WALK BOONE • 2011

Town of Boone Pedestrian Transportation Plan

Town *of* Boone, North Carolina

Pedestrian Plan




Division of Bicycle & Pedestrian Transportation

Town of Boone, North Carolina
North Carolina Department of Transportation
Division of Bicycle and Pedestrian Transportation

Acknowledgements

Citizen Involvement

A special thanks to the 350+ local residents who participated in this planning process through comment forms, public workshops, and meetings.

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Division of Bicycle & Pedestrian Transportation

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"We will have a vibrant, attractive, walkable, bikable and transit-friendly community that is financially, socially, and environmentally sustainable."

- Boone 2030 Land Use Plan (2009)

"Our vibrant downtown and the university is surrounded by strong neighborhoods, successful and beautiful corridors, and an easily accessible university campus."

- Boone 2030 Land Use Plan (2009)

1 Project Overview & Purpose

Chapter Contents

Purpose

Background

Planning Process and Public Involvement

Benefits of a Walkable Community

Purpose

This plan will guide the Town of Boone, NCDOT, and other local and regional partners in improving infrastructure for pedestrians in Boone and fostering a 'walking culture' through related programs and policies.

Background

NCDOT's Bicycle and Pedestrian Planning Grant Initiative

In 2010, the Town of Boone was awarded a matching grant from the North Carolina Department of Transportation (NCDOT) Bicycle and Pedestrian Planning Grant Initiative. The purpose of the grant is to encourage municipalities to develop comprehensive bicycle plans and pedestrian plans. This program has assisted more than 100 North Carolina communities and is administered through NCDOT's Division of Bicycle and Pedestrian Transportation (DBPT).

Past and Current Plans and Initiatives

The Town of Boone has taken a proactive approach in meeting the needs of pedestrians through many of its past and current plans and initiatives. Since 2007, the Town of Boone's Alternative Transportation Subcommittee has championed such efforts including *Walk Boone: A Program to Promote Pedestrian Safety and Activity*. This plan will draw upon and combine the findings of Walk Boone and other related efforts, including the following, each of which are summarized in Chapter 2:

- Boone/Blowing Rock Alternative Transportation Plan (1995)
- Town of Boone Unified Development Ordinance (1997, with updates)
- Feasibility Study for Alternative Transportation Improvements (2004)
- Comprehensive Plan Update (2006)
- Boone Smart Growth Audit (2007)
- Boone 2030 Land Use Plan (2009)
- Roadway & Sidewalk Program Handbook (2009)
- Watauga County Thoroughfare Plan Update (2010)

Vision

The Town of Boone adopted the *Boone 2030 Land Use Plan* in 2009, and two of the five vision statements relate directly to pedestrian planning:

- *"We will have a vibrant, attractive, walkable, bikable and transit-friendly community that is financially, socially, and environmentally sustainable."*

- *"Our vibrant downtown and the university is surrounded by strong neighborhoods, successful and beautiful corridors, and an easily accessible university campus."*

Plan Components

This plan is designed to guide the Town of Boone in fulfilling its vision by providing a clear purpose (Chapter 1), an assessment of where things stand today (Chapter 2), detailed recommendations for pedestrian facilities (Chapter 3), and implementation strategies for pedestrian-related policies, programs, and infrastructure (Chapter 4). Also included in this plan are appendices that are designed to be used as implementation resources. They cover topics such as design guidelines, program ideas, state and federal policies, trail development resources, and a summary of public comments.

Members of the Alternative Transportation Subcommittee identify target areas for improvements.

The Planning Process and Public Involvement

The Project Steering Committee

The project steering committee for the pedestrian plan consisted primarily of members of the Town of Boone's Alternative Transportation Subcommittee (ATS, see page ii), but also included representatives from Appalachian State University and Downtown businesses. The ATS is part of the larger Town of Boone Transportation Committee, and focuses on issues related to walking, bicycling, and transit. The project steering committee met with project consultants from Alta/Greenways four times throughout the process, focusing on project vision and goals (November 2010), existing conditions (February 2011), the draft plan (May 2011), and the final plan (June 2011).

Data Collection and Analysis

After collecting baseline information about the study area in November 2010, the consultants began assessing existing conditions, which are the focus of Chapter 2 of this plan. Consultants used aerial photography and geographic information systems (GIS) data, to identify opportunities and constraints for pedestrian facility development. These preliminary findings were then tested for applicability and appropriateness through on-the-ground field research. Field research also included an intersection inventory and a photographic inventory. The existing conditions and the preliminary findings were then presented to the steering committee in February 2011 and to the public in March 2011 (see below).

A planning consultant, bottom left, takes notes for an intersection inventory.

Public Involvement & Plan Development

In February 2011, an online public comment form was launched for this plan, which yielded responses from more than 340 people (see Chapter 2 for results, which indicate need for pedestrian improvements in Boone).

In March 2011, project consultants set up a table at the Jones House Community Center as part of the Art Crawl. People were invited to learn about the plan and provide comments about where they would like to see improvements for walking and bicycling. A public input map, newsletters, and posters were provided for review and a project consultant answered questions and took comments. There were 35 people who stopped by to learn about the plan and directly provide input. The general feedback was highly positive, with many people impressed that the Town of Boone was being proactive in addressing walkability.

In April and May 2011, the draft plan was developed through input gathered during the steps described above. The draft plan was available for review and comment during a May 2011 public workshop at Council Chambers, and was posted online for public review shortly thereafter. Comments from the committee, the public, NCDOT, and other stakeholders were collected, and the plan was then revised into the final version that was presented to NCDOT and Town Council in June 2011.

People providing input during the Downtown Boone Art Crawl in March 2011.

Benefits of a Walkable Community

When considering the level of dedication in time and valuable resources that it takes to create a walkable community, it is also important to assess the immense value of pedestrian transportation. Walking helps to improve people's health and fitness, enhance environmental conditions, decrease traffic congestion, and will contribute to a greater sense of community.

Scores of studies from experts in the fields of public health, urban planning, urban ecology, real estate, transportation, sociology, and economics have supported such claims and have acknowledged the substantial value of supporting walking as it relates to active living and alternative transportation. Communities across the United States and throughout the world are implementing strategies for serving the walking needs of their residents, and have been doing so for many years. They do this because of their obligations to promote health, safety and welfare, and also because of the growing awareness of the many benefits of walking.

By providing attractive and safe, places for people to walk (such as Overlook Trail, above) the Town of Boone encourages increased health and physical activity among residents.

INCREASED HEALTH AND PHYSICAL ACTIVITY

A growing number of studies show that the design of our communities—including neighborhoods, towns, transportation systems, parks, trails and other public recreational facilities—affects people's ability to reach the recommended daily 30 minutes of moderately intense physical activity (60 minutes for youth). The increased rate of disease associated with inactivity reduces quality of life for individuals and increases medical costs for families, companies, and local governments.

Transportation investments impact health directly, and also indirectly through their impact on land use. According to a 2010 report from the American Public Health Association, "Investments in transit, walking and bicycling facilities support transit use, walking and bicycling directly; they also support the formation of compact, walkable, transit-oriented neighborhoods that in turn support more walking, bicycling and transit and less driving. These built environments have repeatedly been associated with more walking, bicycling and transit use, more overall physical activity, and lower body weights; lower rates of traffic injuries and fatalities, particularly for pedestrians; lower rates of air pollution and greenhouse gas emissions; and better mobility for non-driving populations."[1]

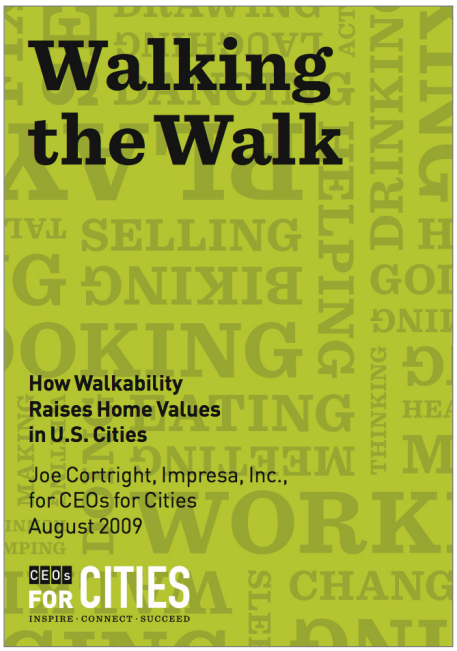
The CDC determined that creating and improving places to be active could result in a 25 percent increase in the number of people who exercise at least three times a week.[2] This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits . The establishment of a safe and reliable network of sidewalks and trails can have a positive impact on the health of nearby residents. The Rails-to-Trails Conservancy puts it simply: "Individuals must choose to exercise, but communities can make that choice easier."[3]

Economic Benefits

Walking is an affordable form of transportation. According to the Pedestrian and Bicycle Information Center (PBIC), of Chapel Hill, NC, the cost of operating a car for a year is approximately $5,170, while walking is virtually free. The PBIC explains, "When safe facilities are provided for pedestrians and bicyclists, more people are able to be productive, active members of society. Car ownership is expensive, and consumes a major portion of many Americans' income."

Walking becomes even more attractive from an economic standpoint when the unstable price of gasoline is factored into the equation. Oil prices more than quadrupled between 2000 and 2008, when gasoline prices topped $4 a gallon.[4] The unreliable cost of fuel reinforces the idea that local communities should be built to accommodate people-powered transportation, such as walking and biking. Many older North Carolina communities already have traditional mixed-use and generally compact land development patterns; when combined with new strategies for improving pedestrian transportation, many such communities could foster local reductions in auto- and oil-dependency.

There are also economic benefits of walkable communities from a real estate standpoint. The study by CEO's for Cities (*Walking the Walk: How Walkability Raises Home Values in U.S. Cities, 2009*) estimates how much market value homebuyers implicitly attach to houses with higher 'Walk Scores' (a Walk Score is a number between 0 and 100 that measures the walkability of any address; see www.walkscore.com for more info). The study looked at data for more than 90,000 recent home sales in 15 different markets around the nation. While controlling for key characteristics that are known to influence housing value, the study showed a positive correlation between walkability and housing prices in 13 of the 15 housing markets studied.[5]



This report can be found online at: www.ceosforcities.org/work/walkingthewalk

Trails also play a part in making communities more walkable, and they too have a positive economic impact. In a survey of homebuyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the second most important community amenity out of a list of 18 choices.[6] Additionally, the study found that 'trail availability' outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers. Findings from the American Planning Association (*How Cities Use Parks for Economic Development*, 2002), the Rails-to-Trails Conservancy (*Economic Benefits of Trails and Greenways*, 2005), and the Trust for Public Land (*Economic Benefits of Parks and Open Space*, 1999) further substantiate the positive connection between walkability and property values across the country.

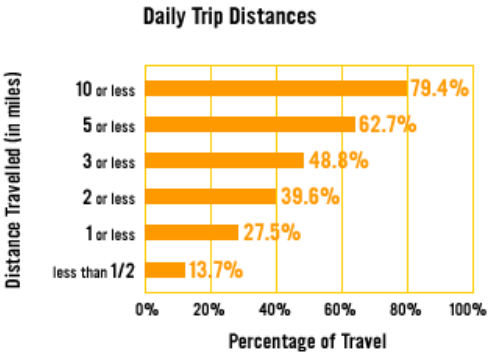
Environmental Improvements

When people choose to get out of their cars and walk, they make a positive environmental impact. They reduce their use of gasoline, which then reduces the volume of pollutants in the air. Other environmental impacts can be a reduction in overall neighborhood noise levels and improvements in local water quality as fewer automobile-related discharges wind up in the local rivers, streams, and lakes. Furthermore, every car trip replaced with a pedestrian trip reduces U.S. dependency on fossil fuels, which is a national goal.

Trails and greenways are also part of the pedestrian network, conveying their own unique environmental benefits. Greenways protect and link fragmented habitat and provide opportunities for protecting plant and animal species. Aside

Environmental benefits can be further promoted through walking by offering interpretive signs that educate passers by about the local environment and environmental systems.

from connecting places without the use of air-polluting automobiles, trails and greenways also reduce air pollution by protecting large areas of plants that create oxygen and filter air pollutants such as ozone, sulfur dioxide, carbon monoxide and airborne particles of heavy metal. Finally, greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.



'Daily Trip Distances' chart from the Bicycle and Pedestrian Information Center, www.pedbikeinfo.org

TRANSPORTATION BENEFITS

The National Household Travel Survey found that roughly 40% of all trips taken by car are less than two miles (see chart at left). By taking these short trips on foot, rather than in a car, citizens can have a substantial impact on local traffic and congestion. Additionally, many people do not have access to a vehicle or are not able to drive. According to the National Household Travel Survey, one in 12 U.S. households does not own an automobile and approximately 12 percent of persons 15 or older do not drive.[7] An improved pedestrian network provides greater and safer mobility for these residents.

QUALITY OF LIFE

Many factors go into determining quality of life for the citizens of a community: the local education system, prevalence of quality employment opportunities, and affordability of housing are all items that are commonly cited. Increasingly though, citizens claim that access to alternative means of transportation and access to quality recreational opportunities such as parks, trails, greenways, and bicycle routes, are important factors for them in determining their overall pleasure within their community. Communities with such amenities can attract new businesses, industries, and in turn, new residents. Furthermore, quality of life is positively impacted by a walkable community through the increased social connections that take place by residents being active, talking to one another and spending more time outdoors and in their communities.

By walking for our trips that are less than 2 miles, we could eliminate 40% of local car trips.

According to the Brookings Institution, the number of older Americans is expected to double [between 2000 and 2025].[8] All but the most fortunate seniors will confront an array of medical and other constraints on their mobility even as they continue to seek both an active community life, and the ability to age in place. Trails built as part of the pedestrian transportation network generally do not allow for motor vehicles. However, they do accommodate motorized wheelchairs, which is an important asset for the growing number of senior citizens who deserve access to independent mobility.

Children under 16 are another important subset of our society who deserve access to safe mobility and a higher quality of life. According to the U.S. Environmental Protection Agency, fewer children walk or bike to school than did so a generation ago. In 1969, 48 percent of students walked or biked to school, but by 2001, less than 16 percent of students between 5 and 15 walked or biked to or from school.[9]

According to the National Center for Safe Routes to School, "Walking or biking to school gives children time for physical activity and a sense of responsibility and independence; allows them to enjoy being outside; and provides them with time to socialize with their parents and friends and to get to know their neighborhoods."[10] In a 2004 Centers for Disease Control and Prevention survey, 1,588 adults answered questions about barriers to walking to school for their youngest child aged 5 to 18 years.[11] The main reasons cited by parents included distance to school, at 62%, and traffic-related danger, at 30%. Strategic additions to municipal trail systems could shorten the distance from homes to schools, and overall pedestrian and bicycle improvements can improve the safety of our roadways.

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1. American Public Health Association. (2010) The Hidden Health Costs of Transportation.

2. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2002). Guide to Community Preventive Services.

3. Rails-to-Trails Conservancy. (2006) Health and Wellness Benefits.

4. King, Neil. The Wall Street Journal: Another Peek at the Plateau. (2/27/08)

5. CEOs for Cities. (2010) Walking the Walk: How Walkability Raises Home Values in U.S. Cities.

6. National Association of Realtors and National Association of Home Builders. (2002). Consumer's Survey on Smart Choices for Home Buyers.

7. U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA). (2002). National Household Travel Survey.

8. Brookings Institution. 2003. The Mobility Needs of Older Americans: Implications for Transportation Reauthorization.

9. US EPA. (2003). Travel and Environmental Implications of School Siting.

10. National Center for Safe Routes to School. (2006). National Center for Safe Routes to School Talking Points.

11. Centers for Disease Control and Prevention. The Importance of Regular Physical Activity for Children. Accessed in 2005 from www.cdc.gov/nccdphp/dnpao/index.html

2 Existing Conditions

US 421 near Pinacle Dr.

Chapter Contents

Existing Conditions Overview

Field Inventory and Observations

Geographic Information Systems (GIS) Analysis

Public Comments about Existing Conditions

Past & Current Pedestrian-Related Programs

Review of Existing Plans

Current Institutional Challenges

Existing Conditions Overview

The Town of Boone is a popular resort town located in the mountains of northwestern North Carolina and is home to Appalachian State University (ASU). Boone's population is roughly 15,000, plus ASU has a total student population of more than 17,000. Additionally, as many as 30,000-40,000 visitors are often in Boone to watch ASU football games in the fall, to escape the heat in the summer, or to enjoy local ski resorts in the winter. While this level of activity and interest in the Town of Boone is in many ways beneficial, it also puts pressure on local traffic conditions, making alternative transportation infrastructure a crucial component in meeting the needs of both residents and visitors.

Field Inventory and Observations

The Town of Boone features a mixture of pedestrian conditions ranging from a pleasant walking environment Downtown, to busy commercial corridors with infrequent opportunities to cross the street comfortably. The following text on strengths and weaknesses corresponds to Map 2.1 Existing Pedestrian Facilities.

Existing Pedestrian System Strengths

In general, pedestrian-friendly areas such as Downtown have sidewalks, safe crossings, low speed limits, and pedestrian-scale land uses. Due to the surrounding topography, the Town of Boone is relatively compact, affording a realistic opportunity to walk for short trips. Also, commercial, institutional, and residential areas are interspersed, creating opportunities for walking—provided that the proper facilities are in place for pedestrians.

Key strengths of the existing pedestrian system are:

- Approximately 12.6 miles of sidewalk, mainly along major thoroughfares and in the Downtown Business District;
- Approximately five miles of greenway trails, mainly along the South Fork of the New River and its tributaries;
- Numerous traffic calming devices (specifically speed humps and signage) are provided throughout Boone, mainly where pedestrians are present and sidewalks are not always present.
- Crosswalks throughout majority of the Downtown Business District;
- Sidewalks along both sides of Hardin Street and Blowing Rock Road from King Street to Deerfield Road;
- Pedestrian-activated stoplights across three streets: Hardin Street, NC 105, and Rivers Street.

By providing key connections (such as this link between Pine and Hardin) the Town of Boone makes walking an attractive option for commuting to and from ASU and destinations along Hardin.

Existing Pedestrian System Weaknesses

The Town of Boone serves as the transportation crossroads for several regional highways, posing challenges to safe pedestrian travel, especially in places that lack sidewalks, crossing facilities, and have higher speed limits and traffic volumes. Key weaknesses of the existing pedestrian system are:

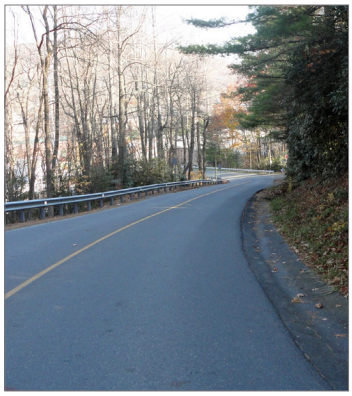
- Sidewalk gaps on major roadway corridors including:
  - US 421 west of Downtown and east of Jefferson
  - NC 105 west of Old Watauga High School
- The current trail system does not connect with ASU, Downtown, and many neighborhoods;
- General lack of sidewalks overall, other than on major thoroughfares and the Downtown area;
- Many AppalCart bus stops have no adjacent sidewalk, and no bench and/or shelter. In many cases, only a sign is present.
- Other weaknesses include non-standard sidewalk widths, high frequency of driveway cuts, lack of sidewalk ramps in some areas, faded crosswalks, and few pedestrian activated signals.

End of sidewalk leading to a footpath on NC 105, west of Old Watauga High.

Physical Barriers to Mobility

Barriers to mobility are elements of our physical environment that impede or deter pedestrians from making a walking trip. These can be real or perceived barriers. Key barriers to mobility in Boone include:

- Heavy traffic volume on the five-lane cross sections of US 321, NC 105, and US 421. These heavily-traveled, higher speed regional highways provide both real and perceived danger for pedestrians crossing these roads.
- Curb without ramps and curb ramps in disrepair present hazards and barriers to disabled persons and those using strollers or other wheeled devices.
- Many collector and residential roadways are steep, narrow, curvy, and lacking shoulder space to walk safely.



Steep, narrow, and curving residential and collector roadways present challenges to the construction of sidewalks or even shoulders.

Intersection Inventory

Table 2.1 (page 2-4) provides a summary of current conditions at each of Boone's major intersections. The inventory concentrates on intersections where surrounding land uses suggest a higher potential for pedestrian activity, such as higher density housing, commercial areas, and Downtown Boone. The major findings include:

- The majority of intersections inventoried are NCDOT owned and maintained, have high traffic volumes, and have sidewalk on at least half the sides of the streets approaching the intersections;
- There are few high-visibility marked crosswalks throughout Boone and there are many faded crosswalks that are barely visible;
- Most intersections lack pedestrian signals or signage for pedestrian crossings;
- Most intersections have at least some corners with curb ramps, but most of the curb ramps in place are missing truncated domes, are in disrepair, or are designed completely flat to accommodate the turning radius of trucks and buses;
- No use of curb extensions/bulbouts in the Downtown area;
- No use of pedestrian refuge median islands.

Crosswalks, curb ramps, and sidewalk missing adjacent to Hardin, just south of ASU.

Map 2.1 Existing Pedestrian facilities

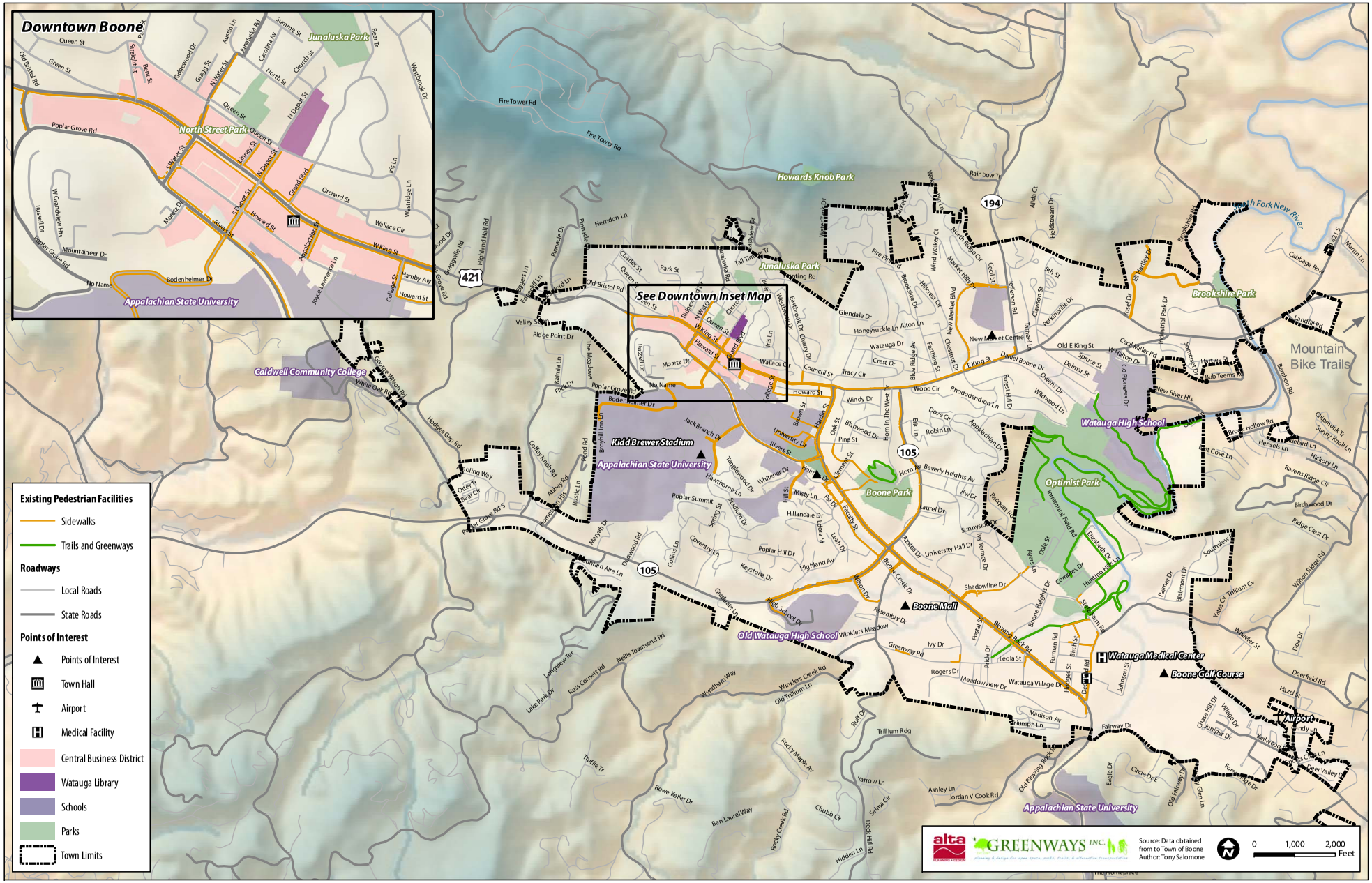


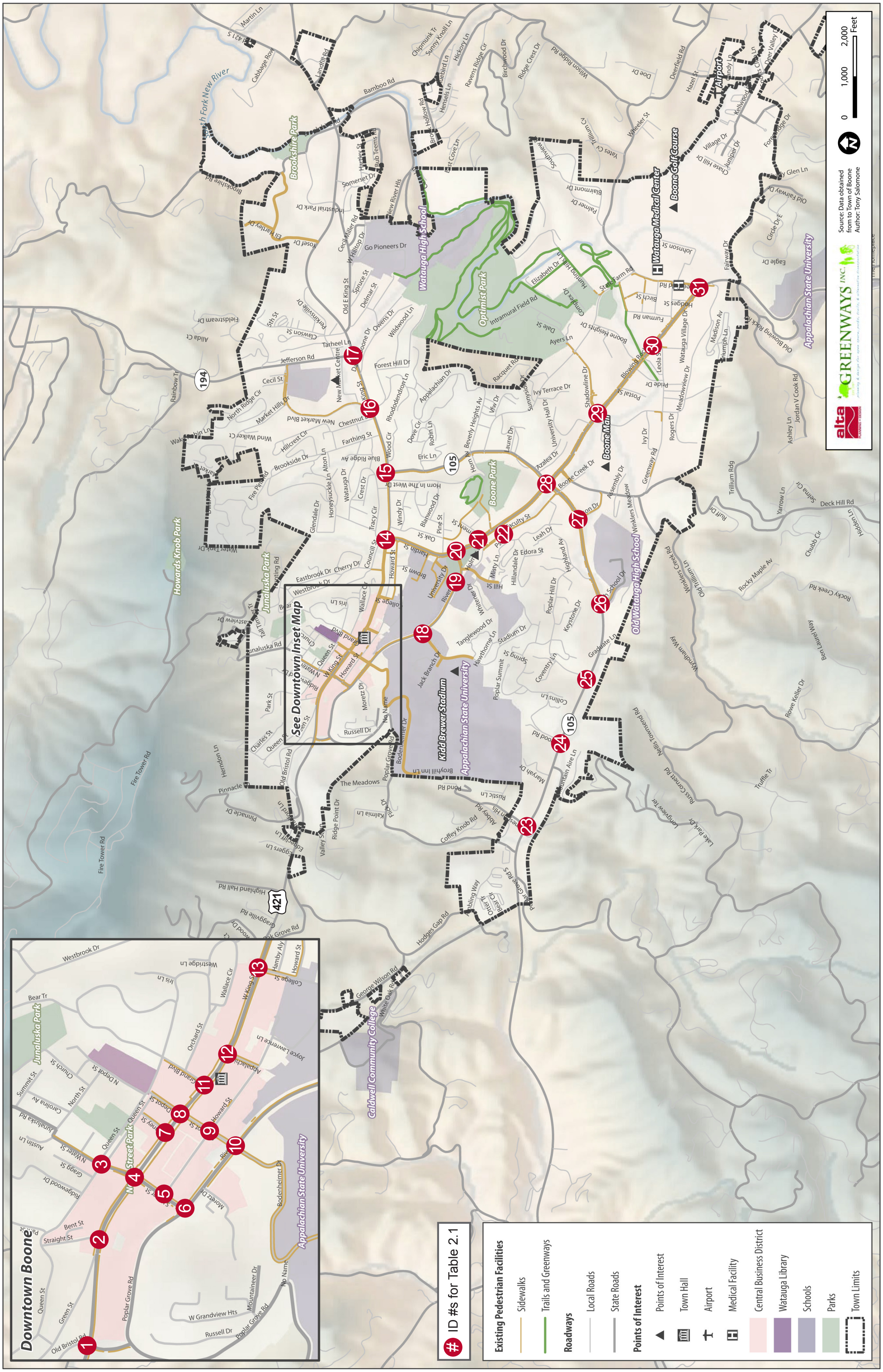
Table 2.1 Intersection Inventory

	Intersection	Stop Light/Signal or Stop Sign	Sight Distance (Good, Fair, Poor)	Ped. Signage (Y/N)	Curb Ramps (Y/N)	Curb Radius (Normal / Wide / Xtra Wide)	Crosswalks (Y/N)	Advanced Stop Line (Y/N)	Ped Signal (Regular / Countdown / None)	Sides of street with sidewalk	Median Island Width and Type	Est. Traffic Volume (High / Med / Low)	Speed Limit (MPH)	State or Town or ASU Owned & Maintained	Destinations Served:
1	W. King St. & Old Bristol Rd.	Sign	Fair	No	Yes*	Wide	No	No	None	3/8	None	High	35	State	Multi-family housing; senior/mental health services; Appalcart
2	W. King St. & Straight St.	Sign	Good	No	Yes*	Norm	No	No	None	3/5	None	High	20	State	Downtown; Appalcart
3	Queen St. & Water St.	Sign	Good	No	Yes*	Norm	No	Yes	None	4/8	5' Concrete	Med	20	Town	Downtown; Watauga Library; North St. Park; Appalcart
4	W. King St. & Water St.	Signal	Fair	No	Yes*	Norm	Yes*	Yes*	CD	8/8	None	High	20	State	Downtown; North St. Park; Appalcart
5	Howard St. & Water St.	Sign	Good	No	No	Norm	No	No	None	3/5	None	Med	20	Town	Downtown, apartments
6	Rivers St. & Water St.	Sign	Good	No	Yes*	Wide	No	Yes*	None	2/5	None	Med	25	Town	Downtown gateway; ASU
7	W. King St. & Linney St.	Sign	Fair	No	No	Norm	Yes*	No	None	4/5	None	High	20	State	Downtown; Watauga Library; North St. Park
8	W. King St. & Depot St.	Signal	Fair	No	Yes*	Norm	Yes*	Yes	CD	8/8	None	High	20	State	Downtown; Watauga Library; North St. Park
9	Howard St. & Depot St.	Sign	Fair	No	Yes*	Norm	Yes*	Yes*	None	6/8	None	Med	20	Town	Downtown
10	Rivers St. & Depot St.	Signal	Good	No	Yes*	Norm	Yes*	Yes	Reg.	8/8	None	Med	25	Town	Downtown; ASU; Appalcart
11	W. King St. & Grand Blvd.	Sign	Fair	No	Yes*	Norm	Yes*	Yes*	None	4/5	None	High	20	State	Downtown
12	W. King St. & Appalachian St.	Signal	Good	No	Yes*	Norm	Yes*	Yes	None	5/5	None	High	20	State	Downtown; ASU; Appalcart
13	W. King St. & College St.	Signal	Good	No	Yes*	Norm	Yes*	Yes	None	5/5	None	High	20	State	Downtown; ASU
14	King St. & Hardin St.	Signal	Fair	No	Yes*	Wide	Yes*	Yes*	None	7/8	10' Paint	High	35	State	Major intersection; commercial area; adjacent residential; Appalcart
15	E. King St. & NC 105 Ext.	Signal	Good	No	No	X-Wide	No	Yes*	None	2/5	None	High	35	State	Commercial area with adjacent residential
16	E. King St. & New Market Blvd.	Signal	Good	No	Yes*	Wide	No	No	None	3/8	None	High	35	State	School; commercial area; adjacent residential; Appalcart
17	E. King St. & Jefferson Rd.	Signal	Good	No	Yes*	X-Wide	No	No	None	2/5	None	High	35	State	School; commercial area; adjacent residential; Appalcart
18	Rivers St. & Stadium Dr.	Signal	Good	No	Yes*	Norm	Yes*	Yes*	None	5/5	None	High	25	ASU	ASU; major campus Intersection; Kidd Brewer Stadium; Appalcart
19	Rivers St. & Center St.	Signal	Good	No	Yes*	Norm	Yes*	Yes*	CD	8/8	None	High	25	ASU	ASU; major campus intersection; Appalcart
20	Hardin St./ Blowing Rock Rd. & Rivers St.	Signal	Good	No	Yes*	Norm	Yes*	Yes*	CD	5/5	8' Grass	High	35	State	ASU; major intersection; commercial/ restaurant area; Appalcart
21	Blowing Rock Rd & Holmes Dr.	Signal	Good	No	Yes*	Wide	No	No	None	7/8	None	High	35	State	Commercial area; adjacent residential; ASU; Boone Park; Appalcart
22	Faculty St. & Highland Dr.	Sign	Good	No	No	Norm	No	No	None	3*/8	None	High	25	Town	Commercial area; multi-family housing; Appalcart
23	NC 105 & Homespun Hills Rd.	Sign	Good	No	No	Wide	No	No	None	0/5	None	High	35	State	Commercial area; multi-family housing; Appalcart
27	NC 105 & Wilson Dr.	Signal	Fair	No	Yes*	Wide	Yes*	Yes	None	4/5	None	High	35	State	Commercial area with adjacent residential.
28	Blowing Rock Rd. & NC 105	Signal	Good	No	Yes*	Norm	Yes*	Yes	CD	8/8	None	High	35	State	Major intersection; commercial area; adjacent residential; Appalcart
29	Blowing Rock Rd. & Shadowline Dr.	Signal	Good	No	Yes*	Norm	No	No	None	5/5	None	High	35	State	Major commercial area.
30	Blowing Rock Rd. & Watauga Village Dr.	Signal	Good	No	Yes*	Wide	No	No	None	4/5	None	High	35	State	Major commercial area.
31	Blowing Rock Rd & Deerfield Rd	Signal	Fair	No	Yes*	X-Wide	Yes*	Yes	None	3/8	None	High	35	State	Commercial area & medical services; Appalcart.

* Indicates that the facility type present is either considered to be insufficient in number, or is in substandard condition (non-ADA compliant, worn out or in disrepair).

Corresponds to Map 2.2

Map 2.2 Intersection Inventory Locations



Geographic Information Systems (GIS) Analysis

Geographic Information Systems (GIS) data was analyzed from the Town of Boone, Watauga County, and the State of North Carolina. The analysis included information about past pedestrian-related accidents, popular destinations, land use, and various demographic patterns that may be useful in assessing need for future pedestrian facilities.

Pedestrian Crashes (Map 2.3)

Pedestrian crash data from 1990-2009 was provided by NCDOT and geocoded by the planning consultant, Alta/Greenways. Fifty-six accidents were mapped and can be seen in the following pedestrian crash map. The majority of crashes took place along US 421 and US 321, with others in Downtown Boone, ASU campus, and other locations. The highest pedestrian crash density can be seen on King Street, with eight crashes only a few blocks apart, near Depot & Appalachian.

Table 2.2 Pedestrian Crashes in Boone, 1990-20009 (NCDOT)

Ped Accident Location	*# of Accidents*
US 421	22
US 321	14
Rivers	6
NC 105	4
All other locations	10

Walk Score Map from the Boone 2030 Land Use Plan (Map 2.4)

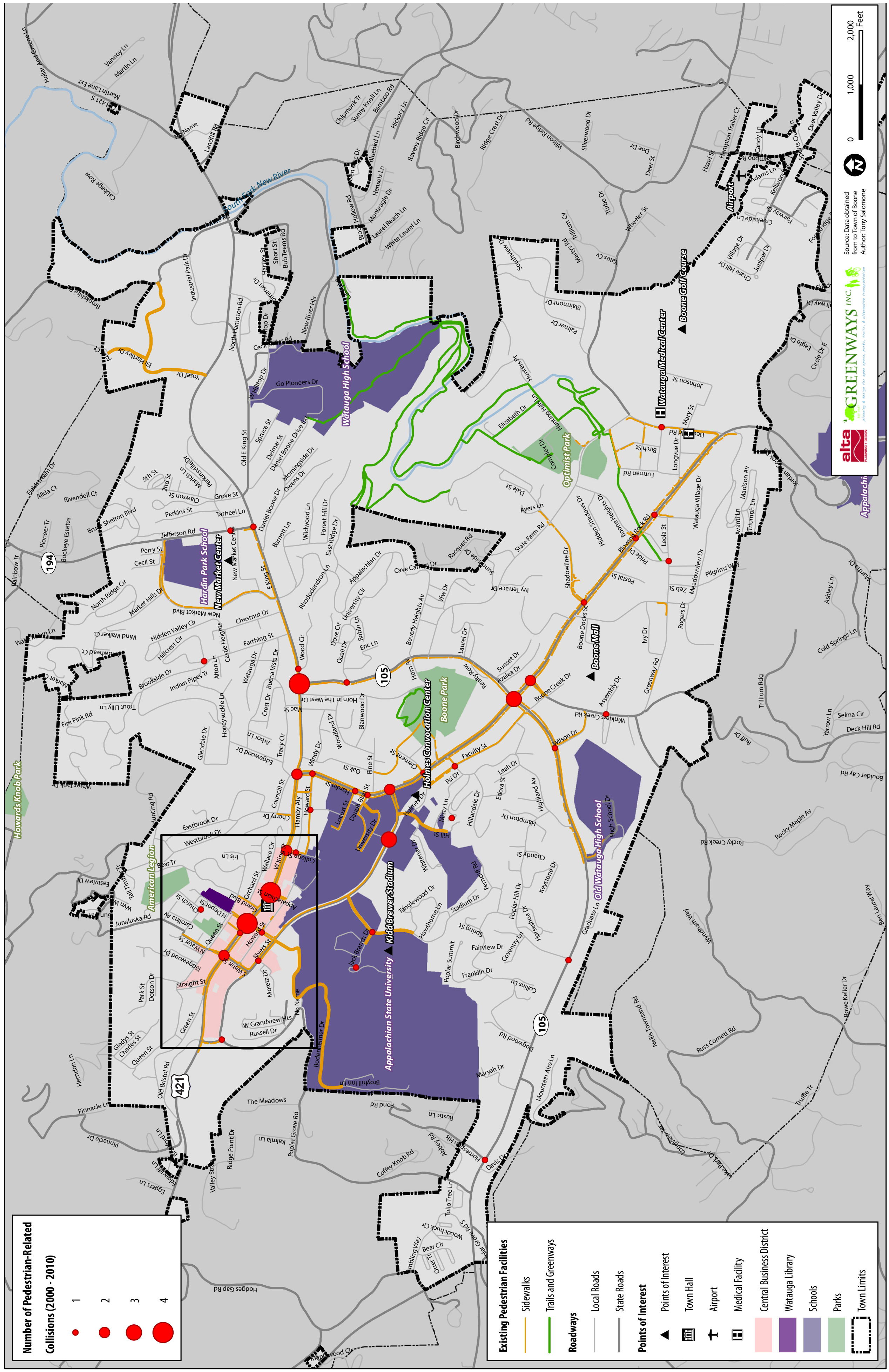
The Boone 2030 Land Use Plan (2009) included an analysis of walking conditions, which culminated in the map shown on page 2-8. The Boone Walk Score Map rates different areas in the Town of Boone on a scale ranging from 'Very Walkable' to 'Car Access Only'. Using www.walkscore.com, the planners at the time evaluated the "potential" walkability for each neighborhood and major residential area in Boone. According to the Walk Score web site "Walk Score helps people find walkable places to live. Walk Score calculates the walability of an address by locating nearby stores, restaurants, schools, parks, etc. Walk Score measures how easy it is to live a car-lite lifestyle—not how pretty the area is for walking."

A number of in-town neighborhoods scored remarkably well, but the map has one major flaw due to an algorithm that gathers information from Google Earth's extensive inventory of destinations such as churches, schools, restaurants, and shopping areas, without taking into account the journey. Rather, it only looks at how far people live from destinations as the crow flies, and does not evaluate the site conditions—the presence of a sidewalk or the area's topography—from point A to point B.

Census Maps (Map 2.5)

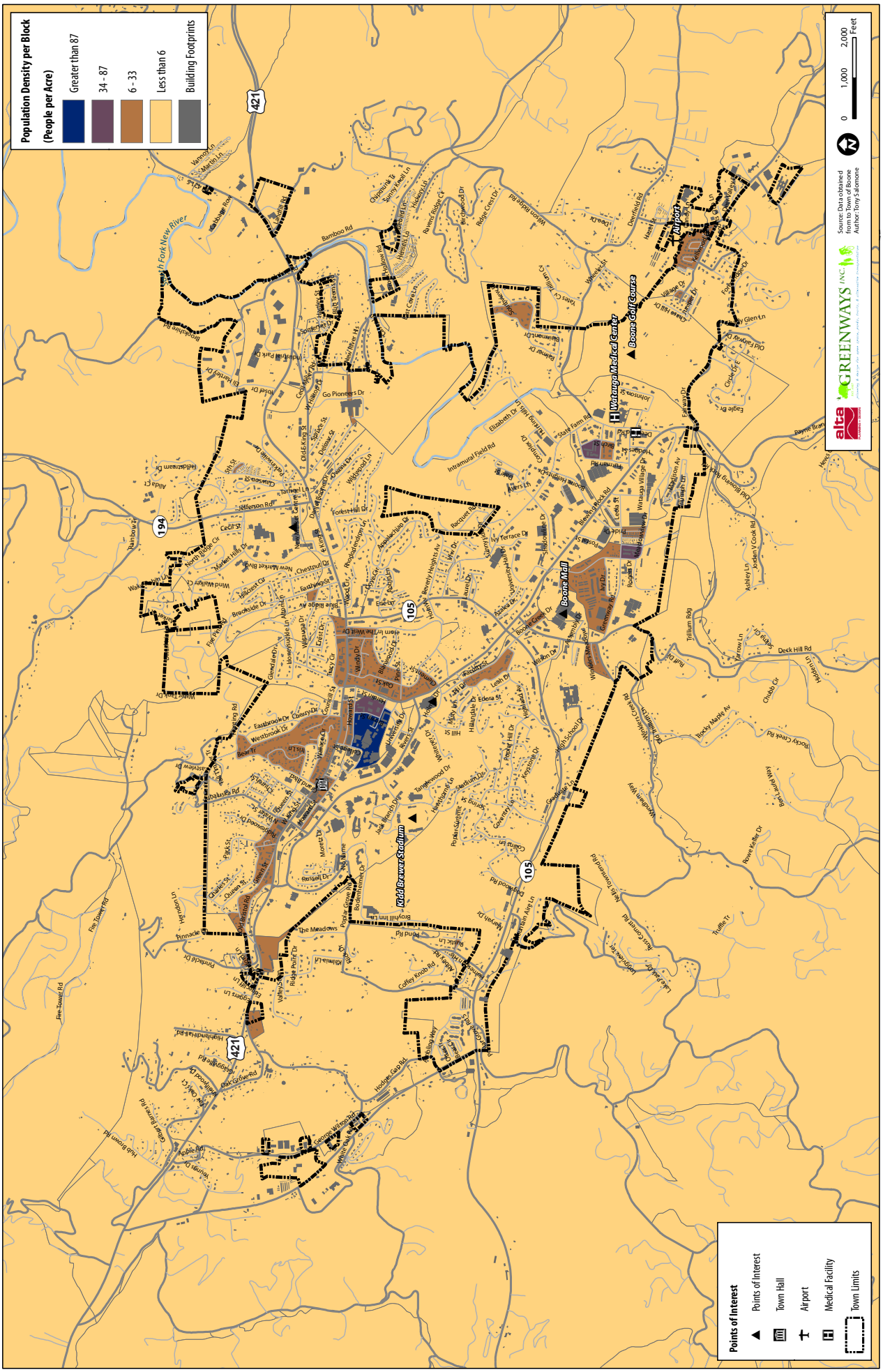
There is correlation between the Walk Score Map (page 2-8) and the Population Density Map (page 2-9). The higher density areas scored better for walkability, which is not surprising considering the main factor for the walk score was proximity of destinations. Building footprints are also shown on the density map as an overall indicator of existing development density, since the Census population data is from 2000. Other Census maps include the 'Walk to Work' map (page 2-10) and the 'No Access to Vehicles' map (page 2-11). These maps use information collected for the Census to show areas where there may be a greater need to accommodate pedestrians.

Map 2.3 Pedestrian-Auto Crash Locations

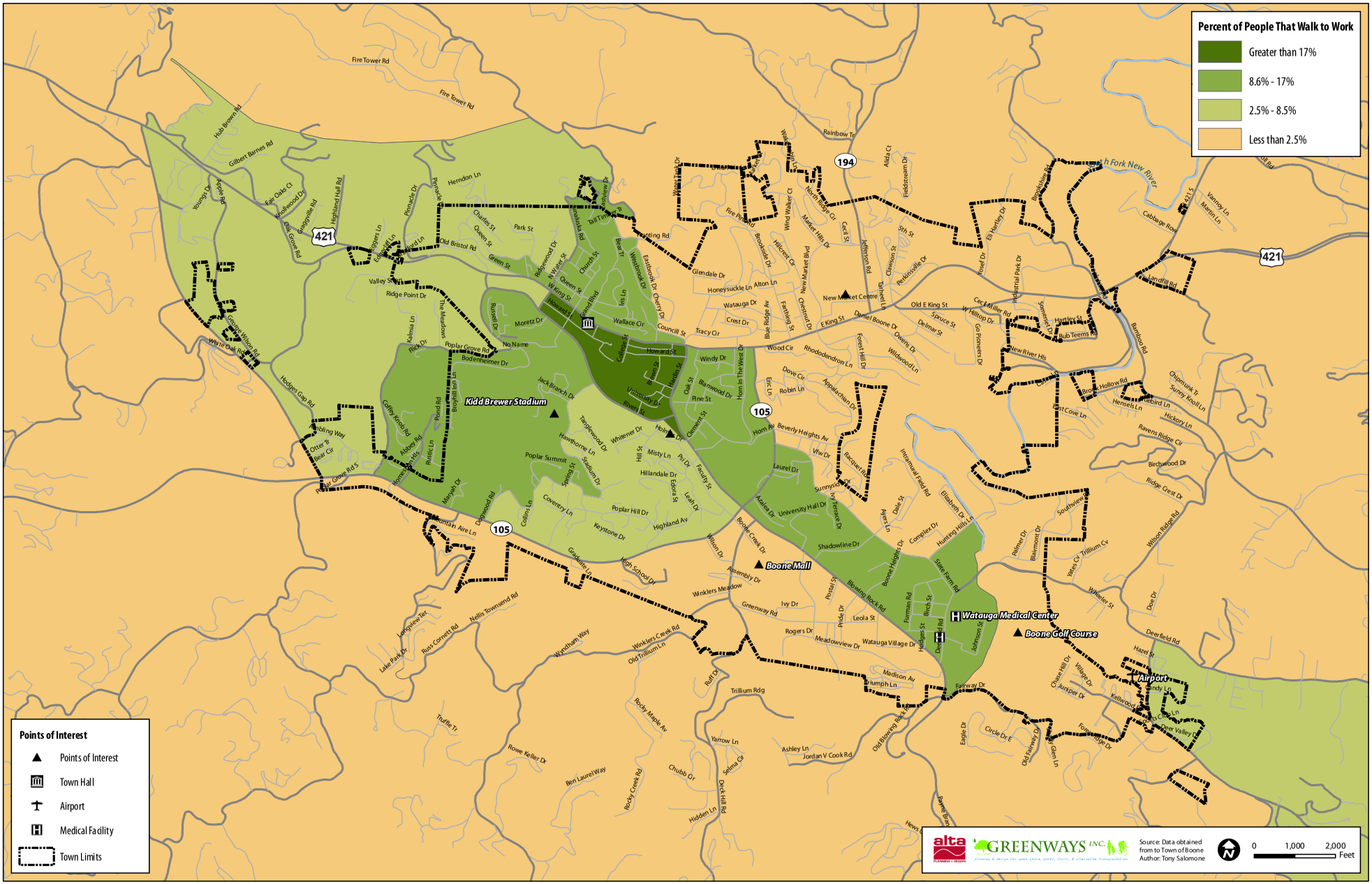


Map 2.4 Walk Score Map from the Boone 2030 Land Use Plan

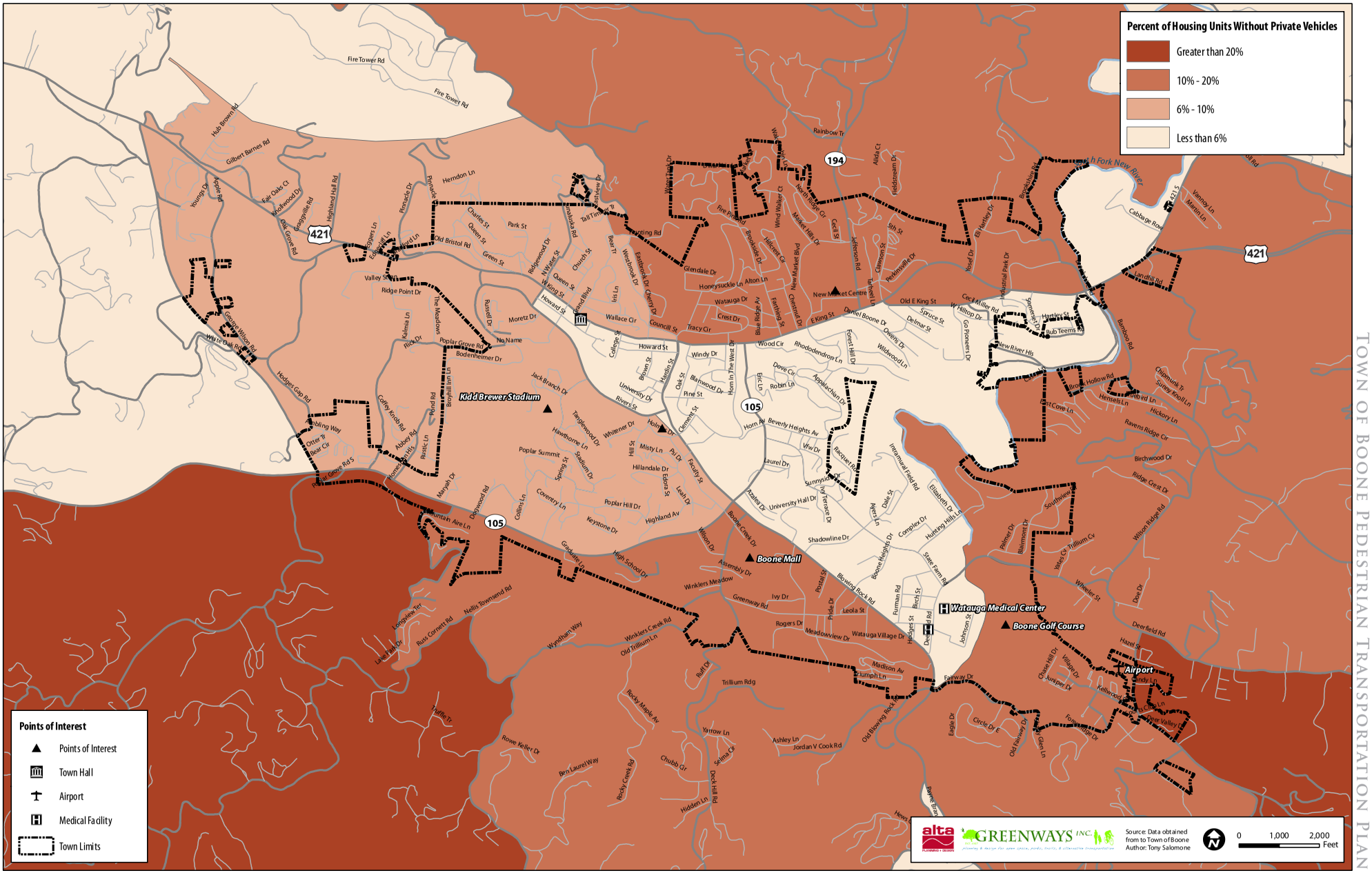
Map 2.5 Population Density



MAP 2.6 PERCENT POPULATION WALKING TO WORK



Map 2.7 Percent Population Without Access to a Vehicle



TRIP ATTRACTORS (MAP 2.6)

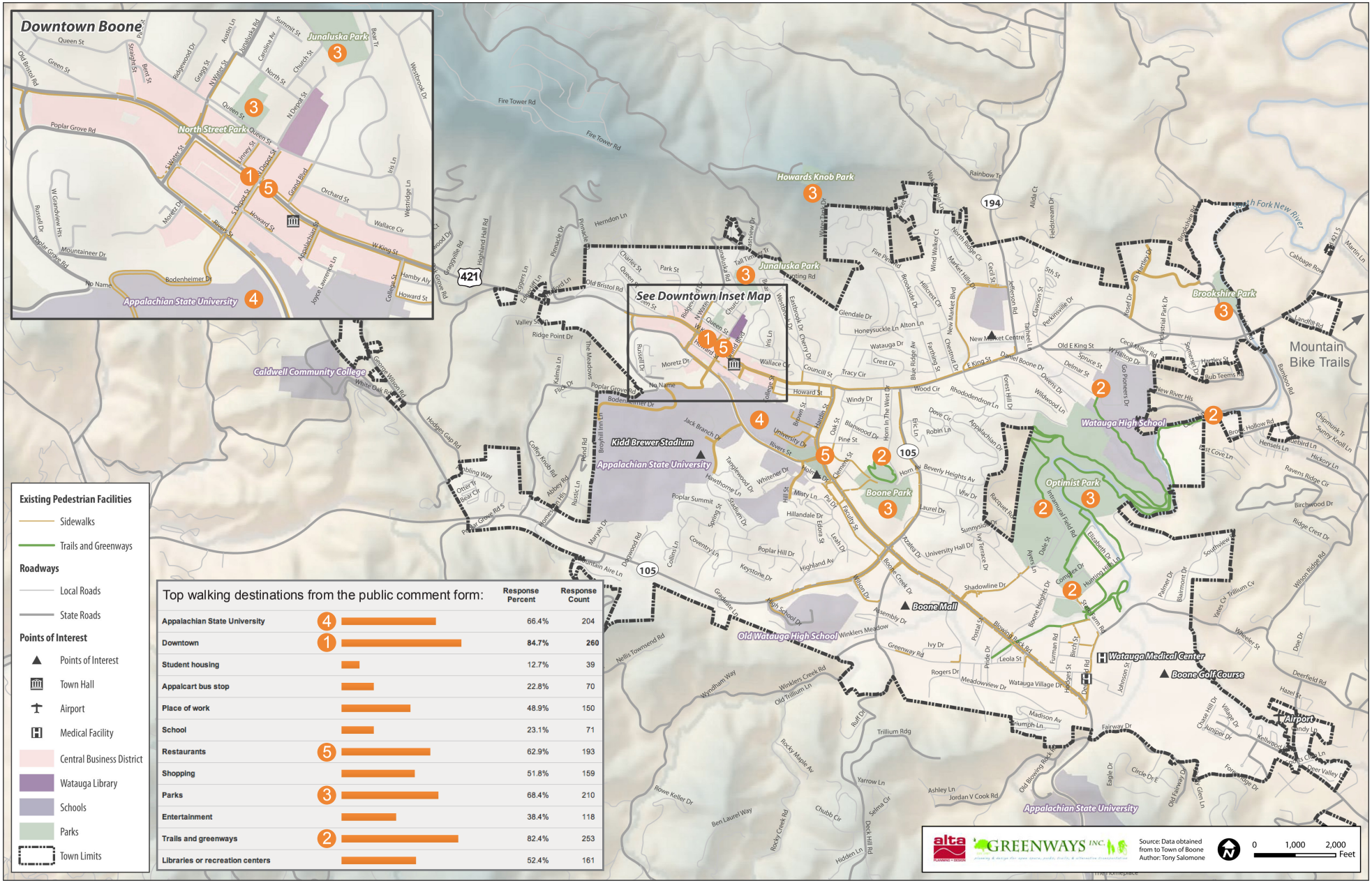
People currently drive, walk, or bike to a variety of destinations across Boone for various purposes. These potential destinations and points of origin for pedestrians are referred to in this document as 'trip attractors'. Examples include:

- Downtown Boone
- Greenway trails
- Parks
- Appalachian State University
- Restaurants
- Shopping locations (grocery stores, shopping centers, drug stores, banks, etc.)
- Higher density/Multi-family residential areas
- The Watauga County Farmer's Market
- Community and recreation centers
- Public destinations (schools, post offices, libraries, etc.)
- Historic and other points of interest
- Places of employment (office centers, retail areas, Downtown Boone)

Each of these categories of pedestrian trip attractors were considered when determining locations for recommended pedestrian improvements. They represent important starting and ending points for pedestrian travel and provide a good basis for planning ideal routes.

