Racks
- Sweeping

BICYCLE RACKS

Description

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. Racks should:

- Support the bicycle in at least two places, preventing it from falling over.
- Allow locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

Guidance

- 2' minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50' maximum distance from main building entrance.
- Minimum clear distance of 6' should be provided between the bicycle rack and the property line.
- Locate racks in areas that cyclists are most likely to travel.

SWEEPING

Description

Bicyclists often avoid shoulders and bike lanes filled with gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, potentially causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.

Guidance

- Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes.
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility.
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders.
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders.
- Perform additional sweeping in the Spring to remove debris from the Winter.
- Perform additional sweeping in the Fall in areas where leaves accumulate.

MULTI-USE TRAILS

A multi-use trail (greenway trail) allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of multi-use trails include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

This Section Includes:

- General Design Practices
- Sidepaths - Multi-Use Trails along Roadways
- Neighborhood Greenways
- Local Neighborhood Accessways

General design practices

Sidepaths: Multi-use trails along roadways

Neighborhood greenways

Local neighborhood accessways

General Design Practices

Description

Shared use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Clearance

- Lateral Clearance: A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- Overhead clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Discussion

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared use paths along roadways. Also known as "sidepaths", these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding when either entering or exiting the path.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Additional References

Flink, C. (1993). Greenways: A Guide to Planning Design and Development.

Sidepaths: Multi-use Trails Along Roadways

Description

A sidepath allows for two-way bicycle and pedestrian use along roadways. Sidepaths may also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. Because of operational concern it is generally preferable to place trails within independent rights-of-way away from roadways. However, there situations where existing roads provide the only corridors available.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path.

The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings.

Pay special attention to the entrance/exit of the path as bicyclists may continue to travel on the wrong side of the street.

Guidance

- Guidance for sidepaths should follow that for general design practices of shared use paved trails.
- A high number of driveway crossings and intersections create potential conflicts with turning traffic. Consider alternatives to sidepaths on streets with a high frequency of intersections or heavily used driveways.
- Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.

Discussion

When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are cycling for transportation purposes.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

NACTO. (2012). Urban Bikeway Design Guide. See entry on Raised Cycle Tracks.

MULTI-USE TRAIL CROSSINGS

At-grade roadway crossings can create potential conflicts between path users and motorists. However, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users. This is evidenced by the thousands of successful facilities around the United States with at-grade crossings. In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture. Signing for path users may include a standard "STOP" or "YIELD" sign and pavement markings, possibly combined with other features such as bollards or a bend in the pathway to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. Crosswalk striping is typically a matter of local and State preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.

This Section Includes:

- Marked / Unsignalized Crossings
- Active Warning Beacons
- Route Users to Existing Signals
- Bridges
- Boardwalks