Trip attractor examples: Downtown Boone, ASU, and Strawberry Hill Arboretum

Map 2.8 Pedestrian Trip Attractors



Public Comments About Existing Conditions

The following charts and tables represent comments collected as part of this plan's public comment form that relate to existing conditions. There were more than 340 responses to the comment form.

How do you rate present pedestrian conditions in Boone? (select one)

	Response Percent	Response Count
Excellent	1.8%	6
Fair	**55.7%**	**190**
Poor	42.5%	145
	answered question	**341**

How important to you is improving walking conditions in Boone? (select one)

	Response Percent	Response Count
Very important	**78.7%**	**269**
Somewhat important	20.2%	69
Not important	1.2%	4
	answered question	**342**

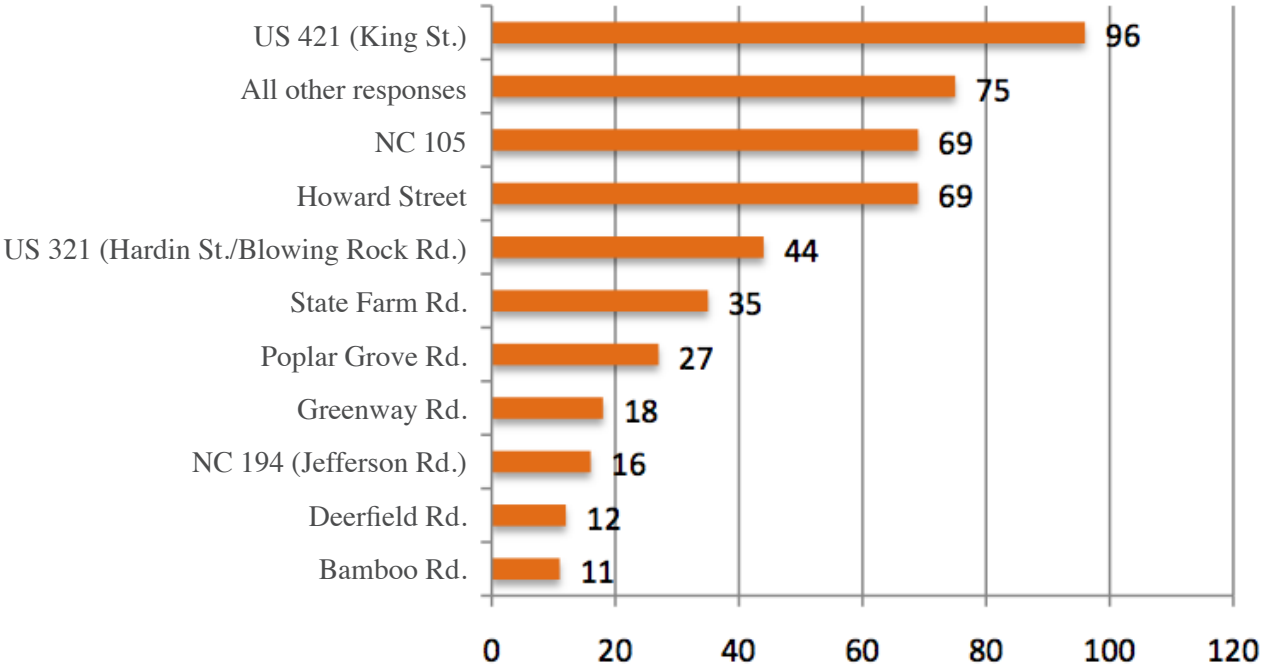
Would you walk more often if more sidewalks, trails, and safe roadway crossings were provided for pedestrians?

	Response Percent	Response Count
Yes	**91.1%**	**308**
No	8.9%	30
	answered question	**338**

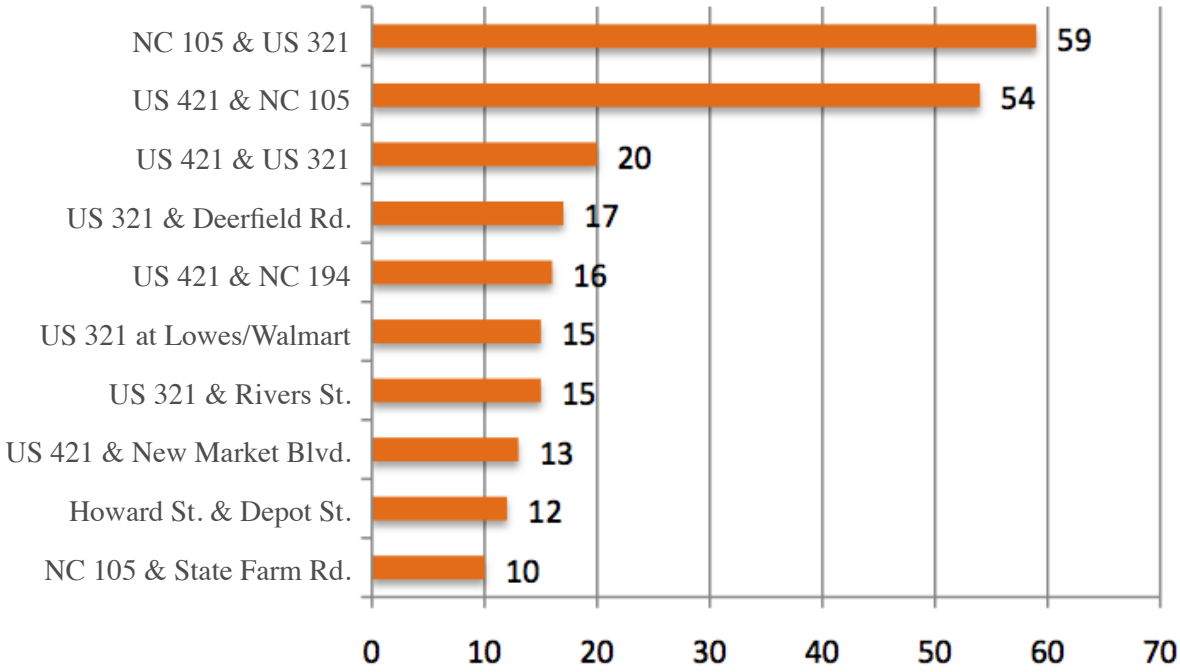
What factors discourage walking? Select all that apply.

	Response Percent	Response Count
Lack of sidewalks and trails	**85.4%**	**276**
Lack of crosswalks at traffic signals	53.3%	172
Lack of pedestrian signals at intersections	46.1%	149
Automobile traffic and speed	62.5%	202
Pedestrian unfriendly streets and land uses	69.0%	223
Steep hills	16.4%	53
Blind curves in roadway	39.9%	129
Lack of interest	3.7%	12
Lack of time	14.6%	47
Aggressive motorist behavior	37.2%	120
Sidewalks in need of repair	41.2%	133
Lack of nearby destinations	13.0%	42
Criminal activity	4.0%	13
Level of street lighting	18.6%	60
Lack of landscaping and/or buffer between sidewalks and road	36.2%	117
	answered question	**323**

Top Corridors Identified as 'In Need of Pedestrian Improvements' in the Public Comment Form



Top Intersections Identified as 'In Need of Pedestrian Improvements' in the Public Comment Form



Past & Current Pedestrian-Related Programs

In fiscal years 2008 and 2009, the Town of Boone partnered with the Appalachian District Health Department and they were awarded the *Childhood Obesity Grant* from the Robert Wood Johnson Foundation. The grant funded pedestrian and bicycle related activities that targeted school age children, and provided funding to construct a 0.75 mile connector trail from Watauga High School to the local greenway system. The connector has made possible the use of the greenway system for physical education and cross-country sports. Additionally, the Town of Boone participated in a state program that conducted a weight loss program for employees and their families called Be Active, promoting walking to reduce unneeded weight.

Current programs include:

Safe Kids - Both Boone Police and Fire departments conduct a program called Safe Kids, in which classes for school aged children are held several times a year on the safe crossing of streets, home fire safety, and bicycle safety.

Walk Boone Walk Safe - For this program, the Town of Boone distributes bookmarks to kids that contain information about pedestrian laws in North Carolina.

Bicycle Helmet Encouragement - The Town of Boone has a law that requires the use of a helmet while using a bicycle, and promotes helmet use by giving approved helmets to youth who request a helmet at Town Hall.

The Walk Boone Downtown & Area Map - The Town of Boone produced a map in conjunction with Eat Smart Move More that features sidewalks, greenway trails, trail distances, and popular destinations. The map also features walking tips and information about local destinations.

The Town of Boone also has three committees that meet regularly to discuss issues related to pedestrians: The Greenways, Parks & Gardens Committee; the Transportation Committee; and the Alternative Transportation Sub-Committee. These committees are valuable existing resources for future program development.

Review of Existing Plans and Policies

The following tables and text serve as a reference point for all pedestrian-related elements of existing plans and policy documents in the Town of Boone. Please refer to Chapter 4: Implementation for recommended policy changes and additions.

2006 Comprehensive Plan Update – Boone, NC

Page	Section	Project/Task	Contents
1.1 OVERAL OBJECTIVES			
15	Bikeways		Implement the planned system of bikeways as a legitimate transportation alternative. Unify with greenways and other facilities where possible
16	Pedestrian Movement		Encourage a system of sidewalks, paths, crosswalks and compact development patterns which make it easy to get around Boone on foot
16	Downtown		Support and enhance the cultural and historic significance of downtown Boone, and affirm its appealing, pedestrian orientation.
2.0 POLICIES FOR GROWTH AND DEVELOPMENT			
24	2.1.2 Commercial Development	Buffer large scale land uses from adjacent residential areas, but make such uses accessible from the neighborhood.	When plant material, fences, or walls are created or preserved as buffer strips, they should include pedestrian and bicycle paths which penetrate the buffer from the adjacent residential area.
25		Integrate small scale pedestrian oriented shopping and work places into the design of new neighborhoods.	
25		Consider automated neighborhood services	Such as walk-up post offices, automated bank teller machines… to be made readily available a t the pedestrian-oriented neighborhood scale
27		Policies and Actions	J. Highway Oriented Commercial uses shall be clustered along segments of major streets and contain land uses which are mutually compatible and reinforcing in use and design. Businesses shall be encouraged to coordinate their site designs with other nearby businesses. Design factors shall include, at a minimum, shared parking and street access, convenient pedestrian and vehicular movement, and consistent sign standards.
31	2.1.4 Agricultural and Rural Development	Policies and Actions	A. Farms and woodlands shall be recognized as an integral part of the planning area's open space system. A.1 …These areas should be considered in the planning for pedestrian ways, bikeways, greenways, and other open space needs.
33	2.1.5 Downtown		The master plan fro the downtown should include, at the minimum, the following elements: An idealized land use pattern including the placement, size and use of buildings and land, traffic flow, parking areas and pedestrian movements
35		Polices and actions	E.1 Evaluate the need for additional sidewalks and crosswalks and make physical improvements to existing sidewalks and crosswalks in the downtown area. *** E.4 Planned improvements shall emphasize needs of the pedestrian.
40	2.2.1 Transportation	Transit Sensitive Development	Applying the AppalCART Systems to the transit systems creates the opportunity to develop 'pedestrian pockets', that present convenient features that enhance pedestrian use, for example, heater or weatherized shelters, market services, convenient stores and coffee shops.
40		Central Medians	There is a need to place central medians down the middle of several of the town's major streets. Specific examples include Rivers Street and Blowing Rock Road. In addition to providing an aesthetic improvement to the roadway corridor, central medians can provide a "safe island" for pedestrians trying to cross these busy streets.
40		Bikeways	Boone is uniquely positioned to develop an outstanding combination bikeway-greenway system. The Town's adopted "Alternative Transportation Plan" short and long term plans for development of greenways, pedestrian ways, and mass transit.
41		King and Howard Streets Downtown	Retain the present character and design of King Street, in terms of pedestrian and automobile movement and on-street parking

42		Pedestrian Crossings	Another specific recommendation involves the placement of one or more elevated pedestrian crossings over River Street in conjunction with a landscaped central median barrier to effectively eliminate unsafe, at-grade pedestrian crossings.
42		Policies and Actions	B. Planned systems of pedestrian ways, bikeways, greenways, and similar facilities shall be encouraged as energy efficient and environmentally sound transportation alternatives. Site planning that incorporates secure bicycle storage at places of living, working or schooling, shopping, and gathering shall be required, where appropriate
43			D. Properly designed major street intersections containing right and left turn bays shall be encouraged where crosswalks and pedestrian traffic do not have first priority
			G. The operational success of the area's mass transit system shall be enhanced through the encouragement of compact, transit sensitive development patterns. Site planning that incorporates transit stops and convenience clusters shall be required, where appropriate. G.1 Evaluate and amend site plan standards to include provisions for transit stops, sidewalks and pedestrian ways, bikeways and secure bicycle storage.
44			L. All future road construction within the Town shall be examined for bike and pedestrian feasibility. Wherever possible, compatible bike lanes and pedestrian walkways shall be implemented in conjunction with accompanying road construction.
51	2.2.3 Parks, Recreation and Open Space	Policies and Actions	D. Land acquisition for new recreation sites in advance of need shall be encouraged to achieve desirable locations at cost effective levels. D.2 Consider the establishment of a land dedication provision or fees in lieu of land dedication in the Town's development regulations. Coordinate such dedications fully with pedestrian, bikeway or greenway space objectives.
63	2.3.1 Community Appearance		Give high visibility, pedestrian-scaled area first priority. king Street and Howard Street are on-going project priorities for the Town of Boone.
73	2.3.3 Housing and neighborhoods		In regard with new housing development, this development should be designed to be supportive of bikeways, pedestrian ways, and the AppalCART transit system whenever possible.
73		Policies and Actions	A. The protection and rehabilitation of viable neighborhoods shall be encouraged to insure their continued existence as a major housing source and as a reflection of the area's image as an attractive, highly livable community.
74			B. Street system designs which discourage through traffic on purely local streets while allowing for free circulation within the neighborhood shall be encouraged. B.1 Update the Town's standards for subdivision street layouts, emphasizing circulation between neighborhoods and the ability of pedestrians and bicyclists to travel on back streets throughout the town.

BOONE, NC SMART GROWTH AUDIT 2007

Page	Section	Contents
1 MIX LAND USES		
16	Develop Strategic Land Use Master Plan	A land use master plan would identify with precision the type of development that is desired for each part of Boone and appropriate locations, density, and design standards for such
18	Apply the Transect	As part of a town wide plan, the Transect model should be applied at the "pedestrian shed" level (1/4 mile radius or a five-minute walk).
18	Allow Mixed-Use Development by Right	Mixed-Use Districts outlines by pedestrian oriented designs are encouraged and have been adopted by Boone. However, the problem with these districts is that they are optional and subject to approval process under Town Council regulations.
20	Details for Form-Based Codes	5. Streets should be pedestrian-scaled and multimodal 9. Neighborhoods should be compact, pedestrian-friendly, and mixed-use.
2. COMPACT BUILDING DESIGN		
21	Opportunities and Challenges	"Housing should be encouraged that is mass-transit and pedestrian friendly"

23	Concentrate Commercial Development in Mixed-Use Nodes	This report suggests that the Town consolidate commercial zoning into nodes that can become truly mixed-use districts by: • Allowing greater range of uses and intensity of development (coupled with pedestrian-oriented design standards) in the nodes to facilitate walkable, commercial centers.
23	Locate Highest Density Residential Near Existing and Future Mixed-Use Centers	The best locations for high density development should be evaluated in the context of an overall community master plan effort.
24	Reduce Setback/Dimensional Standards	By permitting a reduction in front setbacks—such as 10 feet instead of 25 feet—house lots can increase the private, useable space of the rear yard as well as the building envelope and increase pedestrian friendliness of the street by bringing buildings closer to the sidewalk.
28	Revise Screening / Buffer Standards	The distance between land uses and creating mixed-use centers of activity, negatively affect pedestrian access to goods and services because they have to travel further to get to destinations that are severely affected by setbacks.
4. CREATE WALKABLE COMMUNITIES		
35	Vision	• "Create a walkable community" • "Create a pedestrian friendly downtown" • "Improved streetscape (lighting, landscaping, etc.), pedestrian friendliness, and sidewalks that connect to other parts of town."
36	Recommendations	Census data shows that Boone has one of the highest rates of pedestrian commuters of any community in the state, most likely due to the number of students who walk to ASU
36		Boone also has good basic requirements for sidewalks in its UDO and is spending money on sidewalk and other pedestrian improvements in neighborhoods and downtown.
36		• Sidewalks should be required in new developments based on a number of objective standards such as density, street type, and development context (rural versus urban). • Sidewalks should be required on both collector and arterial streets in the urbanized area. • The sidewalk requirement for streets abutting new subdivisions is good. However, developers should also be required to build or improve sidewalks and other streetscape amenities in the public right of way for all development projects except individual single-family homes. • Minimum sidewalk widths should generally be 5 feet. • In higher density and mixed-use developments and along collector and thoroughfare streets sidewalks should be on both sides of the street with a width of six to twelve (6-12) feet based on use type. Pedestrian-friendly streetscapes, particularly on streets with higher traffic volumes and commercial uses, should include the planting of canopy trees such as oaks and maples at a regular interval.
38		Adopt a Pedestrian Network Requirement Town officials should consider an amendment to the UDO to require that all new development or expansions to existing development provide sidewalk connections from the buildings on the site to the existing pedestrian network, including surrounding sidewalks and trails.
38		Support Safe Routes to School Initiatives and Infrastructure
38		Make Pedestrian Crossings Safer High-visibility crosswalk markings, reduce turning radios, improve curb ramps, pedestrian/bicycle activated signals, mid block crossings, and pedestrian islands where right turn lanes are present.
39		Lobby NCDOT for other Walkable Facilities Especially referring to the US 421 widening, the town should lobby to include: low design speeds and posted speeds, pedestrian refuges, small curb radii, separation between roadway and sidewalks (preferably with street trees), bike lanes, sidewalks that are at least 6 feet wide on thoroughfares, restricted driveways and medians, and pedestrian friendly intersections (including right turn islands and pedestrian countdown signals).
39		Continue Walkability audits
39		Pedestrian - oriented design standards Boone recently adopted Mixed-Use Districts.
40		Restrict Drive-Thrus in Walkable Districts
5. COMMUNITIES WITH A STRONG SENSE OF PLACE		
42	Recommendations	Require Attractive Streetscapes
7. EXISTING COMMUNITIES		
59	Recommendations	Develop a Downtown Master Plan

8. PROVIDE A VARIETY OF TRANSPORTATION CHOICES		
63	Opportunities and challenges	"Oak Street was made one way and narrowed. Delivery trucks are parking over bike lanes, which are trying to foster pedestrian, bike transportation."
65	Recommendations	Update Thoroughfare Plan and Prepare Master Plan for Transportation …provide attractive route alternatives from neighborhoods to major activity centers for motorists, transit, cyclists, and pedestrians.
65		Update Plans for Transit, Pedestrian, & Bicycle Infrastructure Plan updates should include greenway linkages, on-street facilities such as bike lanes and sidewalks, as well as off-street facilities such as bicycle and pedestrian connections between existing residential neighborhoods and across waterways. Such a network should be implemented through the development process and as opportunities and funding arises through roadway projects or other capital funding.
66		Establish Retrofit Connectivity Program Development Context to the area
69		Improve Roadway Connectivity Standards
70		Apply (and enforce) appropriate urban speed limits on major streets Regulate speeds to 20MPH in pedestrian areas
71		Allocate Transportation Funding Based on Smart Growth Priorities The Town should compare at all of its current funding for transportation projects (including parking, resurfacing, maintenance, transit, etc.) against the population in the town that does not drive due to age, income, or physical disability (typically around 30%, although probably higher in a college town). Set a goal that funding for transit and active modes (i.e., walking, bicycling) begin to reflect that portion of the population, at least.

Boone 2030 Land Use Plan (Adopted October 2009)

Page	Section	Contents
3. CIVIC DIALOGUE AND PARTICIPATION		
23	Public Input & Communities Priorities	In summary, the public would like to see the following improvements: 3. Provide transportation choices; Make it practical for people to bicycle/walk 5. Develop a vibrant downtown 6. Create attractive streetscapes and corridors 7. Encourage denser /pedestrian-friendly, mixed-use Development
24	Advisory Committee	One of the goals of the advisory committee is for Howard St to be a pedestrian safe walking area.
25	Community Survey	Town staff, the Advisory Committee, and the consultants developed and distributed a survey to elicit feedback on community priorities. According to the 132 completed surveys, some of the top 10 community objectives are: Implement the planned system of bikeways. Unify with greenways and other pedestrian facilities. Improve and expand the pedestrian network Pedestrian and bike bridges (e.g., NC 105 at Faculty St)
4. THE FRAMEWORK PLAN		
35	Vision for Boone 2030	To have: Vibrant, pedestrian-friendly downtown with adequate parking (wider, brick sidewalks, streetscape furnishings) Greenway systems: pedestrian and bikes and creeks. More multi-modal route options
37		Subdivide regional sectors into transect zones and develop/apply new context-based development standards .
6. TRANSPORTATION		
66	Principle 3: Build Complete Streets	Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street.
67	Principle 5: Promote Walkability	Several aspects contribute to the walkability of a community. In general, pedestrians need safe, comfortable, and accessible routes covering the entire Town of Boone. A pedestrian system can encourage walking as a viable mode of transportation as well as a recreational activity. Strategic planning plays a vital role in the planning of a connected system of pedestrian facilities. In this way, policy commitments that actively encourage the development of pedestrian facilities can aid the Town in ensuring that pedestrian facilities are implemented.

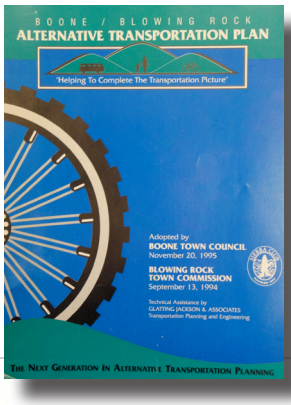
72	Capital Improvements	Consider capital improvements for downtown including: improved pedestrian and intersection safety; consider reverse angle parking, and consider a festival street section for Howard Street. Implement by Town of Boone.
72	Downtown Transportation	Recommendations Improve pedestrian and intersection safety Consider a Festival Street Section for Howawrd Street
73	US 421/East king Street	Recommendations Implement planned Pedestrian improvements with the US 421 Widening The cross section should include the following elements: A planted median instead of the concrete monolithic median as proposed to aesthetically soften the cross section; The use of high-visibility crosswalks at both signalized and unsignalized intersections; and The use of a "sharrow" marking on the wide outside lane to emphasize shared use with cyclists and to give guidance to cyclists on safe lane positioning.
75	US 321 South	Recommendations Consider an Urban Boulevard as One Possible Long-term Solution for US 321. This is a long term vision that would include walkable, parallel access roads along US 321 Implement Pedestrian and Bicycle Improvements to Corridor
76	Other Roadway recommendations	Reallocate Space on Rivers and Hardin Streets to Other Modes of Transportation King Street to Rivers Street have excess roadway capacity that could be reallocated to create a street that is safer for all users and at the same time more walkable, bikeable, and attractive, while adding needed on-street parking.
81	Bicycle and Pedestrian Access & Mobility See map: Pedestrian Recommendations page 82	Complete a Pedestrian Master Plan. The Town should complete a pedestrian master plan to identify locations and prioritize funding for sidewalks, and Safe Routes to School facilities and safety programs. Such a plan can be partially funded through an NCDOT grant. Recommendations from the plan should be implemented through the Town's Capital Improvement Plan (CIP) and through State and local transportation and development projects. Consider partnering with the University for funding and implementation of the plan.
		Make Changes to the Unified Development Ordinance. The 2007 Boone Smart Growth Audit recommended numerous changes to the Town's UDO that would create a more walkable community. These should be prioritized for integration into the current UDO.
		Prioritize sidewalk construction around identified nodes and key pedestrian routes. • Link disconnected segments of sidewalk around activity nodes in the Town. • Provide additional sidewalks near the periphery of town, including King Street between Green Street and NC 105 Spur; and State Farm Road between NC 105 and Deerfield Road; • Add side paths along Poplar Grove and Stadium Drive (cantilevered if necessary) to provide pedestrian access to the university from the south side • Incorporation of an approximately 20 foot wide pedestrian promenade into the US 321 Multi-way Boulevard Concept.
		Improve pedestrian safety at intersections and crossings. Improve pedestrian safety along major corridors through high-visibility crosswalks, activated strobe signage, pedestrian refuge medians, and lighting at appropriate locations. Provide pedestrian signal heads and countdown clocks at all signalized intersections within the Town.
SECTION 7: DOWNTOWN BOONE		
87	Short Term Improvements	• New street paint (Depot & River) [Pedestrian cross walk enhancements] • Pedestrian scaled lighting on King Street (north side very dark @ night) • Sidewalk cafes
89	Recommendations	Create a green pedestrian alley/public space between King and Howard Streets
SECTION 8: FOCUS AREAS		
106	Kraut Creek/Boone Creek Restoration concept	Showcase the site as a "green" redevelopment opportunity Restoring the creek to its natural state would be the first step to creating this living laboratory. A public green space with pervious walking trails would be another component of the design with strategic pedestrian crossings at different locations along the creek.
109	Redevelopment of Kmart site	Eventually, the site can begin to fill in with the same amount of square footage as a big box (around 100,000 sf) but with a mix of uses and parking hidden behind buildings. This mixed use development creates not only a pedestrian friendly environment but an economically sustainable opportunity.

TOWN OF BOONE UNIFIED DEVELOPMENT ORDINANCE (UDO)

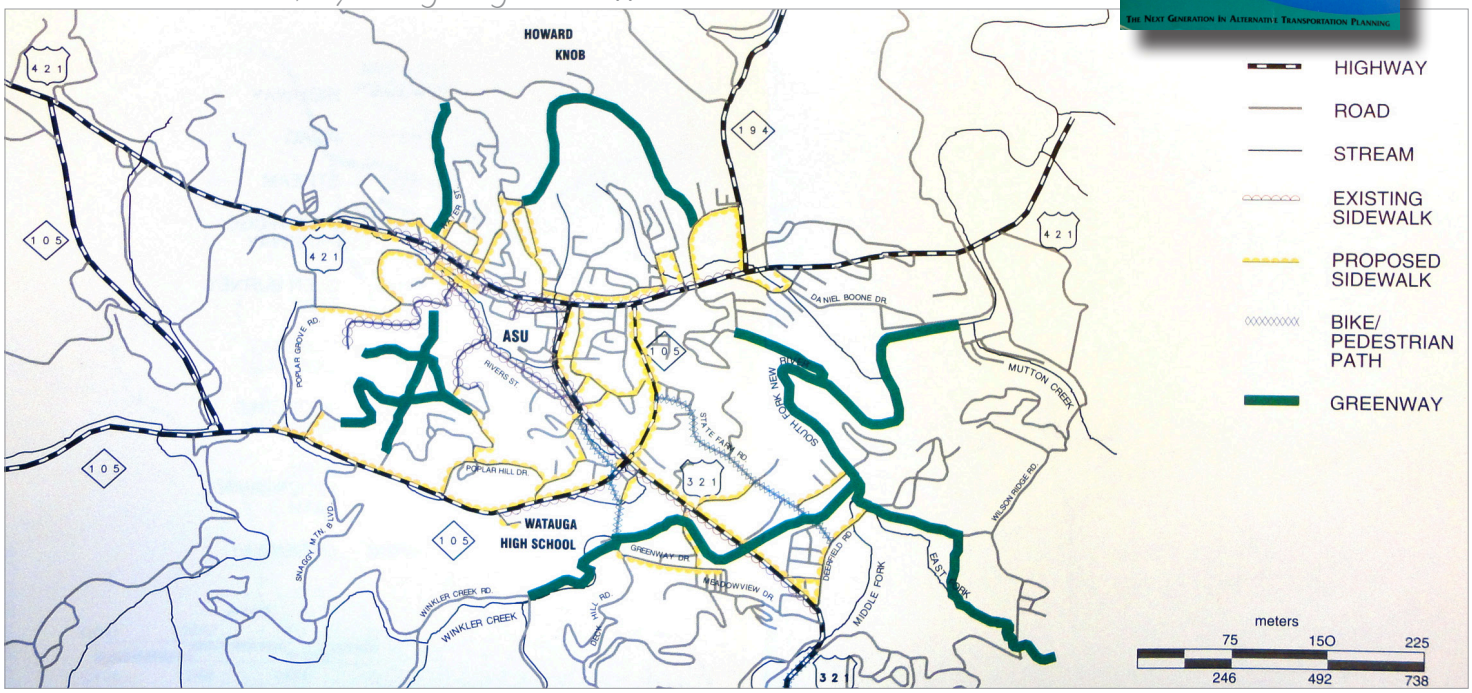
Page	Policy/Regulation/Recommendations	Contents
9-1 ARTICLE IX: ZONING DISTRICTS AND ZONING MAP		
149	Section 158. Corridor Districts	e. The requirements for all properties 12. Coordination of Access: Access shall be provided and coordinated between adjoining properties for vehicles, pedestrians and bicycles. Pedestrian linkages must be in an acceptable form such as sidewalks, maintained gravel paths and paved walks
11-1 ARTICLE XI: SUPPLEMENTARY USE REGULATIONS		
	Section 179. Mixed Use Districts Established: The criteria applies to Muti-Family residential uses allowed in the Central Business District (B-1), Multi-family residential uses allowed in neighborhood Business District (B-2), and Multi-Family uses wholly or partially on Property Zoned B-3General Business Outside the Corridor District but Proximate to Mayor Streets	…established to introduced some residential uses into areas with commercial designations. . .and [to provide] options for pedestrian-oriented lifestyles." **[b]** Multi-family residential uses, either as the result of new construction or conversion, are allowed in the Central Business District (B-1) only if the projects in which they are included meet all the following criteria: 9] Building facades may be no further than 0'-0" from the established street setback line, except where necessary to provide landscaped courtyards, plazas, pocket parks, other pedestrian oriented amenities, or when there would be interference with public utilities. 11] Pedestrian weather protection such as awnings or canopies are encouraged along the public street but may be placed only in accordance with an encroachment agreement authorized by the Town Council.
14-1 ARTICLE XIV STREETS AND SIDEWALKS		
232	Section 237. Street Width and Drainage Requirements in Subdivisions	**[a]** Street rights-of-way are designed and developed to serve several functions: (i) to carry motor vehicle traffic, and in some cases allow on street parking; (ii) to provide a safe and convenient passageway for pedestrian traffic; and (iii) to serve as an important link in the town's drainage system. In order to fulfill these objectives, all public streets shall be constructed to meet either the standards set forth in Subsection [b] or Subsection [c].
235	Section 242. Road Requirements in Unsubdivided Developments	**[a]** Within unsubdivided developments, all private roads and access ways shall be designed and constructed to facilitate the safe and convenient movement of motor vehicle and pedestrian traffic. Widths of roads, use of curb and gutter, and paving specifications shall be determined by the provisions of this ordinance dealing with parking (Article XIX) and drainage (Article XVII)…
236 – 238	Section 243. Pedestrian Circulation and Sidewalk Requirements. (Check section for detail information)	The purpose of this section is to provide minimum standards for the provision of sidewalks within the Town of Boone and the Town of Boone extraterritorial planning jurisdiction.
18-1 ARTICLE XVIII SIGNS		
328	Section 330. Signs Permitted in the B-2 District	**[a]** The neighborhood business district provides a variety of commercial services. It is oriented to vehicular traffic as well as pedestrian traffic. The signs allowed in this area permit an efficient means of information transfer consistent with the size of the streets and speed of the traffic.
19-1 ARTICLE XIX PARKING		
358 - 363	Section 355. Bicycle Parking	[6] Bicycle parking shall be located so as to avoid impeding or creating a hazard to pedestrians from parked or approaching bicycles, and to avoid creating a hazard to bicyclists or bicycles from automobiles or other motor vehicles.
22-1 ARTICLE XXII COMMERCIAL DEVELOPMENT APPEARANCE STANDARDS		
397	Section 393. Building Design	**[a]** Pedestrian-Orientation The intent of this section is to provide a design of buildings that support a safe and attractive pedestrian environment. [a] The main building entrance, when not facing the primary public way, shall provide a safe and convenient access for pedestrians from the main building entrance to the primary public way. The pedestrian way must provide additional landscape amenities.
404	Section 396. Lighting	**[c]** The following are specific standards for lighting intensity based upon the land use involved. Values are presented in allowable foot-candles (fc) maintained (measured horizontally) at grade and are to be averaged throughout the site to avoid hot spots, i.e. areas of extreme light intensity relative to the remainder of the site: For Pedestrian areas ad sidewalks the minimum light intensity is 0.2 fc, and maximum is 1.0 fc

Boone/Blowing Rock Alternative Transportation Plan (1995)

This 1995 plan laid the groundwork for much of the alternative transportation facilities, programs, and initiatives in existence today for Boone, including the Alternative Transportation Subcommittee. The plan makes the case for why alternative transportation planning is necessary, and analyzes demand and level of service for alternative transportation. The plan also features specific recommendations for pedestrian facilities, as shown in the 'Boone Walkways Long Range Plan,' which identifies proposed sidewalks, bike/ped paths (sidepaths), and greeways (multi-use trails). Since adoption, the Town of Boone has made great strides in installing many of the recommended facilities.

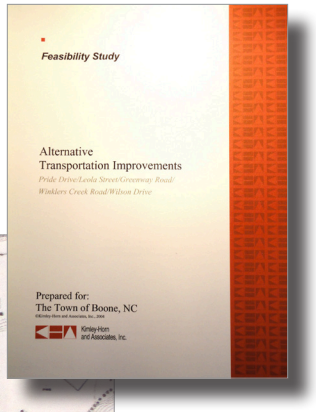


Below The Boone Walkways Long Range Plan (1995)

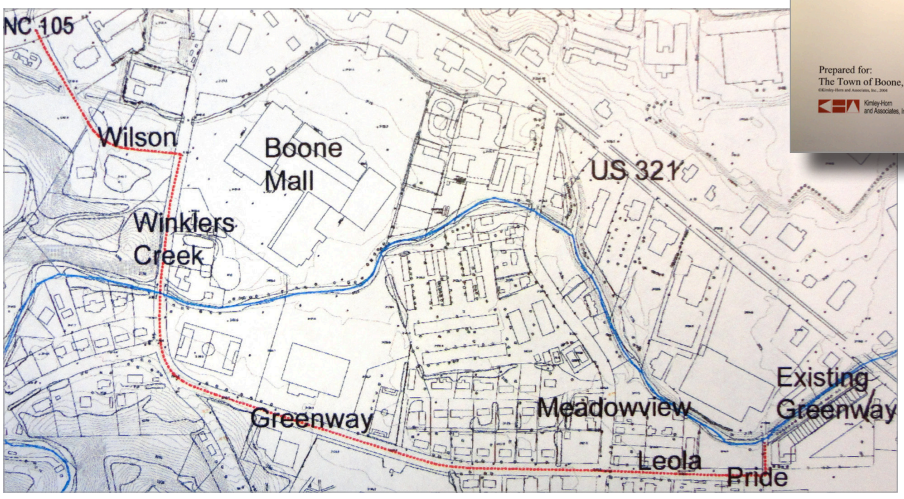


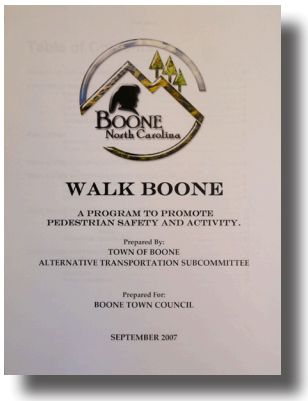
Feasibility Study for Alternative Transportation Improvements (2004)

This study builds off recommendations from the Boone/Blowing Rock Alternative Transportation Plan, specifically for the construction of sidewalks and bicycle lanes along the project study area bounded between the greenway trail at Pride Drive and NC 105. The improvements are proposed along Pride Drive / Leola Road / Greenway Rd / Winklers Creek Road and Wilson Drive. While some sections of sidewalk have been constructed, the project as a whole has yet to be built.



Right: Route overview map for the feasibility study.





Walk Boone (2007)

'Walk Boone' is a program that was developed by the Alternative Transportation Subcommittee in 2007 to promote pedestrian safety and activity. The 'pedestrian safety action plan' component focuses on annual maintenance, agency coordination, and enforcement. The 'promotion of pedestrian activity' component identifies several promotional tools and educational activities, including the use of maps, media, school presentations, and distribution of motorist/pedestrian laws via bookmarks. Several of these promotions have already been launched, including a walking map and bookmark distribution.

Another major component of Walk Boone was the Town of Boone Walkability Audit, which evaluated five major walking corridors in Boone. The scoring took into account room for walking, ease of crossing, driver behavior, visibility, signage, and the quality of experience. Below are the results followed by score interpretation:

- **US 321** (NC 105 to Deerfield Road) - **Average Score: 13.0**
- **US 321** (NC 105 to King Street) - **Average Score: 15.0**
- **US 421** (Hardin Street to NC 194) - **Average Score: 10.5**
- **King Street** (Hardin Street to Poplar Grove Connector) - **Average Score: 20.7**
- **Rivers Street** (Hardin Street to Poplar Grove Connector) - **Average Score: 18.7**

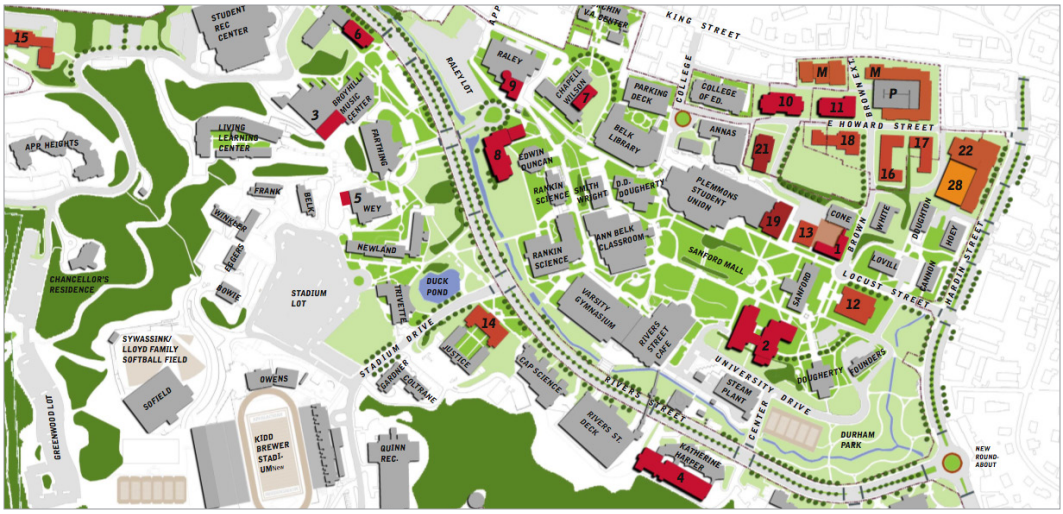
Score Interpretation:
26-30 = Celebrate! You have a great town for walking!
21-25 = Celebrate a little. Your town is pretty good.
16-20 = Okay, but need work.
11-15 = It needs a lot of work.
5-10 = It's a disaster for walking!

Roadway & Sidewalk Program Handbook (2009)

The Public Works Department designed this handbook in an effort to promote consistent street and sidewalk infrastructure within the Town of Boone. This handbook sets forth expectations to citizens, engineers, developers and contractors and should be incorporated into plans and specifications for future projects. The handbook includes roadway standard drawings, sidewalk standard drawings, and maintenance, repair & replacement guidelines.

ASU Campus Master Plan 2020

According to the plan's design guidelines update (page 39): "The inclusion of open space and creating a pedestrian-oriented campus will be a priority for growth Appalachian State University will seek to include design guidelines that highlight their commitment to a



Right: A portion of the ASU Campus Master Plan; Full plan available at: www.masterplan2020.appstate.edu

"pedestrian-friendly" campus with an increased focus on providing additional outdoor gathering spaces for use by students, faculty and the community." The plan's design considerations for multimodal access and circulation are described below:

- Consider a design to narrow streets and encourage sharing of roadways by cars, bicycles and pedestrians. Most campus streets can be two lanes wide to facilitate pedestrian and bicycle crossings and minimizing the roadway impact on adjoining land uses.
- Explore the design of main roads such as Rivers Street as flexible corridors that accommodate a mix of travel modes, including drivingcampus streets.
- Consider integrating context sensitive design measures into campus street design, choosing tools such as textured surfaces, street curvature, narrowed lanes, roundabouts, on-street parking, raised crosswalks, or bulb-outs which can enhance the campus experience for pedestrians and cyclists.
- Consider development of Level of Service (LOS) standards to assess acceptable volumes of travel on roadways by transit, bicycles and pedestrians.

Current Challenges & Opportunities

The following section summarizes some of the current challenges and opportunities to pedestrian facility construction, as seen by several major stakeholder agencies. These summaries were developed from interviews with key staff from each agency.

Town of Boone

Some of the Town of Boone's greatest challenges to developing more pedestrian facilities and expanding the trail system are a lack of funding, environmental concerns, trout streams, utilities, easements, and lack of influence on NCDOT owned and maintained roadways.

NCDOT Division 11

On the Issue of Funding: There are opportunities through the Transportation Improvement Program (TIP) to include pedestrian facilities. However, one challenge is that NCDOT Division 11 only gets a small sidewalk fund allocation, requiring them to save it for a few years in order to do one project. Also, enhancement funds have not been funded for several years. Some other opportunities exist, such as spot safety funds to pay for HAWK signals (see Appendix A for a description), and Safe Routes to School funding for sidewalks within 1.5 miles of a school.

Notes on Specific Locations:

- Wilson Ridge Rd at Deerfield – Traffic congestion is recurring because there is no bypass for the Town of Boone. The Town of Boone has yet to make a decision on alignment. From NCDOT Division 11's perspective, an adopted Comprehensive Transportation Plan with a bypass alignment shown and recommended would help considerably.

- College/King – Problem location due to very short left turn lane (space for only one car).

- NC 105/High School Drive – Redevelopment of the building space left vacant in the old high school on the south side of NC 105 will create a need for improvements.

- Depot/King – The Town of Boone requested a ped-only phase at the signalized intersection of Depot/King in Downtown. It is currently a two-phase signal, so pedestrians do not have to wait long to cross. Adding another phase may increase pedestrian delay, even though peds would be able to cross diagonally across the intersection during the ped-only phase. With an increase in delay, pedestrians may cross against the light.

- Problem location – US 321 five-lane section near Boone Mall. The Town of Boone request for marked midblock crosswalks is not supported by NCDOT because of concern for pedestrian safety. UNC Highway Safety Research Center research report is the key research on this topic, showing higher pedestrian crashes and injury rates at marked mid-block crosswalks on multi-lane roads where speeds exceed 40 mph.

- Project – planned new closed-loop traffic signal systems on US 321 (Deerfield to NC 105) and on King (Hardin to Old E. King St.) will include pedestrian signals and crosswalks.

- HAWK signal installed – at Graduate Lane and NC 105. New student housing generated considerable pedestrian crossings of NC 105 to get to the bus stop serving campus buses. HAWK signals are more appropriate on multi-lane, high-speed roads, whereas rectangular rapid flashing beacon are more appropriate on two or three lanes roads, including at-grade crossings for greenways/multi-use trails.

- Project – Consideration is being given to converting to a HAWK signal on Hardin St. south of King.

Watauga County

The County does not request pedestrian accommodations, since all sites are rural and most developments are speculative residential subdivisions offering homes for seasonal use. Little to no development activity is currently underway because banks are not making loans for such projects.

One pedestrian facility type that Watauga County is actively pursuing is greenways. They are extending greenways from the Boone town limits into the County. The lead agency is the Watauga County Tourism and Development Authority (TDA). An example project related to the Town of Boone:

- Greenway along the South Fork of the New River, connecting underneath the west side of the US 421 bridge. This would connect existing trails in Brookshire Park to existing trails in Optimist Park (where it currently ends near the Water Treatment Plant).

The Watauga County Recreation Plan and the Middle Fork Greenway Association can be consulted for further information on regional trail efforts.

Appalachian State University (ASU)

As the student population grows, ASU is weighing options for addressing transportation needs, with a major focus on parking. Sustainability advocates at ASU are promoting car sharing, regional rides, and the regional bus systems as solutions. The university is also considering policy to prohibit incoming freshman from having cars their first year, but there has been no official action on that yet. ASU is also trying to get a Bicycle Friendly University designation from the League of American Bicyclists. The biggest constraint

to sustainbiilty programs and initiatives, including those related to walking, is funding. Refer to the Campus Master Plan 2020 for more information (summary on page 2-25).

High Country Rural Planning Organization (RPO)

The Comprehensive Transportation Plan (CTP) has been underway since September 2010, and includes a Pedestrian Element. The CTP covers Watauga County and the entire town limits of Boone. According to the RPO, compared with many other places in NC, Boone is doing a good job meeting the needs of pedestrians, and they dedicate as much or more local money into sidewalks as some larger cities in NC.

The RPO stands by, ready for Boone (or any other member agency) to submit a project for NCDOT funding, so long as the Town of Boone has the right-of-way already acquired. Greenway projects scored very well in the last NCDOT scoring process. Sources of funding sought by the RPO for pedestrian infrastructure include TIP funding, the Recreation Trails Fund, NCDOT Division spot safety funds, and Safe Routes to Schools funding.