Route users to existing signals

Marked/unsignalized crossings

Bridges

Active warning beacons

Boardwalks

Unsignalized Marked Crossings

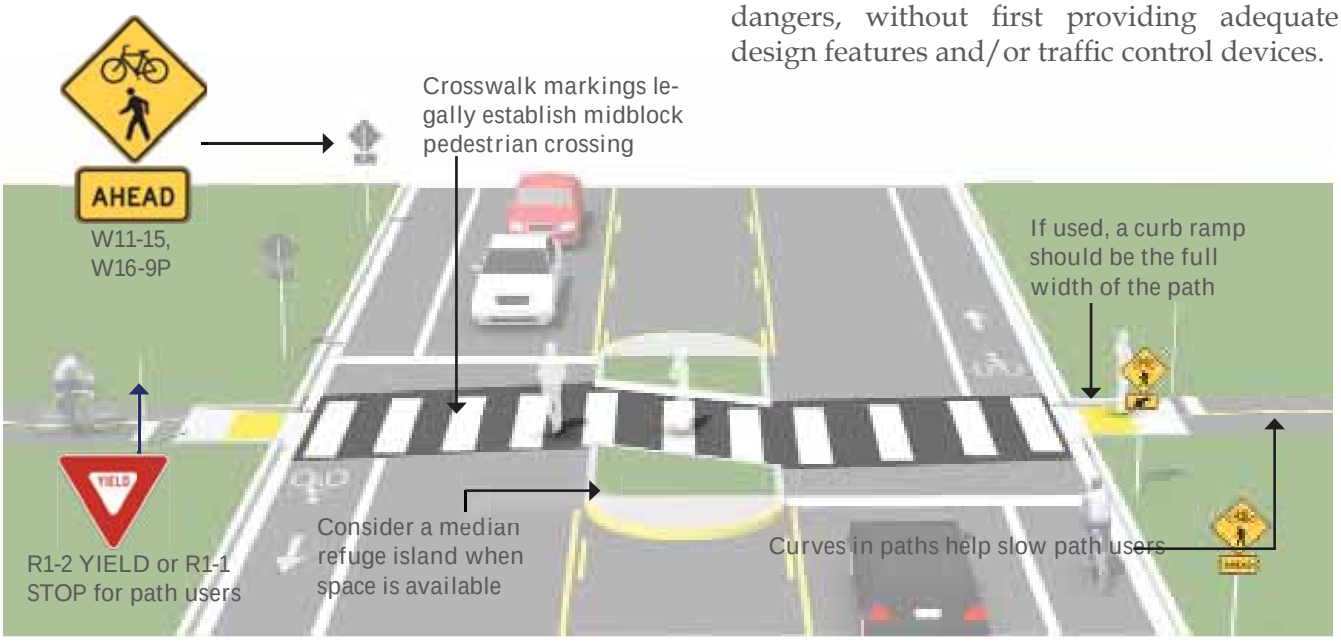
Description

An unsignalized marked crossing typically consists of a marked crossing area, signage, and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

- Refer to the FHWA report, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations" for specific volume and speed ranges where a marked crosswalk alone may be sufficient.
- Where the speed limit exceeds 40 miles per hour, marked crosswalks alone should not be used at unsignalized locations.
- Crosswalks should not be installed at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices.



Discussion

Marked crosswalks alone will not make crossings safer, nor will marked crosswalks necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g. raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions, etc.) as needed to improve the safety of the crossing. These are general recommendations; good engineering judgment should be used in individual cases for deciding which treatment to use.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

NCDOT. (2012). Complete Streets Planning and Design Guidelines.

Active Warning Beacons

Description

Enhanced marked crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on multi-lane or high volume roadways.

These enhancements include pathway user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB) shown below, or in-roadway warning lights.

Guidance

- Guidance for Unsignalized Marked Crossings applies.
- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Warning beacons shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.

Discussion

Rectangular rapid flash beacons show the most increased compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent. Additional studies of long term installations show little to no decrease in yielding behavior over time.

Materials and Maintenance

Depending on power supply, maintenance of active warning beacons can be minimal. If solar power is used, signals should run for years without issue.

Additional References

NACTO. (2012). Urban Bikeway Design Guide.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

FHWA. (2008). MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11) NCDOT. (2012). Complete Streets Planning and Design Guidelines.