3 Recommendations

Chapter Contents

The Pedestrian Network

Methodology

Priority Project Cutsheets

The Pedestrian Network

This chapter contains recommended changes to the Town of Boone's physical environment that will create a safe, accessible, and connected pedestrian network. The main types of recommendations covered in this chapter include sidewalks, greenways/multi-use trails, and crossing improvements. Conceptually, the pedestrian recommendations and the destinations they connect can be seen as a network of 'hubs and spokes'(see below). Downtown Boone, parks, ASU, residential areas, restaurants, and other places where people walk to and from are the 'hubs', whereas sidewalks, crosswalks, trails, and other pedestrian facilities are the 'spokes' that connect them (see below).

The 'hubs and spokes' model conceptually illustrates how destinations in Boone will be linked through various types of pedestrian facilities.

The descriptions on this page offer a brief overview of the primary facility types recommended in this plan. For more information on facility design, please see Appendix A: Design Resources and the Town of Boone's Roadway & Sidewalk Program Handbook.

Sidewalks

The recommended sidewalks in Boone are shown in red on map 3.1. They connect to destinations throughout Boone by expanding upon the existing sidewalk network, shown in orange.

- *Sidewalks in Boone should be a minimum of 5' in width, and, where possible, should include a landscaped buffer between the sidewalk and roadway.*
- *Areas of higher pedestrian volume may require 7' wide sidewalks, and sidewalks serving as part of the greenway trail system should be at least 10' in width.*

Sidewalk

Greenways/Multi-Use Trails

A greenway is a linear corridor of land that can be either natural, such as rivers and streams, or man-made, such as utility corridors or abandoned railroad beds. Many greenways contain trails that can be paved or unpaved, and can be designed to accommodate a variety of trail users, including bicyclists, walkers, hikers, joggers, wheelchairs users, and skaters (hence, the term 'multi-use trail'). Proposed multi-use trails for Boone are shown as a dashed green line on Map 3.1, and they build off of the existing system of trails, shown in solid green.

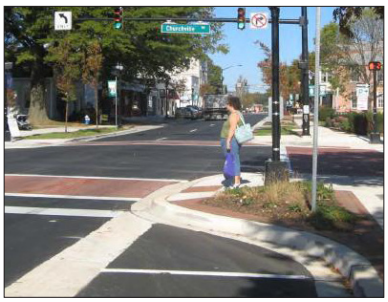
- *Multi-use trails in Boone should be a minimum of 10' in width.*
- *Surface types vary according to use, but paved asphalt is standard for trails accommodating bicyclists and other wheeled users; An 18" strip of gravel on each side of paved trails is recommended to accommodate walkers and runners who prefer a softer trail surface.*

Greenway/Multi-Use Trail

Pedestrian-Friendly Crossings

Consultant fieldwork, committee input, and previous planning efforts helped to identify important pedestrian crossing points that are in need of minor to significant improvements (see cutsheets on the following pages).

- *Crossings that link to sidewalks on each side should possess curb cuts with ramps and marked crosswalks (which helps to satisfy the standards set forth by the American Disability Act of 1991).*
- *Busy intersections could have a variety of improvements, such as pedestrian-activated crossing and countdown signals, median islands, and curb extensions.*



Pedestrian-Friendly Crossing

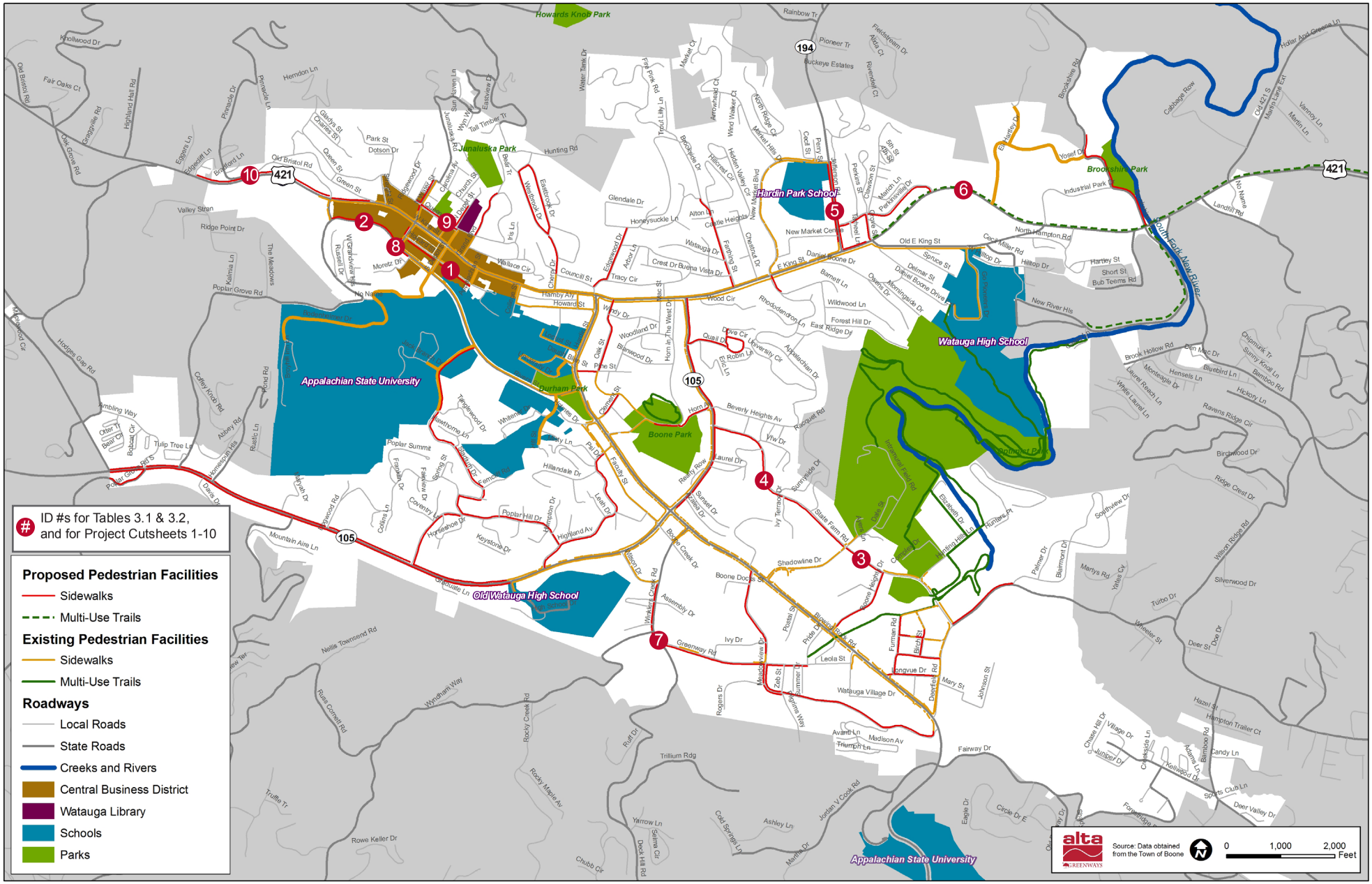
Some of these treatments have been proven to reduce crashes, as shown in the 2007 FHWA Crash Reduction Factors Study (http://safety.fhwa.dot.gov). The following table shows some typical countermeasures and associated crash reduction factors from that study.

Pedestrian Crash Reduction Factors

Countermeasure	Crash Reduction Factor
Install sidewalk	*74%*
Install pedestrian countdown signal heads	*25%*
Install pedestrian refuge islands	*56%*
Improve/install pedestrian crossings	*25%*

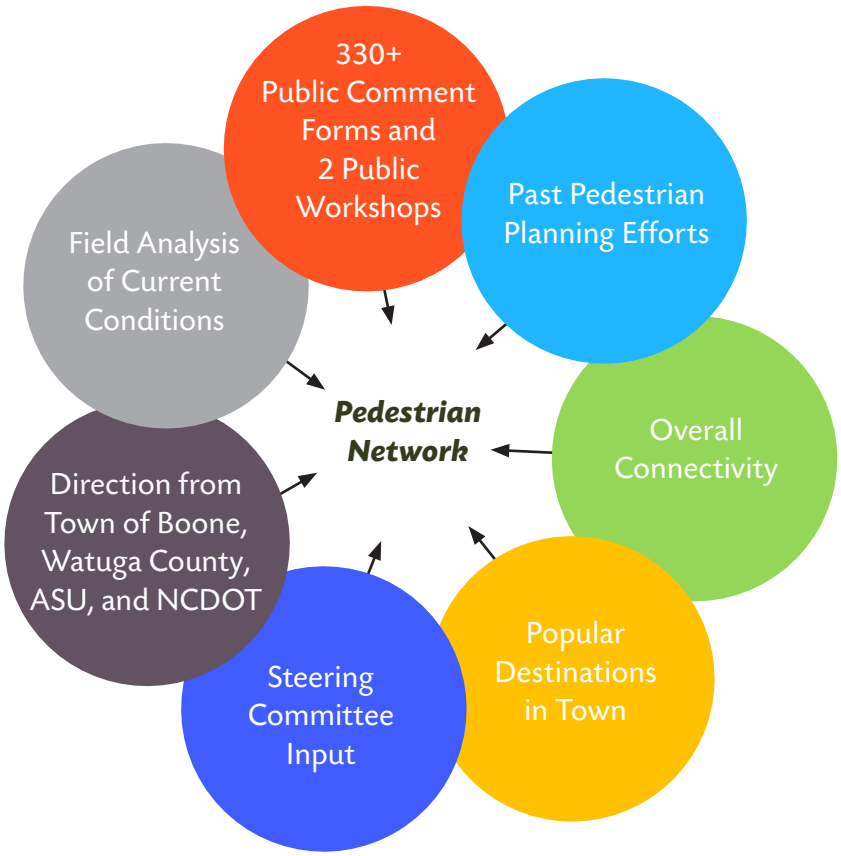
(2007 FHWA Crash Reduction Factors Study)

Map 3.1 Recommended Pedestrian Network & Priority Projects



Methodology

A variety of sources were consulted during the development of the recommended pedestrian network: input from the staff and steering committee, previous plans and studies, maps of existing pedestrian conditions, the consultant's field analysis, public input from workshops and comment forms, and noted pedestrian destinations. Fieldwork included an examination of conditions at key roadway crossings, primary roadway corridors, and a consideration of trail opportunities.



This diagram illustrates the inputs used to develop this Plan's recommendations.

Prioritization

The Town of Boone maintains a list of priority sidewalk improvements, based on many of the same inputs noted above. Project consultants used the latest 2011 sidewalk priority list and sorted it according to input from hundreds of public comment forms, recommendations from current plans, crash history, and connectivity to destinations and the existing sidewalk network.

Table 3.1 (page 3-5) shows the updated list of priority pedestrian corridors. The criteria fulfilled by each corridor segment is checked in the boxes to the right of each segment. Projects that fulfilled more criteria were moved up the list, but it remains in the original order otherwise. This priority ranking should be considered as a general guide only; individual projects could still be developed as opportunities arise, regardless of the order.

Priority Project Cutsheets

The cutsheets on the following pages describe the top ten priority projects from Table 3.1. These project cutsheets provide a planning-level of analysis only. Actual development of facilities may differ according to specific site conditions, project funding, and factors unforeseen at the time this plan was developed. These cutsheets can be used to communicate the individual projects to stakeholders involved in implementation, such as various departments and agencies within the Town of Boone and NCDOT.

Table 3.1 Pedestrian Corridor Prioritization Table

General Priority Ranking	Street Name	Start/End Point	Length (Feet)	Length (Miles)	Location (recommended)	Town of Boone 2011 Sidewalk Priority	Top Rec. from 2011 Public Comments	Boone 2030 Land Use Plan Priority	2006 Comp Plan Update Priority	Pedestrian accident reported	Connects to a school or library	Connects to ASU	Serves Downtown Boone	Connects to a park or trail	Existing sidewalk on both ends
1	Howard Street	Water Street to Appalachian Street	1,480	0.28	South		✔	✔	✔	✔		✔	✔		✔
2	Poplar Grove Road	Water Street to Poplar Grove Road Extension	1,247	0.24	North	✔	✔	✔	✔	✔			✔		✔
3	State Farm Road	Boone Heights Drive to Shadowline Drive	778	0.15	South	✔	✔	✔		✔				✔	✔
4	State Farm Road Section 2	NC 105 Ext. to Shadowline Drive	3,387	0.64	TBD	✔	✔	✔						✔	✔
5	NC 194	US 421 to New Market Boulevard	2,850	0.54	Both	✔	✔			✔	✔				✔
6	US 421 East	NC 194 to Corporate Limits	10,323	1.96	North	✔	✔			✔	✔			✔	
7	Greenway Road (Phases II-IV)	Wilson Drive to Pride Drive	3,502	0.66	North	✔	✔			✔				✔	✔
8	Water Street/River Street	Water St sidewalk gaps/Water St to Moretz St	1,054	0.20	South	✔				✔		✔	✔		✔
9	Queen Street	Water Street to N. Depot Street	761	0.14	North	✔					✔		✔	✔	✔
10	W. King Street	Edgecliff Lane to Old Bristol Road	2,639	0.50	North	✔	✔		✔				✔		
11	NC 105 Extension	US 321 to US 421	3,893	0.74	East	✔	✔			✔					✔
12	Stadium Drive Section 1	Hemlock Drive to existing sidewalks	1,501	0.28	East	✔		✔		✔		✔			
13	Pine Street	Oak Street to stairs above Hardin Street	340	0.06	TBD	✔						✔		✔	✔
14	Grand Boulevard	US 421 to Bear Trail	901	0.17	TBD	✔					✔		✔	✔	
15	Poplar Grove Road Section 2	NC 105 to corporate limits	756	0.14	TBD	✔	✔	✔							
16	Deerfield Road	State Farm to Blairmont Road	1,358	0.26	West	✔	✔							✔	
17	NC 105	Studio West to NC 105 Bypass	6,424	1.22	South	✔	✔			✔					
18	NC 105	Highland Avenue to NC 105 Bypass	7,368	1.40	North	✔	✔			✔					
19	Stadium Drive Section 2	Dogwood Road to Hemlock Drive	2,289	0.43	TBD	✔		✔				✔			
20	Boone Heights Drive	Blowing Rock Road to State Farm Road	1,370	0.26	East	✔								✔	✔
21	Perkinsville Drive	NC 194 to US 421	1,891	0.36	TBD	✔				✔	✔				
22	Clement Street	Oak Street to US 321	421	0.08	TBD	✔								✔	✔
23	Furman Road	Lonvue Drive to existing sidewalks	964	0.18	TBD	✔								✔	✔
24	Highland Avenue	NC 105 to Faculty Street	2,994	0.57	TBD	✔				✔					✔
25	North Depot Street	Queen Street to North Street	416	0.08	TBD	✔					✔		✔		
26	NC 105	Studio West property to High School Drive	1,221	0.23	South	✔	✔								
27	Grove Street	US 421 to Perkinsville Drive	475	0.09	TBD	✔					✔				
28	Horn Avenue	Horn in the West Drive to NC 105 Ext.	673	0.13	TBD	✔								✔	
29	Longvue Drive	US 321 to Deerfield Road	802	0.15	TBD	✔									✔
30	Doctors Drive	Furman Road to Deerfield Road	779	0.15	TBD	✔				✔					
31	Horn in the West Drive	US 321 to Horn Avenue	419	0.08	TBD	✔								✔	
32	Oak Street	US 421 to Horn in the West Drive	1,306	0.25	TBD	✔									✔
33	Brookshire Road	US 421 to corporate limits	2,014	0.38	TBD	✔								✔	
34	Farthing Street	US 421 to Brookside Drive	1,323	0.25	TBD	✔				✔					
35	Meadowview Drive	Greenway Road to Blowing Rock Road	3,704	0.70	TBD	✔									
36	Quail Drive	NC 105 Ext. to Dove Circle	735	0.14	TBD	✔									
37	Forest Hills	US 421 to Appalachian Drive	337	0.06	TBD	✔									
38	Meadowview Drive Section 1	US 321 to Greenway Road	1,538	0.29	TBD	✔									
39	Birch Street	Furman Road to Doctors Drive	433	0.08	TBD	✔									
40	Kimberly Drive	Furman Road to Birch Street	328	0.06	TBD	✔									
41	Meadowview Drive Section 2	Greenway Road to Pilgrims Way	727	0.14	TBD	✔									
42	Cherry Drive	US 421 to Eastbrook Drive	709	0.13	TBD	✔									
43	Eastbrook Drive	Cherry Drive to Hunting Road	1,350	0.26	TBD	✔									
44	Hunting Road	Eastbrook Drive to Westbrook Drive	226	0.04	TBD	✔									
45	Westbrook Drive	Hunting Road to Cherry Drive	1,285	0.24	TBD	✔									
46	Poplar Hill Section 1	Highland Avenue to Dogwood Drive	1,837	0.35	TBD	✔									
47	Dogwood Road	Poplar Hill Drive to Stadium Drive	365	0.07	TBD	✔									
48	Poplar Hill Section 2	Dogwood Road to Hemlock Drive	1,355	0.26	TBD	✔									
49	Brookside Drive	Farthing Street to Councill Oaks	255	0.05	TBD	✔									
50	Dove Circle	Quail Drive to Pheasant Ridge	785	0.15	TBD	✔									
51	Pheasant Ridge	Quail Drive to Woodpecker Lane	319	0.06	TBD	✔									
52	Tracy Circle	Councill Street to Edgewood Drive	276	0.05	TBD	✔									
53	Edgewood Drive	Tracy Circle to East Glendale Street	1,015	0.19	TBD	✔									

1 Howard Street

From: Water Street
To: Appalachian Street

Distance: 1,480 feet (0.28 miles)

Location (recommended): south side

Reasons for priority ranking:

- *#1 top recommended improvement from the 2011 Pedestrian Plan Public Comment Form (for a town-owned roadway)*
- *Identified as a priority in the Boone 2030 Land Use Plan*
- *Identified as a priority in the 2006 Comp Plan Update*
- *Pedestrian accident reported*
- *Connects to ASU*
- *Serves Downtown Boone*
- *Connects to existing sidewalk on each end*

Recommended Pedestrian Facilities Featured in this Cutsheet

Sidewalk Segment
- *See text box at right*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *1A - Crosswalk & curb ramps recommended on SE side*
- *1B - Crosswalk & curb ramps recommended on SE, SW, and NW sides*
- *1C - Crosswalk & curb ramps recommended on SE and SW sides*
- *Consider curb extensions where practicable at each intersection*

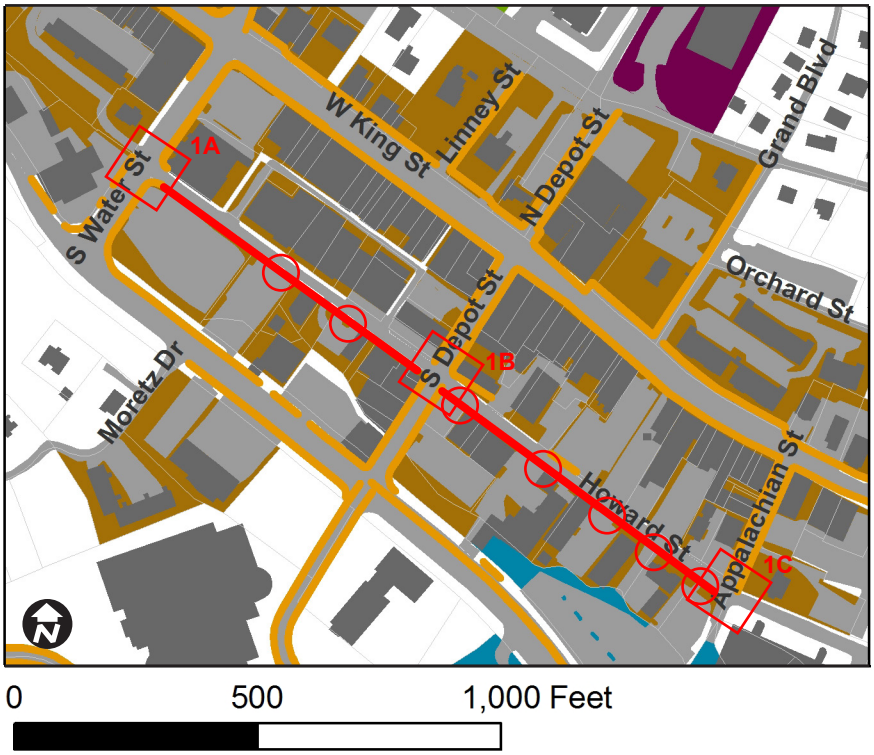
Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools

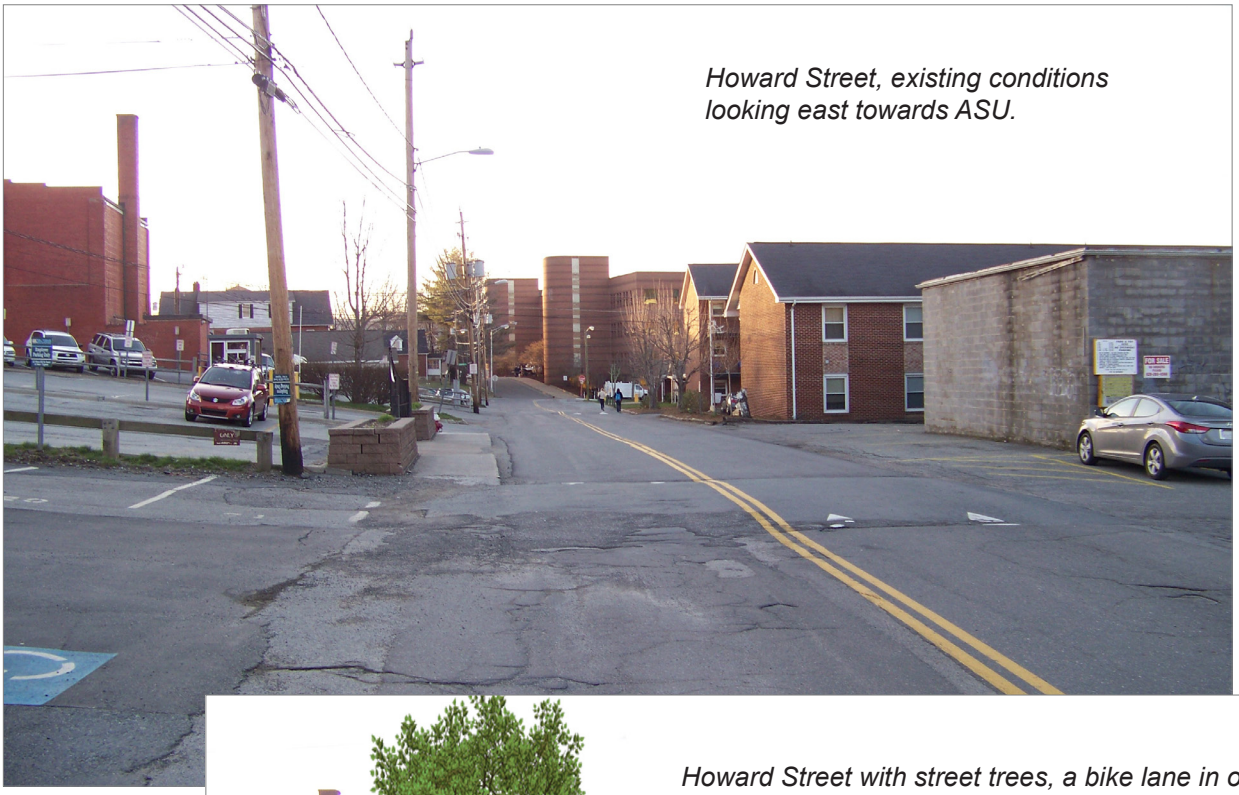
Short Term Recommendation for Howard Street:

Stripe a wide shoulder on the south side of Howard Street, for 750 feet, from Appalachian Street to Depot Street. This section of Howard is the highest priority, as it directly connects downtown and ASU. Use pedestrian zone pavement markings similar to Hunting Lane (photo above). While neither side of the street is currently ideal for a pedestrian walkway, the south side has only five intersecting driveways/parking lot access points (from Howard to Depot), whereas the north side has eight such points along with a section of open parking near Depot Street. Residential apartments are also located along the south side, serving as pedestrian trip attractors.

Note: The east end of Howard Street, from College St to Hardin St. was also identified in a public workshop as being in need of pedestrian improvements.



Long Term Concept for Howard Street:
Conduct traffic study to determine feasibility of Howard Street as one-way only (direction TBD), for 1,480 feet, from Appalachian Street to Water Street. Changing automobile travel to one direction will create greater width for bicycle and pedestrian facilities while reducing potential conflict points. Install curb, gutter and sidewalk on the south side of the street while consolidating driveway/parking lot access points. Install street trees, curb extensions, and high visibility ladder-style marked crosswalks wherever practical within the corridor. Note that previous plans have also called for relocating overhead utilities underground.



Howard Street, existing conditions looking east towards ASU.

Howard Street with street trees, a bike lane in one direction, and a one-way shared travel lane in the opposite direction.

2 Poplar Grove Road

From: Water Street
To: Poplar Grove Road Extension

Distance: 1,247 feet (0.24 miles)

Location (recommended): north side

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the Alternative Transportation Committee (ATC) as a sidewalk priority*
- *Identified as a priority in the Boone 2030 Land Use Plan*
- *Pedestrian accident reported*
- *Serves Downtown Boone*
- *Connects to existing sidewalk on each end*

Poplar Grove Road, looking NW from the existing sidewalk near Water Street.

Recommended Pedestrian Facilities Featured in this Cutsheet

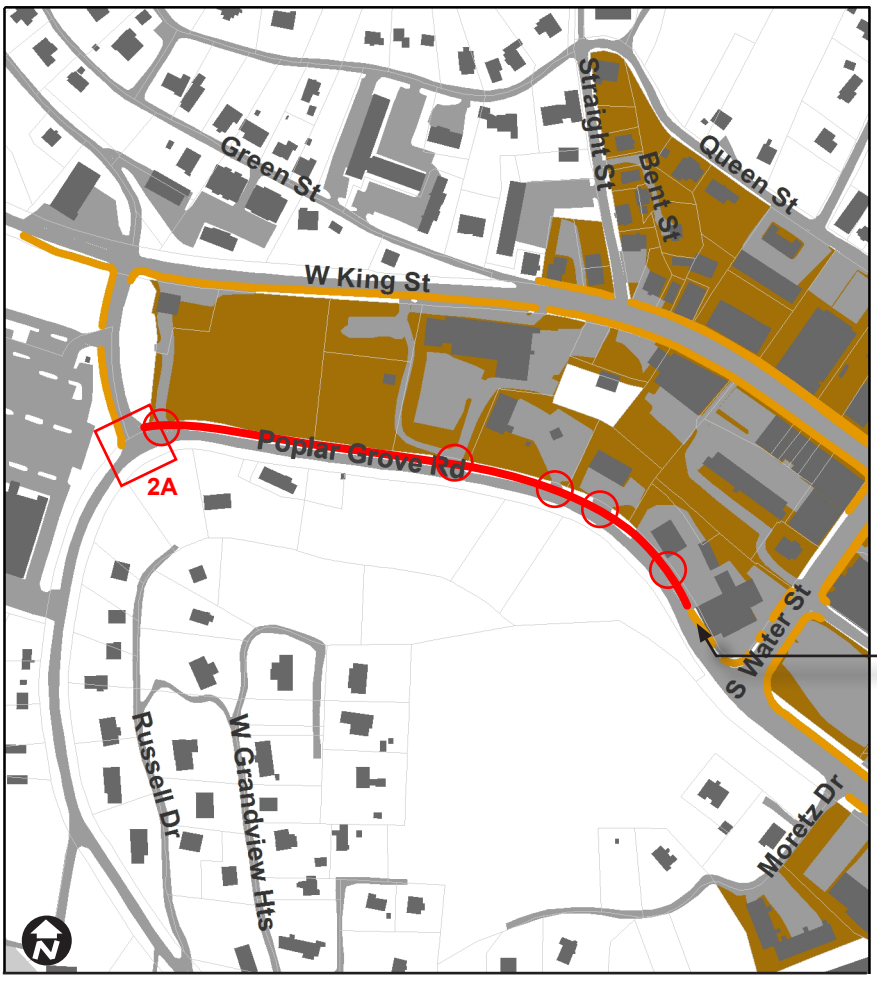
Sidewalk Segment
- *Note: Shoulder has steep slope downward from the road on the north side for a short part of this segment*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *2A - Crosswalk & curb ramps recommended on north side*
- *Consider curb radius reduction where practicable*

Existing Pedestrian Facilities

- Sidewalks
- Trails and Greenways
- Creeks and Rivers
- Parcels
- Buildings
- Streets & Parking Lots
- Watauga Library
- Central Business District
- Parks
- Schools



3 State Farm Road

From: Shadowline Drive
To: Boone Heights Drive

Distance: 778 feet (0.15 miles)

Location (recommended): south side

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Identified as a priority in the Boone 2030 Land Use Plan*
- *Connects to town, county, and ASU park and recreation facilities*
- *Connects to existing sidewalk on each end*

Recommended Pedestrian Facilities Featured in this Cutsheet

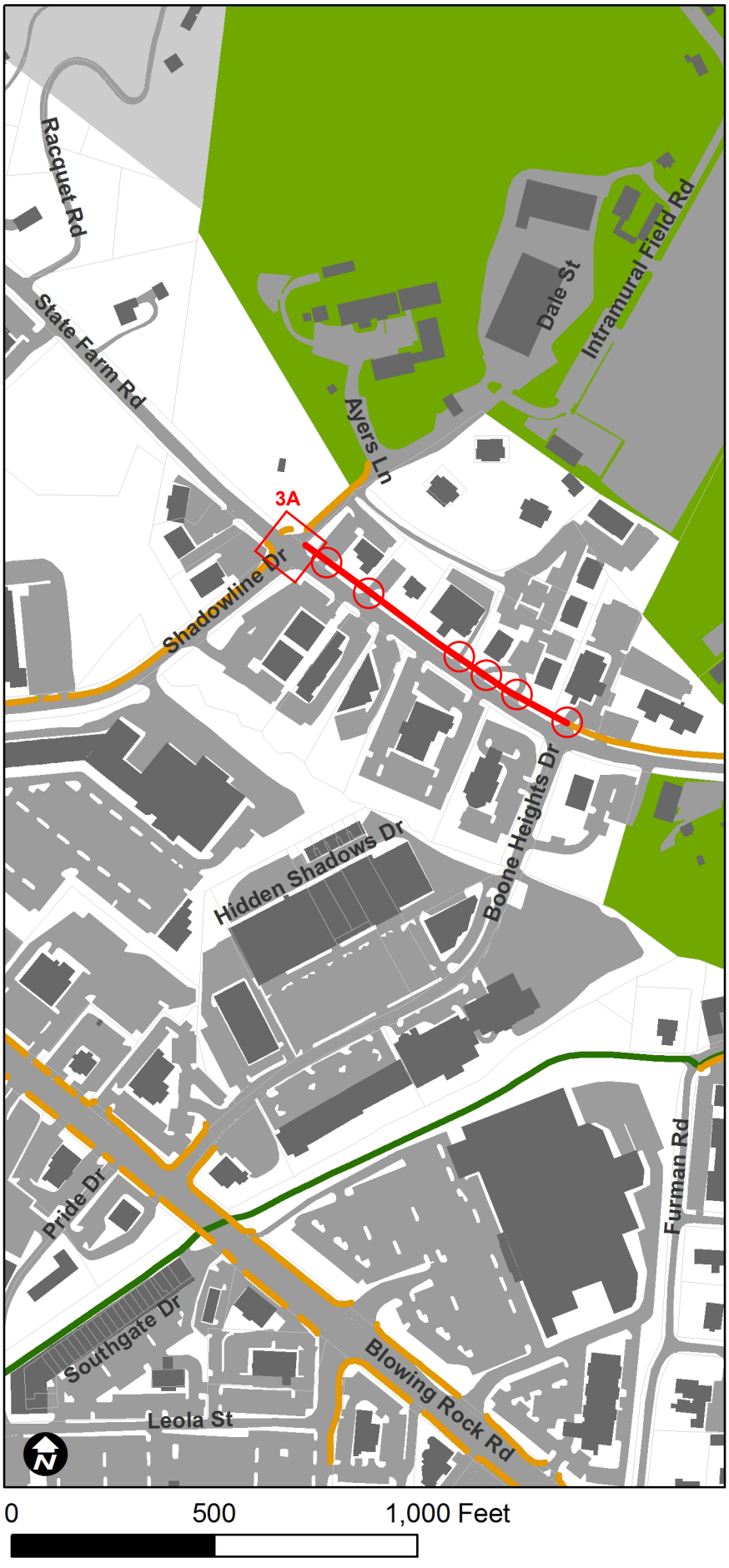
Sidewalk Segment

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *3A - Crosswalk & curb ramps recommended on NW & NE sides*

Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools



4 State Farm Road Section 2

From: NC 105 Ext.
To: Shadowline Drive

Distance: 3,387 feet (0.64 miles)

Location (recommended): TBD (north side shown at right due to grade of shoulder)

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Identified as a priority in the Boone 2030 Land Use Plan*
- *Connects two major park areas*
- *Serves as an alternative east-west route to NC 321*
- *Connects to existing sidewalk on each end*

Recommended Pedestrian Facilities Featured in this Cutsheet

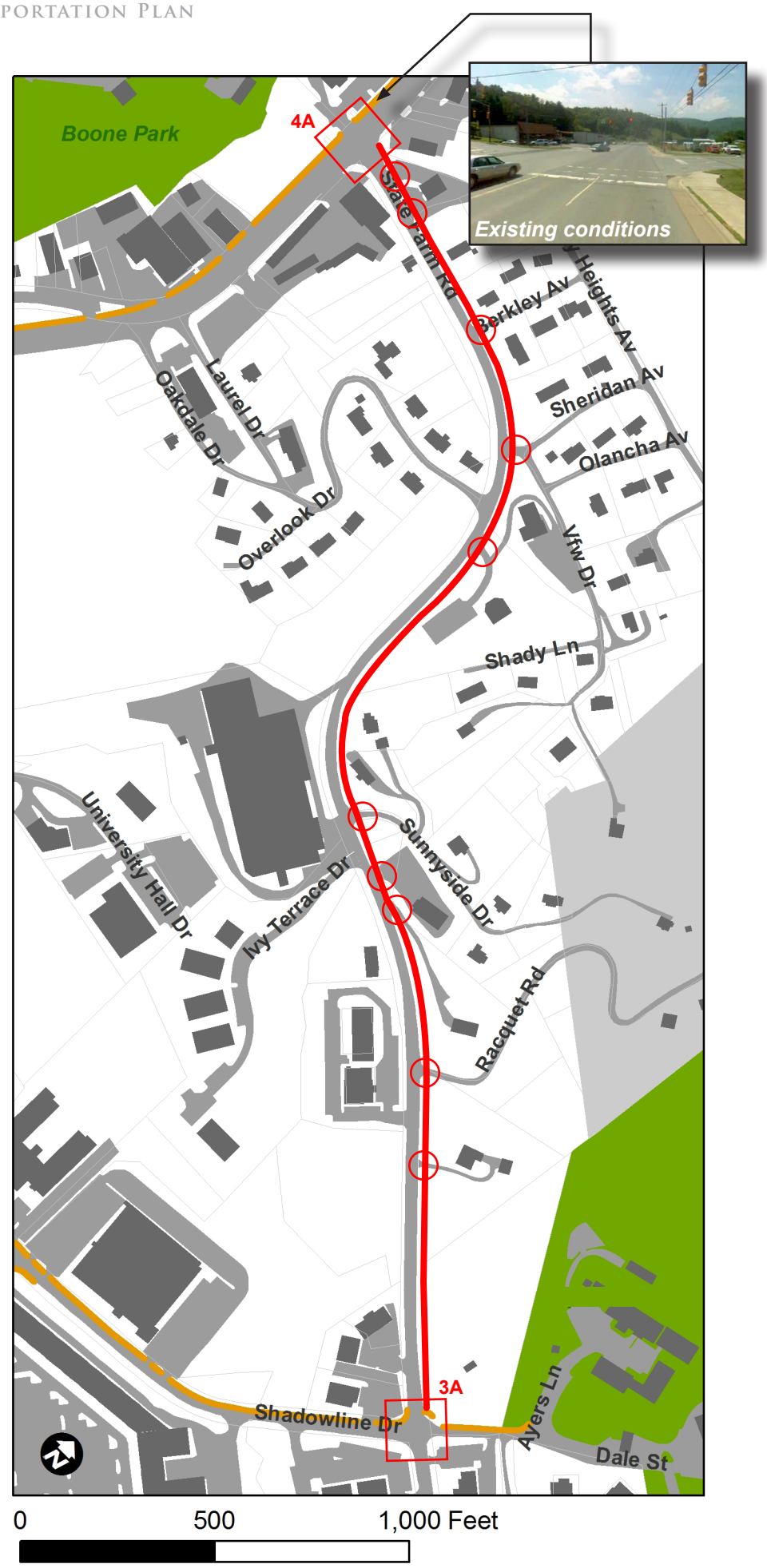
Sidewalk Segment
- *Note: Slope of shoulder may influence actual sidewalk location*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *4A - Crosswalk recommended on north & west sides*
- *Pedestrian countdown signal recommended across NC 105 Ext.*

Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools



5 NC 194 (Jefferson Rd)

From: New Market Blvd
To: US 421 (E King St)

Distance: 2,850 feet (0.54 miles)

Location (recommended): both sides

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Pedestrian accident reported*
- *Connects to Hardin Park School*
- *Connects to New Market Centre*
- *Connects to existing sidewalk on each end*

Recommended Pedestrian Facilities Featured in this Cutsheet

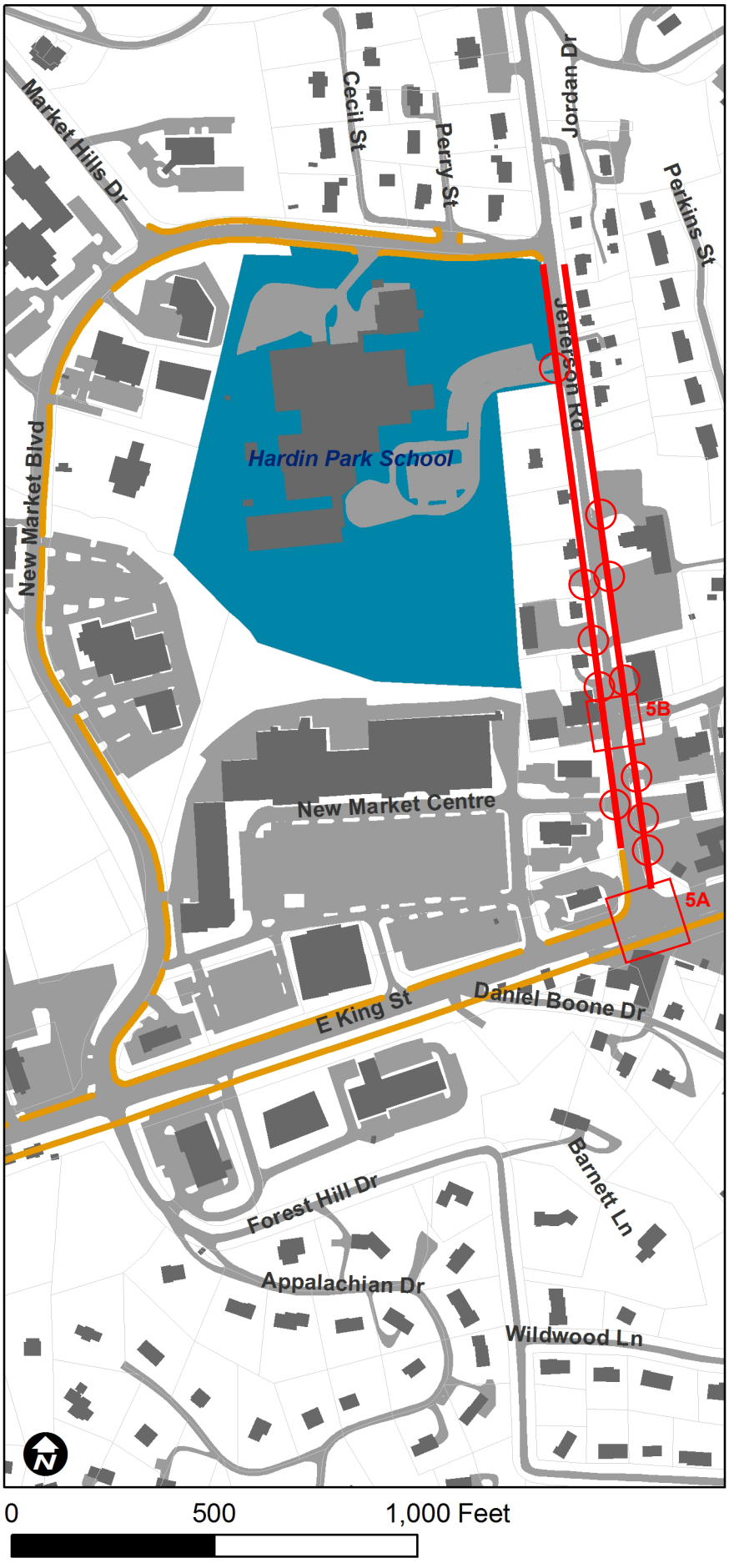
Sidewalk Segment
- *Note: Curb and gutter needed in some sections*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *5A - Crosswalk and curb ramps recommended on north side and on either the west or east side across US 421 (E King St. - Pedestrian countdown signal recommended for crosswalks at this intersection*
- *5B - Potential HAWK signal location (further study req'd)*

Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools



6 US 421 (E King St)

From: NC 194 (Jefferson Road)
To: Brookshire Road

Distance: 10,323 feet (1.96 miles)

Location (recommended): north side

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Pedestrian accident reported*
- *Connects the existing sidewalk network to Brookshire Park & NE Boone*
- *Less than 1/2 mile to two schools*

Recommended Pedestrian Facilities Featured in this Cutsheet

Multi-Use Trail / Sidepath
- *10' wide paved asphalt trail for walking & bicycling*

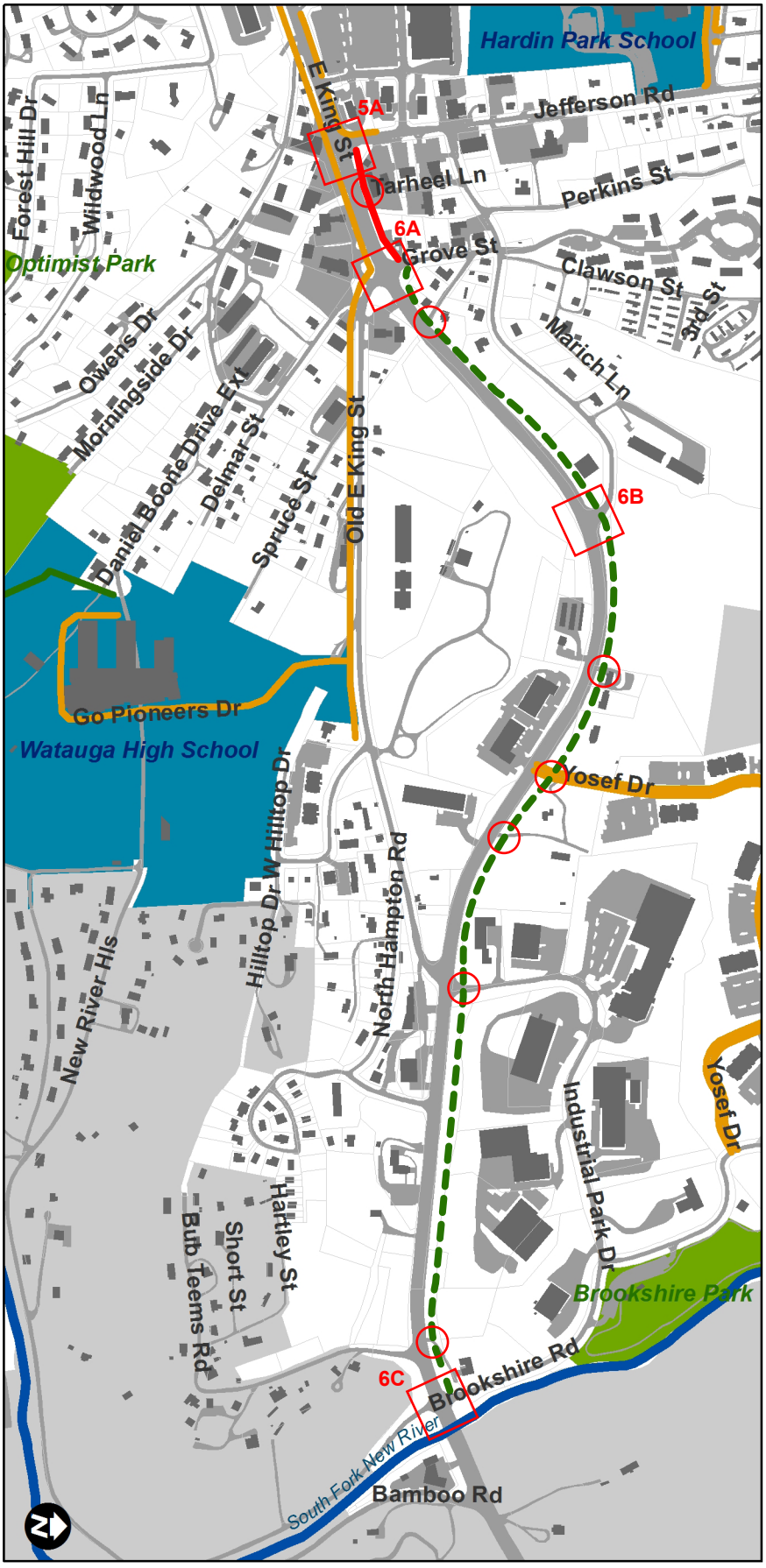
Sidewalk Segment
- *A large portion of this segment would be across a gas station parking lot driveway*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *6A - Crosswalk & curb ramps recommended on west & north sides; pedestrian countdown signal recommended across US 421*
- *6B & 6C - Crosswalk, curb ramps & signage recommended on north side*

Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools



7 Greenway Rd/Winklers Creek Rd

From: Wilson Drive
To: Pride Drive

Distance: 3,502 feet (0.66 miles)

Location (recommended): north side

Reasons for priority ranking:

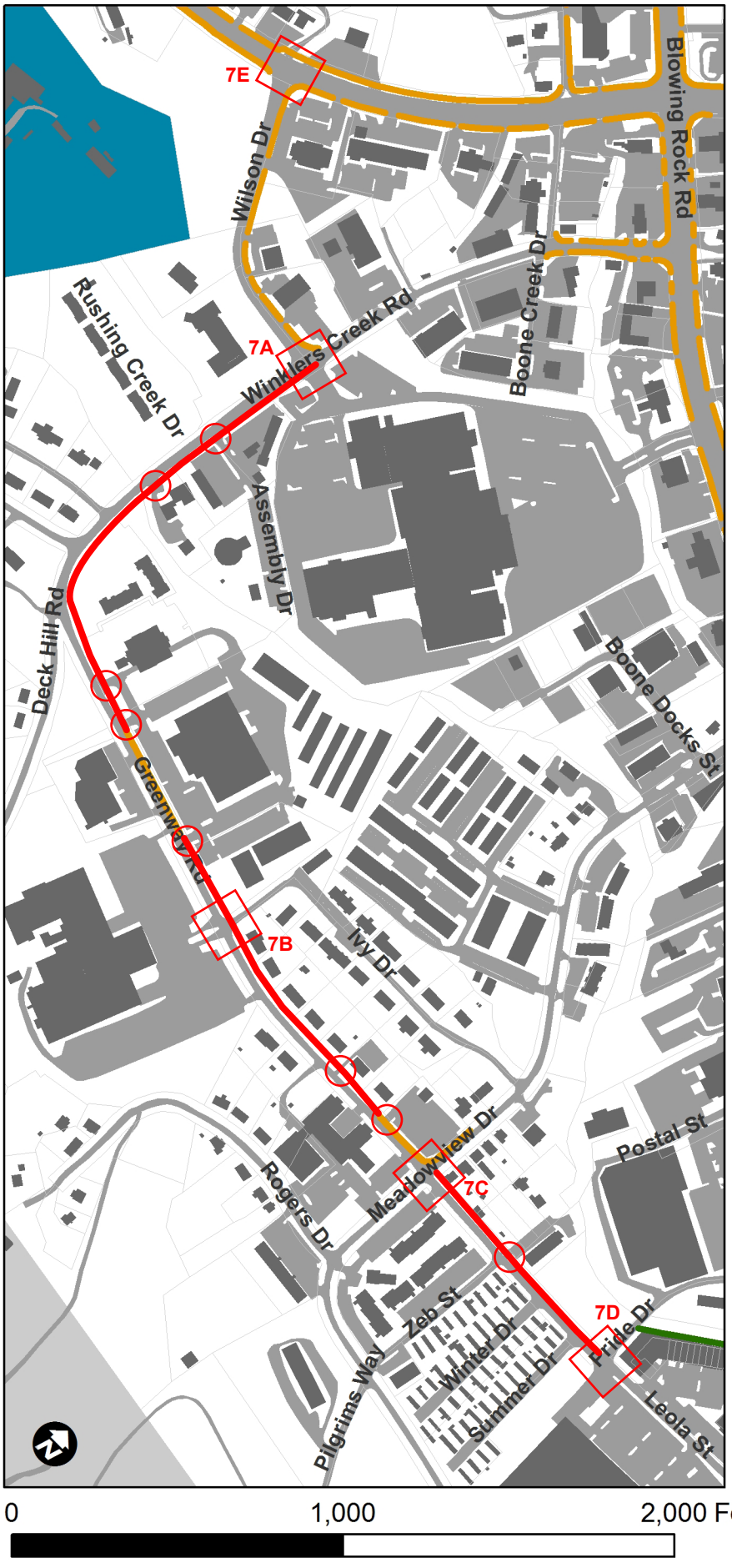
- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Entire segment is the focus of a 2006 feasibility study (phases II-IV)*
- *Pedestrian accident reported*
- *Connects to existing sidewalk on each end*
- *Connects to an existing trail*
- *Serves major shopping areas*
- *Provides an alternative route to NC 321 (Blowing Rock Rd)*

Recommended Pedestrian Facilities Featured in this Cutsheet

- Sidewalk Segment
- Driveway Crossings
  - *Crosswalk and/or signage recommended*
- Intersection Improvements
  - *7A, 7B, 7C, & 7D - Crosswalks & curb ramps along Winklers Creek Rd & Greenway Rd*
  - *7A - Crosswalks & curb ramps across Winklers Creek Rd*
  - *7A, 7C, 7D, 7E - Pedestrian countdown signals (at signalized intersections)*

Existing Pedestrian Facilities

- Sidewalks
- Trails and Greenways
- Creeks and Rivers
- Parcels
- Buildings
- Streets & Parking Lots
- Watauga Library
- Central Business District
- Parks
- Schools



8 Water Street/Rivers Street

From: Water Street
To: Moretz Street
(inc. completion of Water St. sidewalks)

Distance: 1,054 feet (0.2 miles)

Location (recommended): south side of Rivers St & west side of Water Street

Reasons for priority ranking:

- *Identified by the ATC as a sidewalk priority*
- *Pedestrian accident reported*
- *Connects to ASU*
- *Serves Downtown Boone*
- *Connects to existing sidewalk on each end*

Below: An example from Boulder, CO, of a raised crossing across a slip turn lane to a pedestrian refuge island.

In this example, Rivers Street would be here, and Water Street here, looking south.

Recommended Pedestrian Facilities Featured in this Cutsheet

Sidewalk Segment

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *8A - Crosswalks & curb ramps on NE and SE sides.*
- *8A - Use the island created by the right slip turn lane to provide a landscaped pedestrian refuge when crossing Rivers Street.*

Existing Pedestrian Facilities

Sidewalks
Trails and Greenways
Creeks and Rivers
Parcels
Buildings
Streets & Parking Lots
Watauga Library
Central Business District
Parks
Schools

9 Queen Street

From: Water Street
To: N. Depot Street

Distance: 761 feet (0.14 miles)

Location (recommended): north side

Reasons for priority ranking:

- *Identified by the ATC as a sidewalk priority*
- *Connects to the library*
- *Connects to North Street Park*
- *Serves Downtown Boone*
- *Connects to existing sidewalk on each end*

Recommended Pedestrian Facilities Featured in this Cutsheet

Sidewalk Segment
- *Both sides of the street present challenges with landscaping and shoulder slope, but the north side appears to have less obstructions; an alternative may be to relocate the parking meters and place the walkway between the parked cars.*

Driveway Crossings
- *Crosswalk and/or signage recommended*

Intersection Improvements
- *9A - Crosswalks & curb ramps on NE and SE sides; Extend and expand width of the parking area median to create a pedestrian refuge on SE side.*
- *9B - Crosswalks & curb ramps on all sides; Extend and expand width of the parking area median to create a pedestrian refuge on NW side; Extend and realign curbs on SW side to better align N. Depot Street*

Existing Pedestrian Facilities

- Sidewalks
- Trails and Greenways
- Creeks and Rivers
- Parcels
- Buildings
- Streets & Parking Lots
- Watauga Library
- Parks
- Schools
- Central Business District

Below: Existing conditions at the intersection of Queen Street & N. Depot Street.

Above: Recommended improvements, including crosswalks, median island, and curb extensions.

10 US 421 (W. King Street)

From: Town Limits
To: Old Bristol Road (east side)

Distance: 2,639 feet (0.2 miles)

Location (recommended): north side

Reasons for priority ranking:

- *A top recommended improvement from the 2011 Pedestrian Plan Public Comment Form*
- *Identified by the ATC as a sidewalk priority*
- *Identified as a Priority in the 2006 Comp Plan Update*
- *Serves Downtown Boone*
- *Currently no alternate route for pedestrians NE of downtown*

Recommended Pedestrian Facilities Featured in this Cutsheet

Sidewalk Segment

Driveway Crossings

- *Crosswalk and/or signage recommended; where possible, shorten driveway access points to reduce potential conflict points for pedestrians (see photos at right)*

Intersection Improvements

- *10A - There are actually two intersections at this location (for Pinnable Dr and for Old Bristol Rd); Crosswalks & curb ramps recommended for each along US 421 (W. King St.)*
- *10B - Crosswalk & curb ramps on south side and on east side across US 421 (W. King St.); pedestrian crossing signage along US 421 (W. King St.)*

Existing Pedestrian Facilities

- Sidewalks
- Trails and Greenways
- Creeks and Rivers
- Parcels
- Buildings
- Streets & Parking Lots
- Watauga Library
- Parks
- Schools
- Central Business District

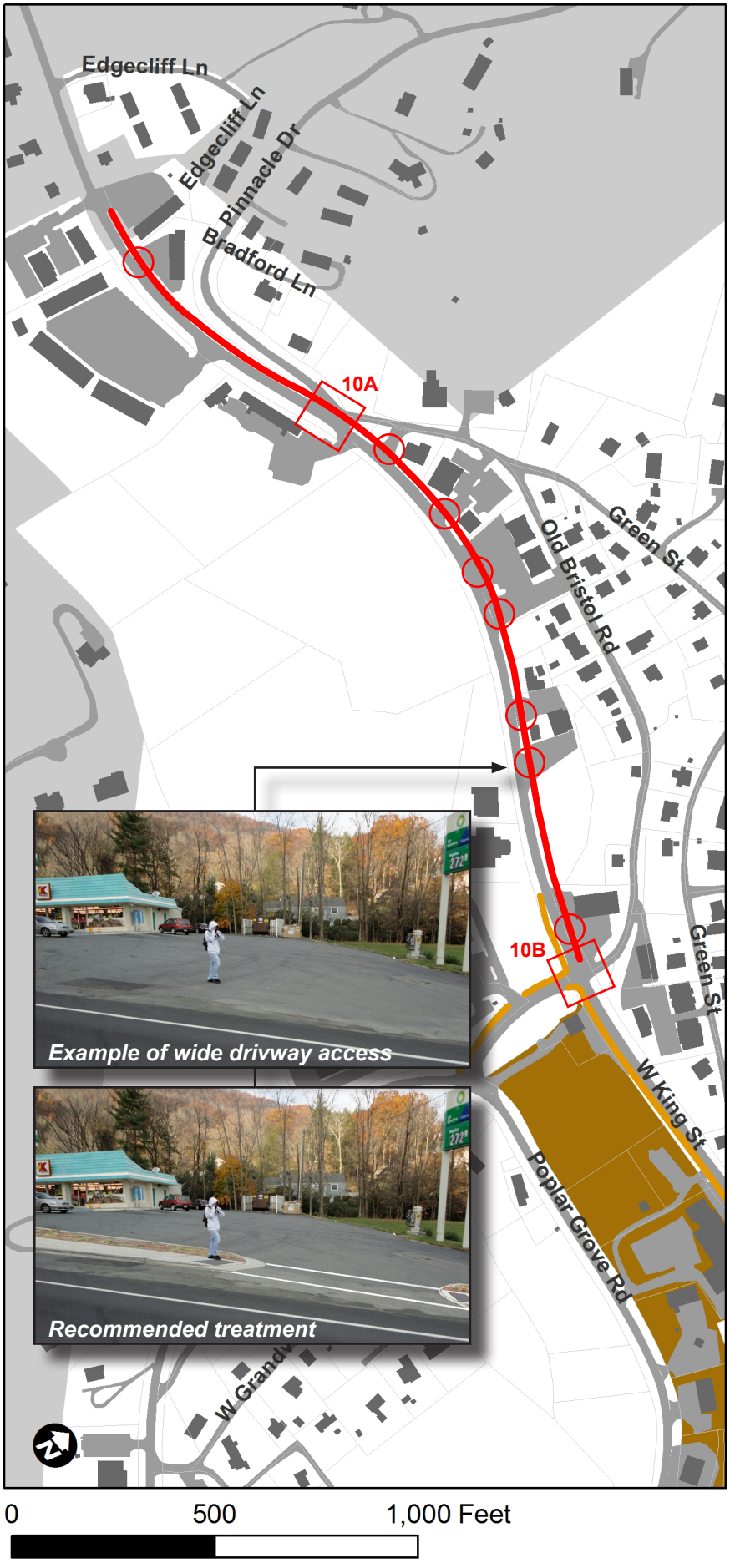


Table 3.2 Project Cutsheet Summary and Cost Estimates

Priority	Street Name	Start/End Point	Sidewalk Length (Feet)	$31.25/LF sidewalk (not inc. curb & gutter) and $55LF multi-use trail	# of driveway x-walks	$100 per standard two-line x-walk	# of crossings at intersections	$2.2K/crossing: $100/continental x-walk + $1K/curb ramp	# of median islands	$17K/ median island	# of curb extensions	$15K/curb extension average	# of ped signals	$7,500/ped signal average	Total $ Estimates
1	Howard Street	Water Street to Appalachian Street	1,480	$46,250	7	$700	6	$13,200	0	$0	0	$0	0	$0	$60,150
2	Poplar Grove Road	Water Street to Poplar Grove Road Extension	1,247	$38,956	5	$500	1	$2,200	0	$0	0	$0	0	$0	$41,656
3	State Farm Road	Boone Heights Drive to Shadowline Drive	778	$24,297	6	$600	2	$4,400	0	$0	0	$0	0	$0	$29,297
4	State Farm Road Section 2	NC Highway 105 Ext. to Shadowline Drive	3,387	$105,844	5	$500	2	$4,400	0	$0	0	$0	2	$15,000	$125,744
5	Highway 194	Highway 421 to New Market Boulevard	2,850	$89,063	11	$1,100	3	$6,600	0	$0	0	$0	6	$45,000	$141,763
6A	Highway 421 East	Highway 194 to Grove St	520	$16,250	0	$0	4	$8,800	0	$0	0	$0	0	$0	$25,050
6B	Highway 421 East (multi-use path)	Grove St to Corporate Limits	9,803	$539,165	7	$700	0	$0	0	$0	0	$0	0	$0	$539,865
7	Greenway Road (Phases II-IV)	Wilson Drive to Pride Drive	3,502	$109,438	15	$1,500	6	$13,200	0	$0	0	$0	8	$60,000	$184,138
8	Water Street/River Street	Water St sidewalk gaps/Water St to Moretz St	1,054	$32,938	2	$200	2	$4,400	1	$17,000	0	$0	0	$0	$54,538
9	Queen Street	Water Street to N. Depot Street	761	$23,782	2	$200	6	$13,200	2	$34,000	2	$30,000	0	$0	$101,182
10	W. King Street	Edgecliff Lane to Old Bristol Road	2,639	$82,469	9	$900	4	$8,800	0	$0	4	$60,000	0	$0	$152,169
		Totals	28,020	$1,108,451	69	$6,900	36	$79,200	3	$51,000	6	$90,000	16	$120,000	$1,455,551

The sidewalk cost of $31.25/LF is based on a recent project example supplied by the Town of Boone Public Works Department. Multi-use trail cost of $55/LF is from other NC projects. All other per-cost figures are based on estimates from the Pedestrian and Bicycle Information Center (PBIC).

Additional Infrastructure Recommendations

This section includes projects to consider as additional pedestrian infrastructure priorities, based on staff, committee, and public input. NCDOT Division 11 and the Town of Boone should work together on appropriate solutions for these projects, which could include a variety of treatments, including but not limited to signage, curb extensions, higher-visibility crosswalks, and pedestrian countdown signals.

- *Improvements for walking safely across US 421.* Note that since King Street in Downtown Boone is already fairly walkable, projects in other parts of Boone may be of greater importance to improving conditions for pedestrians in Boone as a whole. Still, some specific crossing locations were noted at public workshops, and were cited by steering committee members as in need of improvement. Also, the crash history for the following locations (see pages 2-6 and 2-7) further indicates a need for creating safer crossings:

  - US 421 (King St.) & Depot St.
  - US 421 (King St.) & Appalachian St.
  - US 421 (King St.) & College St. (15 buses/hour)
  - US 421 (King St.) & US 321 (Hardin St.)
  - US 421 (King St.) & NC 105

  For King St. & Depot St., one option is to eliminate left turning movements off of King St. If this option is desired by the Town of Boone, Town Council could make a resolution for the change, so that NCDOT could be better positioned to implement it.

  Also note that several of these locations already have studies or construction projects underway. For instance, the intersection of US 421 (King St.) & College St. has a study that will be conducted in September 2011, to see what improvements are feasible. Similarly, the intersection of US 421 (King St.) & NC 105 is still under construction as of 2011, as part of the overall widening of US 421.

- *Other key crossing improvements not already featured within the top ten cutsheets.* These include potential crossings such as:

  - US 321 (Hardin/BlowingRock) & NC 105
  - US 321 (Blowing Rock Rd.) & Boone Mall
  - US 321 (Blowing Rock Rd.) & Shadowline Dr.
  - US 321 (Blowing Rock Rd.) & Boone Heighhts Dr.
  - US 321 (Blowing Rock Rd.) & Watauga Village Dr.
  - US 321 (Blowing Rock Rd.) & Deerfield Rd.
  - NC 105 & Quail Dr.
  - NC 105 & Faculty St.
  - NC 105 near Polar Grove Rd. (serving the nearby apartments, bus stop, and grocery store

  For crossing US 321 in the short term, the Town could improve access to the greenway underpass near Home Depot, with ramps from the sidewalk (which is practically the only improvement the Town would have control over without NCDOT). In the longer term, the best opportunity for systematic improvement may be when an updated signal system is put into place for the entire corridor, which could take place in 2013 (currently it is difficult to add full pedestrian crossing phases without affecting signal timing and traffic flow at 421 & 105).

- Rivers Street improvements through ASU campus (to be determined by ASU, NCDOT, and the Town of Boone).

Chapter Contents

Overview

Key Action Steps

Key Partners in Implementation

Performance Measures (Evaluation and Monitoring)

Facility Development Methods

Action Steps Table

Overview

The three main ways to improve pedestrian conditions in Boone are through facility construction, program implementation and policy enforcement. This chapter outlines the implementation priorities, key partners in implementation, facility development methods, and over 30 specific action steps.

The following action steps are integral to achieving the goals and vision of this Plan. As guiding recommendations and the clearest representation of specific items to accomplish, they should be referred to often. Table 4.1 summarizes these action steps, along with all other recommendations made throughout the plan, and defines recommended actions, responsible agencies, and phasing. Finally, this plan's appendices provide a variety of in-depth resources for assisting in carrying out these tasks.

Key Action Steps

1. ADOPT THIS PLAN

Before any other action takes place, the Town of Boone 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 of Boone's official pedestrian transportation plan, Boone 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 Boone to dedicate or allocate funds, but rather indicates intent to implement this plan over time, starting with these action steps.

2. 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 planning staff and public works staff oversee the day-to-day implementation of this plan. In many municipalities this task is covered by a full-time pedestrian and pedestrian coordinator, but in smaller towns, such as Boone, it makes more sense to fold these responsibilities into current staff responsibilities.

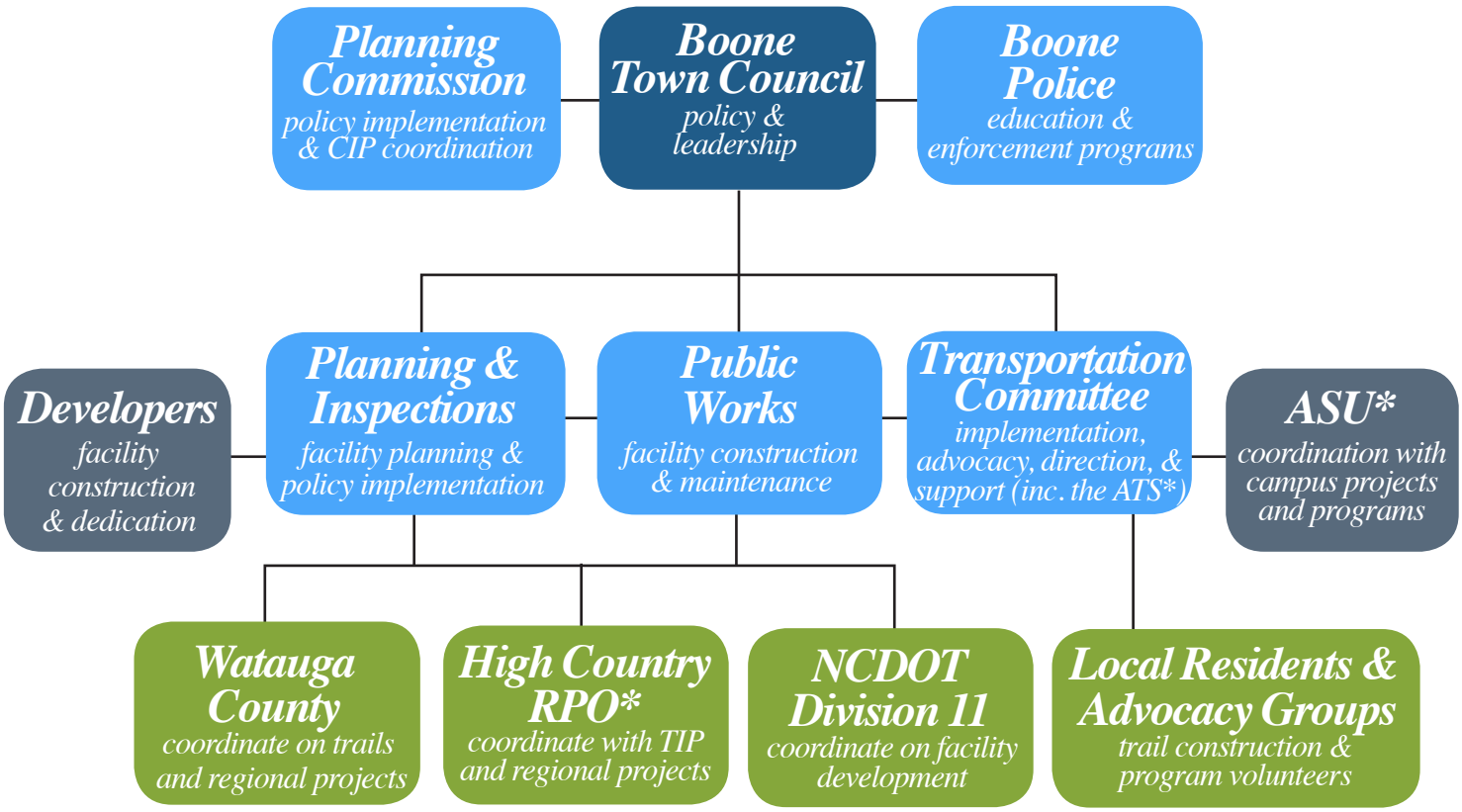
3. MAINTAIN ALTERNATIVE TRANSPORTATION SUBCOMMITTEE (ATS)

The Town of Boone should maintain the Alternative Transportation Subcommittee to assist in the implementation of this Plan. The ATS should have representation from active pedestrians and commuting and recreational cyclists, and should champion the recommendations of this Plan. The existence of this group represents a significant step in becoming designated as a Walk Friendly Community (see page 4-4). The ATS should continue to 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 Boone staff in community outreach, marketing and educational activities recommended by this Plan.

The existing ATS has actively analyzed pedestrian priorities for the Town for years and continues to do so. Communities around the state that have similar committees benefit tremendously by having a dedicated focus on bicycle and pedestrian issues. These types of organizations, and others like them, traditionally focus on education, advocacy, partnerships, events and community service. Moving forward, each subcommittee member could represent one key functional area: planning, design, safety, maintenance, education, health, recreation, etc.

Above: The ATC provides input on the development of the pedestrian plan.

ORGANIZATIONAL FRAMEWORK FOR IMPLEMENTATION



*ATS = Alternative Transportation Sub-committee
*ASU = Appalachian State University
*RPO = Regional Planning Organization

4. 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 the Organizational Chart shown on page 4-2. 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 goals for the year should be reconfirmed by participants. The meetings could also occasionally feature special training sessions on bicycle, pedestrian, and trail issues.

5. Seek Multiple Funding Sources and Facility Development Options

Multiple approaches should be taken to support pedestrian 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. A priority action is to immediately evaluate the recommendations against transportation projects that are currently programmed in the Transportation Improvement Program (TIP) 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 TIP updates.

Capital and local funds for 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 D: Funding.

6. Improve Pedestrian Policies

While the Town of Boone addresses non-motorized transportation in a number of important ways, some policy updates could be considered to ensure future development provides pedestrian and bicycle facilities and improves bicycle/pedestrian friendliness. Policy considerations were submitted by the project consultant to Town of Boone Public Works and Planning & Inspections staff as a memorandum for future consideration.

Top Policy Recommendations (see Appendix C for more on pedestrian-related policies)

- *Complete Streets Policy:* There is a growing national trend towards integrating bicycling, walking and transit as a routine element in highway and transit projects. This movement has developed under the name of "Complete Streets," which is defined by the Complete the Streets Coalition as follows: "Complete Streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street." By adopting a "Complete Streets" policy, the Town of Boone aims to accommodate all users when approving development of new roadways and the reconstruction of existing roadways.

- *Coordinated Development:* Ensure that adopted pedestrian and multi-use path recommendations from this plan are part of future residential and commercial developments that connect with such proposed facilities.

- *Driveway Access Management:* Refer to the NCDOT policy on 'Street and Driveway Access to North Carolina Highways' for examples on how to reduce conflict points between motor vehicles and pedestrians and bicyclists. Consider access management for both future development and retrofits to existing development: www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf

7. Develop Sidewalk & Trail Specifications for Proposed Projects

Town of Boone staff could prepare these in-house 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.

8. Launch Programs as New Projects are Built

Through cooperation with the Town of Boone, the Alternative Transportation Committee, and groups such as walking clubs, strong education, encouragement, and enforcement campaigns could occur as new facilities are built. When an improvement has been made, the roadway environment has changed and proper interaction between motorists 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. Appendix B: Program Resources, provides program ideas to choose from, many of which are also included in the action steps table at the end of this chapter.

Top Program Recommendations (see Appendix B for more on bicycle-related programs)

- Seek Safe Routes to School (SRTS) programmatic funding for Hardin Park Elementary and involve local school systems to develop education and encouragement programs for children. Be sure that the committee formed to apply for funding stays together throughout the grant process. Coordinate with the High Country RPO when applying for funding.
- Safe Routes for Seniors: A senior walking and bicycling program could include group walks and/or bicycle rides, walk/bike maps at senior centers, and/or senior participation in Safe Routes to Schools (e.g. crossing guard or Walking School Bus volunteer).
- The Town could initiate weekly or monthly family trail walks that incorporate nature, education, and healthy living themes. Local citizens and environmental advocacy organizations (or even ATS members) might be willing to coordinate such events.

9. Offer Training for Enforcement

Law enforcement officers have many important responsibilities, yet pedestrians and bicyclists remain the most vulnerable forms of traffic. The Boone Police Department 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 Boone's officers 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).

10. Become Designated as a Walk Friendly Community

One of the goals for this Pedestrian Plan is to transform Boone into a "Walk Friendly Community" (WFC). The Walk Friendly Community 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.

The development and implementation of this Plan is an essential first step in eventually becoming a Walk Friendly Community. Being the first year of this award (2011), Boone has an opportunity to become an early award winner. With ongoing efforts and the short term work program recommended here, the Town of Boone should be in a position to apply for and receive WFC status within two years. An introduction to Walk Friendly Communities can be found at: www.walkfriendly.org/webinar.cfm.

Key Partners in Implementation

Role of Boone Town Council

The Town Council will be responsible for adopting this plan. Through adoption, the Town of Boone's leadership is further recognizing the value of pedestrian transportation and is putting forth a well-thought out set of recommendations for improving public safety and overall quality of life (see the 'Benefits of a Walkable Community' section starting on page 1-3). 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 Town departments and the local NCDOT, Division 11.

Adoption of this Plan is in line with public support. Boone's online comment form (which yielded over 330 responses) showed strong support for improving pedestrian conditions. Though not a statistical survey, the comment form results do represent the opinions of hundreds of local residents. The comment form asked, "How important to you is improving walking conditions in Boone?" Seventy-nine (79) percent responded "Very important", twenty (20) percent responded "Somewhat important", while only one (1) percent responded "Not important". See Appendix on Public Involvement for more information.

Role Of The Town Of Boone Planning Commission

The Town of Boone Planning Commission serves as an advisory board to the Council on matters of planning and zoning. The Planning Commission should be prepared to:

- Become familiar with the recommendations of this Plan, and support its implementation.
- Learn about pedestrian-related policy in Appendix C of this Plan.

Role of the Town of Boone Public Works Department

The Public Works Department handles the responsibility for the construction and maintenance of pedestrian facilities on locally owned and maintained roadways, as well as on NCDOT roadways, where encroachment agreements are secured. The Department also maintains Town parks and greenways. The department should be prepared to:

- Communicate and coordinate with other Town departments and the ATS on priority pedestrian projects.
- Become familiar with the standards set forth in Appendix A of this Plan, as well as state and national standards for pedestrian facility design.
- Secure encroachment agreements for work on NCDOT-owned and maintained roadways.
- Design, construct and maintain pedestrian facilities.
- Communicate and coordinate with Watauga County, High Country RPO, and neighboring municipalities on regional trails; partner for joint-funding opportunities, such as SRTS.
- Communicate and coordinate with NCDOT Division 11 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 Division 11 to ensure that when NCDOT-owned and maintained roadways in Boone are resurfaced or reconstructed, that this Plan's adopted recommendations for 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 Town of Boone Planning & Inspections

Planning & Inspections' planning staff will take primary responsibility for the contact with new development to implement the plan (with support from the Public Works Department). For example, the staff should be prepared to:

- Communicate and coordinate with local developers on adopted recommendations for pedestrian facilities, including paved multi-use trails.
- Assist the Public Works Department in communicating with NCDOT and regional partners
- Refer often to Appendix C: Policy Resources for information that may apply to bicycle and pedestrian facility development in Boone.

Role Of The The Alternative Transportation Subcommittee

See pages 4-1 and 4-3 for more information. The Committee should be prepared to:

- Meet with staff from Planning & Inspections and the Public Works Department; evaluate progress of the plan's implementation and offer input regarding pedestrian and trail-related issues; assist Town of Boone staff in applying for grants and organizing pedestrian-related events and educational activities.
- Build upon current levels of local support for pedestrian issues and advocate for local project funding.

Role of the Local NCDOT, Division 11

Division 11 of the NCDOT is responsible for the construction and maintenance of pedestrian facilities on NCDOT-owned and maintained roadways in the Town of Boone, OR is expected to allow for the Town to do so with encroachment agreements. Division 11 should be prepared to:

- Recognize this Plan as not only as an adopted plan of the Town of Boone, but also as an approved plan of the NCDOT.
- Become familiar with the 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 A of this Plan, as well as state and national standards for pedestrian facility design; construct and maintain pedestrian facilities using the highest standards allowed by the State (including the use of innovative treatments on a trial-basis).
- Notify the Town of Boone Public Works Department of all upcoming roadway reconstruction or resurfacing/restriping projects in Boone, no later than the design phase; Provide sufficient time for comments from the planning 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 the Town of Boone Police Department

The Town of Boone Police Department is responsible for providing the community the highest quality law enforcement service and protection to ensure the safety of the citizens and visitors to the Town of Boone. The Police Department should be prepared to:

- Become experts on pedestrian-related laws in North Carolina
  (see: www.ncdot.gov/bikeped/lawspolicies/laws/)

- Continue to enforce not only pedestrian-related laws, but also motorist laws that affect walking, such as speeding, running red lights, aggressive driving, etc.

- Participate in pedestrian-related education programs.

- Review safety considerations with the Public Works Department as projects are implemented.

Role of Developers

Developers in Boone can play an important role in facility development whenever a project requires the enhancement of transportation facilities or the dedication and development of 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 A of this Plan, as well as state and national standards for pedestrian facility design.

- Be prepared to account for bicycle and pedestrian circulation and connectivity in future developments

Role of Local & Regional Stakeholders

Stakeholders for pedestrian facility development and related programs, such as Watauga County, the High Country RPO, ASU, and local economic development organizations 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.

- The RPO should work with the Town of Boone on populating the Transportation Improvement Program (TIP) with pedestrian infrastructure projects.

- Watauga County should coordinate with the Town on trail development and SRTS grants.

- ASU and local economic development groups, such as downtown organizations and chambers, should look for opportunities to partner on specific projects, such as improvements to Howard Street (see page 3-6), 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 issues in Boone.

- Assist Town of Boone staff and the Alternative Transportation Subcommittee by volunteering for pedestrian-related events and educational activities and/or participate in such activities.

- Assist Town of Boone staff and the Alternative Transportation Subcommittee by speaking at Town Council meetings and advocating for local pedestrian project and program funding.

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 Appendix B of this plan. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and personal connections to the Town's greenway and pedestrian networks.

Performance Measures (Evaluation and Monitoring)

The Town of Boone should establish performance measures to benchmark progress towards fulfilling the recommendations of this Plan. These performance measures should be stated in an official report within two years after the Plan is adopted. Performance measures could address the following aspects of pedestrian transportation and recreation in Boone:

- *Safety*. Measures of pedestrian crashes and injuries or speeding.
- *Facilities*. Measures of how many pedestrian facilities have been funded and constructed since the Plan's adoption.
- *Maintenance*. Measures of existing sidewalk/crosswalk deficiency or maintenance needs.
- *Counts*. Measures of pedestrian traffic at specific locations.
- *Education, Encouragement and Enforcement*. Measures of the number of people who have participated in part of a pedestrian program since the Plan's adoption.

Facility Development Methods

This section describes different construction methods for the proposed pedestrian facilities outlined in Chapter 3. Note that many types of transportation facility construction and maintenance projects can be used to create new pedestrian facilities. It is much more cost-effective to provide 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 pedestrian facilities into routine transportation and utility projects, the Town of Boone should keep track of NCDOT's projects and any other local transportation improvements. While doing this, s/he should be aware of the different procedures for state and local roads and interstates.

NCDOT Transportation Improvement Program

The Transportation Improvement Program (TIP) is an ongoing program at NCDOT which includes a process asking localities to present their transportation needs to state government. Pedestrian facility and safety needs are an important part of this process. Every other year, a series of TIP meetings are scheduled around the state. Following the conclusion of these meetings, all requests are evaluated. Pedestrian improvement requests, which meet project selection criteria, are then scheduled into a four-year program as part of the state's long-term transportation program.

There are two types of projects in the TIP: incidental and independent. Incidental projects are those that can be incorporated into a scheduled roadway improvement project. Independent are those that can stand-alone such as a greenway, not related to a particular roadway.

The Town of Boone, guided by the priority projects within this plan, should present pedestrian projects along State roads to the RPO and State. Local requests for small pedestrian projects, such as crosswalks and smaller segments of sidewalk, can be directed to the RPO or the local NCDOT Division 11 office. Further information, including the criteria evaluated can be found at: http://www.ncdot.org/transit/bicycle/funding/funding_TIP.html

Local Roadway Construction or Reconstruction

Pedestrians should be accommodated any time a new road is constructed or an existing road is reconstructed. All new roads with moderate to heavy motor vehicle traffic should have sidewalks and safe intersections. The Town of Boone should take advantage of any upcoming construction projects, including roadway projects outlined in local comprehensive and transportation plans. 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.

Residential and Commercial Development

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

Retroftit Roadways with New Pedestrian Facilities

For priority pedestrian projects, it may be necessary to add new facilities before a roadway is scheduled to be reconstructed. In some places, it may be relatively easy to add sidewalk segments to fill gaps, but other segments may require removing trees, relocating landscaping or fences, re-grading ditches or cut and fill sections.

Bridge Construction or Replacement

Provisions should always be made to include a walking facility as a part of vehicular bridges, underpasses, or tunnels. All new or replacement bridges should accommodate pedestrians with wide sidewalks on both sides of the bridge. Even though bridge construction and replacement does not occur regularly, it is important to consider these policies for long-term 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. Sidewalks across a new bridge shall be a minimum of five to six feet wide with a minimum handrail height of 42”.

Signage and Wayfinding Projects

As more pedestrian facilities are constructed, the Town should consider developing and adopting a signage style policy and procedure, to be applied throughout the entire community, to make it easier for people to find destinations. Mile markers or signs for the Town’s trails are one example of these wayfinding signs, and they can be installed along routes as a part of a comprehensive wayfinding improvement project. 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 Boone should explore opportunities to revise existing easements to accommodate public access greenway facilities. Similarly, as new easements are acquired in the future, the possibility of public access should be considered. Sewer easements are very commonly used for this purpose, offering cleared and graded corridors that easily accommodate trails. This approach avoids the difficulties associated with acquiring land, and it better utilizes the Town’s resources.

Action Steps Table

Table 4.1 Policy, Program, and Administrative Action Steps Table

Task	Lead Agency	Support	Details	Phase
Present Plan to Town Council	Project Consultants	Public Works	Presentation to Town Council in Summer 2011	Summer 2011
Approve this Plan	NCDOT Bike/Ped Division	Project Consultants	Official letter of approval in Summer 2011	Summer 2011
Adopt this plan	Town Council	Public Works, Project Consultants	Through adoption, the Plan becomes an official planning document of the Town. Adoption shows that the Town of Boone has undergone a successful, supported planning process.	Summer 2011
Designate Staff	Town Council	Leadership of Town Departments	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 from Public Works and Planning & Inspections oversee the day-to-day implementation of this plan.	Summer 2011
Reconfirm goals of the Alternative Transportation Subcommittee (ATS)	Town Council	ATS	Reconfirm goals of the ATS to include assistance in the implementation of this Pedestrian Plan.	Summer 2011
Begin Annual Meeting With Key Project Partners	Public Works	Planning & Inspections, NCDOT, ATS, and local & regional stakeholders	Key project partners (see org. chart on page 4-2) should meet on an annual basis to evaluate the implementation of this Plan. Meetings could also occasionally include on-site tours of locations where facilities are recommended.	Ongoing/ Beginning Fall 2011
Seek Multiple Funding Sources and Facility Development Options	Public Works	Planning & Inspections, ATS	Chapter 3 contains project cost estimates and Appendix D contains potential funding opportunities.	Ongoing/ Beginning Fall 2011
Improve Pedestrian Policies	Town Council	Planning & Inspections, Public Works, ATS	Suggested policy revisions to the Town of Boone UDO are outlined in Appendix C. The changes suggested clarify some basic policy positions regarding future development and the provision of pedestrian facilities. Some changes are also suggested for terminology that is more inclusive and 'Complete Streets' oriented.	Fall 2011
Develop Sidewalk and Trail Specifications	Public Works	Planning & Inspections, NCDOT	Town staff could prepare these in-house to save resources using the design guidelines of this plan and the project cut-sheets as starting points. Specifically, the resources listed on page A-3 will be very useful in drafting such documents.	Ongoing/ Beginning Fall 2011
Launch Programs as New Projects are Built	Transportation Committee	Public Works, Planning & Inspections, ATS	Assist in the coordination of programs, such as those described in Appendix B: Program Resources.	Short-Term (2012)
Provide police officers with educational material to hand out with warnings	Police Department	NCDOT Bike/Ped Division	Provide officers with an informational handout to be used during bicycle and pedestrian-related citations and warnings.	Short-Term (2012)
Complete three of the top priority projects	Public Works + NCDOT Division 11	High Country RPO, NCDOT Bike/Ped Division	Table 3.1 provides a list of projects with a general priority ranking. Immediate attention to the higher ranking projects will instantly have a large impact on pedestrian conditions in Boone. Aim to complete at least three of these pedestrian projects by the end of 2012.	Short-Term (2012)

Task	Lead Agency	Support	Details	Phase
Present this Plan to other local and regional bodies and agencies.	Transportation Committee	Public Works, Planning & Inspections, ATS	This Plan should be presented to other local and regional bodies and agencies. Possible groups to receive a presentation might include: the High Country Regional Planning Organization, regional transportation planners, Watauga County planners, health clubs and fitness facilities, schools and youth organizations, environmental clubs, major employers, and large neighborhood groups.	Short-Term (2012)
Develop a long term funding strategy	Public Works	Town Council, Planning & Inspections, ATS	To allow continued development of the overall system, capital and Powell Bill funds for pedestrian facility 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). Funding for an ongoing maintenance program should also be included in the Town's operating budget.	Short-Term (2012)
Maintain pedestrian facilities	Public Works, NCDOT Division 11	ATS + General Public (for reporting maintenance needs)	Public Works and NCDOT should make improvements to faded crosswalks and address crosswalks that are missing (see table 2.1)	Ongoing/ Beginning 2012
Notify the Public Works Department of all upcoming roadway reconstruction or resurfacing/restriping projects, no later than the design phase.	Public Works Director, and NCDOT Division 11	Planning & Inspections, NCDOT Bike/Ped Division	Provide sufficient time for comments; Incorporate pedestrian recommendations from this Plan. If a compromise to the original recommendation is needed, then contact NCDOT Division of Pedestrian and Pedestrian Transportation for guidance on appropriate alternatives.	Ongoing/ Beginning Fall 2011
Explore possibility of a regional multimodal coordinator	Town Council	ATS, High Country RPO, neighboring municipalities	Explore the possibility of partnership with neighboring municipalities in hiring a regional full-time Multi-Modal Transportation Coordinator	Short-Term (2012)
Ensure planning efforts are integrated regionally	Transportation Committee	High Country RPO, Watauga County, neighboring municipalities, ATS	Combining resources and efforts with surrounding municipalities, regional entities, and stakeholders is mutually beneficial, especially with trail development. Communicate and coordinate with the regional partners on regional trails and pedestrian facilities; partner for joint-funding opportunities. After adoption by the Town, this document should also be recognized in regional transportation plans.	Ongoing/ Beginning Fall 2011
Apply for Safe Routes to School Grants and Infrastructure Funding	Transportation Committee	High Country RPO, NCDOT Division 11, ATS	Establish 'bike-to-school' groups, 'walking school buses' or other similar activities for children through the Safe Routes to School Program. Inquire about pedestrian infrastructure funding for projects within 1.5 miles of schools through NCDOT Division 11.	Ongoing/ Beginning Fall 2011
Policy Orientation	All Stakeholders	NCDOT Bike/Ped Division	Become familiar with State and Federal bicycle and pedestrian policies, as outlined in Appendix C.	Short-Term (2012)
Design Orientation	Public Works and NCDOT Division 11	NCDOT Bike/Ped Division	Become familiar with the standards set forth in Appendix A of this Plan, as well as state and national standards for pedestrian facility design.	Short-Term (2012)

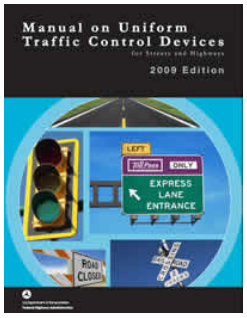
Task	Lead Agency	Support	Details	Phase
Become familiar with the pedestrian facility recommendations for NCDOT roadways in this Plan (Chapter 3); take initiative in incorporating this plan's recommendations into the Division's schedule of improvements.	NCDOT Division 11	Public Works, NCDOT Bike/Ped Division	Construct and maintain pedestrian facilities using the highest standards allowed by the State (including the possibility of using innovative treatments on a trial-basis). Seek guidance and direction from the NCDOT Division of Pedestrian and Pedestrian Transportation on issues related to this Plan and its implementation.	Ongoing/ Beginning Fall 2011
If the Town determines that there are streets where speeds need to be lowered for safety purposes, contact NCDOT to lower them.	Town Council	Public Works, NCDOT Division 11, NCDOT Bike/Ped Division, ATS	The authority to lower speeds is set out in NC General Statute 20-141(f) - Whenever local authorities within their respective jurisdictions determine upon the basis of an engineering and traffic investigation that a higher maximum speed than those set forth in subsection (b) is reasonable and safe, or that any speed hereinbefore set forth is greater than is reasonable and safe, under the conditions found to exist upon any part of a street within the corporate limits of a municipality and which street is a part of the State highway system (except those highways designated as part of the interstate highway system or other controlled access highway) said local authorities shall determine and declare a safe and reasonable speed limit. A speed limit set pursuant to this subsection may not exceed 55 miles per hour. Limits set pursuant to this subsection shall become effective when the Department of Transportation has passed a concurring ordinance and signs are erected giving notice of the authorized speed limit.	Ongoing/ Beginning Fall 2011
Update the Town's user-friendly pedestrian map	GIS	Public Works, ATS	Once more facilities are in place, reproduce and distribute the user-friendly pedestrian map of Boone, and consider the advantages of adding bicycling routes. Provide basic safety information, commuting information, trail etiquette, transit information, and a list of local resources on the back side of the map.	Mid-Term (2013)
Offer Training for Enforcement	Police Department	ATS, National Highway Traffic Safety Administration (NHTSA) or Association of Pedestrian and Bicycle Professionals (APBP)	Training for Boone's officers could be done through free online resources, such as APBP webinars. If the Town is able to find and secure grants for education, the Town could also seek instructor-led courses offered by the NHTSA or groups such as the League of American Bicyclists (LAB).	Mid-Term (2013)
Become Designated as a Walk Friendly Community	Transportation Committee	Public Works, Planning & Inspections, ATS	Boone should make progress in accomplishing the goals of this Plan, and then apply for Walk Friendly Community status. See page 4-4 for more information.	Long-Term (2014)
Attend a pedestrian planning and design training session	Public Works	Planning & Inspections, ATS	Sponsor at least one planner, one engineer, and one ATS member to attend a bicycle and pedestrian planning and design training session. NCDOT, in partnership with the Institute for Transportation Research and Education (ITRE), offers pedestrian planning and design workshops for practicing professionals. Free or inexpensive webinars are also available online through such groups as the Association of Pedestrian and Bicycle Professionals (APBP).	Opportunity-Based

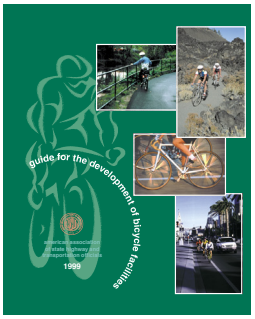
A Design Resources

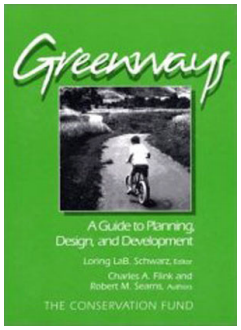
Below: These resources (and those listed on A-2) can be consulted for more information on design standards.

Pedestrian and Bicycle Information Center

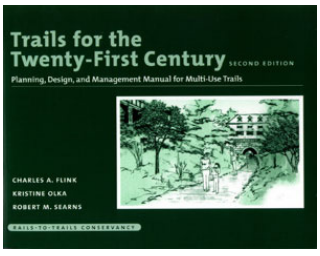
North Carolina DOT completestreets







CITIES FOR CYCLING



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Overview

Even though this is a *Pedestrian* Plan, this appendix provides design guidelines for bicycle, pedestrian and trail-related facilities, as requested for reference purposes by the project steering committee. The guidelines should be used with the understanding that design adjustments will be necessary in certain situations in order to achieve the best results. Facility installation and improvements should be evaluated on a case-by-case basis, in consultation with local or state bicycle coordinators, and/or a qualified engineer or landscape architect. Some new treatments may require formal applications to the North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration (FHWA) for approval as experimental uses. Should national standards be revised in the future and result in discrepancies with this report, those standards should be consulted for design decisions.

On facilities maintained by NCDOT, the State's design guidelines will apply. The Town of Boone has the potential to exceed minimum guidelines where conditions warrant (within their jurisdiction).

Design Resources:

NCDOT "Typical" Highway Cross Sections - The comprehensive planning and design "typical" highway cross sections have been updated to support the NCDOT's "Complete Streets" policy that was adopted in 2009 (see Chapter 4 and Appendix C for more on Complete Streets). The guidance in the updated cross sections establishes design elements that emphasize safety, mobility, and accessibility for multiple modes of travel. For more information, contact the State Roadway Design Engineer, or visit: www.nccompletestreets.org

Cities for Cycling Urban Bikeway Design Guide by the National Association of City Transportation Officials (NACTO)
The purpose of the NACTO Urban Bikeway Design Guide is to provide cities with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists.
www.nacto.org/cities-for-cycling/design-guide/

The Town of Boone Roadway and Sidewalk Program Handbook, 2009, Town of Boone Public Works Department

Greenways: A Guide to Planning, Design and Development. Island Press, 1993. Authors: Flink and Searns

Trails for the Twenty-First Century Island Press, 2nd ed. 2001. Authors: Flink, Searns, Olka

Pedestrian and Bicycle Information Center - www.walkinginfo.org and www.bicyclinginfo.org

Bicycle Parking Design Guidelines - www.bicyclinginfo.org/engineering/parking.cfm

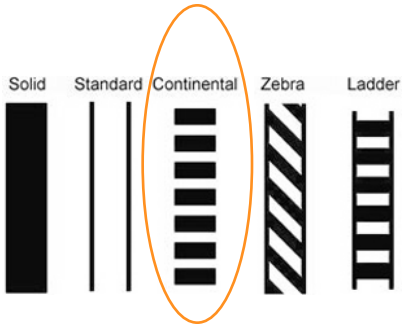
Guide for the Development of Bicycle Facilities (update scheduled for 2011) American Association of State Highway Transportation Officials , 1999 - www.transportation.org

Manual on Uniform Traffic Control Devices (MUTCD) U. S. Department of Transportation, Washington, DC, 2009 - http://mutcd.fhwa.dot.gov

Policy on Geometric Design of Streets and Highways. American Association of State Highway Transportation Officials, 2001 - http://transportation.org

Universal Access to Outdoor Recreation: A Design Guide. PLAE, Inc., Berkeley, CA, 1993.

Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities: An ITE Proposed Recommended Practice. - www.ite.org/css



A variety of patterns are possible in designating a crosswalk; an example of a 'continental' design is shown above.

Marked Crosswalks

A marked crosswalk designates a pedestrian right-of-way across a street. It is often installed at controlled intersections or at key locations along the street (a.k.a. mid-block crossings). Every attempt should be made to install crossings at the specific point at which pedestrians are most likely to cross: a well-designed traffic calming location is not effective if pedestrians are instead using more seemingly convenient and potentially dangerous locations to cross the street. Marked pedestrian crosswalks may be used under the following conditions: 1) At locations with stop signs or traffic signals, 2) At non-signalized street crossing locations in designated school zones, and 3) At non-signalized locations where engineering judgment dictates that the use of specifically designated crosswalks are desirable.

There is a variety of form, pattern, and materials to choose from when creating a marked crosswalk. It is important however to provide crosswalks that are not slippery, are free of tripping hazards, or are otherwise difficult to maneuver by any person including those with physical mobility or vision impairments. Although attractive materials such as inlaid stone or certain types of brick may provide character and aesthetic value, the crosswalk can become slippery. Potential materials can be vetted by requesting case studies from suppliers regarding where the materials have been successfully applied. Also, as some materials degrade from use or if they are improperly installed, they may become a hazard for the mobility or vision impaired.

Crosswalk Guidelines:

- Should not be installed in an uncontrolled environment [at intersections without traffic signals] where speeds exceed 40 mph. (AASHTO, 2004)
- Crosswalks alone may not be enough and should be used in conjunction with other measures to improve pedestrian crossing safety, particularly on roads with average daily traffic (ADT) above 10,000
- Width of marked crosswalk should be at least six feet; ideally ten feet or wider in downtown areas.
- Curb ramps and other sloped areas should be fully contained within the markings.
- Crosswalk markings should extend the full length of the crossings.
- Crosswalk markings should be white per MUTCD.
- Either the 'continental' or 'ladder' patterns are recommended for intersection improvements for aesthetic and visibility purposes. Lines should be one to two feet wide and spaced one to five feet apart.

Crosswalk Guideline Sources:

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

Metro Regional Government. (2005). Portland, Oregon: Transportation Information Center. http://www.oregonmetro.gov

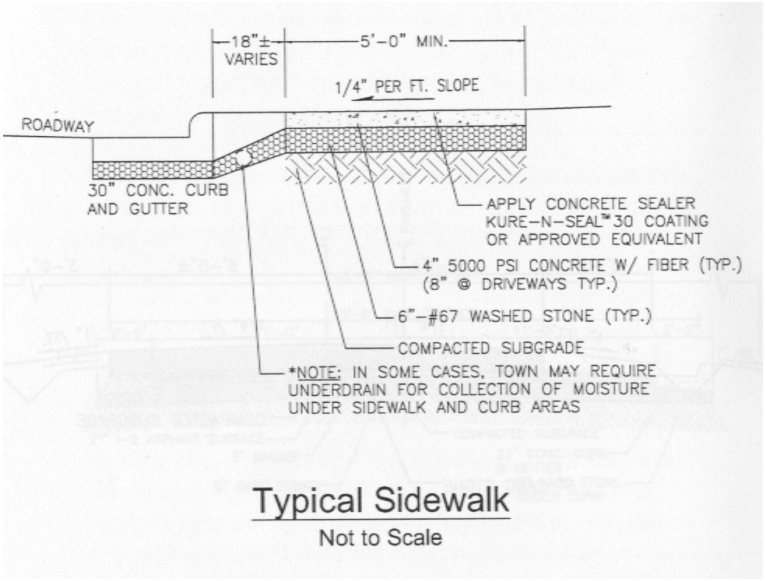
Sidewalks and Walkways

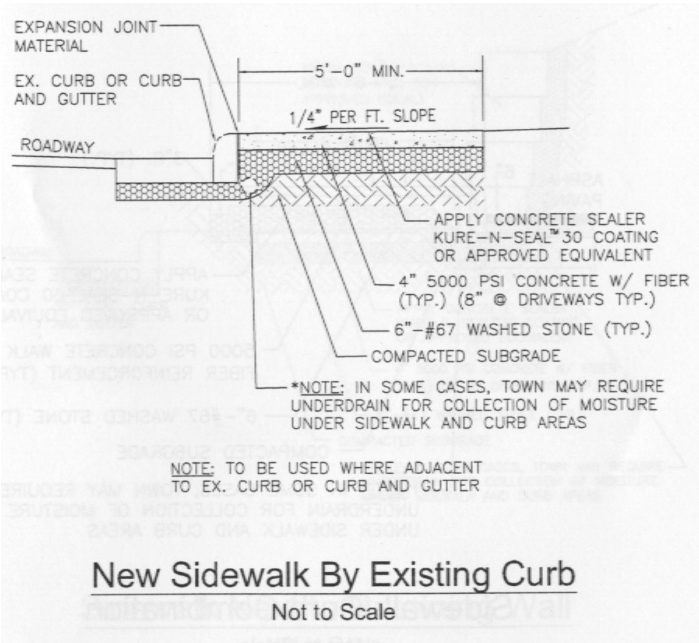
Sidewalks and walkways are extremely important public right-of-way components often times adjacent to, but separate from automobile traffic. In many ways, they act as the seam between private residences, stores, businesses, and the street.

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

Sidewalk with a vegetated buffer zone. Notice the sense of enclosure created by the large canopy street trees. (Image from http://www.walkinginfo.org)

Below: Sidewalk standards from the Town of Boone Roadway & Sidewalk Program Handbook





Sidewalk Guideline Sources:

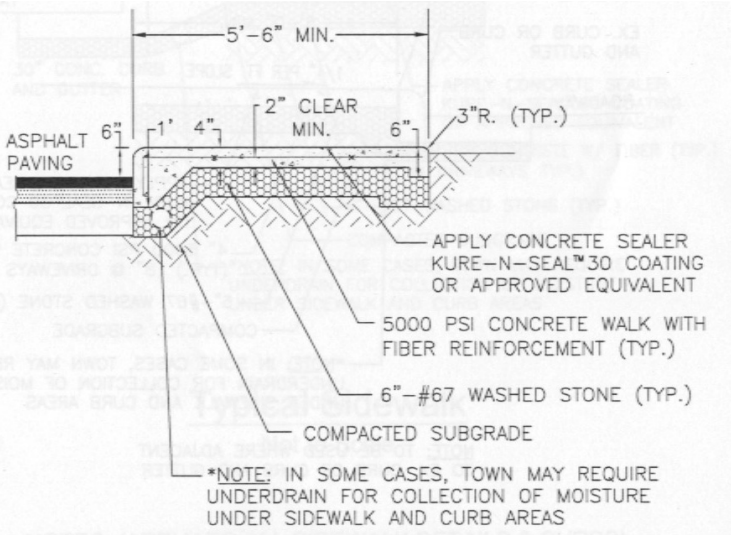
American Association of State Highway and Transportation Officials. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities.