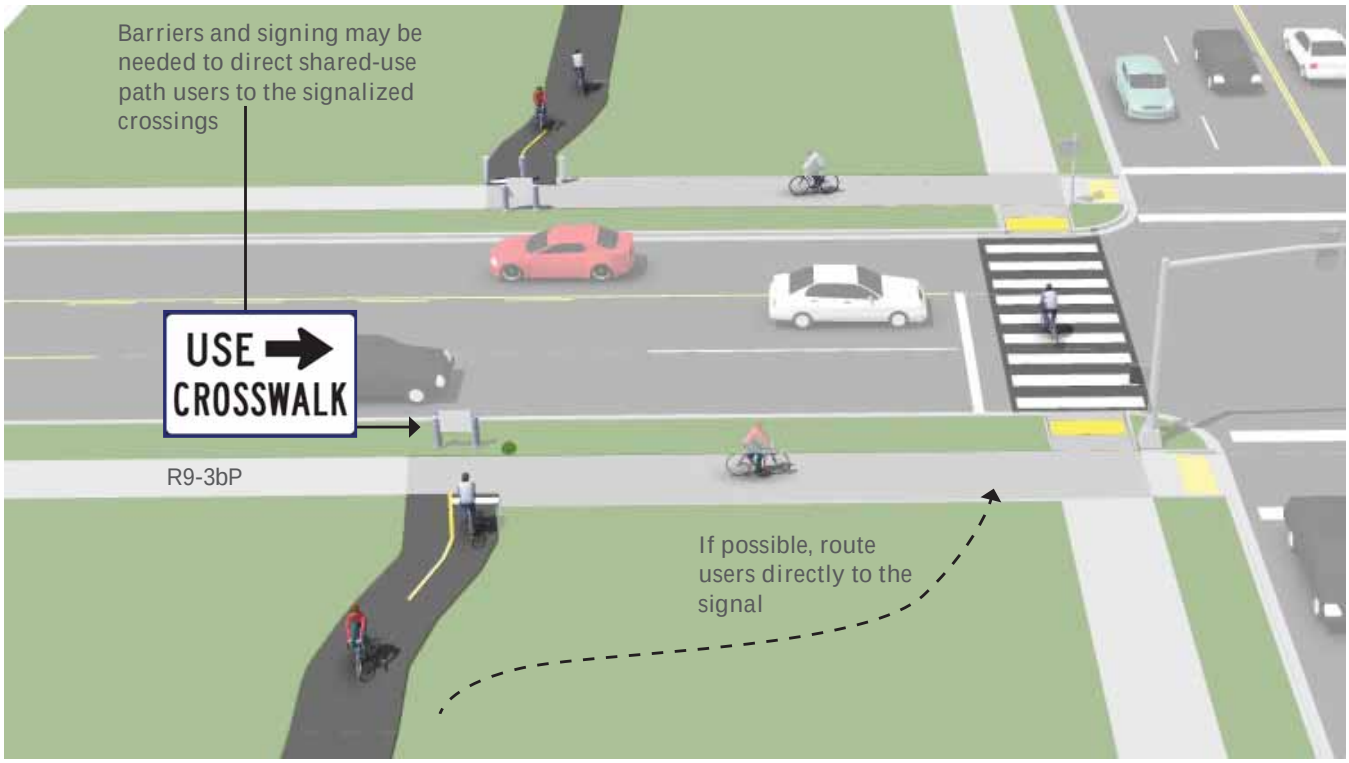
Route Users to Signalized Crossings

Description

Path crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct path users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.

Guidance

- Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route path directly to the signal.



Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgement and the context of the location should be taken into account when choosing the appropriate allowable setback. Pedestrians are particularly sensitive to out of direction travel and jaywalking may become prevalent if the distance is too great.

Materials and Maintenance

Municipalities should maintain comprehensive inventories of the location and age of bicycle wayfinding signs to allow incorporation of bicycle wayfinding signs into any asset management activities.

Additional References

AASHTO. (2012). Guide for the Development of Bicycle Facilities.

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

TRAFFIC CALMING

Traffic calming is a design principle that seeks to lower vehicular traffic speeds using physical and visual cues. These tools are typically self-enforcing: the roadway's physical conditions influence drivers rather than regulatory devices and enforcement measures. Traffic calming works best on local streets with residential areas and highly trafficked commercial corridors. Extensive research shows that slower motorist speeds reduce overall crash severity and frequency, and improve cyclist and pedestrian comfort within and adjacent to traffic. Slower traffic also tends to reduce roadway noise, which contributes to overall neighborhood livability and walking comfort.

An area applying traffic calming measures must make special considerations for bicyclists. Measures such as narrowing the roadway may adversely affect bicyclists' ability to share the road, while introducing vertical or horizontal deflections to slow traffic may introduce an unexpected hazard to the cyclist. Conversely, carefully designed and applied traffic calming measures can enhance bicyclist safety and access.


Vertical Traffic Calming


Horizontal Traffic Calming

Vertical Traffic Calming

Description

Motor vehicle speeds affect the severity of crashes that can occur with pedestrians and bicyclists. Maintaining low motor vehicle speeds greatly improves the comfort of people walking along and across a street. Slower vehicular speeds also improve motorists' ability to see and react to bicyclists and minimize conflicts at driveways and other turning locations.

Vertical speed control measures are composed of slight rises in the pavement, on which motorists and bicyclists must reduce speed to cross.

Guidance

- Local neighborhood streets should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Speed humps are raised areas usually placed in a series across both travel lanes. A 14' long hump reduces impacts to emergency vehicles. Speed humps can be challenging for bicyclists, gaps can be provided in the center or by the curb for bicyclists and to improve drainage. Speed humps can also be offset to accommodate emergency vehicles.
- Speed lumps or cushions have gaps to accommodate the wheel tracks of emergency vehicles.
- Speed tables are longer than speed humps and flat-topped. Raised crosswalks are speed tables that are marked and signed for a pedestrian crossing.
- For all vertical traffic calming, slopes should not exceed 1:10 or be less steep than 1:25. Tapers should be no greater than 1:6 to reduce the risk of bicyclists losing their balance. The vertical lip should be no more than a 1/4" high.