Metro Regional Government. (2005). Portland, Oregon: Transportation Information Center. www.oregonmetro.gov

Sidewalks and Walkway Guidelines:

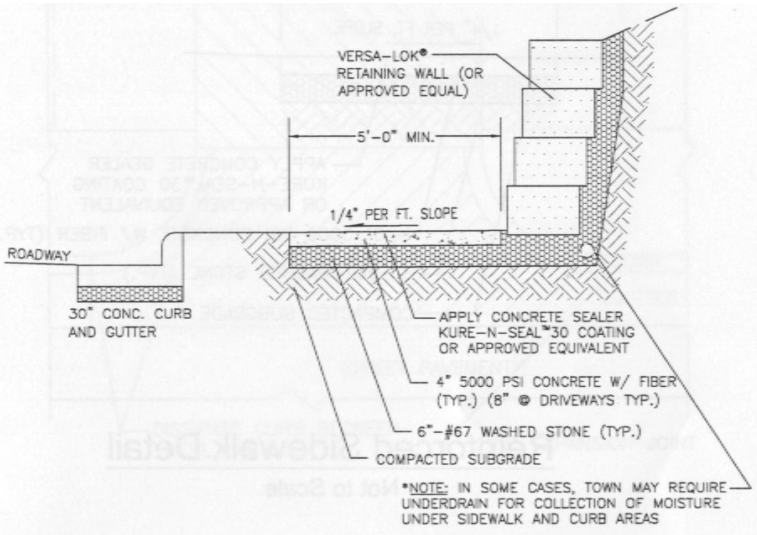
- Refer to the Town of Boone Roadway & Sidewalk Program Handbook for sidewalk construction details.
- Concrete is preferred surface, providing the longest service life and requiring the least maintenance. Permeable pavement such as porous concrete may be considered to improve water quality.
- Sidewalks should be built as flat as possible to accommodate all pedestrians; they should have a running grade of five percent or less; with a two percent maximum cross-slope.
- Concrete sidewalks should be built to minimum depth of four inches; eight inches at driveways.
- Residential sidewalks should be a minimum of 5 ft in width. Sidewalks serving mixed use and commercial areas shall be a minimum of 7 ft in width (though 12–15 feet is ideal in front of retail storefronts). The slope should be 1/4'' per ft.
- See the Landscaping section later in this chapter for shade and buffer opportunities of trees and shrubs.
- Motor vehicle access points should be kept to minimum to reduce conflict points between pedestrians and vehicles.
- If a sidewalk with buffer on both sides is not feasible due to topography and right-of-way constraints, then a sidewalk on one side is better than no facility. Each site should be examined in detail to determine placement options.

Below: Sidewalk standards from the Town of Boone Roadway & Sidewalk Program Handbook



Sidewalk Curb Combination

Not to Scale



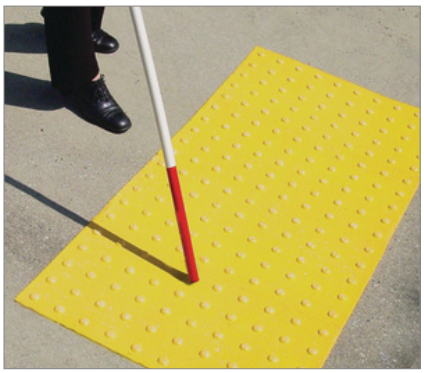
Sidewalk Next to Retaining Wall

Not to Scale

Curb Ramps

Curb ramps are critical features that provide access between the sidewalk and roadway for wheelchair users, people using walkers, crutches, or handcarts, people pushing bicycles or strollers, and pedestrians with mobility or other physical impairments. In accordance with the 1973 Federal Rehabilitation Act and to comply with the 1990 Federal ADA requirements, curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist (Pedestrian and Bicycle Information Center: www.walkinginfo.org/engineering/roadway-ramps.cfm). In addition, these federal regulations require that all new constructed or altered roadways include curb ramps.

Two separate curb ramps should be provided at each intersection (see image below). With only one large curb ramp serving the entire corner, there is not safe connectivity for the pedestrian. Dangerous conditions exist when the single, large curb ramp inadvertently directs a pedestrian into the center of the intersection, or in front of an unsuspecting, turning vehicle.



The use of texture and bright color at curb ramps helps the visually impaired to cross safely.

Curb Ramp Guidelines:

- Two separate curb ramps, one for each crosswalk, should be provided at corner of an intersection.
- Curb ramp should have a slope no greater than 1:12 (8.33%). Side flares should not exceed 1:10 (10%); it is recommended that much less steep slopes be used whenever possible.

Curb Ramp Guideline Sources:

Metro Regional Government. (2005). Portland, Oregon: Transportation Information Center. http://www.oregonmetro.gov

Left: The corner shown has two separate ramps leading across the intersection (Image from http://www.walkinginfo.org).

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

Curb Extensions/Bulb-Outs

Curb extensions extend the sidewalk or curb line out into the parking lane, which reduces the effective street width. Curb extensions significantly improve pedestrian crossings by reducing the pedestrian crossing distance, visually and physically narrowing the roadway, improving the ability of pedestrians and motorists to see each other, and reducing the time that pedestrians are in the street.

Curb Extension/Bulb-Out Guidelines (Source: Bicycle and Pedestrian Information Center).

- Curb extensions are only appropriate where there is an on-street parking lane.
- Curb extensions must not extend into travel lanes, bicycle lanes, or shoulders (curb extensions should not extend more than 1.8 m (6 ft) from the curb).
- The turning needs of larger vehicles, such as school buses, need to be considered in curb extension design. However, it is important to take into consideration that those vehicles should not be going at high speeds, and most can make a tight turn at slow speeds. In some situations, curb bulbs can actually make it easier for trucks to turn by bringing them out, away from the curb, thereby giving them a better angle to enter the receiving lane.
- It is not necessary for a roadway to be designed so that a vehicle can turn from a curb lane to a curb lane. Vehicles can often encroach into adjacent lanes safely where volumes are low and/or speeds are slow. Speeds should be slower in a pedestrian environment.
- Emergency access is often improved through the use of curb extensions if intersections are kept clear of parked cars. Fire engines and other emergency vehicles can climb a curb where they would not be able to move a parked car. At midblock locations, curb extensions can keep fire hydrants clear of parked cars and make them more accessible.
- Ensure that curb extension design facilitates adequate drainage.

Medians & Crossing Islands

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

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

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

Crossing Island Guidelines:

- Where midblock or intersection crosswalks are installed at uncontrolled locations (i.e., where no traffic signals or stop signs exist), crossing islands should be considered as a supplement to the crosswalk.
- Crossing islands are appropriate at signalized crossings though they should never be used to create a two-phased pedestrian crossing at a signalized intersection (don't leave pedestrian stuck on a crossing island between moving lanes of traffic)
- Bicycle lanes (or shoulders, or whatever space is being used for bicycle travel) must not be eliminated or squeezed in order to create the curb extensions or islands.
- Illuminate or highlight islands with street lights, signs, and/or reflectors to ensure that motorists see them.
- Design islands to accommodate pedestrians in wheelchairs.
- Crossing islands at intersections or near driveways may affect left-turn access.
- Medians can incorporate trees and plantings to change the character of the street and reduce motor vehicle speed. However, landscaping should not obstruct the visibility between motorists and pedestrians.
- Median crossings should provide ramps or cut-throughs for ease of accessibility for all pedestrians.
- Median crossings should be at least 6 feet wide in order to accommodate more than one pedestrian, while a width of 8 feet (where feasible) should be provided for bicycles, wheelchairs, and groups of pedestrians.
- Median crossings should possess a minimum of a 4 foot square level landing to provide a rest point for wheelchair users.

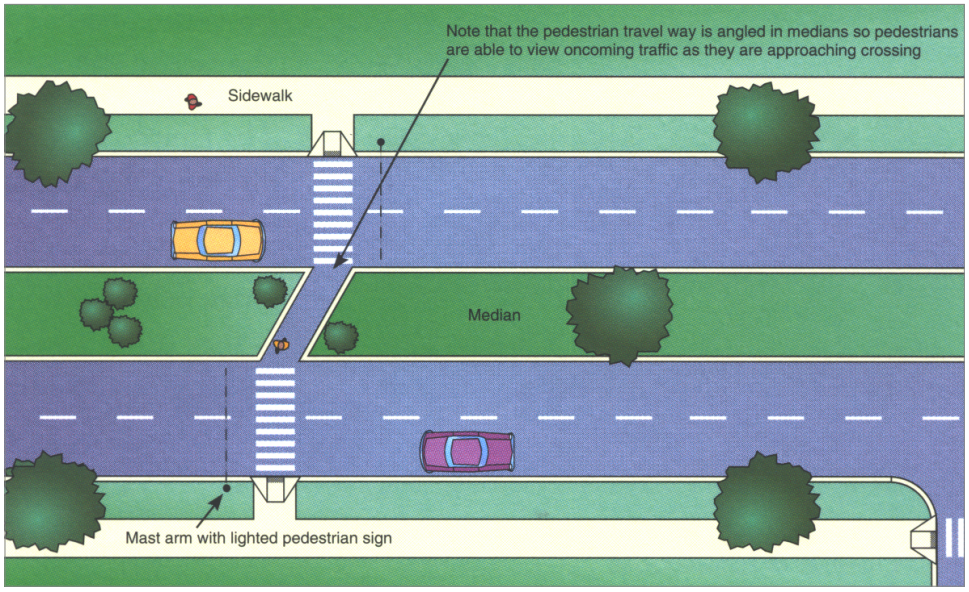
Median & Crossing Island Resources:

Bicycle and Pedestrian Information Center

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

Metro Regional Government. (2005). Portland, Oregon: Transportation Information Center. http://www.oregonmetro.gov

Crossing island in Greenville, NC, on Charles Blvd.



A median used in conjunction with mid-block crossing, serving as a refuge for pedestrians. (Image from AASHTO).

Pedestrian Signals

There are a host of traffic signal features and enhancements that can greatly improve the safety and flow of pedestrian traffic. Some include countdown signals, the size of traffic signals, positioning of traffic signals, audible cues, and timing intervals which are discussed below (Pedestrian and Bicycle Information Center: http://www.walkinginfo.org/engineering/crossings-signals.cfm).

As of 2008, new federal policy requires all new pedestrian signals to be of the countdown variety. In addition, all existing signals must be updated to countdown within 10 years (updated in MUTCD). Countdown signals have proven to be an effective measure of crash reduction (25% crash reduction in 2007 FHWA study).

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

International symbols used in a crosswalk to designate WALK and DON'T WALK (Image from www.walkinginfo.org).

Signals should be of adequate size, clearly visible, and, in some circumstances, accompanied by an audible pulse or other messages to make crossing safe for all pedestrians. Consideration should be paid to the noise impact on the surrounding neighborhoods when deciding to use audible signals.

The timing of these or other pedestrian signals needs to be adapted to a given situation. In general, shorter cycle lengths and longer walk intervals provide better service to pedestrians and encourage better signal compliance. For optimal pedestrian service, fixed-time signal operation usually works best. Pedestrian pushbuttons may be installed at locations where pedestrians are expected intermittently. Quick response to the pushbutton or feedback to the pedestrian (e.g.- indicator light comes on) should be programmed into the system. When used, pushbuttons should be well-signed and within reach and operable from a flat surface for pedestrians in wheelchairs and with visual disabilities. They should be conveniently placed in the area where pedestrians wait to cross. Section 4E.09 within the MUTCD provides detailed guidance for the placement of pushbuttons to ensure accessibility (Pedestrian and Bicycle Information Center: http://www.walkinginfo.org/engineering/crossings-signals.cfm).

Audible cues can also be used to pulse along with a countdown signal.

There are three types of signal timing generally used: concurrent, exclusive, and leading pedestrian interval (LPI). The strengths and weaknesses of each will be discussed with an emphasis on when they are best employed.

When high-volume turning situations conflict with pedestrian movements, the exclusive pedestrian interval is the preferred solution. The exclusive pedestrian intervals stop traffic in all directions. In order to keep traffic flowing regularly, there is often a greater pedestrian wait time associated with this system. Although it has been shown that pedestrian crashes have been reduced by 50% in some areas by using these intervals, the long wait times can encourage some to cross when there is a lull in traffic (Pedestrian and Bicycle Information Center: http://www.walkinginfo.org/engineering/crossings-signals.cfm).

An LPI gives pedestrians an advance walk signal before the motorists get a green light, giving the pedestrian several seconds to start in the crosswalk where there is a concurrent signal. This makes pedestrians more visible to motorists and motorists more likely to yield to them. This advance crossing phase approach has been used successfully in several places, such as New York City, for two decades and studies have demonstrated reduced conflicts for pedestrians. The advance pedestrian phase is particularly effective where there is a two-lane turning movement. There are some situations where an exclusive pedestrian phase may be preferable to an LPI, such as where there are high-volume turning movements that conflict with the pedestrians crossing.

The use of infrared or microwave pedestrian detectors has increased in many cities worldwide. Theses devices replace the traditional push-button system. They appear to be improving pedestrian signal compliance as well as reducing the number of pedestrian and vehicle conflicts. The best use of these devices is when they are employed to extend crossing time for slower moving pedestrians.

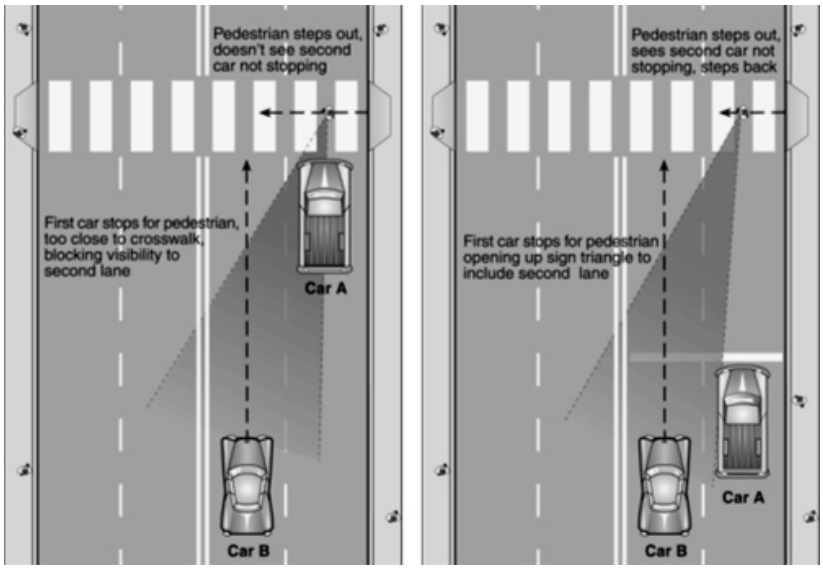
Pedestrian Signal Guidelines:

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

Advance Stop Bars

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

Below: Advance stop bars enhance visibility for pedestrians (Image from www.walkinginfo.org).



High Intensity Activated Crosswalk (HAWK)

The FHWA's Office of Safety Research recently completed a report on the High Intensity Activated Crosswalk (HAWK)— also known as the Pedestrian Hybrid Signal in the Manual on Uniform Traffic Control Devices (MUTCD). The HAWK is a pedestrian activated beacon located on the roadside and on mast arms over major approaches to an intersection. The HAWK signal head consists of two red lenses over a single yellow lens. It displays a red indication to drivers when activated, which creates a gap for pedestrians to use to cross a major roadway. The HAWK is not illuminated until it is activated by a pedestrian, triggering the warning flashing yellow lens on the major street. From the evaluation that considered data for 21 HAWK sites and 102 unsignalized intersections, the following changes in crashes were found after the HAWK was installed: a 29 percent reduction in total crashes, a 15 percent reduction in severe crashes, and a 69 percent reduction in pedestrian crashes. The HAWK is now an MUTCD approved device, so a request for experimentation is not necessary. For more details, visit this website: http://mutcd.fhwa.dot.gov/htm/2009/part4/part4f.htm (Source: FHWA Office of Safety, Pedestrian Forum, Fall 2010)

Above: HAWK signal.

Rectangular Rapid Flashing Beacons (RRFB)

The Federal Highway Administration (FHWA) issued an interim approval for the optional use of rectangular rapid flashing beacons (RRFBs, shown below, left) as warning beacons supplementing pedestrian crossing or school crossing warning signs at crossings across uncontrolled approaches. Studies have found them to have much higher levels of effectiveness in making drivers yield at crosswalks than the standard over-head and side-mount round flashing beacons. See the study "Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding at Multilane Uncontrolled Crosswalks" (FHWA, 2010), which showed installation of the two-beacon system increased yielding compliance from 18 to 81 percent, which was statistically significant.

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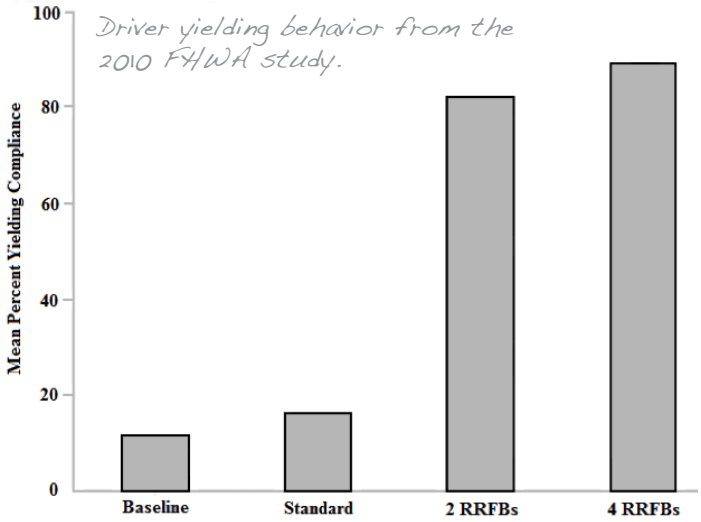
Left: RRFB with two forward-facing LED flashers and a side-mounted LED flasher.



Driver yielding behavior from the 2010 FHWA study.

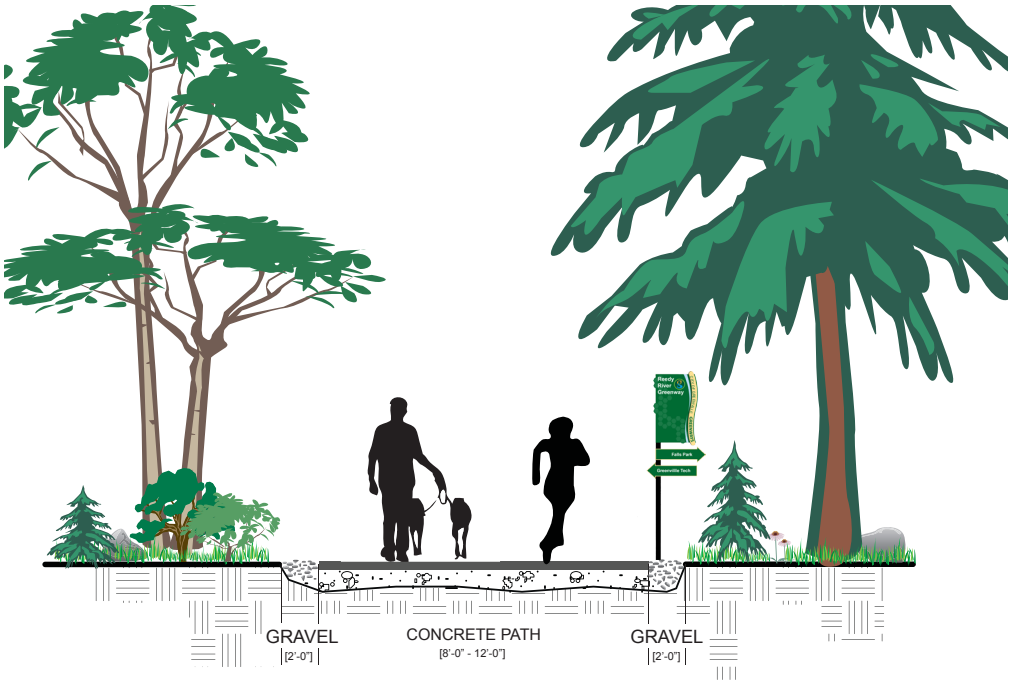
Right: standard overhead beacon system

Multi-use Trails / Greenways

Paved Multi-use Trail: Overview

Multi-use paths are completely separated from motorized vehicular traffic and are constructed in their own corridor, often within an open-space area. Multi-use trails typically have a concrete or paved asphalt surface and are capable of being constructed within flood-prone landscapes as well as upland corridors.

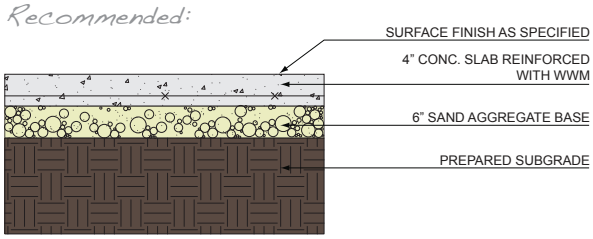
- Concrete is the recommended surface treatment. Paved asphalt or permeable paving can be used as alternatives.
  1. It is recommended that concrete be used for its superior durability and lower maintenance requirements—especially in areas prone to frequent flooding, and for intensive urban applications; Consider using high albedo pavement in place of conventional concrete surfaces (it reflects sunlight, reducing radiated heat).
  2. As an alternative to concrete, paved asphalt trails offer substantial durability for the cost of installation and maintenance. As a flexible pavement, asphalt can also be considered for installing a paved trail on slopes.
  3. Consider the following for permeable paving: a) It can be twice the cost of asphalt, b) A maintenance schedule for vacuuming debris is required to retain permeability, and c) Not suitable in the floodplain, or in areas without proper drainage (sheet flow or pooling of water with sediment clogs pours).
- Proper trail foundation will increase the longevity of the trail; two inches surfacing material over four inches (min.) of base course gravel over geotextile fabric is recommended. Soil borings may need to be conducted to determine adequate material depths; it should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles.
- Typically 10' wide, 2% cross slope, with two-foot wide graded shoulders; the shoulders help prevent edges from crumbling and provide an alternate walking and jogging surface.
- Centerline stripes should be considered for trails that generate substantial amounts of traffic, and are particularly useful along curving sections of trail.
- Trail landscaping and maintenance should enhance conditions for wildlife by planting only native species in the trail corridor, removing invasive species when possible, and avoiding harmful pesticides and herbicides. The overall shape of protected natural landscapes along trail corridors also influences wildlife: single, large, contiguous natural areas are more beneficial to wildlife than the same acreage split into smaller segments.



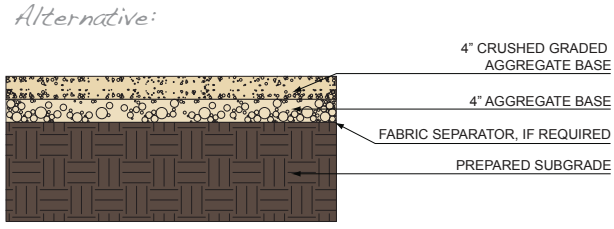
Multi-use Trail : Floodplain Areas

'Paved Multi-use Trail' guidelines apply, with the following considerations and exceptions:

- Typically positioned outside the floodway, within the floodplain; significant vegetative buffer between the stream and trail should be left intact.
- Use existing cleared corridors for trail routing whenever possible, to avoid unnecessary vegetative clearing.
- Subject to occasional flooding, during large storm events.
- Concrete recommended, though an aggregate stone surface may be adequate in some locations.



CONCRETE PAVING ON AGGREGATE



GRAVEL PAVING ON AGGREGATE

Sidepaths

Multi-use paths located within the roadway corridor right-of-way, or adjacent to roads, are called 'Sidepaths'. Sidepaths provides a comfortable walking space for pedestrians and enables children and recreational bicyclists to ride without the discomfort of riding in a busy street.

This configuration works best along roadways with limited driveway crossings and with services primarily located on one side of the roadway, or along a riverfront or other natural feature. ***Not recommended in areas with frequent driveways or cross streets.***

- A minimum 10' width is necessary on sidepaths for bicyclists to pass one another safely (12' for areas expecting high use)
- A 6' or greater vegetated buffer between the sidepath and the roadway should be provided where possible.
- Roadway corridors where side paths are recommended should also have adequate on-road bicycle facilities (such as shared lane markings, paved shoulders, or bicycle lanes), so that all levels of bicyclists are accommodated.
- Well-designed transitions from sidepaths to on-road facilities will direct bicyclists to the correct side of the roadway (see guidelines for Trail-Roadway Intersections)

Natural Surface Trails

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development.

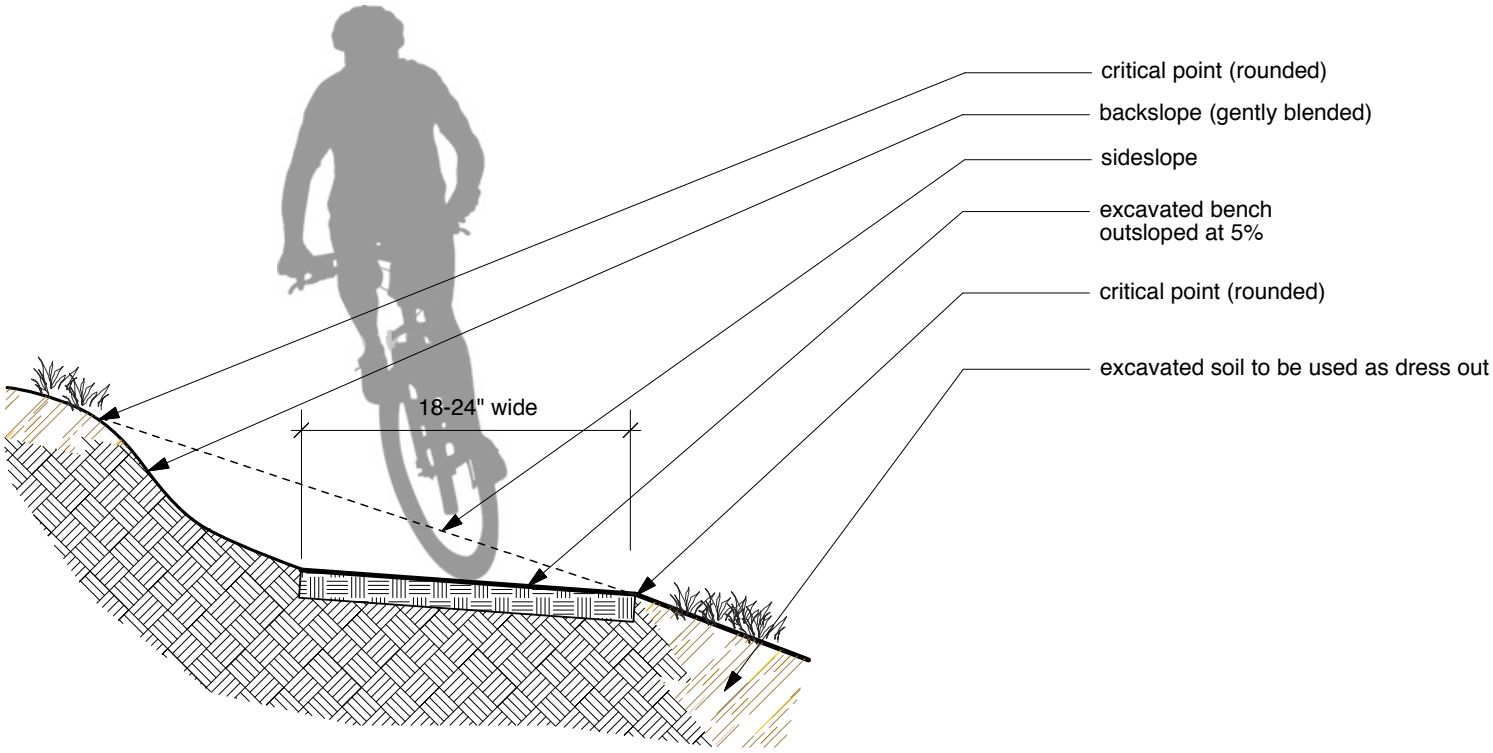
- The trail can vary in width from 18-inches to 6-feet; vertical clearance should be maintained at nine-feet above grade.
- Preparation varies from machine-worked surfaces to those worn only by usage.
- Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.
- At the time of this writing, a new, environmentally sound trail surface is being researched in Greenville County, SC. The organic soil stabilizer, called Roadzyme, is non-toxic, made from sugar beet extract.
- Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).
- Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.
- Consider implications for accessibility when weighing options for surface treatments.
- For the purposes of this Plan, 'Natural Surface Trails' do not include bicycles. See following page for guidelines on mountain bike trails.

Natural surface trails provide options in areas that are environmentally sensitive.

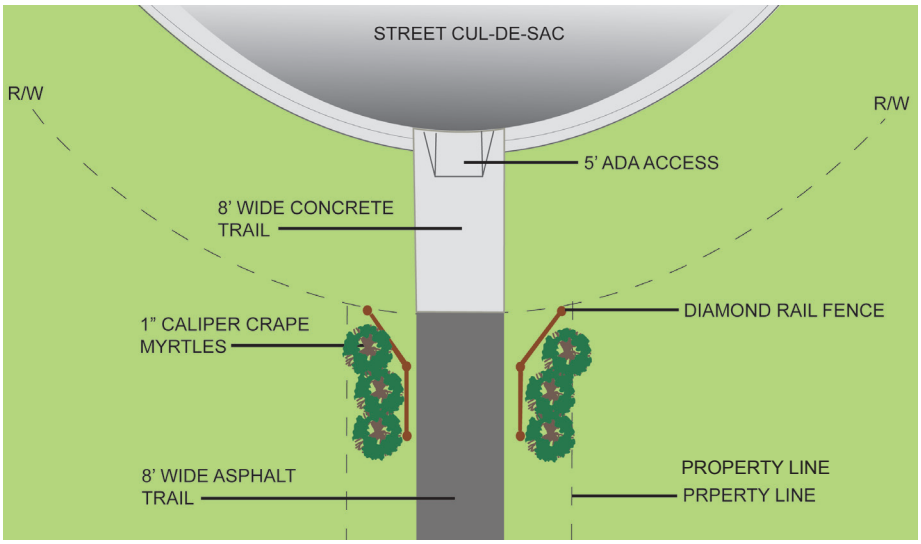
Single-Track Mountain Bike Trails

Due to their narrow width and ability to contour with the natural topography, single-track mountain bike trails (or off-road bicycling trails) require the least amount of disturbance and support features of all types of trails.

- Their minimal footprint provides opportunities for localized stormwater management solutions. Localizing the stormwater features at small scales along the network keeps the trails available for use year-round and requires very little long term maintenance.
- If trails remain unused during storm events, and are constructed correctly, they can remain virtually maintenance free.
- Mountain bike trails are typically 18-24 inches wide and have compacted bare earth or leaf litter surfacing.
- Mountain bike trails are constructed using hand tools or low impact machinery such as a mini excavator.
- Refer to the International Mountain Bicycling Association (IMBA) standards for more information.



Neighborhood Spur Trail



Neighborhood entrance trail diagram.

Neighborhood spur trails provide residential areas with direct bicycle and pedestrian access to parks, trails, greenspaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements. Additionally, these smaller trails can be used to provide bicycle and pedestrian connections between dead-end streets, culs-de-sac, and access to nearby destinations not provided by the overall street network. Neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable.

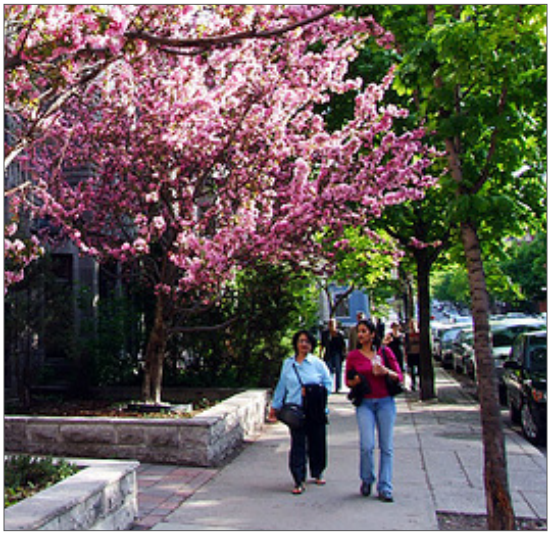
- Neighborhood spur trails should remain open to the public.
- Trail pavement shall be at least 8' wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 8' wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should meander whenever possible.
- Landscaping shall be included at the street frontage of the access trail based upon input from the residents of the cul-de-sac or dead-end street. If the access is not in a cul-de-sac, the adjacent property owners and property owners directly across from the access trail will be invited to provide landscape design input. See following section related to landscaping.
- Two sections of diamond rail fencing should be included on each side of the trail near the street frontage. Diamond rail will not be included if the respective neighborhood deeds and covenants do not permit it.

Example of a neighborhood entrance trail, featuring landscape signage.

Vegetation Buffer, Landscaping, and Street Trees

Vegetated buffers are used to separate trails not only for floodplain protection and noise from the road, but also, where desired, to screen trail corridors from nearby properties.

- Use native plant species and plants appropriate to the region that are already adapted to the local soil and climate, reducing overall maintenance costs and enhancing local identity. Landscape materials should be installed during the appropriate planting season for the particular species.
- Design the buffer with a combination of evergreen and deciduous plants for year-round interest.
- Plant buffers with a combination of trees and large shrubs, understory plantings, and ground cover.
- Keep the vegetation buffer maintained so that it does not impede views or interefere with trail circulation.
- Avoid vegetation "walls" that box-in trail users.
- Select and place trail vegetation to provide seasonal comfort: shade on trails in the warmer months and warming sunlight on trails in colder months.



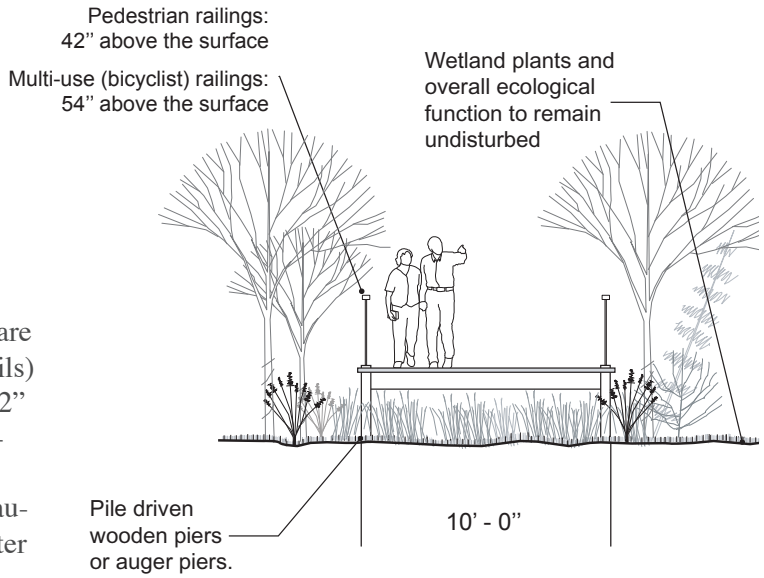
Street trees and other plantings provide comfort, a sense of place, and a more natural and inviting setting for pedestrians.

- Street and sidewalk landscaping can be used to provide a separation buffer between pedestrians and motorists (see image at left), reduce the width of a roadway, calm traffic by creating a visual narrowing of the roadway, enhance the street environment, and help to generate a desired aesthetic.
- Growth pattern and space for maturation, particularly with larger tree plantings, are important to avoid cracking sidewalks and other pedestrian obstructions.
- Islands of vegetation can be created to collect and filter stormwater from nearby streets and buildings. These islands are referred to as constructed wetlands, rain gardens, and/or bioswales. When these devices are employed, the benefits listed above are coupled with economic and ecologic benefits of treating stormwater at its source. See Seattle's Green Streets Program as a model.

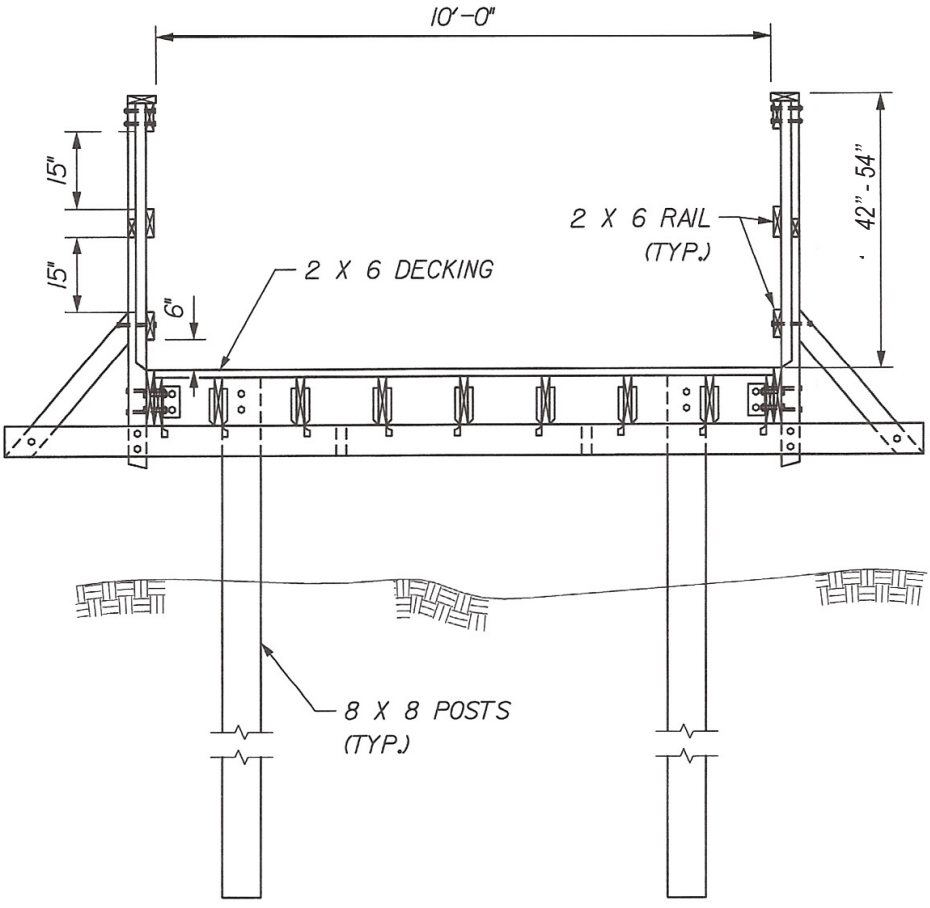
Landscaping used on the Capital Crescent Trail, Washington DC, shows how stormwater treatment can be tied to aesthetically pleasing plantings.

Boardwalk

Boardwalk or wood surface trails are typically required when crossing wetlands or other poorly drained areas. They are constructed of wooden planks or recycled material planks that form the top layer of the boardwalk. The recycled material has gained popularity in recent years since it lasts much longer than wood, especially in wet conditions. A number of low-impact support systems are also available that reduce the disturbance within wetland areas to the greatest extent possible.



- When the height of a boardwalk exceeds 30", railings are required (see section on 'Railings and Fences' for details)
- The thickness of the decking should be a minimum of 2"
- Decking should be either non-toxic treated wood or recycled plastic.
- The foundation normally consists of wooden posts or auger piers (screw anchors). Screw anchors provide greater support and last much longer.
- Opportunities exist to build seating and signage into boardwalks.
- In general, building in wetlands should be avoided.
- Note: muddy bicycle tires may be slick on wood surfaces.



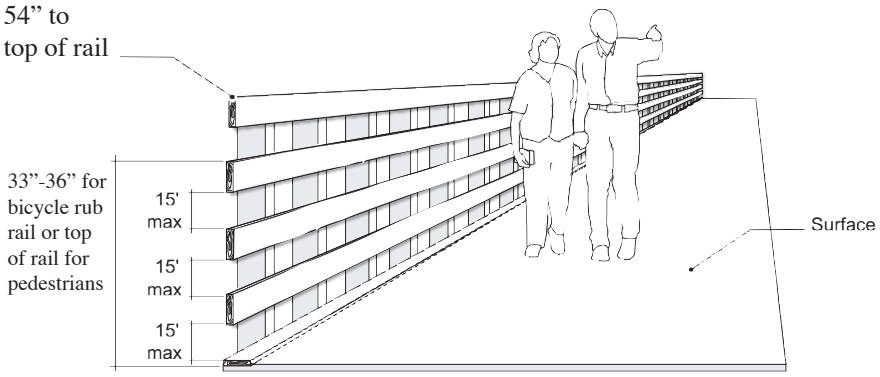
A boardwalk allows for travel through wet areas..

Railings and Fences

Railing and fences are important features on bridges, some boardwalks, or in areas where there may be a hazardous drop-off or hazardous adjacent land uses (such as active rail lines).

- At a minimum, railings and fences should consist of a vertical top, bottom, and middle rail. Picket style fencing should be avoided as it presents a safety hazard for bicyclists.
- A pedestrian railing should be 42-inches above the surface.
- A bicyclist railing should be 54-inches above the surface.
- The middle railing functions as a "rub rail" for bicyclists and should be located 33-and 36-inches above the surface.
- Local, state, and/or federal regulations and building codes should be consulted to determine when it is appropriate to install a railing.

Example image of fence used along a rail with trail (Grand Rounds Parkway).



Innovative Accessways

There are also other innovative ways to provide direct access, particularly in topographically constrained areas (e.g., on steep hills, over waterways, etc.) Stairs, alleyways, bridges, and elevators can provide quick and direct connections throughout the city and can be designed so they are safe, inviting, and accessible to most trail users. For example, stairways can have wheel gutters so that bicyclists can easily roll their bicycles up and down the incline and boardwalks can provide access through sensitive wet areas and across small waterways.

Left and above: Bicycle wheel gutters on stairs.

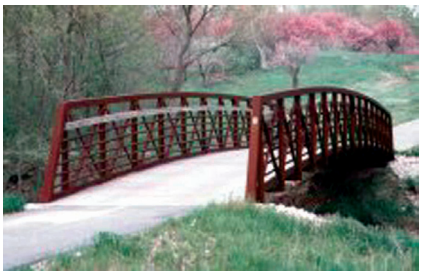
Below: A boardwalk bridge

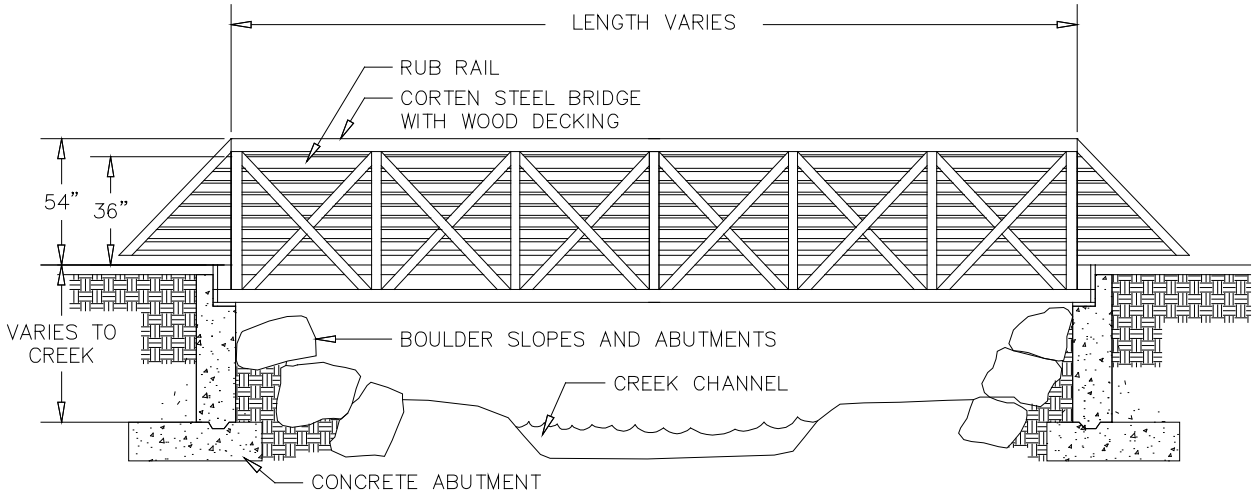
Trail Bridges, Overpasses and Underpasses

Trail Bridges

Multi-Use Trail bridges (also 'bicycle/pedestrian bridges' or 'footbridges') are most often used to provide trail access over natural features such as streams and rivers, where a culvert is not an option. The type and size of bridges can vary widely depending on the trail type and specific site requirements. Some bridges often used for multi-use trails include suspension bridges, prefabricated span bridges and simple log bridges. When determining a bridge design for multi-use trails, it is important to consider emergency and maintenance vehicle access.

- If a corridor already contains a bridge such as an abandoned rail bridge, an engineer should be consulted to assess the structural integrity before deciding to remove or reuse it.
- A trail bridge should support 6.25 tons; Information about the load-bearing capacity of bridges can be found in the American Association of State Highways and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges.
- There are many options in terms of high quality, prefabricated pedestrian bridges available. Prefabricated bridges are recommended because of their relative low cost, minimal disturbance to the project site, and usually, simple installation.
- All abutment design should be sealed by a qualified structural engineer and all relevant permits should be filed.





Trail Overpass

Trail overpasses are most often used to provide trail access over large man-made features such as highways and railroads.

- Overpasses work best when existing topography allows for smooth transitions.
- Safety should be the primary consideration in bridge/overpass design.
- Specific design and construction specifications will vary for each bridge and can be determined only after all site-specific criteria are known.
- Always consult a structural engineer before completing bridge design plans, before making alterations or additions to an existing bridge, and prior to installing a new bridge.
- A 'signature' bridge should be considered in areas of high visibility, such as over major roadways. While often more expensive, a more artistic overpass will draw more attention to the trail system in general, and could serve as a regional landmark.
- For shared-use facilities, a minimum width of 14' is recommended.
- Trail overpasses are prohibitively expensive and should only be placed in areas of substantial need.

"Vehicular" Bridges And Underpasses

All new or replacement bridges and tunnels should accommodate pedestrians and bicyclists. Even though bridge replacements do not occur regularly, it is important to consider these in longer-term pedestrian planning.

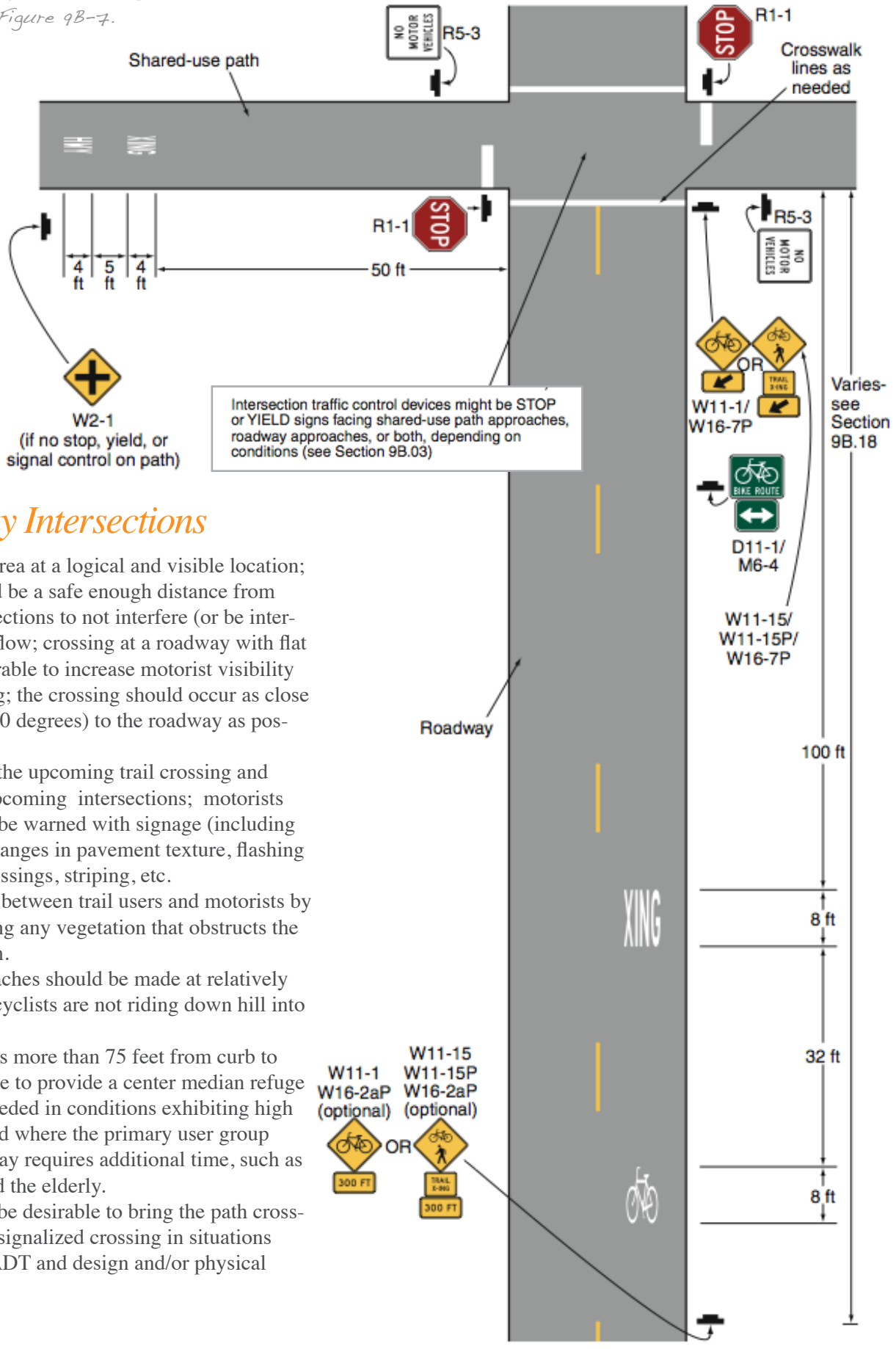
- Sidewalks should be included on roadway bridges on both sides, minimum 5' wide, with minimum handrail height of 42"
- Sufficient bridge deck width should be provided on new bridges, including approaches, to accommodate bicyclists
- In roadway underpasses, where vertical clearance allows, the pedestrian walkway should be separated from the roadway by more than a standard curb height.
- On bridges built for controlled access roadways, a separated, mult-use sidepath should be provided, minimum 12 ' wide, with connections made to bike/ped facilities on both sides of the bridge.

Trail Underpass

- Over and underpasses should be considered only for crossing arterials with greater than 20,000 vehicle trips per day and speeds 35 - 40 mph and over.
- Underpasses work best with favorable topography when they are open and accessible, and exhibit a sense of safety.
- Underpasses should have a daytime illuminance minimum of 10 fc achievable through artificial and/or natural light provided through an open gap to sky between the two sets of highway lanes, and a night time level of 4 foot-candle.
- Typically utilize existing overhead roadway bridges adjacent to steams or culverts under the roadway that are large enough to accommodate trail users
- Vertical clearance of the underpass is ideally at least 10'; minimum clearance is 8'.
- Width of the underpass is ideally at least 12'; minimum width is 10'.
- Proper drainage must be established to avoid pooling of stormwater, however, some undepasses can be designed to flood periodically (after significant rainfall, for instance). See image below, at top right, as an example).

Curb-cut used for drainage.

The diagram on this page is from the 2009 Manual for Urban Traffic Control Devices (MUTCD), page 803, Figure 9B-7.



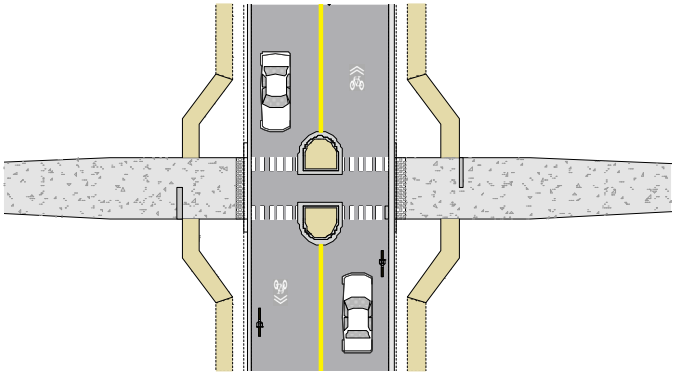
Trail-Roadway Intersections

- Site the crossing area at a logical and visible location; the crossing should be a safe enough distance from neighboring intersections to not interfere (or be interfered) with traffic flow; crossing at a roadway with flat topography is desirable to increase motorist visibility of the path crossing; the crossing should occur as close to perpendicular (90 degrees) to the roadway as possible.
- Warn motorists of the upcoming trail crossing and trail users of the upcoming intersections; motorists and trail users can be warned with signage (including trail stop signs), changes in pavement texture, flashing beacons, raised crossings, striping, etc.
- Maintain visibility between trail users and motorists by clearing or trimming any vegetation that obstructs the view between them.
- Intersection approaches should be made at relatively flat grades so that cyclists are not riding down hill into intersections.
- If the intersection is more than 75 feet from curb to curb, it is preferable to provide a center median refuge area; a refuge is needed in conditions exhibiting high volumes/speeds and where the primary user group crossing the roadway requires additional time, such as school children and the elderly.
- If possible, it may be desirable to bring the path crossing up to a nearby signalized crossing in situations with high speeds/ADT and design and/or physical constraints.

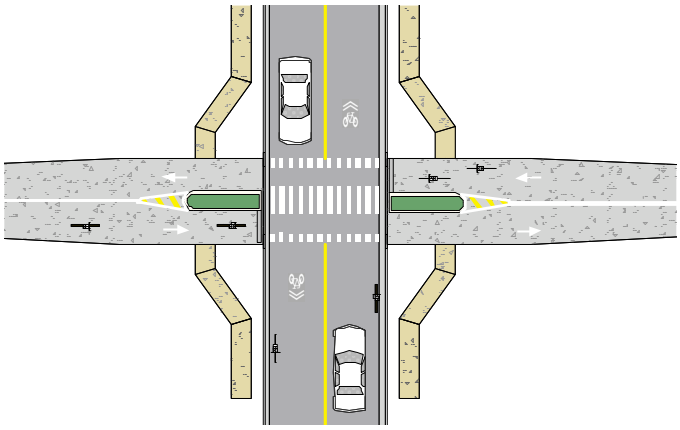
Trail-Roadway Intersections (Continued)

Also see page B-32 for information on High Intensity Activated Crosswalks (HAWK) and Rectangular Rapid Flashing Beacons (RRFB).

Median Refuge
Shared Use Path with Sidewalks



Mid-block Crossing
Shared Use Path with Sidewalks and Medians



Trail Amenities

BENCHES: There are a wide variety of benches to choose from in terms of style and materials. The illustrated bench is a custom design that reflects the industrial feel of the warehouse district it is found in. Material selection should be based on the desired design theme as well as cost.

- Due to a wide range of users, all benches should have a back rest.
- A bench should normally be 16 - 20" above ground with sturdy handrails on either side.
- The seating depth should be 18-20" and the length should vary between 60 - 90".
- Provide wheelchair access alongside benches, at least a 30-by-48-inch area for adequate maneuvering. If benches are next to each other (either side by side or face to face), allow 4 feet between them.

OTHER SEATING: Other more informal seating opportunities may exist along a trail or near a parking area where other furniture like a picnic table may be appropriate.

- This type of furniture can be triangulated with cooking facilities, and a trash receptacle.
- Wheelchair access spacing recommendations, as noted in the preceding section on 'benches,' also applies to other seating.

TRASH RECEPTACLES: Trash receptacles should be constructed of a suitable material to withstand the harsh elements of the outdoor environment. Adequate trash receptacles will combat littering and preserve the natural environment for all trail users.

- Trash receptacles should be placed along the trail and at all trailheads.
- Trash receptacles should ensure that litter is contained securely preventing contamination or spillage into the surrounding environment.

Public Art on Trails

Explore opportunities to include public art within the overall design of the trail system. Local artists can be commissioned to provide art for the trail system, making it uniquely distinct. Many trail art installations are functional as well as aesthetic, as they may provide places to sit and play on. According to American Trails,

"Art is one of the best ways to strengthen the connection between people and trails. Across America and elsewhere, artists are employing a remarkably wide range of creative strategies to support all phases of trail activities, from design and development to stewardship and interpretation. In particular, art can be an effective tool for telling a trail's story compellingly and memorably."

Example art programs for trails can be found at:
www.americantrails.org/resources/art/ArtfulWays.html

Trail Heads

Major access points should be established near commercial developments and transportation nodes, making them highly accessible to the surrounding communities. Minor trailheads should be simple pedestrian and bicycle entrances at locally known spots, such as parks and residential developments.

A minor trailhead could include facilities such as parking, drinking fountains, benches, a bicycle rack, trash receptacles, and an information kiosk and/or signage. Major trailheads could include all of the above plus additional facilities, such as rest rooms, shelters, picnic areas, a fitness course, an emergency telephone, and a larger parking area.

Partnerships could also be sought with owners of existing parking lots near trails. Benefits are three fold: Business benefit from trail-user patronage; trail owners benefit from not having to buy more land and construct a parking facility; and the environment benefits from less development in the watershed.

Air compressor (for bicycle tires).

A major trail head at the Capital Crescent Trail in Maryland, featuring concessions and bicycle, canoe, and kayak rentals.

A water fountain and pet-water fountain.

Trail Lighting

Lighting for multi-use trails should be considered on a case-by-case basis in areas where 24-hour activity is expected (such as college campuses or downtown areas), with full consideration of the maintenance commitment lighting requires. In general, lighting is not appropriate for off-road trails where there is little to no development.

- A licensed or qualified lighting expert should be consulted before making any lighting design decisions. Doing so can reduce up-front fixed costs as well as long-term energy costs.
- Use full cut-off, energy-efficient lighting that is IDA Approved Dark Sky Friendly to avoid excess light pollution and save costs (See www.darksky.org for more info)
- If a main trail corridor is unlit and closes at dark, extended hours for commuters should be considered, particularly during winter months when trips to and from work are often made before sunrise and after dusk. See the American Tobacco Trail in Durham, NC, as an example, which is unlit and remains open to commuters until 10 PM.
- Consider lighting at the following locations:
    - Entrances and exits of bridges
    - Public gathering areas along the greenway
    - Trail access points
- Only use lighting along a trail if:
    - Night usage is desired or permitted
    - It is acceptable to residents living along or near the trail
    - The area is not a wildlife area

Roadway Lighting

Proper lighting in terms of quality, placement, and sufficiency can greatly enhance a nighttime urban experience as well as create a safe environment for motorists and pedestrians. Two-thirds of all pedestrian fatalities occur during low-light conditions (AASHTO, 2004: Guide for the Planning, Design, and Operation of Pedestrian Facilities). Attention should be paid to crossings so that there is sufficient ambience for motorists to see pedestrians. To be most effective, lighting should be consistently and adequately spaced.

In commercial or downtown areas and other areas of high pedestrian volumes, lower level, pedestrian-scale lighting with emphasis on crossings and intersections may be employed to generate a desired ambiance. Roadway streetlights can range from 20-40 feet in height while pedestrian-scale lighting is typically 10-15 feet. It is important to note that every effort should be made to address and prevent light pollution. Also known as photo pollution, light pollution is ‘excess or obtrusive light created by humans’.

- Ensure pedestrian walkways and crossways are sufficiently lit.
- Consider adding pedestrian-level lighting in areas of higher pedestrian volumes, downtown, and at key intersections.
- Install lighting on both sides of streets in commercial districts.
- Use uniform lighting levels
- As also noted above, use full cut-off, energy-efficient lighting that is IDA Approved Dark Sky Friendly to avoid excess light pollution and save costs (See www.darksky.org for more info)

Crime Prevention Through Environmental Design (CPTED)

CPTED is the proper design and effective use of the built environment which may lead to a reduction in the fear and incidence of crime, and an improvement of the quality of life. CPTED is realized for trail design in many ways, some of which are described below and at right.

Natural Surveillance: For trails and greenways, natural surveillance occurs through increased numbers of trail users, creating an environment where behavior on the trail is monitored by trail users themselves. This type of surveillance can, of course, be supplemented with a volunteer-based trail patrol group, park service staff, or the local police (often on bicycle, horseback, and electric cart respectively).

Emergency Call Boxes: Callboxes can be installed at various locations on trails so that trail users can contact the police in case of an emergency. Often, these are voice call boxes using a mobile phone service, and solar-powered so no wiring need be extended to the middle of a remote location.

Lighting in Select Areas: Most trails operate as linear parks, officially closing at dusk. Certain high-use areas of trails are sometimes kept open after dark to serve the needs of trail commuters who use the trail after dark. For sections of the trail open after dark, lighting can serve as a tool of CPTED.

911 Trail Address Locations: There are several key factors involved in properly developing a 911 trail address system:

- *Awareness:* Ensure trail users understand 911 address marking system and how to use it
- *Visibility:* 911 Address Marking should be easy to see and understand but NOT interfere or overwhelm natural ambience of trail environment
- *Cooperation:* Critical to have cooperation among: Trail System Management, 911 Call Center, and Emergency Services
- *Integration:* 911 Trail Addresses MUST be properly and promptly integrated into 911 Emergency System – Addresses are useless if not incorporated into system

Model Case Study Community:
Cedar Valley Trails 911 Signs Project
Black Hawk County, Iowa
Improving Multi-Use Recreational Trail Safety through a Coordinated 911 Sign Project
www.americantrails.org/awards/NTS06awards/TECH06.html

Signage and Wayfinding

A comprehensive system of signage ensures that information is provided regarding the safe and appropriate use of all trails, both on-road and off-road. The greenway 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 is divided into several categories: Network signs, wayfinding signs, regulatory signs and warning signs, and educational/interpretive signs

Trail signage should conform to the (2001) Manual on Uniform Traffic Control Devices and the American Association of State Highway Transportation Official Guide for the Development of Bicycle Facilities. Trail signage should also be coordinated with local and regional networks.

Network Signs

A standardized trail network logo should be developed and used to aid in reinforcing the trail's identity. Additionally, local trail logos should compliment the greenway network signage.

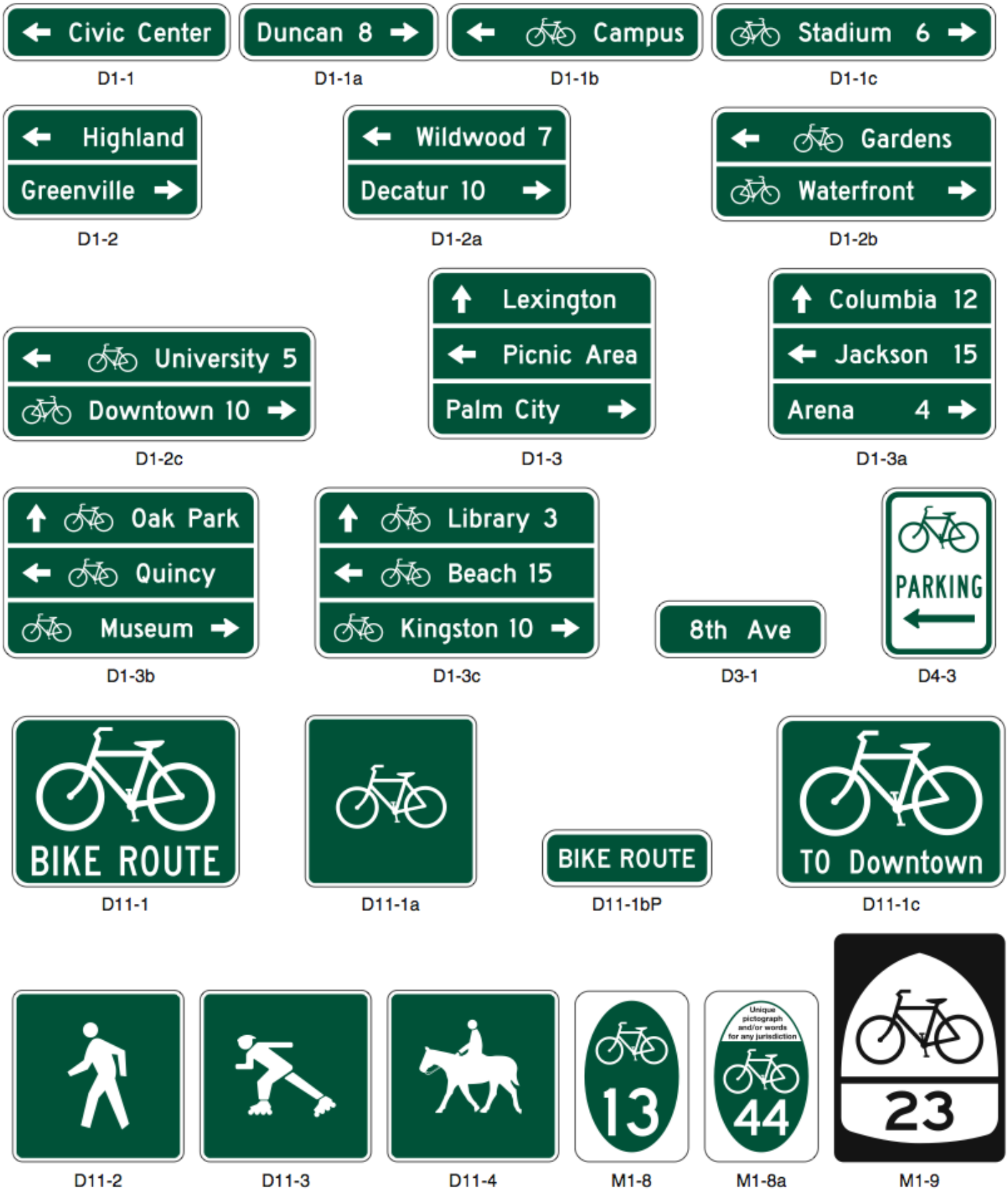
- Network signage should be simple, direct, and easy to identify.
- A skilled graphic designer should be consulted when generating the design for the trail logo.
- Be consistent with the logo throughout the trail network by using it as a stand alone sign, on other signage, or incorporating it into trail furnishings, such as benches or waste receptacles.
- Locate directional signs at intervals along the trail to help users identify their locations or orient their position.
- Locate mile markers 3-feet from the edge of the trail and approximately one mile intervals beginning at the northern and southern ends of the trail network.

Wayfinding Signs and Kiosks

Kiosks are a great facility for directional signage by providing a wealth of information at once, including trail opportunities, regional maps, or local/seasonal events occurring along the greenway. Locate informative signs and overall trail maps at trail access points to help users entering the trail determine their next destination.

Examples of wayfinding signage and a trail kiosk (right).

Examples of bicycle-related directional Signs (from the 2009 MUTCD)



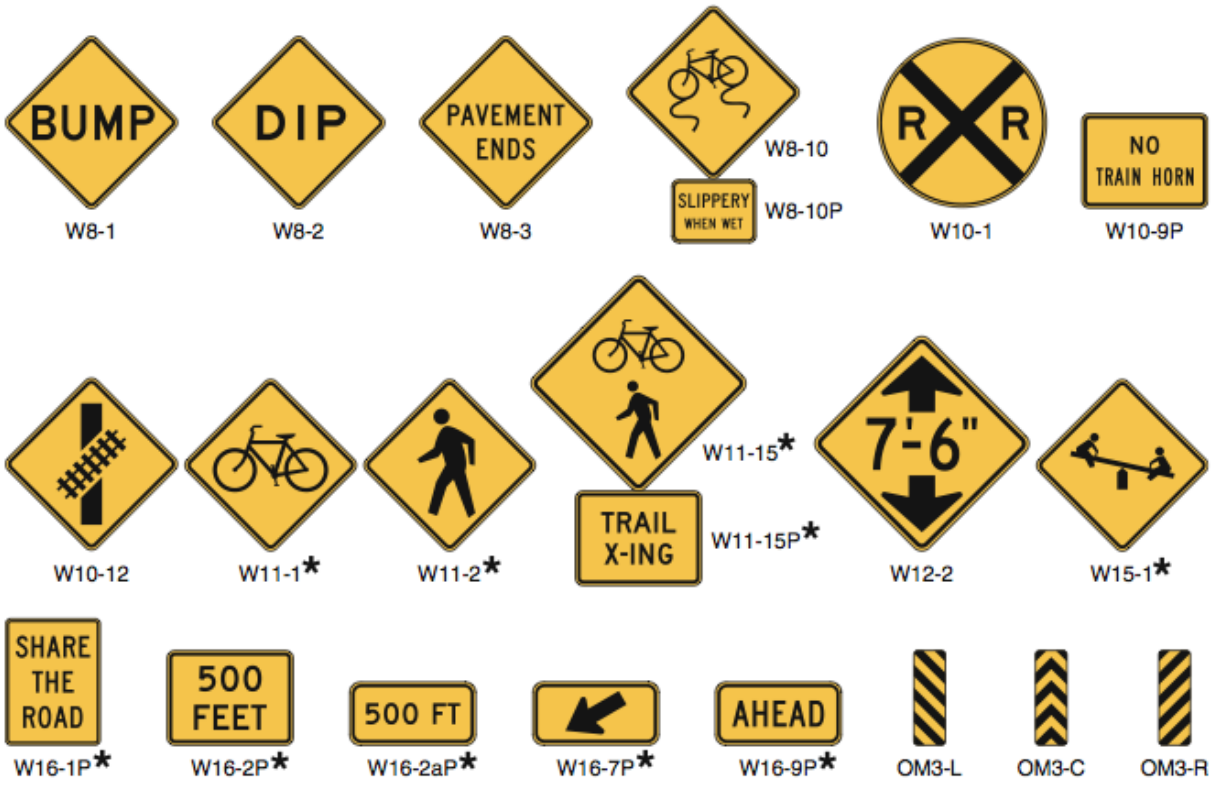
Regulatory/Warning Signs

Located throughout the trail system, these signs inform trail users of rules and regulations along the trail, hours of trail operation, upcoming street and trail crossings and other potential hazards such as trail width changes.

- Post trail rules and regulations as well as hours of operation at trail heads or in kiosks.
- Locate warning signs appropriately ahead of the specific hazards to which they refer, such as road crossings, steep terrain, trail narrowing, and stop signs.
- All signage should conform to the Manual on Uniform Traffic Control Devices (MUTCD).

Examples of bicycle-related regulatory signs *(from the 2009 MUTCD)*

Examples of Bike/Ped/Trail-related warning signs (from the 2009 MUTCD)



* A fluorescent yellow-green background color may be used for this sign or plaque. The background color of the plaque should match the color of the warning sign that it supplements.

Educational/Interpretive Signage

Educational signage provides trail users with information about the greenway, native flora and fauna, history and culture, and significance of elements along the trail.

- There is a wide variety of interpretive signage styles and the amount/type of information they provide.
- Consider the character of the trail and surrounding elements when designing educational signage.
- A skilled graphic designer should be used for sign design.
- Locate interpretive signage 3-feet from the edge of the trail.

Educational signage provides opportunities for gathering and learning about local environment.

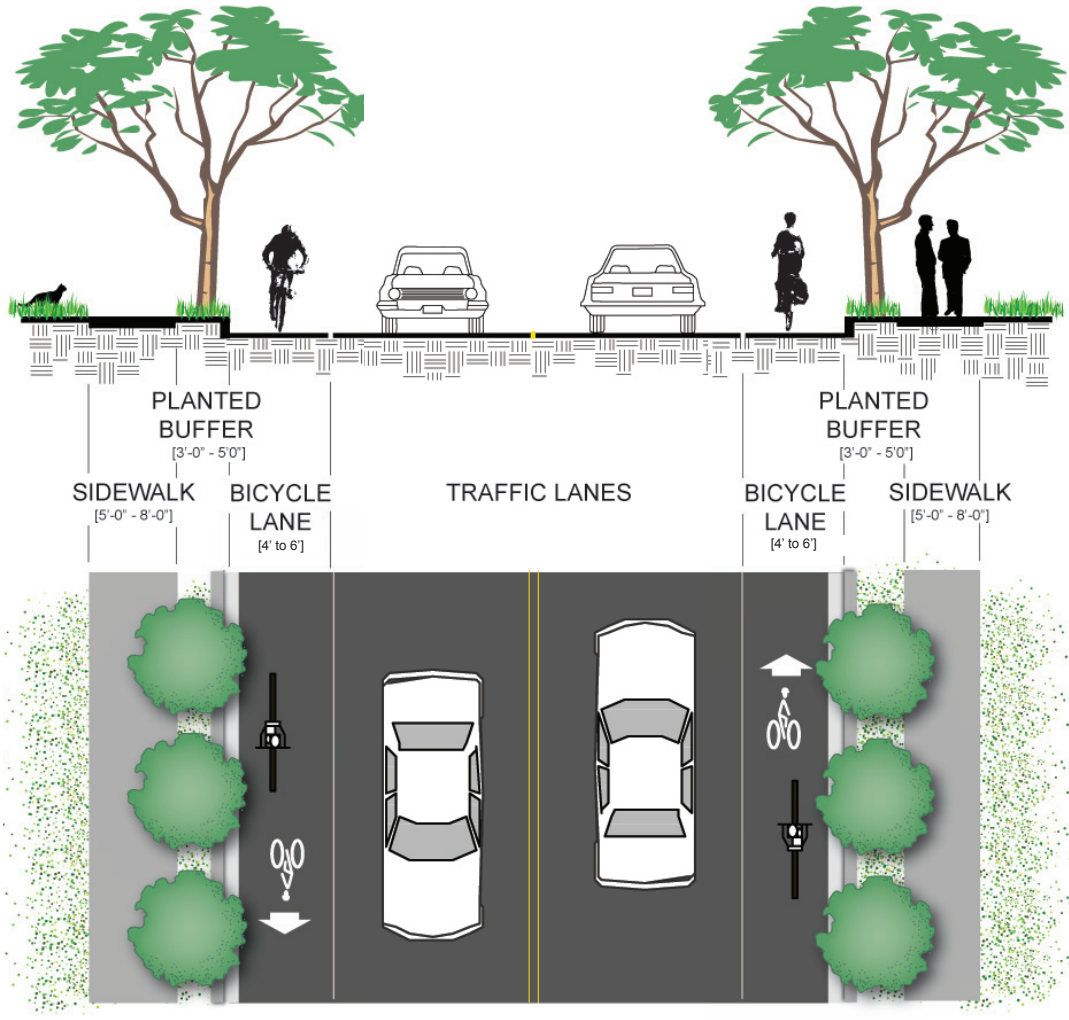
Bicycle Facilities and Related Streetscape Improvements

A wide variety of on-road bicycle facilities are recommended to meet different transportations needs in different roadway situations. The appropriate bicycle facility for any particular roadway, whether new or existing, should be dictated primarily by vehicle volume and speed of the roadway. The figure below provides a matrix for evaluating bicycle facilities. The speed of the travel lane is shown along the x-axis and total traffic volumes per day are shown along the y-axis. The different colors represent the type of bikeway facility prescribed given the volume and speed of the travel lane. This chart represents a broad guideline, rather than a hard standard.

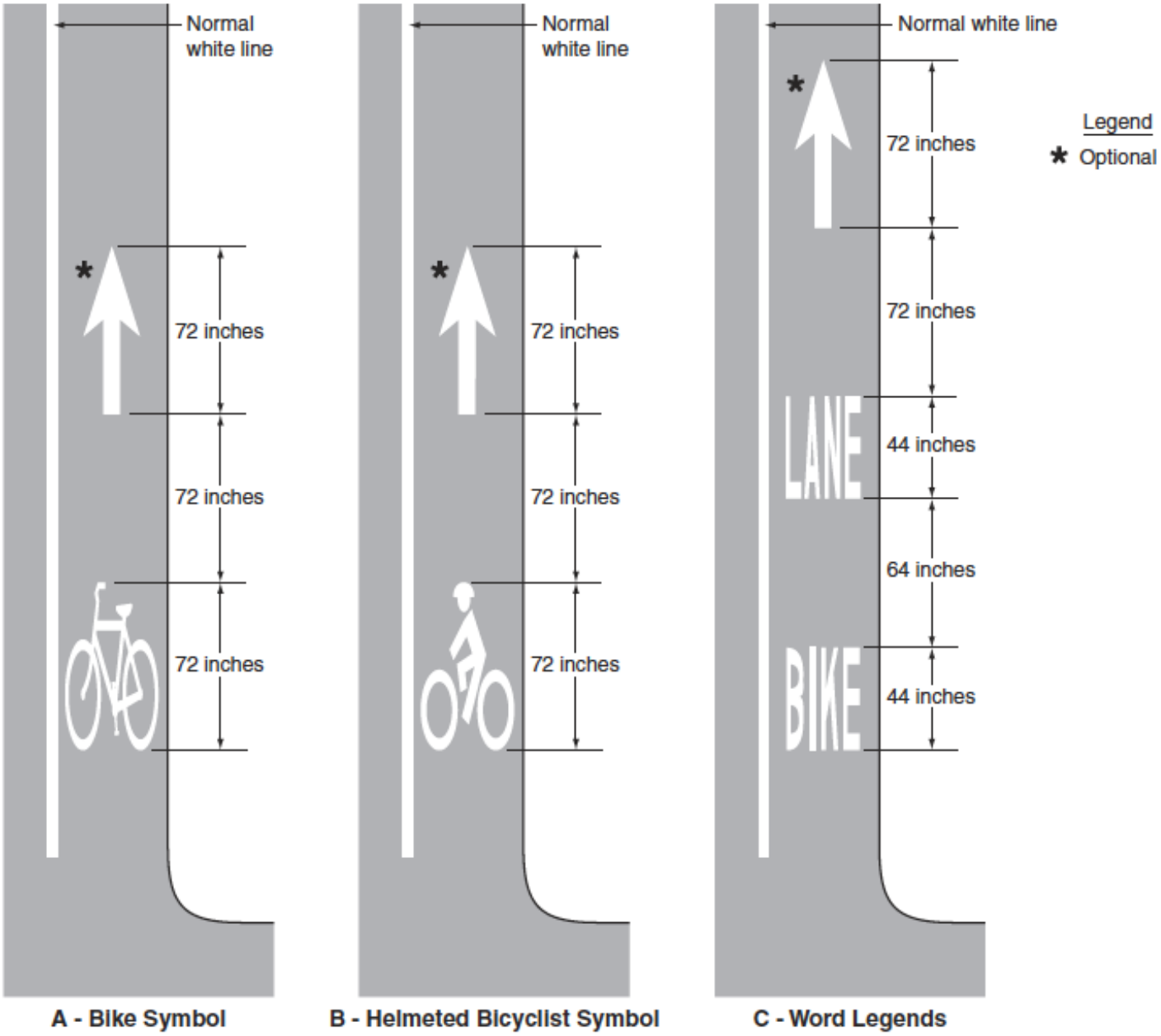
Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. Bicycle lanes are located on both sides of the road, except one way streets, and carry bicyclists in the same direction as adjacent motor vehicle traffic. In some communities, local cyclists may prefer to use striped shoulders as an alternative to bicycle lanes (see guidelines for 'Striped/Paved Shoulders').

- Recommended bicycle lane width: 6' from the curb face when a gutter pan is present (or 4' from the edge of the gutter pan); 4' from the curb face when no gutter pan is present.
- As speed and volume increase, greater width is preferred. Per the AASHTO Guidebook, page 23, a width of 5 feet or greater is preferable and additional widths as desirable where substantive truck traffic is present, or where motor vehicle speeds exceed 50 mph.
- Should be used on roadways with average daily traffic (ADT) counts of 3,000 or more
- Not suitable where there are a high number of commercial driveways
- Suitable for 2-lane facilities and 4-lane divided facilities



Below: 2009 MUTCD examples of word, symbol, and pavement markings for bicycle lanes.

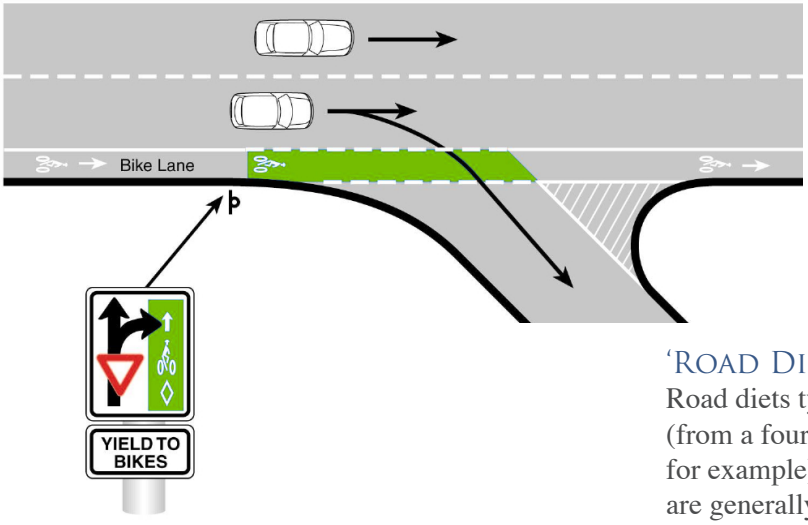


Green Bike Lanes

In addition to markings presented in the MUTCD, the following pavement markings may be considered. Green pavement is used for bicycle lanes in areas that tend to have a higher likelihood for vehicle conflicts. Examples of such locations are freeway on- and off-ramps and where a motorist may cross a bicycle lane to move into a right turn pocket. In the United States, the City of Portland and New York City have green bike lanes and supportive signing with favorable results. Studies after implementation showed more motorists slowing or stopping at colored lanes and more motorists using their turn signals near colored lanes. Green is the recommended color (some cities that have used blue are changing to green, since blue is associated with handicapped facilities).

The FHWA has issued an Interim Approval for the use of green coloring in bike lanes. Citing multiple experiments that demonstrated positive operational effects for both bicycle riders and other road users, with no notable negative effects, this approval allows states to apply for approval to use coloring in bike lanes and bike lane extension, and States may request approval for all jurisdictions in that State. This Interim Approval does not make the use of green-colored pavement mandatory: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia14/index.htm

Below: Henry Street in Brooklyn, NY.



Left: green bicycle lane application at a potential conflict area.

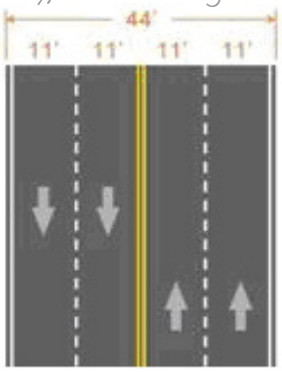
Bike Lanes with On-Street Parking

Where on-street parking is permitted, and a bike lane is provided, the bike lane must be between parking and the travel lane. Appropriate space must be allocated to allow passing cyclists room to avoid open car doors. The distance between the curb face and the outer marking of the bicycle lane is typically 13 to 15 feet (parking stall of 8 to 10 feet and bike lane of 5 feet).

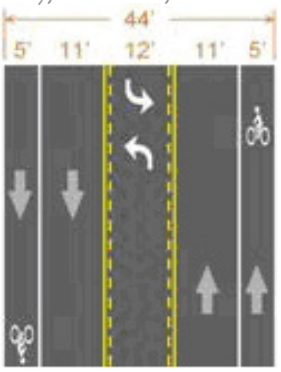
'Road Diets' for Bicycle Lanes

Road diets typically involve reducing the number of travel lanes (from a four-lane road to a two-lane road with center turn lane, for example) allowing adequate space for bicycle lanes. These are generally recommended only in situations where the vehicular traffic count can be safely and efficiently accommodated with a reduced number of travel lanes. Study may be necessary for recommended road diets to ensure that capacity and level-of-service needs are balanced against bicycle level of service needs.

Typical Existing



Typical Proposed

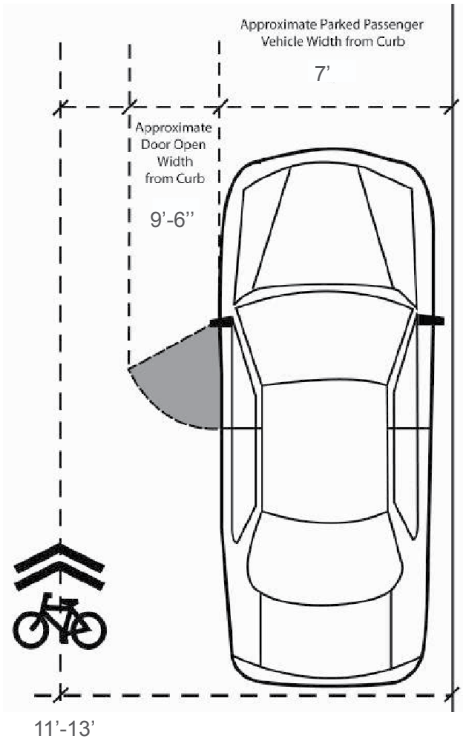


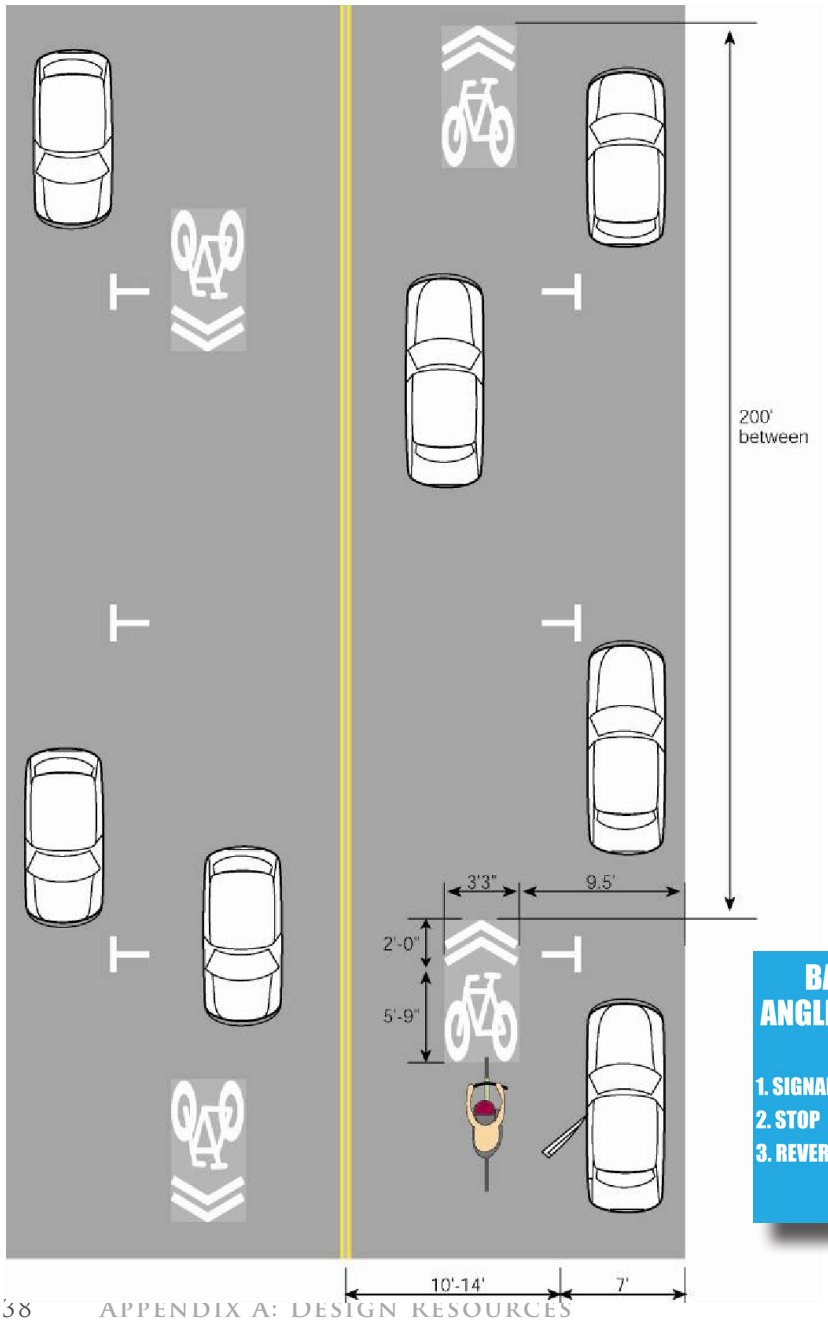
Shared Lane Marking

A bicycle shared lane marking (or 'sharrow') can serve a number of purposes, such as making motorists aware of bicycles potentially traveling in their lane, showing bicyclists the appropriate direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent "dooring" collisions. The shared lane marking stencil is used:

- Where lanes are too narrow for striping bike lanes
- Where the speed limit does not exceed 35 MPH
- With or without on-street parking (with on-street parking, the center of the sharrow should be placed a minimum of 11 feet from the curb face; without on-street parking, the center of the sharrow shall be placed 4 feet from the curb face or edge of pavement)

Cities throughout the United States have effectively used this treatment for many years; it is now officially part of the 2009 Manual for Uniform Traffic Control Devices (MUTCD). Additional guidance will also be available in the update of the AASHTO Bike Guide.





Sharrows with Back-in Angle Parking

Back-in/head-out diagonal parking and conventional head-in/back-out diagonal parking have common dimensions, but the back-in/headout is superior for safety reasons due to better visibility when leaving. This is particularly important on busy streets or where drivers find their views blocked by large vehicles, tinted windows, etc. (drivers do not back blindly into an active traffic lane). Furthermore, with back-in/head-out parking, drivers can see bicyclists as they prepare to pull out. See the "Back-in/Head-out Angle Parking" study by Nelson\Nygaard Consulting Associates for more information: www.bicyclinginfo.org/library/details.cfm?id=4413

Striped/Paved Shoulder

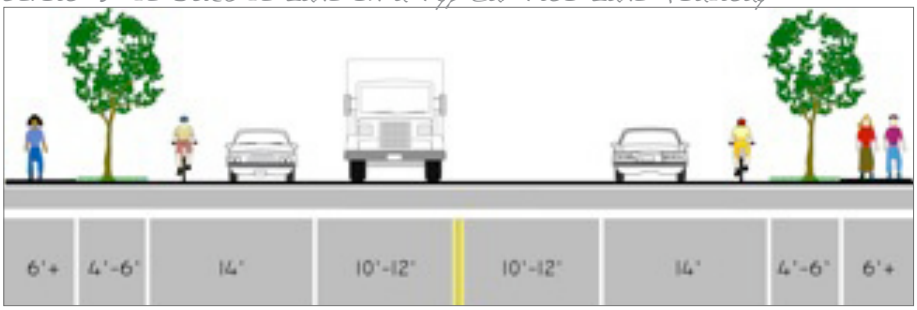
Paved shoulders are the part of a roadway which is contiguous and on the same level as the regularly traveled portion of the roadway. There is no minimum width for paved shoulders, however a width of at least four feet is preferred. Ideally, paved shoulders should be include in the construction of new roadways and/or the upgrade of existing roadways, especially where there is a need to more safely accommodate bicycles.

- Most often used in rural environments, although not confined to any particular setting
- Should be delineated by a solid white line, and provided on both sides of the road
- Should be contiguous and on the same level as the regularly traveled portion of the roadway
- 4' minimum width; however, if site conditions are constrained, then the option of a smaller shoulder should be weighed against simply having a wider outside lane.
- For roads with speeds higher than 40 MPH with high ADT, a shoulder width of more than 4' is recommended.
- Rumble strips should be avoided, but if used, then a width of more than 4' is needed.
- Paved shoulders should not be so wide as to be confused with a full automobile travel lane.

Wide Outside Lanes

Even without a bicycle facility or marking, the conditions for bicycling are improved when the outside travel lane in either direction is widened to provide enough roadway space so that bicyclists and motor vehicles can share the roadway without putting either in danger (e.g., higher volume roadways with wide (14') outside lanes). For outside lanes wider than 14', striping a bicycle lane should be considered.

Below: Wide Outside Lane on a Typical Two Lane Roadway



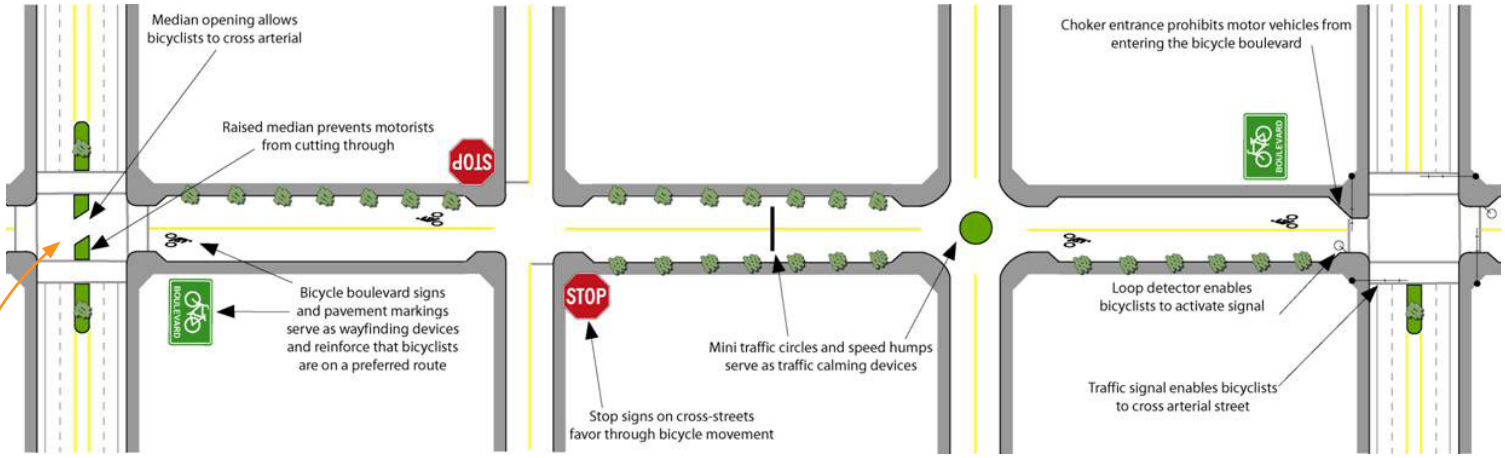
Bicycle Boulevards

To further identify preferred routes for bicyclists, the operation of lower volume roadways may be modified to function as a through street for bicycles while maintaining local access for automobiles. Traffic calming devices reduce traffic speeds and through trips while limiting conflicts between motorists and bicyclists, as well as give priority to through bicycle movement.

For a complete overview, see www.ibpi.usp.pdx.edu/guidebook.php

Above: Bike boulevard pavement markings and choker entrance.

Below: A bicycle boulevard.



Bikeway planners and engineers may pick and choose the appropriate mix of design elements needed for bicycle boulevard development along a particular corridor. Mix and match design elements to:

- Reduce or maintain low motor vehicle volumes;
- Reduce or maintain low motor vehicle speeds;
- Create a logical, direct, and continuous route;
- Create access to desired destinations ;
- Create comfortable and safe intersection crossings;
- Reduce cyclist delay.

Image and text source: Fundamentals of Bicycle Boulevard Planning and Design, www.ibpi.usp.pdx.edu/guidebook.php

Bicycle Facilities at Intersections

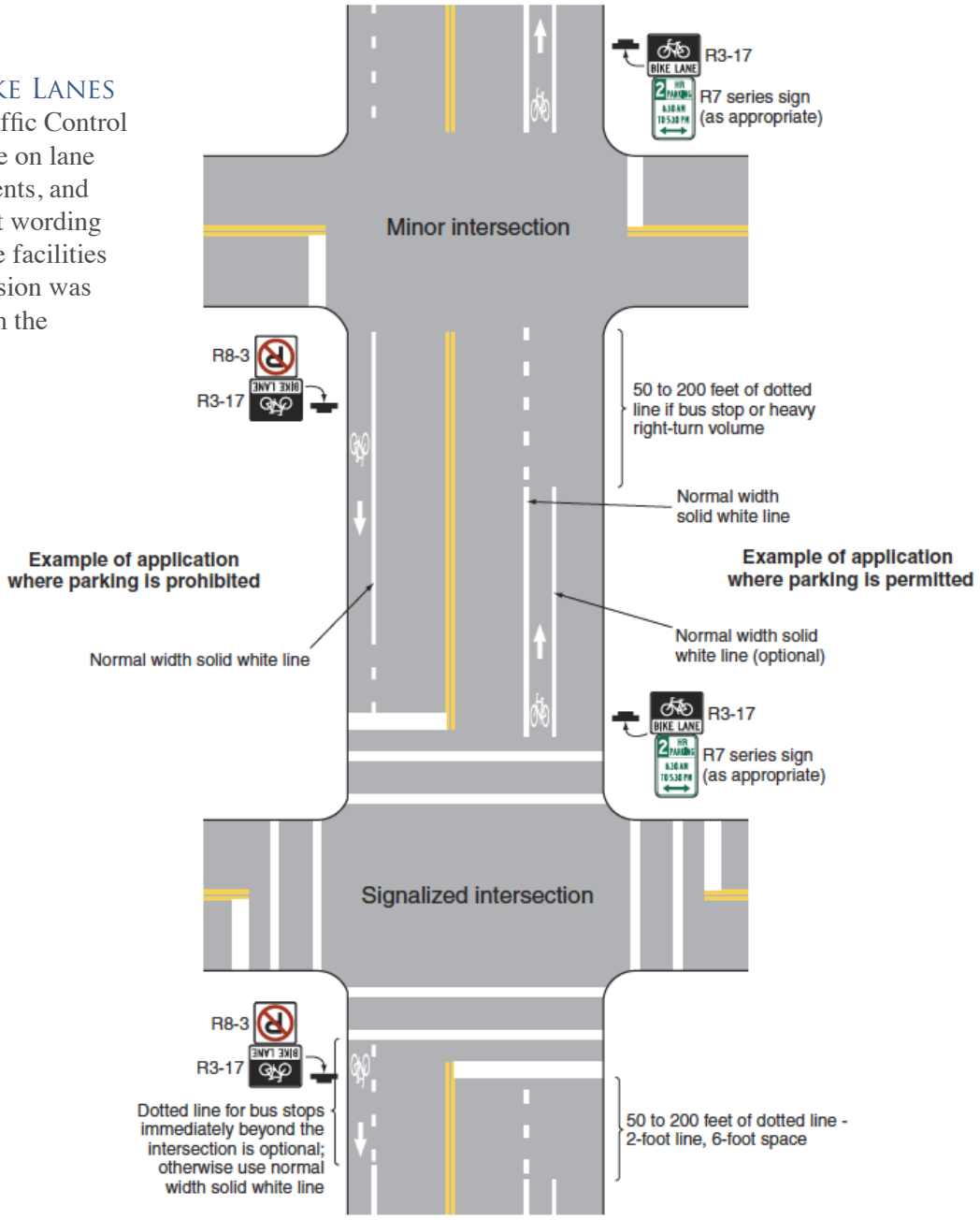
Intersections represent one of the primary collision points for bicyclists, with many factors involved:

- Larger intersections are more difficult for bicyclists to cross.
- On-coming vehicles from multiple directions and increased turning movements make it more difficult for motorists to notice non-motorized travelers.
- Most intersections do not provide a designated place for bicyclists.
- Loop and other traffic signal detectors, such as video, often do not detect bicycles.
- Bicyclists making a left turn must either cross travel lanes to a left-turn lane, or dismount and cross as a pedestrian.
- Bicyclists traveling straight may have difficulty maneuvering from the far right lane, across a right turn lane, to a through lane of travel.

Solutions to some these issues are illustrated below and in the following pages, including intersection configurations for bicycle lanes, pega-tracking, signage, and bicycle-activated detector loops.

Typical Intersection Configuration for Bike Lanes

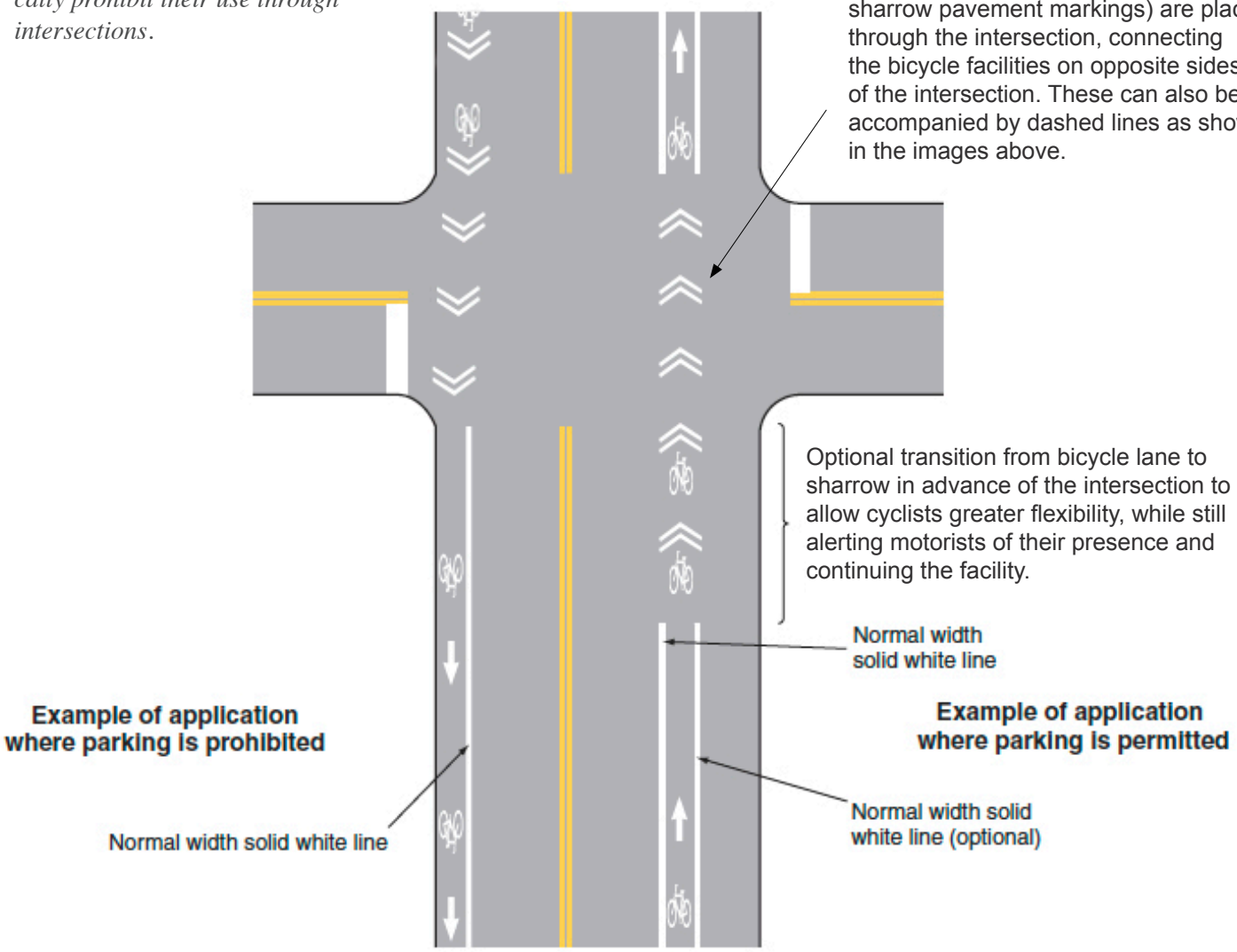
See the Manual on Uniform Traffic Control Devices (MUTCD) for guidance on lane delineation, intersection treatments, and general application of pavement wording and symbols for on-road bicycle facilities and off-road paths (updated version was released in 2009); example from the MUTCD at right.