Speed Hump

Offset Speed Hump

Temporary Speed Cushion

Raised Crosswalk

Discussion

Emergency vehicle response times should be considered where vertical deflection is used. Because emergency vehicles have a wider wheel base than passenger cars, speed lumps/cushions allow them to pass unimpeded while slowing most other traffic. Alternatively, speed tables are recommended because they cannot be straddled by a truck, decreasing the risk of bottoming out. Traffic calming can also deter motorists from driving on a street. Monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Additional References

Ewing, Reid. Traffic Calming: State of the Practice. 1999.

Ewing, Reid and Brown, Steven. U.S. Traffic Calming Manual. 2009.

NACTO. Urban Street Design Guide. 2013.

Horizontal Traffic Calming

Description

Horizontal traffic calming devices cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering.

Such measures may reduce the design speed of a street, and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds.

Temporary Curb Extension

Chicane

Choker or Neckdown

Pinchpoint with Bicycle Access

Guidance

- Maintain a minimum clear width of 20 feet (or 28 feet with parking on both sides), with a constricted length of at least 20 feet in the direction of travel.
- Chicanes are a series of raised or delineated curb extensions, edge islands, or parking bays on alternating sides of a street forming an "S"-shaped curb, which reduce vehicle speeds by requiring motorists to shift laterally through narrowed travel lanes.
- Pinchpoints are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinchpoints are known as chokers or neckdowns. They reduce curb radii and further lower motor vehicle speeds.
- Traffic circles are raised or delineated islands placed at intersections that reduce vehicle speeds by narrowing turning radii and the travel lane. Traffic circles can also include a paved apron to accommodate the turning radii of larger vehicles like fire trucks or school buses.

Discussion

Horizontal speed control measures should not infringe on bicycle space. Where possible, provide a bicycle route outside of the element so bicyclists can avoid having to merge into traffic at a narrow pinch point. This technique can also improve drainage flow and reduce construction and maintenance costs. Traffic calming can also deter motorists from driving on a street. Monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Additional References and Guidelines

Ewing, Reid. Traffic Calming: State of the Practice. 1999.

Ewing, Reid and Brown, Steven. U.S. Traffic Calming Manual. 2009.

NACTO. Urban Street Design Guide. 2013.