Pega-tracking for Bike Lanes & Sharrows at Intersections

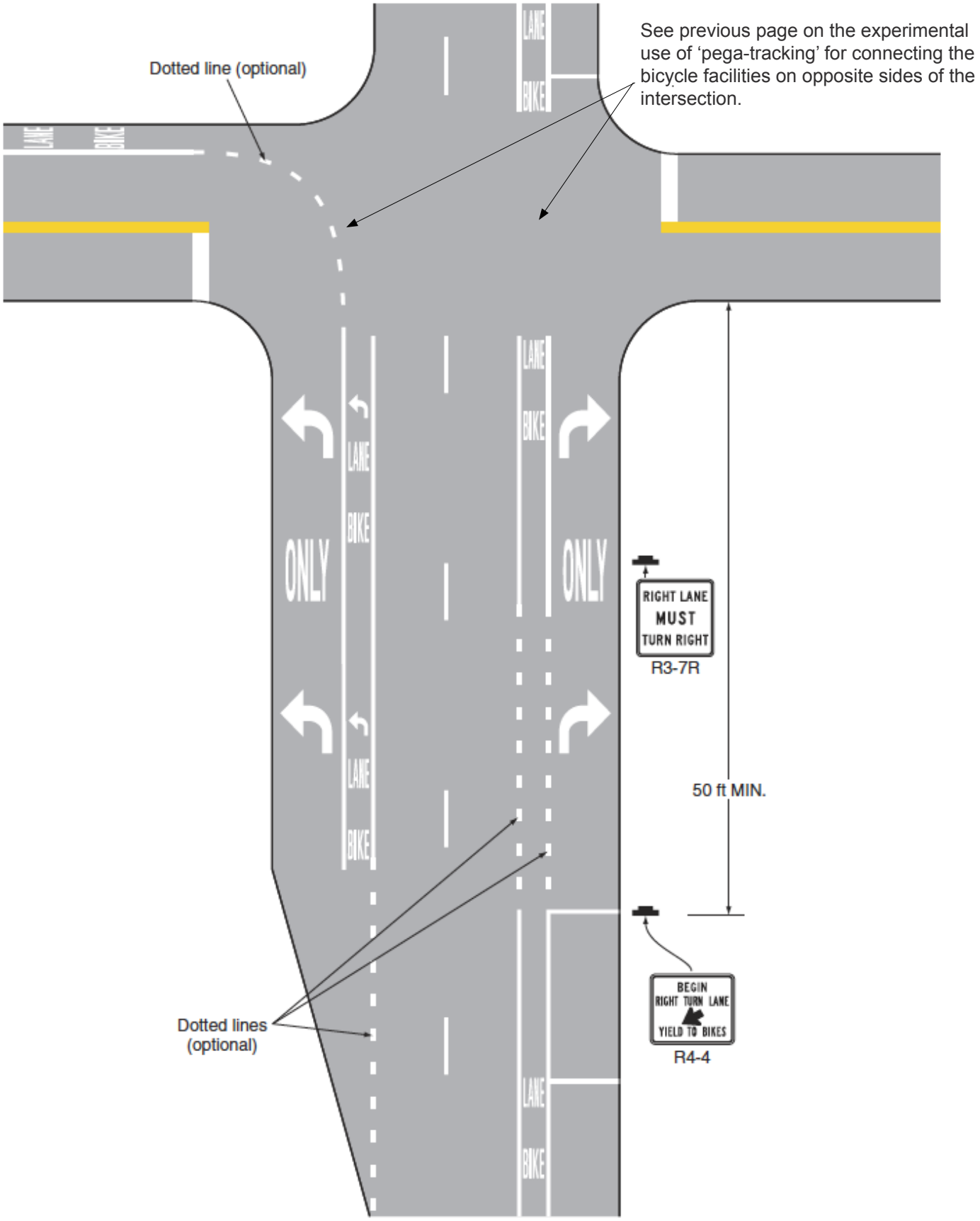
Pega-tracking is a type of pavement marking that connects bicycle facilities on opposite sides of the intersection, placed along the desired path for bicyclists. This use of the sharrow marking carries the bicycle facility through the intersection, rather than entirely 'dropping' the facility before the intersection. This treatment is being used in major cities throughout North America.

Sharrows are included in 2009 MUTCD, which does not specifically prohibit their use through intersections.



Example of Intersection Pavement Marking - Designated Bicycle Lane with Left-Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic, or Divided Highway

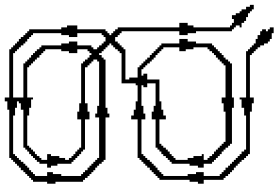
(Image below from the 2009 MUTCD, Figure 9C-1).



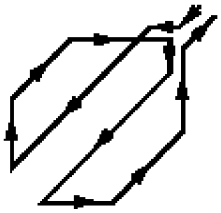
Bicycle-Activated Detector Loop

Changing how intersections operate can help make them more "friendly" to bicyclists. Improved traffic signal timing for bicyclists, bicycle-activated loop detectors, and camera detection make it easier and safer for cyclists to cross intersections. Bicycle-activated loop detectors are installed within the roadway to allow the weight of a bicycle to trigger a change in the traffic signal. This allows the cyclist to stay within the lane of travel and avoid maneuvering to the side of the road to trigger a push button, which ultimately provides extra green time before the light turns yellow to make it through the light. Current and future loops that are sensitive enough to detect bicycles should have pavement markings to instruct cyclists on how to trip them. These common loop detector types are recommended:

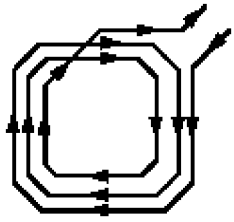
Use pavement marking to aid bicyclists in locating loop detectors at intersections.



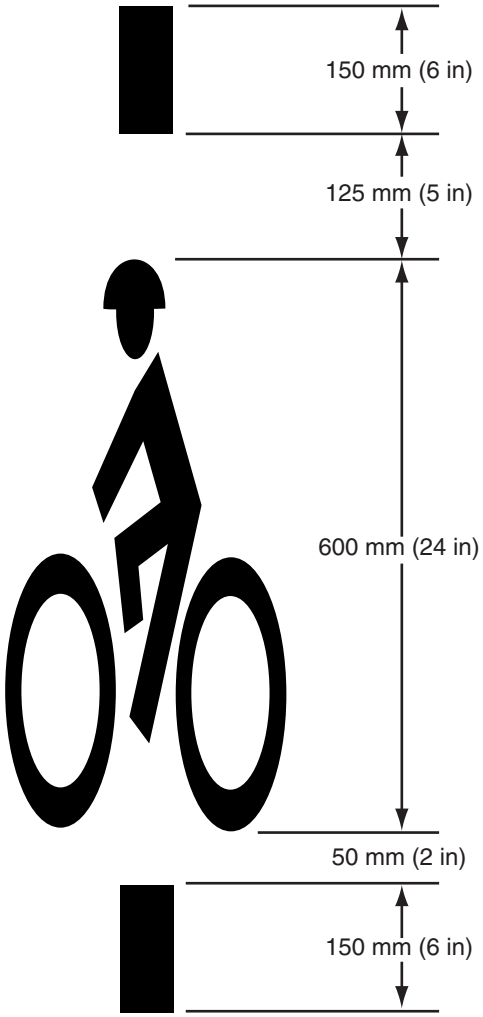
Quadruple Loop
(Recommended for bike lanes)
- Detects most strongly in center
- Sharp cut-off sensitivity



Diagonal Quadruple Loop
(Recommended for shared lanes)
- Sensitive over whole area
- Sharp cut-off sensitivity



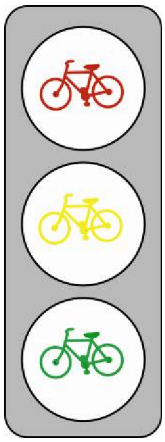
Standard Loop
(Recommended for advanced detection)
- Detects most strongly over wires
- Gradual cut-off



(See: Implementing Bicycle Improvements at the Local Level, FHWA, 1998, p. 70)

Bicycle Specific Traffic Control Signals

A bicycle signal is an electrically-powered traffic control device that may only be used in combination with an existing traffic signal. Bicycle signals direct bicyclists to take specific actions and may be used to address an identified safety or operational problem involving bicycles. A separate signal phase for bicycle movement will be used. Alternative means of handling conflicts between bicycles and motor vehicles shall be considered first. When bicycle traffic is controlled, green, yellow or red bicycle symbols are used to direct bicycle movement at a signalized intersection. Bicycle signals shall only be used at locations that meet MUTCD warrants. A bicycle signal may be considered for use only when the volume and collision, or volume and geometric warrants have been met:



1. Volume. When W = B x V and W > 50,000 and B >50.

Where:
W is the volume warrant.
B is the number of bicycles at the peak hour entering the intersection.
V is the number of vehicles at the peak hour entering the intersection.
B and V shall use the same peak hour.

2. Collision. When 2 or more bicycle/vehicle collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible public works official determines that a bicycle signal will reduce the number of collisions.

3. Geometric.
(a) Where a separate bicycle/multi use path intersects a roadway.
(b) At other locations to facilitate a bicycle movement that is not permitted for a motor vehicle.

Bicycle traffic signal used to bring bicycles leaving the UC Davis campus back into the road network.

See: MUTCD 2003 and MUTCD 2003 California Supplement (May 20, 2004), Sections 4C.103 and 4D.104 - www/dot.ca.gov/hq/traffops/signtech/mutcdsupp/

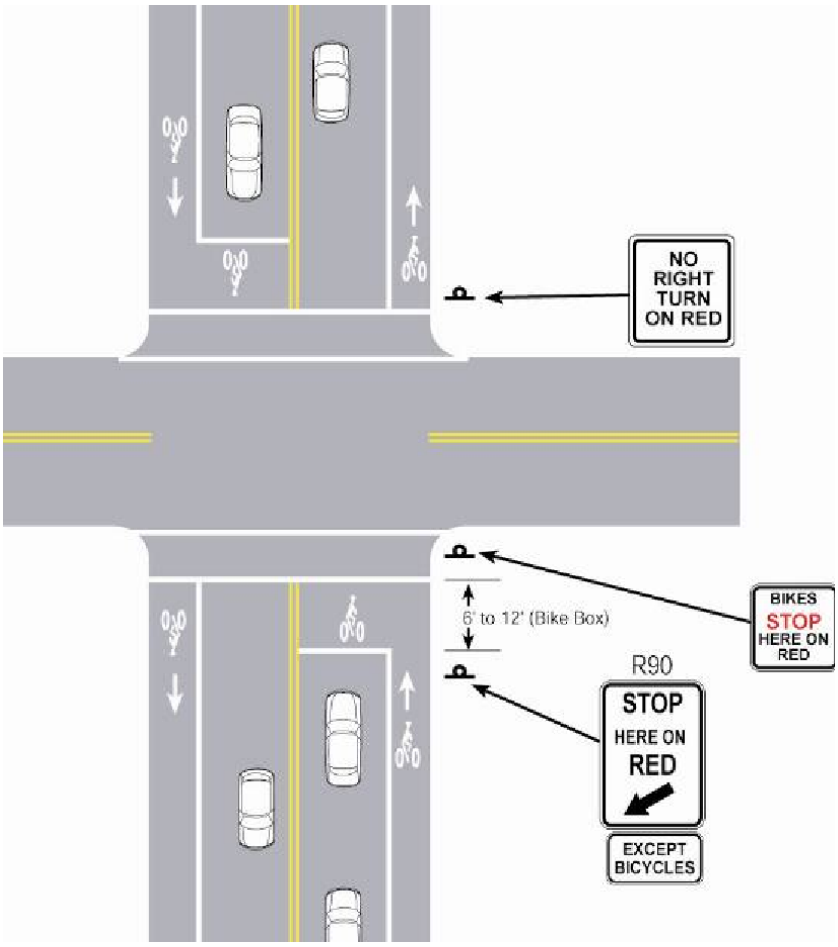
Bike Box / Advance Stop Line

(Not part of the 2009 MUTCD)

A bike box is a relatively simple innovation to improve turning movements for bicyclists without requiring cyclists to merge into traffic to reach the turn lane or use crosswalks as a pedestrian. The bike box is formed by pulling the stop line for vehicles back from the intersection, and adding a stop line for bicyclists immediately behind the crosswalk. When a traffic signal is red, bicyclists can move into this "box" ahead of the cars to make themselves more visible, or to move into a more comfortable position to make a turn. Bike boxes have been used in Cambridge, MA; Eugene, OR; and European cities.

Potential Applications:

- At intersections with a high volume of bicycles and motor vehicles
- Where there are frequent turning conflict and/or intersections with a high percentage of turning movements by both bicyclists and motorists
- At intersections with no right turn on red (RTOR)
- At intersections with high bicycle crash rates
- On roads with bicycle lanes
- Can be combined with a bicycle signal (optional)



Plan view of a bike box.

Considerations:

- Bike boxes are not currently included in the MUTCD but there are provisions for jurisdictions to request permission to experiment with innovative treatments (and thus with successful application, future inclusion of bike boxes in the MUTCD could occur).
- If a signal turns green as a cyclist is approaching an intersection, they should not use the bike box.
- Motorists will need to be educated to not encroach into the bike box.

Above and below: Bike boxes filled in with color to emphasize allocation of space to bicycle traffic.

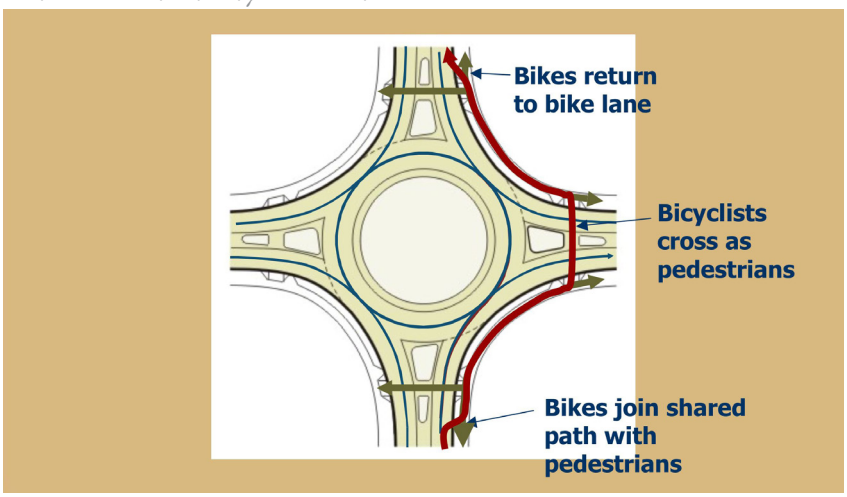
Roundabouts/Traffic Circles

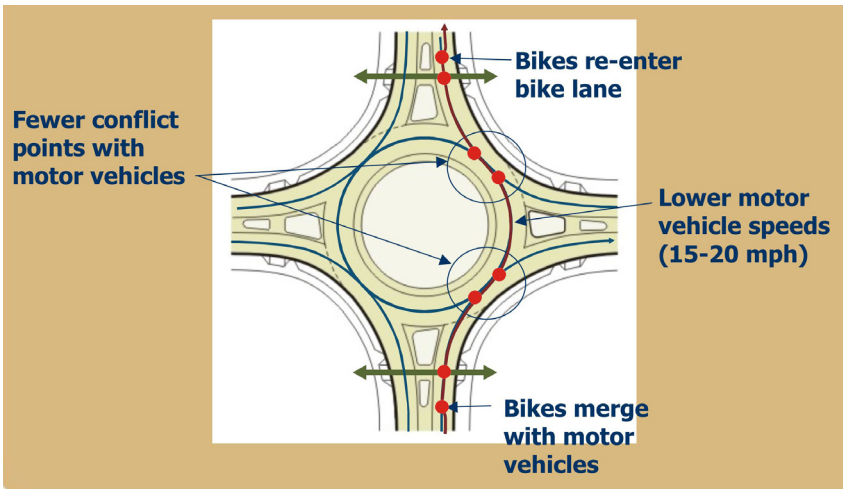
Roundabouts are one-way circular intersections in which traffic flows around a center island without stop signs or signals. Because roundabout traffic enters and exits through right turns only and speeds are reduced, the occurrence of severe crashes is substantially less than in many traditional four-way intersections. The lower speeds within roundabouts also allow entering traffic to access smaller gaps between circulating vehicles, increasing traffic volume and decreasing delays, congestion, fuel consumption and air pollution.

Modern roundabouts greatly reduce the potential for high-speed, right-angle, rear-end and left turn/head-on collisions. In traditional four-way traffic intersections, there are 32 points of conflict in which two vehicles may collide. Modern roundabouts have only eight conflict areas, greatly reducing potential crashes.

- Roundabouts with only one circulating lane are much safer to navigate than are multi-lane roundabouts, especially for bicyclists.
- The diagrams below show two ways for bicyclists to navigate roundabouts, depending on comfort and skill level.

Below: Circulating as a Pedestrian: If a cyclist is uncomfortable riding with traffic, a cyclist can choose to travel instead as a pedestrian.



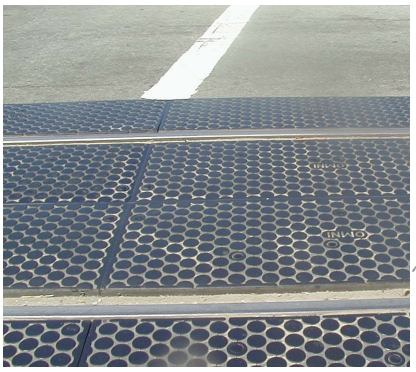


Above: Circulating as a Vehicle: Bike lanes are not recommended within a roundabout. Instead, cyclists merge with traffic before entering the roundabout, circulate with traffic, and then re-enter the bike lane after existing.

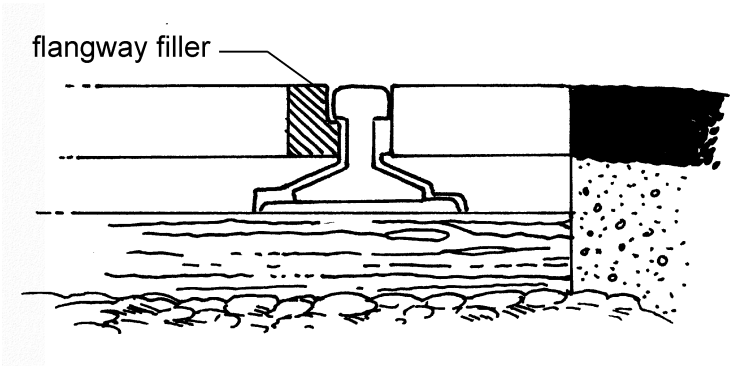
Bicycle Facilities at Railroad Crossings

Railroad crossings are particularly hazardous to those who rely on wheeled devices for mobility (railroad crossings have flangeway gaps that allow passage of the wheels of the train, but also have the potential to catch wheelchair casters and bicycle tires). In addition, rails or ties that are not embedded in the travel surface create a tripping hazard. Recommendations:

- Make the Crossing Level: Raise approaches to the tracks and the area between the tracks to the level of the top of the rail.
- Bikes Should Cross RR at Right Angle
- When bikeways or roadways cross railroad tracks at grade, the roadway should ideally be at a right angle to the rails. When the angle of the roadway to the rails is increasingly severe, the approach recommended by Caltrans (Highway Design Manual, Section 1003.6) and AASHTO (Guide for the Development of Bicycle Facilities, 1999, p.60) is to widen the approach roadway shoulder or bicycle facility, allowing bicycles to cross the tracks at a right angle without veering into the path of passing motor vehicle traffic.
- Use Multiple Forms of Warning: Provide railroad crossing information in multiple formats, including signs, flashing lights, and audible sounds.
- Clear Debris Regularly: Perform regular maintenance to clear debris from shoulder areas at railroad crossings.
- Fill Flangeway with Rubberized Material or Concrete Slab: Normal use of rail facilities causes buckling of paved-and-timbered rail crossings. Pavement buckling can be reduced or eliminated by filling the flangeway with rubberized material, concrete slab, or other treatments. A beneficial effect of this is a decrease in long-term maintenance costs.



Installing a rubber surface rather than asphalt around railroad flangeways reduces changes in level and other maintenance problems.

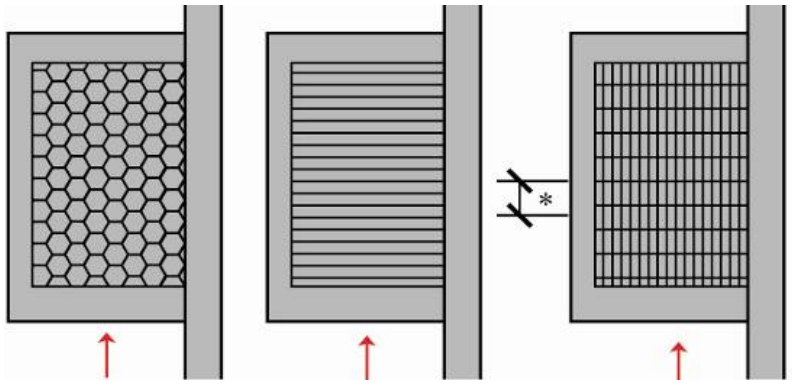


The "flangeway filler" eliminates the gap in the path of travel for pedestrians crossing railroad tracks. The filler, consisting of a rubber insert, will deflect downward with the weight of a train and does not affect railway function.

Bicycle Friendly Drainage Grates

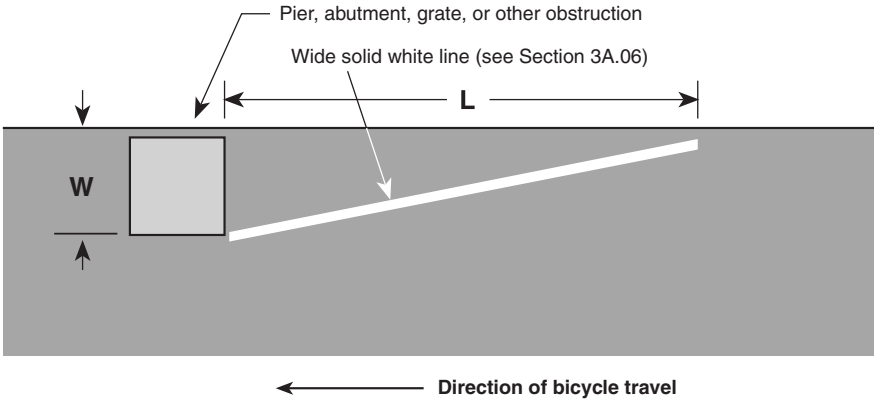
Drainage grates usually occupy portions of roadways, such as bicycle lanes, where bicycles frequently travel. Often drainage grates are poorly maintained or are of a design that can damage a bicycle wheel or in severe circumstances, cause a bicyclist to crash. Improper drainage grates create an unfriendly obstacle a cyclist must navigate around, often forcing entrance into a motor vehicle lane in severe cases. Bicycle friendly drainage grates should be installed in all new roadway projects and problem grates should be identified and replaced.

Right: Bicycle Friendly Drainage Grate Designs



*max 150 mm (6") spacing

Right: MUTCD example of obstruction pavement marking; if dangerous drainage grates (or other obstructions) are not to be fixed in the short term, then this pavement marking should direct cyclists away from the obstruction.



Dangerous Drainage Grate Condition; this example is dangerous due to the grate running parallel to the roadway, creating a trap for bicycle tires.

Dangerous Drainage Grate Condition; this example is dangerous due to the surrounding paving condition (when the road was resurfaced the drainage grate remained at the same height).

Bicycle-Friendly Drainage Grate

Bicycle Parking and Bicycle Stations

Bicycle Parking

As more bikeways are constructed and bicycle usage grows, the need for bike parking will climb. Long-term bicycle parking at transit stations and work sites, as well as short-term parking at shopping centers and similar sites, can support bicycling. Bicyclists have a significant need for secure long-term parking because bicycles parked for longer periods are more exposed to weather and theft, although adequate long-term parking rarely meets demand. These bicycle parking standards should also be shared with local colleges.

Bicycle Parking According to Town of Boone UDO, Article XIX

Residential Land Uses	**Short Term Spaces**	**Long Term Spaces**
1.300 Multi-family Residences	2, or 1 per 20 units	1 per 4 units
1.400 Group Homes	2, or 1 per 20 bedrooms	
1.510 Rooming Houses	2	
1.530 Hotels	2	2
1.540 Fraternity/Sorority	2, or 1 per 20 units	2
Commercial Land Uses	**Short Term Spaces**	**Long Term Spaces**
2.100 Commercial Retail	2, or 1 per 5,000 SF*	2, or 1 per 12,000 SF
2.200 Commercial Wholesale	2, or 1 per 15,000 SF	
2.300 Convenience Stores	2	2
2.400 Large Scale Retail	2, or 1 per 5,000 SF	2, or 1 per 12,000 SF
3.0 Commercial Office	2 2, or 1 per 10,000 SF	
4.0 Industrial Uses	2, or 1 per 15,000 SF	
4.300 Warehouses	2, or 1 per 40,000 SF	
5.110 Elementary/High Schools	1 per classroom	1 per classroom
5.120 Trade Schools	2, or 1 per 10,000 SF	2, or 1 per 20,000 SF
5.130 Colleges	2, or 1 per 10,000 SF	2, or 1 per 20,000 SF
5.200 Churches	2	2
5.300 Libraries	1 per 10 automobile spaces	2
5.400 Social Clubs	1 per 10 automobile spaces	2
6.110 Indoor Recreation	1 per 10 automobile spaces	2
6.120 Movie Theaters	8 or 1 per 40 seats	
6.130 Coliseums	8 or 1 per 40 seats	
6.210 Private Outdoor Rec.	2	
6.220 Public Outdoor Rec.	2	
6.230 Town Passive Rec.	5	
7.100 Hospitals	2, or 1 per 40,000 SF	2, or 1 per 50,000 SF
7.200 Nursing Homes	2	2
8.0 Restaurants	2, or 1 per 5,000 SF	2, or 1 per 12,000 SF
9.0 Motor Vehicle Sales	2	
10.100 Automobile Parking	1 per 10 automobile spaces	
12.0 Animal Services	2	
13.0 Emergency Services	2	
15.100 Post Office	2	2
15.200 Airport	2	2
16.0 Dry Cleaners	2	2
19.0 Open Air Market	2	2
22.0 Daycare	2, or 1 per 10,000 SF	
24.0 Transportation	8	
25.0 Greenhouse	2	2
28.0 Combination	As applied individually	As applied individually

Bicycle Rack Standards

When choosing bike racks, there are a number of things to keep in mind:

- The rack element (part of the rack that supports the bike) should keep the bike upright by supporting the frame in two places allowing one or both wheels to be secured.
- Install racks so there is enough room between adjacent parked bicycles. If it becomes too difficult for a bicyclist to easily lock their bicycle, they may park it elsewhere and the bicycle capacity is lowered. A row of inverted "U" racks should be installed with 15" minimum between racks.
- Empty racks should not pose a tripping hazard for visually impaired pedestrians. Position racks out of the walkway's clear zone.
- When possible, racks should be in a covered area protected from the elements. Long-term parking should always be protected.

The rack element should:

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

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

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

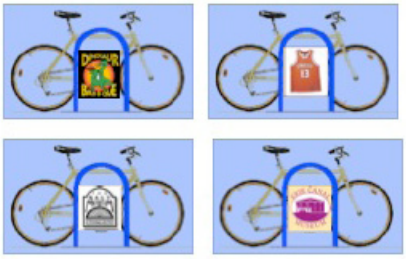
INVERTED "U"
One rack element supports two bikes.

"A"
One rack element supports two bikes.

POST AND LOOP
One rack element supports two bikes.

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

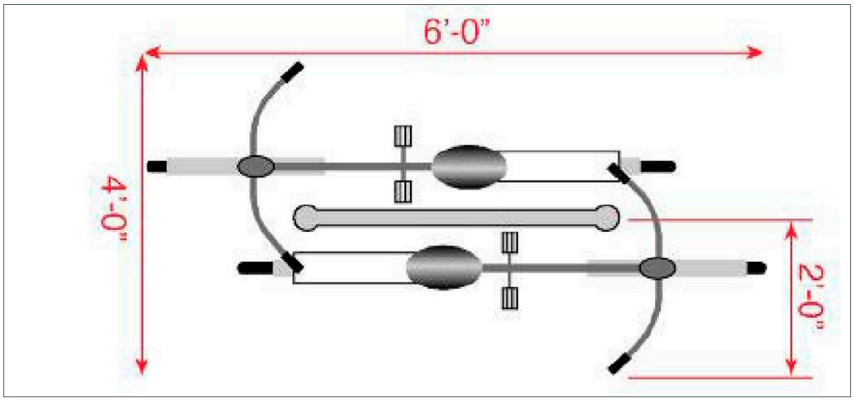
Recommended guidelines for bicycle parking from the Association of Pedestrian and Bicycle Professionals, 2002, www.apbp.org.



Bicycle racks that incorporate advertising can be sponsored by local merchants.

Provision of shelter from rain greatly increases usefulness of this bicycle parking facility during inclement weather.

Recommended guidelines for bicycle parking spacing dimensions.



A single inverted "U" rack can accommodate two bicycles.

Bicycle Parking and the Public vs. Private Right-of-Way

Bicycle parking can be located either in the public right of way or on private property, depending on the adjacent land uses and streetscape. For example, an office park may provide short-term bicycle parking racks near building entrances, and may also provide secure indoor parking for employees. For on street bike parking, the following example from the Portland, OR offers guidelines for city policy.

Example On-Street Bicycle Parking Requirements (City of Portland, OR, Administrative Rule for On-Street Bicycle Parking)

- Sidewalk racks are at capacity on a recurring basis.
- City staff and applicant jointly determine time of day and day of week for highest bicycle use. This assessment must be independent of any special event that may inflate the average daily use.
- City staff visits site to assess bicycle use, based on the formula listed below, and whether or not it can be met by normal sidewalk rack installations. Due to seasonal variations and weather dependence, determination of bicycle use may need to be delayed pending suitable conditions to assess actual needs.
- Formula used to determine supply and demand for the areas:
    1. Bicycles parked within 50 feet of proposed site multiplied by 1.5
    2. Bicycles parked more than 50 feet, but less than 150 feet, of proposed site multiplied by 1.0
    3. Bicycles parked more than 150 feet, but less than 200 feet, of proposed site multiplied by 0.5
- City staff inventories parked bicycles and available bicycle racks within 200 feet of the site, measured using marked and unmarked crosswalks, including street crossing distances. City staff also will assess the possibilities for additional sidewalk racks.
- If sidewalk bicycle parking cannot be installed to meet 80 percent of inventoried, parked bicycles, then a bicycle corral is warranted. City staff will determine this.
- At a minimum there must be 100 percent agreement with adjacent property owners, established through petition.
- A Maintenance Agreement must be signed by the requestors and the City and kept on file with the City.
- If the business owner that originally requested the bicycle parking closes, sells or transfers ownership the new owner must give written approval of the bicycle parking to the City within 30 days of taking ownership.

Below: An example of replacing on-street vehicular parking with a 'bicycle corral' (in Portland, OR).

Attended Bike Parking and Bike Lockers

Attended bike parking is analogous to a coat check – your bike is securely stored in a supervised location. An organization called The Bikestation Coalition is promoting enhanced attended parking at transit stations.

The Bikestation concept is now in use in Palo Alto, Berkeley and San Francisco and Seattle. Bikestations offer secured valet bicycle parking near transit centers. What makes Bikestations distinctive are the other amenities that may be offered at the location – bicycle repair, cafes, showers and changing facilities, bicycle rentals, licensing, etc. Bikestations become a virtual one-stop-shop for bicycle commuters.

Attended bicycle parking can be offered at some special events. For example, the Marin County Bicycle Coalition sponsors valet parking at many festivals in the county, the Sonoma County Bicycle Coalition sponsors valley parking at the downtown Santa Rosa Farmer's Market, and secured bicycle parking is offered at Pac Bell Park in San Francisco.

A bicycle station with attended parking in Long Beach, CA.

Bike lockers should be constructed of opague materials and be clearly labelled as bicycle parking. Parking rates are reasonable at about 3-5 cents per hour (www.bikelink.org).

Bike Sharing Programs

Many cities including Washington, DC, Montreal and Louisville are implementing innovative bike-sharing programs using a variety of revenue generating and fee-for service programs. Copenhagen, Denmark, pioneered the concept of providing a fleet of bicycles for free public use throughout the urban center. Paris has made this concept popular with the development of the city-wide Velib system of credit-card operated bike rentals. The Danish free bikes are subsidized by advertising sales on the bicycles, and they require a coin or credit card deposit for use. The bicycles are single speed, durable and suitable only for short trips. Their design makes them less likely to be stolen. They can be picked up and dropped off at a variety of destinations – making them an easy choice for in-town travel by residents and visitors. A variety of similar programs utilize recycled bicycles or bicycles painted in a common color for free public use.

See www.altabicycleshare.com for more information.

Lousiville's "Freewheelin" bike sharing system is supported by Humana Healthcare. The City is working with public private partnerships to provide a fleet of shared bicycles.

Bicycle Stations and Repair Stands

Bicycle repair stands and bicycle stations are fixtures in highly successful bicycle-friendly communities. Popular locations include farmer's markets or public areas that are centers for activity, easily accessible by foot or bicycle. Local bike shops and local events could provide similar services. The presence of smaller scale operations that primarily provide maintenance and repair functions within semi-permanent structures like the tent and tarp shown below allow for a lower cost operation, thereby passing on savings to the customer in terms of lower repair and maintenance costs.

In North Carolina communities (Durham and Carborro, for example), local, volunteer-run bicycle non-profit organizations offer maintenance training and space for local residents to work on their bikes. The City of Durham, for example, granted funding to their local bicycle co-op for their provision of this important bicycle support facility.

A bicycle maintenance stand at a farmers' market in Durham, NC.

Bicycle Access on Transit

Integrating bicycle facilities with transit modes allows bicyclists to greatly expand the area accessible. Below are example instructions for bikes on buses that could be used to encourage people to use take their bikes on Appalcart buses.

1. Have your bike ready to load—always approach the bus from the curbside. Remove water bottles or other loose items.

2. Make eye contact with the driver to alert him/her to your presence.

3.If the rack is empty, lift the metal handle and pull the folded bike rack down flat.

4. Load the bike in the space nearest the bus.

If another bike is on the rack, load your bike in the open position. You are responsible for loading and securing your bike on the rack. Drivers are not allowed to load or unload bicycles.

5. Lift the support arm and hook it over the front tire.

Make sure the support arm clamps the tire and not the fender or frame. Your bike now is securely fastened in the rack.

Above: Images of bikes on Appalcart's buses, from http://appalcarts.blogspot.com/

6. Hop on and pay your fare.

7. When you reach your stop, tell the driver before you exit the bus that you'll be removing your bike.

Raise the support arm, lower it into place and lift your bike off the rack.

Fold up the rack if it is empty, and step onto the sidewalk with your bike.

NEVER cross in front of the bus—wait until the bus has left the stop.

If the rack is full, please wait for the next bus.

Above: Instructions on how to load a bicycle onto a bus equipped with a bicycle rack, developed for a bicycle user map by Fremont, CA

B Program Resources

Appendix Contents

Introduction

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Introduction

The purpose of this appendix is to provide a set of programmatic resources for outreach, education, enforcement, and evaluation/policy that will support the goals of the Town of Boone Pedestrian Plan. The information that follows is for guidance and discussion purposes; actual program implementation will vary depending on the particular needs and goals determined by those involved in organizing such efforts.

While improving pedestrian infrastructure is critical to increasing walking rates and walking safety, the importance of outreach, education, evaluation, and enforcement efforts should not be underestimated. These programs can ensure that more residents will know about new and improved facilities, learn about the benefits of walking, and receive positive reinforcement about why and how to integrate walking and bicycling into their everyday lives. In essence, these efforts market walking to the general public and ensure the maximum "return on investment" in the form of more Boone residents walking and a higher degree of safety and awareness around walking in Boone.

The following sections contain information about the program purpose, a description of the basic approach and, wherever possible, links to model programs.

Partners

- *Town of Boone* – The Town's Transportation Committee will work with Public Works, Planning & Inspections, and the Alternative Transportation Subcommittee to assist in the coordination of programs.
- *North Carolina Department of Transportation (NCDOT)* – NCDOT will necessarily be involved in any project on state-owned facilities, and can be a strong partner as well for trainings related to active transportation. See www.ncdot.gov/bikeped/safetyeducation/ for more information about safety and education program resources offered by NCDOT.
- *Be Active-Appalachian Partnership* - collaboration between Be Active North Carolina and Appalachian State University, supported by a five-year grant from Blue Cross and Blue Shield of North Carolina and housed in Appalachian's Institute for Health and Human Services. It promotes physical activity for the citizens of western North Carolina through programming, people and policies. The Partnership can play a role in implementing key recommendations in this memo that will help Boone residents get more physical activity.
- *Watauga County Health Department* – One of the WCHD's priorities is to promote physical activity for all ages. They will be a natural partner on programs that result in increased physical activity.
- *CPPW Leadership Team* – this team was brought together for the purposes of implementing the Communities Putting Prevention to Work grant. The CPPW program aims to achieve broad reaching, highly impactful, and sustainable

change to reduce chronic disease morbidity and mortality associated with obesity and tobacco use. If this team agrees to continue meeting, they could be effective partners in implementing many of the recommendations in this plan as they relate to promoting increases in physical activity (particularly Safe Routes to School).

- *Appalachian State University* – Because it is so centrally located, ASU contributes materially to the pedestrian environment in Boone. ASU representatives may be natural partners for certain pedestrian safety campaigns that are aimed at students and at the campus walking environment.
- *Town of Boone Police Department* – The Police Chief already sits on the Transportation Committee, and the Police Department has been involved in identifying traffic safety problems and executing enforcement campaigns. The enforcement recommendations in this memo can only be implemented with the partnership and support of the Town of Boone Police Department.
- *Watauga County School District* – Schools in Boone are natural partners for Safe Routes to School efforts as well as on enforcement actions related to student safety. A representative from Watauga County School District sits on the CPPW Leadership Team, which may be sufficient for coordination purposes if that group continues to meet in the future.
- *Parent Teacher Associations (PTAs)* – PTAs can be effective partners in implementing Safe Routes to School efforts and other school-oriented traffic safety initiatives.
- *Watauga County Parks & Recreation* – Parks and Recreation are natural partners for public events and classes such as organized walks.
- *Wautauga County Project on Aging* – this County department serves as the focal point for aging services in Watauga County and will be a natural partner for programs aimed at helping seniors walk more for physical activity.
- *Boone Area Cyclists* – This cycling club may be able to provide volunteer support for greenway initiatives that benefit cycling as well as walking.
- *Boone Area Chamber of Commerce* – The Chamber may be interested in supporting initiatives that bring residents and visitors to downtown Boone, such as *Cyclo.Via* and themed walking tours.
- *Boone Convention and Visitor's Bureau* – The Visitor's Bureau may be interested in supporting initiatives that bring residents and visitors to downtown Boone, such as *Cyclo.Via* and themed walking tours.
- *Downtown Boone Development Association* – The DBDA may be interested in supporting initiatives that bring residents and visitors to downtown Boone, such as *Cyclo.Via* and themed walking tours.

Outreach Resources

Senior Strolls Program

Purpose: Encourage seniors to walk for fitness

Audience: Seniors

Potential Partners: Watauga County Project on Aging, Watauga County Health Department, AppalCART, Watauga County Parks and Recreation

Seniors often experience limitations in mobility as they age, and are often left out of recreation programs. A Senior Strolls program will help seniors maintain physical fitness, improve health, and enjoy opportunities for social interaction. Senior Strolls should be organized group walks hosted on a regular basis (weekly or biweekly) during pleasant

weather months. Walks may originate at the Lois E. Harrill Senior Center, or AppalCART may be able to provide transportation to other walking destinations such as the Greenway Trail.

Sample Programs:

- Senior Adult Walking Clubs (Arlington, VA): http://www.walkarlington.com/pages/walking-in-arlington/clubs-and-groups/senior-adult-walking-clubs/
- Senior Strolls Program (Portland, OR): http://www.portlandonline.com/transportation/index.cfm?c=41541

Safe Routes to School

Purpose: Promote physical fitness and health by helping children walk and bicycle to school; improve school traffic safety through physical improvements and programs

Audience: School-aged children and their parents; school administrators, faculty, and staff

Partners: Watauga County School District, Parent-Teacher Associations, CPPW Leadership Team, Town of Boone Police Department, Town of Boone Public Works Staff, community members

Safe Routes to School programs use a "5 Es" approach using Engineering, Education, Encouragement, Enforcement, and Evaluation strategies to improve safety and encourage children walking and biking to school. The programs are usually run by a coalition of city government, school and school district officials and teachers, parents and students, and neighbors.

In a rural environment, a majority of school trips will be too long for students to make the entire trip by walking or bicycling. For this reason, the focus should be on creative efforts to help schoolchildren increase their physical activity in other ways.

For example, a Park and Walk effort, where children are dropped off at a pre-determined location (such as a park) near the school, and then walk with parent volunteers and/or school staff the remaining distance to school. Park and Walk campaigns can reduce congestion and improve traffic safety near schools while increasing youth physical activity. Teachers also report that children who walk to school arrive awake and "ready to learn."

Above: Walking School Bus in Black Mountain, NC, as part of a Safe Routes to School Program.

Likewise, a Safe Routes to Bus Stops program can help children safely access bus transportation by walking, and International Walk to School Day in October can be an excellent annual event that offers all families and children the opportunity to participate in healthy school transportation.

A next step towards creating safer active travel opportunities for schoolchildren would be creating a Safe Routes to School Plan for every elementary and middle school in the Watauga County School District. This will necessarily be a coalition effort, and the CPPW Leadership Team may be well suited to coordinating this effort. This planning project may be eligible for grant funding through the NCDOT Safe Routes to School program, though because of the uncertain outlook for this federal funding program, it is recommended that this funding source be investigated sooner rather than later.

Sample Programs:

- Marin County National Model Program: http://www.saferoutestoschools.org/index.shtml
- Laura Richards School Walking School Bus Program (Gardiner, ME): http://www.msad11.org/node/3705
- Walking School Bus and Park and Walk Programs (Windsor, VT): http://www.saferoutesinfo.org/data-central/success-stories/windsor-vermont-parent-volunteers-lead-walking-school-buses-forward
- Ira B. Jones School Walking to School Program (Asheville, NC): http://www.saferoutesinfo.org/data-central/success-stories/asheville-north-carolina-encouraging-walking-and-wheeling-school-wide

Walking/Bicycling Maps

Purpose: Encourage walking and biking by providing route and facility information and highlighting walking and bicycling destinations

Audience: General public

Partners: Downtown Boone Development Association, Boone Area Chamber of Commerce, Boone Convention and Visitor's Bureau, Appalachian State University, Town of Boone GIS Department

One of the most effective ways of encouraging people to walk is through the use of maps and guides to show where you can walk, and to guide people to enjoyable routes and destinations for walking. Boone already has a walking map that shows the Greenway Trail and other destinations. The map should be reprinted as needed and actively distributed to residents and visitors; it should also be updated on a regular basis as new facilities are implemented.

As a next step, partners should collaborate on creating one or more guided tour routes based on themes such as a historic tour and/or a public art tour. Live tours should be hosted by knowledgeable tour guides (annually or more frequently as demand permits) and publicized widely. The tour routes should be preserved in a brochure and/or a self-guided (e.g. iPod-based) tour as well so that people can participate even if they are unable to attend the guided tour.

Boone already has numerous partners and resources who may be able to help research walking tours and manage tour logistics. Downtown Boone Development Association, Boone Area Chamber of Commerce, Boone Convention and Visitor's Bureau may be

willing to partner based on the nexus with tourism and economic development. The DBDA Public Art program is an excellent starting place for a public art tour. Appalachian State University may be able to assist with historic research and through the Recreation Management Program. Researching and developing tour routes and creating supporting materials might be a good student project, for example. The online Boone Historic Archives may also be a resource for this effort (http://www.booneonline.com).

Sample Guided Walks and Maps:

- Bedford County Walking Tours (Bedford, PA): http://www.visitbedfordcounty.com/walkingtours.html
- Austin Historic Walking Tours (Austin, TX): http://www.austintexas.org/visitors/plan_your_trip/historic_walking_tours
- Walking Route Maps (Wilsonville, OR): http://www.ridesmart.com/Index.aspx?page=190

Ciclovias/Open Streets Events

Purpose: Encourage walking, biking and physical activity by providing a car-free street event

Audience: General public, generally within a particular community but can be promoted citywide

Images from Bull City Open Streets in Durham, NC: www.bullcityopenstreets.com

Partners: Be Active-Appalachian Partnership, Watauga County Health Department, Town of Boone Police Department, Town of Boone Public Works, Town of Boone Planning & Inspections,, Watauga County Parks and Recreation, Boone Area Cyclists, Watauga County Tourism Development Agency, Boone Convention and Visitors Bureau, others.

These programs have many names: Ciclovias, Open Streets, Sunday Parkways, Summer Streets, Sunday Streets, etc. Ciclovias, which originated in Bogotá, Colombia (hence the Spanish name), are periodic street closures (usually on Sundays) that create a temporary park that is open to the public for walking, bicycling, dancing, hula hooping, roller skating, etc. They have been very successful internationally and are rapidly becoming popular in the United States. They promote health by creating a safe and attractive space for physical activity and social interaction, and are cost-effective compared to the cost of building new parks for the same purpose. These events can be weekly events or one-time events, and are generally very popular and well-attended.

The Boone Area Cyclists club led an effort to implement the area's first ciclovia event in 2011. Called Boone Cyclo.Via, it was held on June 26, 2011 and included a linear route. This project was supported by the Watauga County Tourism Development Agency and the Boone Convention and Visitors Bureau.

For future expansion of the program, organizers should consider lessons learned and best practices from other communities. Some recommendations include:

- Make sure that there are programmed, family-friendly activities along the route; an "open street" alone is not sufficient to draw participants (and especially not on a repeat basis).
- These events lend themselves to innovative partnerships and public/private funding. Health care providers whose mission includes facilitating physical activity are often major sponsors. Businesses may also support the event if it brings customers to their location.
- The cost of organizing the event can be mitigated through volunteer participation, as this type of event lends itself to enthusiastic volunteer support. However, this will require a high level and quality of volunteer recruitment and management to be sustainable in the long run.
- Police costs to manage the road closure will be one of the largest costs. Work with the police to develop a long-term traffic closure management strategy that uses police resources where needed but also allows well-trained volunteers to participate in managing road closures.
- Informing residents along the route about what it means for them is essential. They should be informed numerous times (3-6 times is not too much), including a reminder the day before the event. Expectations about vehicle access to and from residences should be managed clearly.
- Consider linking parks, schools and other public assets. If possible, organize a route that introduces residents to good walking and bicycling routes that they can use at other times as well.
- The greatest value to the community comes when a ciclovia event happens on a regular basis (e.g. monthly during pleasant weather months). For this to be successful, different routes and/or different activities should be considered.

One community (Portland, OR) assembled a training manual for other communities based on their experience; this may be useful for Boone: http://www.portlandonline.com/transportation/index.cfm?c=51522&a=274625

- Videos of Sunday Parkways events: http://www.streetfilms.org/tag/ciclovias/

Education Resources

Professional Development Courses

Purpose: Educate and train planner and engineers on pedestrian and bicycle facilities and policy issues

Audience: Professionals in planning, engineering, landscape architecture, etc.

Professional development courses provide training to transportation and other professionals who do may not have received extensive experience or training in pedestrian and bicycle facilities. This can be a successful way to institutionalize knowledge of pedestrian and bicycle facility design at an institution and create an agency culture that values bicycling. Potential topics include:

- Pedestrian and Bicycle Facilities Standards - NACTO, MUTCD, AASHTO, etc.
- ADA Compliance for Transportation Facilities - PROWAG, ADA Transition Plans, liability issues, etc.
- Complete Intersections – including operations, lighting, planning, accessibility, etc.
- Complete Streets – implementing the policy
- Greenway and Path Crossings
- Pedestrian Facilities – Planning, Design and Implementation
- Working with Law Enforcement on Traffic Safety Campaigns

Sample program: Institute for Bicycle and Pedestrian Innovation: http://www.ibpi.usp.pdx.edu/

Diversion Class

Purpose: Educate motorists, pedestrians, and bicyclists on roadway safety and traffic laws

Audience: General public, usually first-time offenders of particular traffic violations

Partners: Town of Boone Police Department, Watauga County Court System, Alternative Transportation Subcommittee

A diversion class is offered to first-time offenders of certain community-related traffic violations, such as motorists speeding, pedestrians jaywalking, or bicyclists running a stoplight on a bike. It can be aimed at pedestrians, bicyclists, and motorists. In lieu of receiving a citation and/or fine, individuals can take a one-time, free or inexpensive class instead. In Marin County, interested citizens can take the class even if they did not receive a ticket. This program is a good way to educate road users about road user rights and responsibilities.

Sample programs:

- Portland, OR: http://www.legacyhealth.org/body.cfm?id=1928
- Marin County, CA: http://www.marinbike.org/Campaigns/ShareTheRoad/Index.shtml#StreetSkills

Friends of the Greenway Group

Purpose: Foster community pride and stewardship of the Greenway; promote public safety and responsible behavior by path users

Audience: Users of shared-use paths

Partners: Greenway, Parks and Gardens Committee; Town of Boone Police Department; Boone Area Cyclists; other interested citizens

A Friends of the Greenway organization can help to create community pride and a sense of ownership about the Greenway while also reducing the potential for public safety issues and promoting responsible user behavior.

A Friends of the Greenway group must primarily be a citizen-led initiative, that may eventually become a registered nonprofit corporation if desired. Numerous other partners can support and partner with the Friends group, however, both to create the group and to help it be successful in the long run.

Major campaigns for Friends of the Greenway may include:

1. *Annual Greenway Clean-Up Days* - This effort would harness and organize volunteers to install and maintain plantings, remove trash, install benches, signs and other amenities, and create a sense of community pride in the facility. Different groups could be invited to participate for specific events, such as scout troops, seniors (perhaps as part of the Senior Strolls program), and schoolchildren (as part of a Safe Routes to School program or for Earth Day)
2. *Greenway Ambassadors* - Greenway Ambassadors are trained residents who regularly walk or bicycle along the greenway to identify maintenance or safety concerns, report illegal trail dumping, erosion, or vandalism, and make the Town of Boone aware of any security issues or other needs early so they can be dealt with promptly. The presence of trained Ambassadors, who should wear specific t-shirts or other identifying garments, can serve an "Eyes on the Street" function (similar to a "Block Watch" program) to alert the entire community that the facility is being monitored, and that legitimate users take an active role in monitoring the trail.
3. *Share the Greenway Outreach* - Conflicts between greenway users can be a major issue on popular, well-used path systems. Some communities have launched successful "share the path" events to help educate users about safety and courtesy. These programs educate users about expected behavior and how to limit conflicts. Volunteers often give out brochures and engage with users in a non-confrontational way. Media outreach should be included as well. Common strategies include a bicycle bell giveaway, handing out maps and information, posting signs, tabling, and 'stings' that reward good behavior.
4. *Greenway Celebration Days* - Regular festivals and organized outings will help Boone residents experience the Greenway in a fun and supportive atmosphere. Possible themes include a fun run/walk, a family bike parade for Mother's Day or Father's Day, a celebration for International Walk to School Day (in October), or a bike ride with the Mayor during Bike Month (in May).

Policy and Evaluation Resources

Pedestrian and Bicycle Counts Program

Purpose: Gather important benchmarking information about walking and cycling rates

Audience: Agency staff

Partners: Town of Boone Public Works Department; Alternative Transportation Subcommittee; Greenway, Parks, and Gardens Committee; Watauga County Parks and Recreation

In order to determine this Plan's success at helping Boone residents walk more, it is necessary to establish an annual data collection program. At a minimum, this program should tally the number of pedestrians and cyclists at key locations around the community (particularly at pinch points, in downtown, near schools, and on the Greenway); the same locations should be counted in the same manner annually. If major walking or greenway infrastructure projects are planned, baseline and post-construction user counts can be performed through this coordinated annual count process for maximum efficiency. This will provide the Town with information about growth of walking and bicycling rates.

It is recommended that the data collection program use methodology developed by the national National Bicycle and Pedestrian Documentation Project (NBPDP). Counts should be performed in the second week in September; one weekday count (from 5-7 PM on a Tuesday, Wednesday, or Thursday) and one Saturday count (12 noon – 2 pm) should be completed. Counters can be volunteers or agency staff, as long as proper training is provided.

If desired, surveys can also be included in the data collection effort to learn more about walking and bicycling demographics, trip origin/destinations, etc. The NBPDP website includes count and survey instructions, forms, and participant training materials: http://bikepeddocumentation.org.

This program should tally the number of pedestrians and cyclists at key locations around the community

Walking and Greenways Report Card

Purpose: Share information about key walking and bicycling metrics

Audience: General public; elected officials and decisionmakers

Partners: Town of Boone Public Works Department; Alternative Transportation Subcommittee; Greenway, Parks, and Gardens Committee

It can be a useful benchmarking activity to publish an annual report measuring accomplishments and performance against benchmarks. An annual report should include relevant walking metrics (walking count results, new pedestrian facility miles, major completed projects, pedestrian-involved crashes) and may also include information on user satisfaction, public perception of safety, or other qualitative data that has been collected related to walking.

Sample programs:

- City of San Francisco - San Francisco, CA: http://www.sfbike.org/download/reportcard_2006/SF_bike_report_card_2006.pdf

Maintenance Hotlines

Purpose: Allow road users to report safety problems related to walking and bicycling facilities and request facilities

Audience: Boone residents who walk and bicycle

Partners: Town of Boone Public Works Department; Alternative Transportation Subcommittee

The Town of Boone can work together with residents to identify walking safety issues by creating web forms and/or hotlines that residents can use to request maintenance or enhancements. This benefits the public by helping them route their concerns to the correct party. It benefits the Town by making sure they hear about potential safety and liability issues early so they can take action. Many jurisdictions also find that this approach is beneficial because their scheduled maintenance an complaint-based inspection approach cannot identify every legitimate issue, so hotlines and web forms can essentially distribute the job of inspecting facilities to all residents.

The highest priority should be creating a mechanism for residents to report walking safety issues such as cracked pavement, blocked drains, malfunctioning pedestrian signal heads, encroaching vegetation, etc. Residents may also file complaints about property owners who repeatedly fail to clear snow from sidewalks. If desired, additional input may be invited such as allowing residents to request walking maps by mail, allowing residents to request parking enforcement that impacts walking (e.g. parked cars blocking ADA ramps), and/or allowing residents to request traffic safety enforcement.

Sample program: Durham “Report a Problem” web page: http://www.bikewalkdurham.org/BPAC_report.html

20's Plenty Campaign

Purpose: Reduce crashes and crash severity by lowering vehicle speeds on neighborhood streets to 20 MPH

Audience: Drivers

Partners: Town of Boone Public Works, Town of Boone Police Department, Watauga County Court System, Alternative Transportation Subcommittee

More and more communities are realizing that lowering residential speeds to 20 MPH has enormous safety benefits for all users, including walkers, by lowering both the rate and severity of crashes. One campaign, from the United Kingdom, is called "20's Plenty."

A successful campaign will bring together several different strategies, including:

- Changing the legal guidelines around minimum speed and/or authority to set speed limits. For example, the State Legislature may consider passing a law that would permit towns and cities to set speed limits on certain types of roadways, based on classification or designation in an adopted plan.
- Making residents aware of the benefits of 20 MPH roadways and engaging their partnership on raising awareness and buy-in from their neighbors.
- Identifying specific streets on which a 20 MPH speed limit is appropriate. Likely candidates would include designated school walking or bicycling routes, roads identified in pedestrian or bicycle plans as important corridors for those uses, and residential streets whose residents request inclusion in a 20 MPH program.
- Traffic engineering to ensure that the design speed of the street matches the new posted speed.
- Partnership with law enforcement to issue warnings and moving violations on designated 20 MPH streets.
- Evaluation of vehicle speeds and reported crash (number and severity) before and after the integrated campaign is implemented to the effort to measure results and correct course.

Video about UK "Twenty's Plenty" campaign: http://www.streetfilms.org/no-need-for-speed-20s-plenty-for-us/

Enforcement Resources

Speeding Enforcement

Purpose: Reduce speeding

Audience: Motorists

Partners: Town of Boone Public Works, Town of Boone Police Department, Watauga County Court System, Alternative Transportation Subcommittee

Speeding vehicles endanger all road users, including pedestrians. High-speed driving results in more frequent crashes and crashes that are more likely to result in serious injury or death. Targeted speed enforcement activities are a proven way to improve road safety and make walking more appealing.

Law enforcement officials should enforce speed near schools, in downtown, at major ASU entrances/exits, and at locations that are known to have speeding problems (as identified by the Alternative Transportation Subcommittee in consideration of resident complaints). These campaigns are ideal for a Safe Routes to School Program (see above); many towns hold an annual "Back to School Blitz" to enforce speed limits in school zones.

As part of ongoing enforcement against speeding, the Town of Boone Police Department should also consider creating a speed reader board request program to deploy speed reader boards at the request of neighborhood associations and schools. The boards should be mounted temporarily (e.g. for two weeks) and then be moved to another location to keep motorists from becoming inured to the speed reader board effect.

Crosswalk Sting Action

Purpose: Increase driver awareness of and yielding to pedestrian right-of-way in crosswalks; increase pedestrian safety at crosswalks

Audience: Motorists

Partners: Town of Boone Public Works, Town of Boone Police Department, Watauga County Court System, Alternative Transportation Subcommittee

Crosswalk enforcement actions (sometimes known as "pedestrian stings") raise public awareness about the legal obligation of motorists to stop for pedestrians at crosswalks. While crosswalk enforcement actions do result in tickets being distributed, the greater impact comes through media publicity of the event to reinforce the importance of obeying pedestrian crossing laws.

Most crosswalk enforcement sites are selected because they have been identified as locations where pedestrians have trouble crossing, and/or where a large volume of pedestrians (especially vulnerable pedestrians such as children and seniors) is expected. High-crash locations may also be candidates for enforcement actions. If locations near schools are selected, the best timing for an enforcement action is the back-to-school window just after school has begun for the year. Locations should be selected by the Town of Boone Police Department in consultation with city engineers and the Alternative Transportation Subcommittee. If any complaints from the public have been received about problem crossing locations, they should be considered. School officials will also have valuable input about school crossing locations that would benefit from targeted enforcement.

Once locations have been determined, the Police Department prepare by marking the safe stopping distance with cones. Then plainclothes police officers or trained volunteer decoys attempt to cross at corners and marked mid-block crossings just before a vehicle passes the cone. (Decoys may also be notable community members (such as the mayor or a well-known business leader) to increase media interest in the event.) If motorists fail to yield to the pedestrian in a crosswalk, a second police officer issues a warning or a ticket at the officer's discretion. It is recommended that the enforcement action be recorded on video to support issued violations should a motorist challenge the ticket.

The Town of Boone should conduct at least three crosswalk enforcement actions each year. Key locations include downtown, near schools, and near ASU.

C POLICY RESOURCES

Appendix Contents

Overview

Complete Streets

Federal and State Policies

NCDOT Complete Streets Policy

Overview

This chapter provides a reference point for local, state, and federal policies that relate to bicycle and pedestrian transportation. First, a draft resolution for a 'Complete Streets' is provided for consideration. Next, key state and federal policies that support bicycle and pedestrian infrastructure is provided.

Complete Streets

There is a growing national trend towards integrating bicycling, walking and transit as a routine element in highway and transit projects. This movement has developed under the name of "Complete Streets," which is defined by the *Complete the Streets Coalition* as follows:

> *"Complete Streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street."*

Pages 6-2 and 6-3 outline a draft Complete Streets resolution for consideration by the Town of Boone. The text for this draft was developed based on other resolutions being proposed in North Carolina. By adopting a "Complete Streets" policy, municipalities commit to developing new roadways and reconstructing existing roadways to accommodate all users.

See page 6-14 or www.nccompletestreets.org for information on NCDOT's Complete Streets Policy.

Draft Complete Streets Resolution

RESOLUTION NO. _____

A Resolution of the Town of Boone Expressing Support for the Complete Streets Concept and Requesting that a Complete Streets Ordinance be drafted as a component of the Unified Development Ordinance (UDO).

WHEREAS, the "Complete Streets" concept promotes streets that are safe and convenient for all users including pedestrians, bicyclists, and transit riders;

WHEREAS, the North Carolina Board of Transportation adopted a "Complete Streets Policy" for the state;

WHEREAS, streets constitute a large portion of the public space and should be corridors for all modes of transportation including pedestrians, bicyclists, and transit riders;

WHEREAS, Streets that support and invite multiple uses that include safe, active and ample space for pedestrians, bicycles, and transit are more conducive to the efficient movement of people than streets designed primarily to move automobiles and trucks;

WHEREAS, the Town of Boone Alternative Transportation Subcommittee works to advance Boone as a bicycle and pedestrian friendly community and encourages bicycling and walking among its citizens and visitors;

WHEREAS, trends in public health, energy and transportation costs, and air quality necessitate a more comprehensive approach to mobility within communities to offer a greater variety of mobility choices that are not strictly automobile based;

WHEREAS, there are practical limits to roadway expansion as a response to traffic congestion;

WHEREAS, promoting pedestrian, bicycle and transit travel as an alternative to automobiles promotes healthy living, is less costly to the commuter, may delay the need to widen some streets, and reduces negative environmental impacts;

WHEREAS, the development of a more complete transportation network or "Complete Streets" can improve pedestrian safety, facilitate improvements in public health, increase the transportation network's capacity, and reduce climate change effects;

WHEREAS, the Federal Highway Administration has confirmed that designing streets with pedestrians in mind significantly reduces pedestrian risk. About one-third of Americans do not drive, including low-wealth Americans who cannot afford cars, school-age children, and an increasing number of older adults. Whether they walk or bicycle directly to their destinations, or to public transportation, these individuals require safe access to get to work, school, shops and medical visits, and to take part in social, civic and volunteer activities. Over the past decade, 91 motor vehicle crashes involving bicyclists or pedestrians were reported in the Boone.

WHEREAS, obesity threatens the healthy future of one-third of all American children. For the first time in American history, our children's life expectancy may be shorter than their parents;

WHEREAS, forty percent of American adults age fifty and older reported inadequate sidewalks in their neighborhoods. Nearly fifty percent reported they cannot cross main roads close to their home safely. Half of those who reported such problems said they would walk, bicycle, or take the bus more according to a 2008 American Association of Retired Persons (AARP) study;

WHEREAS, transportation expenses can be reduced if local infrastructure encourages active transportation, which helps families replace car trips with bicycling, walking, or taking public transit. When roads are re-designed and maintained to attract pedestrians, the local economy improves and diversifies from increased buyers, which creates job growth and increased investment in the area, including surrounding property values;

WHEREAS, studies have found that providing more travel options, including public transportation, bicycling and walking facilities, is an important element in reducing congestion. When roads are better designed for bicycling, walking, and taking transit, more people do so;

WHEREAS, the construction of "Complete Streets" can be an essential component in reducing automobile trips since nearly fifty percent of all trips in metropolitan areas are three miles or less and twenty-eight percent are one mile or less – distances easily covered by foot or bicycle. Sixty-five percent of trips under one mile are now made by automobile, in part because of incomplete streets that make it dangerous or unpleasant to walk, bicycle, or take transit;

WHEREAS, other jurisdictions and agencies nationwide have adopted "Complete Streets" legislation, including the United States Department of Transportation, numerous state transportation agencies including North Carolina, regions including the Capitol Area (Austin) Metropolitan Planning Organization (MPO) and the San Antonio-Bexar County MPO, and cities such as North Little Rock, Miami, Chicago, San Diego, and Seattle;

WHEREAS, the "Complete Streets" concept is supported by the Institute of Traffic Engineers, American Planning Association and the National Association of Local Boards of Health many other transportation, planning and public health professionals; and

The text used in this draft resolution (especially the last paragraph) should be further customized by the Town of Boone Alternative Transportation Subcommittee (ATS).

NOW, THEREFORE, BE IT RESOLVED by the Boone Town Council that the Council requests that staff partner with community organizations and assess current street standards and land use and transportation plans, policies and programs with regard to the "Complete Streets" concept; identify relevant elements within the town's existing plans, regulations and operational standards that support the implementation of "Complete Streets" within the town; and identify the gaps and opportunities to supplement and fund said plans, regulations and standards in order to achieve the implementation of "Complete Streets" throughout the town and provide council with guidance towards the creation of a complete streets ordinance.

ADOPTED BY THE TOWN COUNCIL ON _____, 2011.

_____
Town Clerk

Approved as to form:

_____
Town Attorney

Federal and State Policies

US DOT Policy Statement Integrating Bicycling and Walking into Transportation Infrastructure

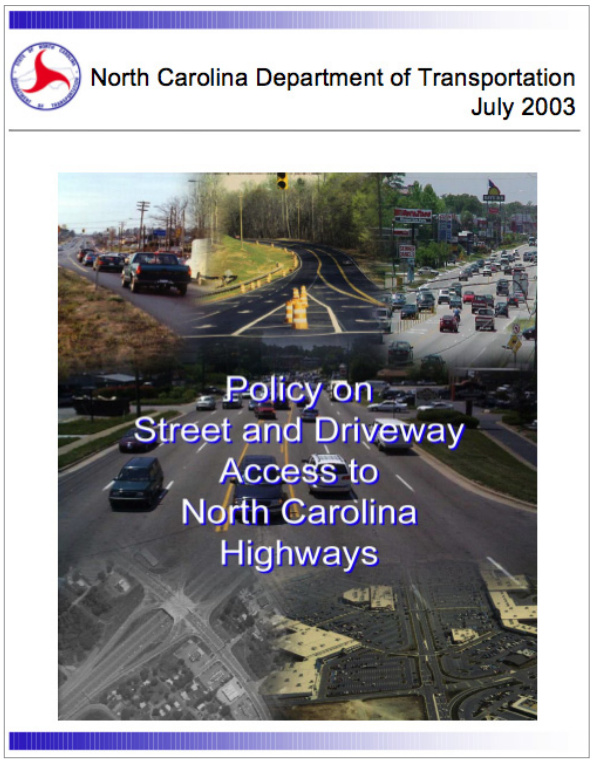
A United States Department of Transportation (US DOT) policy statement regarding the integration of bicycling and walking into transportation infrastructure recommends that, "bicycling and walking facilities will be incorporated into all transportation projects" unless exceptional circumstances exist. The Policy Statement was drafted by the U.S. Department of Transportation in response to Section 1202 (b) of the Transportation Equity Act for the 21st Century (TEA-21) with the input and assistance of public agencies, professional associations and advocacy groups. USDOT hopes that public agencies, professional associations, advocacy groups, and others adopt this approach as a way of committing themselves to integrating bicycling and walking into the transportation mainstream. The full policy can be found here: www.fhwa.dot.gov/environment/bikeped/design.htm

US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations

The DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes. The full policy can be found here: www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

NCDOT Policy on Street and Driveway Access to NC Highways

Refer to the NCDOT policy on 'Street and Driveway Access to North Carolina Highways' for examples on how to reduce conflict points between motor vehicles and pedestrians and bicyclists. Consider access management for both future development and retrofits to existing development: www.ncdot.org/doh/preconstruct/altern/value/manuals/pos.pdf



NCDOT Board of Transportation Resolution: Bicycling and Walking in North Carolina: A Critical Part of the Transportation System

The North Carolina Board of Transportation strongly reaffirms its commitment to improving conditions for bicycling and walking, and recognizes nonmotorized modes of transportation as critical elements of the local, regional, and national transportation system.

WHEREAS, increasing bicycling and walking offers the potential for cleaner air, healthier people, reduced congestion, more liveable communities, and more efficient use of road space and resources; and

WHEREAS, crashes involving bicyclists and pedestrians represent more than 14 percent of the nation's traffic fatalities; and

WHEREAS, the Federal Highway Administration (FHWA) in its policy statement "Guidance on the Bicycle and Pedestrian Provisions of the Federal-Aid Program" urges states to include bicycle and pedestrian accommodations in its programmed highway projects; and

WHEREAS, bicycle and pedestrian projects and programs are eligible for funding from almost all of the major Federal-aid funding programs; and

WHEREAS, the Transportation Equity Act for the 21st Century (TEA-21) calls for the mainstreaming of bicycle and pedestrian projects into the planning, design and operation of our Nation's transportation system;

NOW, THEREFORE, BE IT RESOLVED, the North Carolina Board of Transportation concurs that bicycling and walking accommodations shall be a routine part of the North Carolina Department of Transportation's planning, design, construction, and operations activities and supports the Department's study and consideration of methods of improving the inclusion of these modes into the everyday operations of North Carolina's transportation system; and

BE IT FURTHER RESOLVED, North Carolina cities and towns are encouraged to make bicycling and pedestrian improvements an integral part of their transportation planning and programming. (Adopted by the Board of Transportation on September 8, 2000)

NCDOT Administrative Action to Include Local Adopted Greenways Plans in the NCDOT Highway Planning Process and Design Guidelines

In 1994 the NCDOT adopted administrative guidelines to consider greenways and greenway crossings during the highway planning process. This policy was incorporated so that critical corridors which have been adopted by localities for future greenways will not be severed by highway construction. The text for the Greenway Policy and Guidelines for implementing it can be found here:
www.ncdot.org/bikeped/lawspolicies/policies/

NCDOT's Traditional Neighborhood Development Street Design Guidelines

These guidelines are available for proposed TND developments and permits localities and developers to design certain roadways according to TND guidelines rather than the conventional subdivision street standards. The guidelines recognize that in TND developments, mixed uses are encouraged and pedestrians and bicyclists are accommodated on multi-mode/shared streets. The guidelines can be found here:
www.ncdot.org/doh/preconstruct/altern/value/manuals/tnd.pdf

NCDOT Bicycle Policy

General: Pursuant to the Bicycle and Bikeways Act of 1974, the Board of Transportation finds that bicycling is a bonafide highway purpose subject to the same rights and responsibilities and eligible for the same considerations as other highway purposes, as elaborated below.

1. The Board of Transportation endorses the concept that bicycle transportation is an integral part of the comprehensive transportation system in North Carolina.

2. The Board of Transportation endorses the concept of providing bicycle transportation facilities within the rights-of-way of highways deemed appropriated by the Board.

3. The Board of Transportation will adopt Design Guidelines for Bicycle Facilities. These guidelines will include criteria for selecting cost-effective and safety-effective bicycle facility types and a procedure for prioritizing bicycle facility improvements.

4. Bicycle compatibility shall be a goal for state highways, except on fully controlled access highways where bicycles are prohibited, in order to provide reasonably safe bicycle use.

5. All bicycle transportation facilities approved by the Board of Transportation shall conform with the adopted "Design Guidelines for Bicycle Facilities" on state-funded projects, and also with guidelines published by the American Association of State
Highway and Transportation Officials (AASHTO) on federal aid projects.

Planning and Design: It is the policy of the Board of Transportation that bicycle facility planning be included in the state thoroughfare and project planning process.

1. The intent to include planning for bicycle facilities within new highway construction and improvement projects is to be noted in the Transportation Improvement Program.

2. During the thoroughfare planning process, bicycle usage shall be presumed to exist along certain corridors (e.g., between residential developments, schools, businesses and recreational areas). Within the project planning process, each project shall have a documented finding with regard to existing or future bicycling needs. In order to use available funds efficiently, each finding shall include measures of cost-effectiveness and safety-effectiveness of any proposed bicycle facility.

3. If bicycle usage is shown likely to be significant, and it is not prohibited, and there are positive cost-effective and safety-effective findings; then, plans for and designs of highway construction projects along new corridors, and for improvement projects along existing highways, shall include provisions for bicycle facilities (e.g., bike routes, bike lanes, bike paths, paved shoulders, wide outside lanes, bike trails) and secondary bicycle facilities (traffic control, parking, information devices, etc.).

4. Federally funded new bridges, grade separated interchanges, tunnels, and viaducts, and their improvements, shall be designed to provide safe access to bicycles, pursuant to the policies of the Federal Highway Administration.

5. Barriers to existing bicycling shall be avoided in the planning and design of highway projects.

6. Although separate bicycle facilities (e.g., bike paths, bike trails) are useful under some conditions and can have great value for exclusively recreational purposes, incorporation of on road bicycle facilities (e.g., bicycle lanes, paved shoulders) in highway projects are preferred for safety reasons over separate bicycle facilities parallel to major roadways. Secondary complementary bicycle facilities (e.g., traffic control, parking, information devices, etc.) should be designed to be within highway rights-of-way.

7. Technical assistance shall be provided in the planning and design of alternative transportation uses, including bicycling, for abandoned railroad rights-of way. This assistance would be pursuant to the National Trails act Amendment of 1983, and the resultant national Rails to Trails program, as will the Railway Revitalization Act of 1975.

8. Wherever appropriate, bicycle facilities shall be integrated into the study, planning, design, and implementation of state funded transportation projects involving air, rail, and marine transportation, and public parking facilities.

9. The development of new and improved bicycle control and information signs is encouraged for the increased safety of all highway users.

10. The development of bicycle demonstration projects which foster innovations in planning, design, construction, and maintenance is encouraged.

11. Paved shoulders shall be encouraged as appropriate along highways for the safety of all highway users, and should be designed to accommodate bicycle traffic.

12. Environmental Documents/Planning Studies for transportation projects shall evaluate the potential use of the facility by bicyclists and determine whether special bicycle facility design is appropriate.

13. Local input and advice shall be sought, to the degree practicable, during the planning stage and in advance of the final design of roadway improvements to ensure appropriate consideration of bicycling needs, if significant.

14. On highways where bicycle facilities exist, (bike paths, bike lanes, bike routes, paved shoulders, wide curb lanes, etc.), new highway improvements shall be planned and implemented to maintain the level of existing safety for bicyclists.

15. Any new or improved highway project designed and constructed within a public-use transportation corridor with private funding shall include the same bicycle facility considerations as if the project had been funded with public funds. In private transportation projects (including parking facilities), where state funding or Department approval is not involved, the same guidelines and standards for providing bicycle facilities should be encouraged.

Construction: It is the policy of the Board of Transportation that all state and federally funded highway projects incorporating bicycle facility improvements shall be constructed in accordance with approved state and federal guidelines and standards.

1. Bicycle facilities shall be constructed, and bicycle compatibility shall be provided for, in accordance with adopted Design Guidelines for Bicycle Facilities and with guidelines of the American Association of State Highway and Transportation Officials.

2. Rumble strips (raised traffic bars), asphalt concrete dikes, reflectors, and other such surface alterations, where installed, shall be placed in a manner as not to present hazards to bicyclists where bicycle use exists or is likely to exist. Rumble strips shall not be extended across shoulder or other areas intended for bicycle travel.

3. During restriping operations, motor vehicle traffic lanes may be narrowed to allow for wider curb lanes.

Maintenance: It is the policy of the Board of Transportation that the state highway system, including state-funded bicycle facilities, shall be maintained in a manner conducive to bicycle safety.

1. State and federally funded and built bicycle facilities within the state right-of-way are to be maintained to the same degree as the state highway system.
2. In the maintenance, repair, and resurfacing of highways, bridges, and other transportation facilities, and in the installation of utilities or other structures, nothing shall be done to diminish existing bicycle compatibility.
3. Rough road surfaces which are acceptable to motor vehicle traffic may be unsuitable for bicycle traffic, and special consideration may be necessary for highways with significant bicycle usage.
4. For any state-funded bicycle project not constructed on state right-of-way, a maintenance agreement stating that maintenance shall be the total responsibility of the local government sponsor shall be negotiated between the Department and the local government sponsor.
5. Pot-holes, edge erosion, debris, etc., are special problems for bicyclists, and their elimination should be a part of each Division's maintenance program. On identified bicycle facilities, the bike lanes and paths should be routinely swept and cleared of grass intrusion, undertaken within the discretion and capabilities of Division forces.

Operations: It is the policy of the Board of Transportation that operations and activities on the state highway system and bicycle facilities shall be conducted in a manner conducive to bicycle safety.

1. A bicyclist has the right to travel at a speed less than that of the normal motor vehicle traffic.
In exercising this right, the bicyclist shall also be responsible to drive his/her vehicle safely, with due consideration to the rights of the other motor vehicle operators and bicyclists and in compliance with the motor vehicle laws of North Carolina.

2. On a case by case basis, the paved shoulders of those portions of the state's fully controlled access highways may be studied and considered as an exception for usage by bicyclists where adjacent highways do not exist or are more dangerous for bicycling. Pursuant to federal highway policy, usage by bicyclists must receive prior approval by the Board of Transportation for each specific segment for which such usage is deemed appropriate, and those segments shall be appropriately signed for that usage.

3. State, county, and local law enforcement agencies are encouraged to provide specific training for law enforcement personnel with regard to bicycling.

4. The use of approved safety helmets by all bicyclists is encouraged.

Education: It is the policy of the Board of Transportation that education of both motorists and bicyclists, regarding the rights and responsibilities of bicycle riders, shall be an integral part of the Department's Bicycle Program. School systems are encouraged to conduct bicycle safety education programs as a part of and in addition to the driver's education program, to the maximum extent practicable, and in conjunction with safety efforts through the Governor's Highway Safety Program. The Division of Motor Vehicles is also urged to include bicycle safety and user information in its motor vehicle safety publications.

Parking: It is the policy of the Board of Transportation that secure and adequate bicycle parking facilities shall be provided wherever practicable and warranted in the design and construction of all state-funded buildings, parks, and recreational facilities.

This policy can also be found at: www.ncdot.org/bikeped/download/bikeped_laws_Bicycle_Policy.pdf

Bicycle Laws of North Carolina

In North Carolina, **the bicycle has the legal status of a vehicle**. This means that bicyclists have full rights and responsibilities on the roadway and are subject to the regulations governing the operation of a motor vehicle.

Bicyclists' rights:

- The bicyclist has a right to ride on any state maintained road, except roads of the Interstate Highway system and other fully-controlled access highways.
- While a bicyclist should ride as far to the right as practicable, a bicyclist may ride well out into the traffic lane under the following conditions:
  1. if he or she can maintain the same speed as other vehicles on the roadway;
  2. if the right-hand edge of the roadway is in poor condition or is littered with debris.
- A bicyclist is not required to ride on the shoulder, since the shoulder is not legally defined as part of the roadway.
- A bicyclist may choose to make a left turn from the appropriate lane, like a vehicle, or may dismount and walk the bicycle across the intersection, like a pedestrian.

North Carolina traffic laws require bicyclists to:

- Ride on the right in the same direction as other traffic
- Obey all traffic signs and signals
- Use hand signals to communicate intended movements
- Equip their bicycles with a front lamp visible from 300 feet and a rear reflector that is visible from a distance of 200 feet when riding at night. *(Note: Rear lights are more effective than a rear reflectors)*
- Wear a bicycle helmet on public roads, public paths and public rights-of-way if the bicyclists is under 16 years old
- Secure child passengers in a child seat or bicycle trailer if under 40 pounds or 40 inches

Although the law does not require adult bicyclists to wear helmets, they are strongly encouraged to do so. Some localities within the state have enacted ordinances requiring cyclists to wear helmets.

Laws pertaining to the operation of a bicycle vary from state to state. Below are three issues of bicycling that North Carolina law currently does not clarify.

- Bicycling on Interstate or fully controlled limited access highways, such as beltlines, is prohibited by policy, unless otherwise specified by action of the Board of Transportation. Currently, the only exception to the policy is the US 17 bridge over the Chowan River between Chowan and Bertie Counties.
- There is no law that requires bicyclists to ride single file, nor is there a law that gives cyclists the right to ride two or more abreast. It is important to ride responsibly and courteously, so that cars may pass safely.
- There is no law that prohibits wearing headphones when riding a bicycle; however, it is not recommended. It is important to use all your senses to ensure your safety when riding in traffic.

This text presents only some parts of the North Carolina Motor Vehicle Code that relate to bicycle travel. These laws are subject to change, so please check the North Carolina General Statutes website for new laws and proposed legislation affecting bicyclists: www.ncga.state.nc.us/Statutes/Statutes.html
or the NCDOT Bicycle and Pedestrian Division website:

www.ncdot.gov/bikeped/lawspolicies/laws/

http://www.ncdot.org/bikeped/download/bikeped_safety_materials_handout_RightsNResp.pdf

Pedestrian Laws of North Carolina

Pedestrians' Right-of-Way at Crosswalks:

- Where traffic-control signals are not in place or in operation the driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at or near an intersection.
- Whenever any vehicle is stopped at a crosswalk at an intersection to permit a pedestrian to cross, the driver of any other vehicle approaching from the rear shall not overtake and pass such stopped vehicle.
- Pedestrians have the right-of-way when approaching an alley, building entrance, private road, or driveway, from any sidewalk or walkway.

Other Crossings and Along the Highway:

- Every pedestrian crossing a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles upon the roadway.
- Any pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the right-of-way to all vehicles upon the roadway.
- Between adjacent intersections at which traffic-control signals are in operation pedestrians shall not cross at any place except in a marked crosswalk.
- Where sidewalks are provided, it shall be unlawful for any pedestrian to walk along and upon an adjacent roadway. Where sidewalks are not provided, any pedestrian walking along and upon a highway shall, when practicable, walk only on the extreme left of the roadway or its shoulder facing traffic which may approach from the opposite direction. Such pedestrian shall yield the right-of-way to approaching traffic.
- Notwithstanding the provisions of this section, every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian upon any roadway, and shall give warning by sounding the horn when necessary, and shall exercise proper precaution upon observing any child or any confused or incapacitated person upon a roadway.

This text presents only some parts of the North Carolina Motor Vehicle Code that relate to pedestrian travel. These laws are subject to change, so please check the North Carolina General Statutes website for new laws and proposed legislation affecting pedestrians: www.ncga.state.nc.us/Statutes/Statutes.html or the NCDOT Bicycle and Pedestrian Division website: www.ncdot.gov/bikeped/lawspolicies/laws/

NCDOT COmplete Streets Policy

NCDOT is developing guidelines to implement this policy. The guidelines will include basic Complete Street typologies for various road types within various contexts, along with a framework document that outlines implementation process. More information about these guidelines can be found at the project website: www.nccompletestreets.org

NCDOT's Complete Streets Policy is part of a national movement. The Complete Streets Act of 2009 (S.B 584 and H.R. 1443) was adopted in recognition of the significant influence that street design has on safety, environmental integrity, public health, economic vitality and community livability. The bill directs state Departments of Transportation and Metropolitan Planning Organizations to adopt policies that support inclusive and innovative transportation planning policies and apply these policies to future federally funded transportation projects. As a result of this legislation, state and local Complete Streets policies are emerging.

A. Definition

Complete Streets is North Carolina's approach to interdependent, multi-modal transportation networks that safely accommodate access and travel for all users.

B. Policy Statement

Transportation, quality of life, and economic development are all undeniably connected through well-planned, well-designed, and context sensitive transportation solutions. To NCDOT, the designations "well-planned', "well-designed" and "context-sensitive" imply that transportation is an integral part of a comprehensive network that safely supports the needs of the communities and the traveling public that are served.

The North Carolina Department of Transportation, in its role as stewards over the transportation infrastructure, is committed to:

- providing an efficient multi-modal transportation network in North Carolina such that the access, mobility, and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities are safely accommodated;
- caring for the built and natural environments by promoting sustainable development practices that minimize impacts on natural resources, historic, businesses, residents, scenic and other community values, while also recognizing that transportation improvements have significant potential to contribute to local, regional, and statewide quality of life and economic development objectives;
- working in partnership with local government agencies, interest groups, and the public to plan, fund, design, construct, and manage complete street networks that sustain mobility while accommodating walking, biking, and transit opportunities safely.
- This policy requires that NCDOT's planners and designers will consider and incorporate multimodal alternatives in the design and improvement of all appropriate transportation projects within a growth area of a town or city unless exceptional circumstances exist. Routine maintenance projects may be excluded from this requirement if an appropriate source of funding is not available.

C. Purpose

This policy sets forth the protocol for the development of transportation networks that encourage non-vehicular travel without compromising the safety, efficiency, or function of the facility. The purpose of this policy is to guide existing decision-making and design processes to ensure that all users are routinely considered during the planning, design, construction, funding and operation of North Carolina's transportation network.

D. Scope and Applicability

This policy generally applies to facilities that exist in urban or suburban areas, however it does not necessarily exclude rural setting; and is viewed as a network that functions in an interdependent manner.

There are many factors that must be considered when defining the facility and the degree to which this policy applies, e.g., number of lanes, design speeds, intersection spacing, medians, curb parking, etc. Therefore, the applicability of this policy, as stated, should be construed as neither comprehensive nor conclusive. Each facility must be evaluated for proper applicability.

Notwithstanding the exceptions stated herein, all transportation facilities within a growth area of a town or city funded by or through NCDOT, and planned, designed, or constructed on state maintained facilities, must adhere to this policy.

E. Approach

It is the Department's commitment to collaborate with cities, towns, and communities to ensure pedestrian, bicycle, and transit options are included as an integral part of their total transportation vision. As a partner in the development and realization of their visions, the Department desires to assist localities, through the facilitation of long-range planning, to optimize connectivity, network interdependence, context sensitive options, and multi-modal alternatives.

F. Related Policies

This policy builds on current practices and encourages creativity for considering and providing multi-modal options within transportation projects, while achieving safety and efficiency.

Specific procedural guidance includes:

- Bicycle Policy (adopted April 4, 1991)
- Highway Landscape Planting Policy (dated 6/10/88)
- Board of Transportation Resolution: Bicycling & Walking in North Carolina, A Critical Part of the Transportation System (adopted September 8, 2000)
- Guidelines for Planting within Highway Right-of-Way
- Bridge Policy (March 2000)
- Pedestrian Policy Guidelines –Sidewalk Location (Memo from Larry Goode, February 15, 1995)
- Pedestrian Policy Guidelines (effective October 1, 2000 w/Memo from Len Hill, September 28, 2000)
- NCDOT Context Sensitive Solutions Goals and Working Guidelines (created 9-23-02; updated 9-8-03)

G. Exceptions to Policy

It is the Department's expectation that suitable multimodal alternatives will be incorporated in all appropriate new and improved infrastructure projects. However, exceptions to this policy will be considered where exceptional circumstances that prohibit adherence to this policy exist. Such exceptions include, but are not limited to:

- facilities that prohibit specific users by law from using them,
- areas in which the population and employment densities or level of transit service around the facility does not justify the incorporation of multimodal alternatives.
- It is the Department's expectation that suitable multimodal alternatives will be incorporated as appropriate in all new and improved infrastructure projects within a growth area of a town or city.

As exceptions to policy requests are unique in nature, each will be considered on a case-by-case basis. Each exception must be approved by the Chief Deputy Secretary.

Routine maintenance projects may be excluded from this requirement if an appropriate source of funding is not available.

H. Planning and Design Guidelines

The Department recognizes that a well-planned and designed transportation system that is responsive to its context and meets the needs of its users is the result of thoughtful planning. The Department further recognizes the need to provide planners, designers and decision-makers with a framework for evaluating and incorporating various design elements into the planning, design, and construction phases of its transportation projects. To this end, a multi-disciplined team of stakeholders, including transportation professionals, interest groups, and others, as appropriate, will be assembled and charged with developing comprehensive planning and design guidelines to support this policy.

These guidelines will describe the project development process and incorporate transparency and accountability where it does not currently exist; describe how (from a planning and design perspective) pedestrians, bicyclists, transit, and motor vehicles will share roads safely; and provide special design elements and traffic management strategies to address unique circumstances. An expected delivery date for planning and design guidelines will be set upon adoption of this policy.

I. Policy Distribution

It is the responsibility of all employees to comply with Departmental policies. Therefore, every business unit and appropriate private service provider will be required to maintain a complete set of these policies. The Department shall periodically update departmental guidance to ensure that accurate and up-to-date information is maintained and housed in a policy management system.

D FUNDING RESOURCES

Appendix Contents

Overview

State and Federal

Local Government

Private and Non-Profit Sectors

Overview

When considering possible funding sources for the Town of Boone's bicycle and pedestrian projects, it is important to remember that not all construction activities will be accomplished with a single funding source. It will be necessary to consider several sources of funding, that when combined, would support full project construction. This appendix outlines the most likely sources of funding for the projects at the federal, state, local government level and from the private sector.

State and Federal

Federal funding is typically directed through State agencies to local governments either in the form of grants or direct appropriations. State budget shortfalls may make it extremely difficult to accurately forecast available funding for future project development. The following is a list of possible Federal and State funding sources that could be used to support construction of the many pedestrian projects. Federal funding sometimes requires a 20% local match, however the recent stimulus money does not require a match. Since these funding categories are difficult to forecast, it is recommended that the Town continue to work with the High Country RPO on submitting pedestrian projects to NCDOT for inclusion in the STIP (State Transportation Improvement Program), as discussed below.

Department of Energy (DOE)

The Department of Energy's Energy Efficiency and Conservation Block Grants (EECBG) grants may be used to reduce energy use and fossil fuel emissions and for improvements in energy efficiency. Section 7 of the funding announcement states that these grants provide opportunities for the development and implementation of transportation programs to conserve energy used in transportation including development of infrastructure such as bicycle lanes and pathways and pedestrian walkways. Although this grant period has passed, more opportunities may arise. More information can be found at http://www.eecbg.energy.gov/

NC Department of Transportation and SAFETEA-LU

The most likely source of funding for bicycle and pedestrian projects would come from the North Carolina Department of Transportation and the federal funding program SAFETEA-LU. Some of the sub-programs within SAFETEA-LU and within NCDOT are listed below:

- State Transportation Improvement Program (STIP): The STIP is a 3-5 year transportation project financial plan, containing funding for various transportation divisions of NCDOT including: highways, aviation, enhancements, public transportation, rail, bicycle and pedestrian, and the Governor's Highway Safety Program. STIP is the largest single funding strategy within SAFETEA-LU and NCDOT.

- NCDOT Discretionary Funds: The Statewide Discretionary Fund consists of $10 million and is administered by the Secretary of the Department of Transportation. This fund can be used on any project at any location within the State. Primary, urban, secondary, industrial access, and spot safety projects are eligible for this funding. The Town would have to make a direct appeal to the Secretary of NCDOT to access these funds.

- NCDOT Contingency Fund: The Statewide Contingency Fund is a $10 million fund administered by the Secretary of Transportation. Again, the Town would have to appeal directly to the Secretary.

- NCDOT Enhancement Funding: Federal Transportation Enhancement funding is administered by NCDOT and serves to strengthen the cultural, aesthetic, and environmental aspects of the State's intermodal transportation system. Transportation Enhancement (TE oe ENH) funding is awarded through NCDOT. The State typically will make a Call for Projects, and each project must benefit the traveling public and help communities increase transportation choices and access, enhance the built or natural environment and create a sense of place.

- NCDOT Bicycle and Pedestrian Project: Funds for bicycle and pedestrian projects come from several different sources. Allocation of funds depends on the type of project/program and other criteria. Projects can include independent and incidental projects.

NC Department of Environment – Recreational Trails and Adopt-A-Trail Grants

The State Trails Program is a section of the N.C. Division of Parks and Recreation. The program originated in 1973 with the North Carolina Trails System Act and is dedicated to helping citizens, organizations and agencies plan, develop and manage all types of trails ranging from greenways and trails for hiking, biking and horseback riding to river trails and off-highway vehicle trails. The Recreation Trails Program awards grants up to $75,000 per project. The Adopt-A-Trail Program awards grants up to $5,000 per project.

Powell Bill Funds

Annually, State street-aid (Powell Bill) allocations are made to incorporated municipalities which establish their eligibility and qualify as provided by G.S. 136-41.1 through 136-41.4. Powell Bill funds shall be expended only for the purposes of maintaining, repairing, constructing, reconstructing or widening of local streets that are the responsibility of the municipalities or for planning, construction, and maintenance of bikeways or sidewalks along public streets and highways.

Community Development Block Grant Funds

Community Development Block Grant (CDBG) funds are available to local municipal or county governments that qualify for projects to enhance the viability of communities by providing decent housing and suitable living environments and by expanding economic opportunities, principally for persons of low- and moderate-income. State CDBG funds are provided by the U.S. Department of Housing and Urban Development (HUD) to the state of North Carolina. Some urban counties and cities in North Carolina receive CDBG funding directly from HUD. Each year, CDBG provides funding to local governments for hundreds of critically-needed community improvement projects throughout the state. These community improvement projects are administered by the Division of Community Assistance and the Commerce Finance Center under eight grant categories. Two categories might be of support to bicycle and pedestrian projects in 'entitlement communities': infrastructure and community revitalization.

Land and Water Conservation Trust Fund

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 (DENR).

N.C. Parks and Recreation Trust Fund (PARTF)

The Parks and Recreation Trust Fund (PARTF) provide dollar-for-dollar matching grants to local governments for parks and recreational projects to serve the general public. Counties, incorporated municipalities and public authorities, as defined by G.S. 159-7, are eligible applicants.

A local government can request a maximum of $500,000 with each application. An applicant must match the grant dollar-for-dollar, 50% of the total cost of the project, and may contribute more than 50%. The appraised value of land to be donated to the applicant can be used as part of the match. The value of in-kind services, such as volunteer work, cannot be used as part of the match. http://www.ncparks.gov/About/grants/partf_main.php

Safe Routes to School Program (managed by NCDOT, DBPT)

The NCDOT Safe Routes to School Program is a federally funded program that was initiated by the passing of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005, which establishes a national SRTS program to distribute funding and institutional support to implement SRTS programs in states and communities across the country. SRTS programs facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools. The Division of Bicycle and Pedestrian Transportation at NCDOT is charged with disseminating SRTS funding.

The state of North Carolina was allocated $15 million in Safe Routes to School funding for fiscal years 2005 through 2009 for infrastructure or non-infrastructure projects. In 2009, more than $3.6 million went to 22 municipalities and local agencies for infrastructure and non-infrastructure projects. All proposed projects must relate to increasing walking or biking to and from an elementary or middle school. An example of a non-infrastructure project is an education or encouragement program to improve rates of walking and biking to school. An example of an infrastructure project is construction of sidewalks around a school. Infrastructure improvements under this program must be made within 2 miles of an elementary or middle school. The state requires the completion of a competitive application to apply for funding. For more information, visit www.ncdot.org/programs/safeRoutes/ or contact DBPT/NCDOT, (919) 807-0774.

Rivers, Trails and Conservation Assistance Program

The Rivers, Trails and Conservation Assistance Program (RTCA) is a National Park Service program which provides technical assistance via direct staff involvement, to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance—there are no implementation funds available. Projects are prioritized for assistance based on criteria that include conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation, and focusing on lasting accomplishments.

Local Government

Local funding sources that would support bicycle and pedestrian facility project construction will most likely be limited but should be explored.

High Country Rural Planning Organization

The High Country Rural Planning Organization (RPO) manages the transportation planning process required by Federal law. The RPO plans for the area's surface transportation needs, including highways, transit, bicycle, and pedestrian facilities. An important part of the transportation planning process is to identify transportation needs and to explore feasible alternatives to meet those needs. Plans and programs are often conducted in partnership with the NC Department of Transportation to identify needs and projects to enhance Boone's transportation infrastructure.

It is suggested that the Town work closely with the RPO on getting pedestrian projects included in the STIP since this may be the primary source of funding for the project. Projects in the STIP require a local match.

Town of Boone Capital Improvement programming and Reserve Funds

The Town of Boone may have funding available to support some elements of construction or repair. It will be important to meet with Town Council representatives and the Town Manager to judge the availability of this funding.

Other local funding options

- Bonds/Loans
- Taxes
- Impact fees
- Exactions
- Tax increment financing
- Partnerships

Private and Non-Profit Sectors

Many communities have solicited greenway funding assistance from private foundations and other conservation-minded benefactors. Below are several examples of private funding opportunities available.

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. Website: http://www.landfortomorrow.org/

The Robert Wood Johnson Foundation

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

- To assure that all Americans have access to basic health care at a reasonable cost

- To improve care and support for people with chronic health conditions

- To promote healthy communities and lifestyles

- To reduce the personal, social and economic harm caused by substance abuse: tobacco, alcohol, and illicit drugs

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

North Carolina Community Foundation

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

Z. Smith Reynolds Foundation

This Winston-Salem-based Foundation has been assisting the environmental projects of local governments and non-profits in North Carolina for many years. They have two grant cycles per year and generally do not fund land acquisition. However, they may be able to offer support in other areas of open space and greenways development. More information is available at www.zsr.org.

Bank of America Charitable Foundation, Inc.

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

Duke Energy Foundation

Funded by Duke Energy shareholders, this non-profit organization makes charitable grants to selected non-profits or governmental subdivisions. Each annual grant must have:

- An internal Duke Energy business "sponsor"

- A clear business reason for making the contribution

The grant program has three focus areas: Environment and Energy Efficiency, Economic

Development, and Community Vitality. Related to this project, the Foundation would support programs that support conservation, training and research around environmental and energy efficiency initiatives. Web site: http://www.duke-energy.com/community/foundation.asp.

American Greenways Eastman Kodak Awards

The Conservation Fund's American Greenways Program has teamed with the Eastman Kodak Corporation and the National Geographic Society to award small grants ($250 to $2,000) to stimulate the planning, design and development of greenways. These grants can be used for activities such as mapping, conducting ecological assessments, surveying land, holding conferences, developing brochures, producing interpretive displays, incorporating land trusts, and building trails. Grants cannot be used for academic research, institutional support, lobbying or political activities. For more information visit The Conservation Fund's website at: www.conservationfund.org.

National Trails Fund

American Hiking Society created the National Trails Fund in 1998, the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. 73 million people enjoy foot trails annually, yet many of our favorite trails need major repairs due to a $200 million backlog of badly needed maintenance. National Trails Fund grants help give local organizations the resources they need to secure access, volunteers, tools and materials to protect America's cherished public trails. 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.

Projects the American Hiking Society will consider include:

- Securing trail lands, including acquisition of trails and trail corridors, and the costs associated with acquiring conservation easements.
- Building and maintaining trails which will result in visible and substantial ease of access, improved hiker safety, and/or avoidance of environmental damage.
- Constituency building surrounding specific trail projects - including volunteer recruitment and support.

Web site: www.americanhiking.org/alliance/fund.html.

The Conservation Alliance

The Conservation Alliance is a non-profit organization of outdoor businesses whose collective annual membership dues support grassroots citizen-action groups and their efforts to protect wild and natural areas. One hundred percent of its member companies' dues go directly to diverse, local community groups across the nation - groups like Southern Utah Wilderness Alliance, Alliance for the Wild Rockies, The Greater Yellowstone Coalition, the South Yuba River Citizens' League, RESTORE: The North Woods and the Sinkyone Wilderness Council (a Native American-owned/operated wilderness park). For these groups, who seek to protect the last great wild lands and waterways from resource extraction and commercial development, the Alliance's grants are substantial in size (about $35,000 each), and have often made the difference between success and defeat. Since its

inception in 1989, The Conservation Alliance has contributed $4,775,059 to grassroots environmental groups across the nation, and its member companies are proud of the results: To date the groups funded have saved over 34 million acres of wild lands and 14 dams have been either prevented or removed-all through grassroots community efforts.

The Conservation Alliance is a unique funding source for grassroots environmental groups. It is the only environmental grant maker whose funds come from a potent yet largely untapped constituency for protection of ecosystems - the non-motorized outdoor recreation industry and its customers. This industry has great incentive to protect the places in which people use the clothing, hiking boots, tents and backpacks it sells. The industry is also uniquely positioned to educate outdoor enthusiasts about threats to wild places, and engage them to take action. Finally, when it comes to decision-makers - especially those in the Forest Service, National Park Service, and Bureau of Land Management, this industry has clout - an important tool that small advocacy groups can wield.

The Conservation Alliance Funding Criteria: The Project should be focused primarily on direct citizen action to protect and enhance our natural resources for recreation. We're not looking for mainstream education or scientific research projects, but rather for active campaigns. All projects should be quantifiable, with specific goals, objectives and action plans