STANDARDS COMPLIANCE

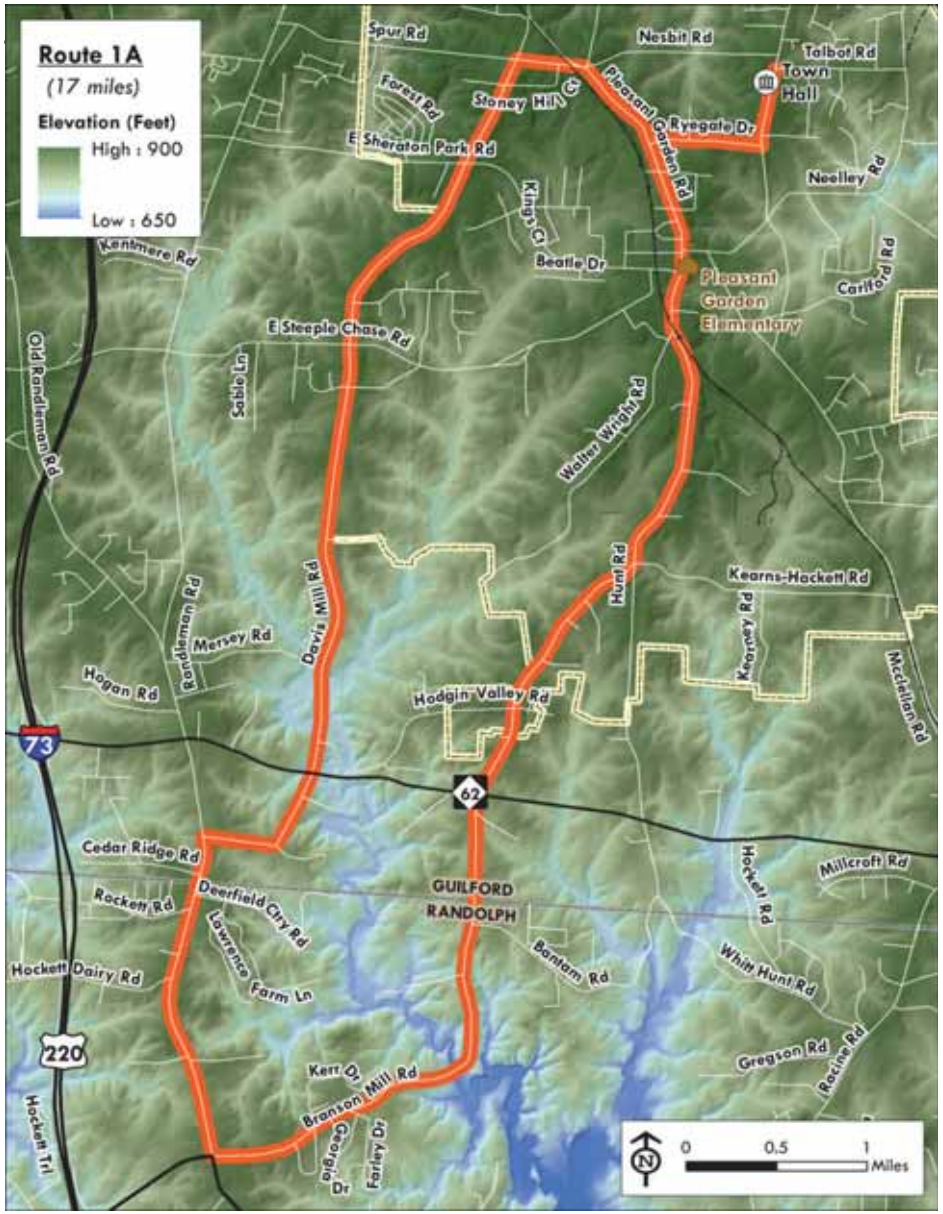
Some of these treatments covered by these guidelines are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. An "X" marking in the following table identifies the inclusion of a particular treatment within the national and state design guides. A "-" marking indicates a treatment may not be specifically mentioned, but is compliant assuming MUTCD compliant signs and markings are used.

In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

	Manual of Uniform Traffic Control Devices (2009)	Guide for the Development of Bicycle Facilities (2012)	Urban Bikeway Design Guide (2012)	NCDOT Bicycle Facilities & Planning Design Guidelines
Signed Shared Roadway	X	X		X
Marked Shared Roadway	X	X	X	
Bicycle Boulevard		X	X	
Shoulder Bikeway	X	X		X
Bicycle Lane	X	X	X	X
Bike Lanes at Right Turn Only Lanes	X	X	X	X
Colored Bike Lanes in Conflict Areas	Interim Approval Granted	X	X	
Combined Bike Lane/Turn Lane	-		X	
Intersection Crossing Markings	X	X	X	
Bicyclists at Single Lane Roundabouts	-	X		
Wayfinding Sign Types	X	X	X	X
Wayfinding Sign Placement	X	X	X	X
Multi-use Trails/Greenways	X	X		X
Sidepaths	X	Discouraged		Discouraged

APPENDIX D: RECREATIONAL RIDE MAPS AND CUE SHEETS

The following route profile is a graphical representation of 1 of 14 recreational rides that were developed on Ride with GPS. The rides were developed with input from local recreational cyclists and all originate from Town Hall. The distances vary in difficulty and distance from 8 to 26 miles. To view and download the routes and elevation profiles to your electronic device, visit: http://ridewithgps.com/users/229843/routes.



Route Name: Route 1A

Distance: 17 Miles

Start/End: Pleasant Garden Town Hall

Description: Rolling terrain, rural roads

Cue Sheet:

Exit Town Hall	X NC 62
R Alliance Church Road	L Hunt Road
R Ryegate Dr	X Railroad Tracks
R Pleasant Garden Rd	Changes to Pleasant Garden Rd
L Spur Rd	R on Ryegate Dr
L Davis Mill	L on Alliance Church Rd
L Randleman Rd (Busy)	Town Hall on the Left
L Branson Mill Rd	

Elevation Profile: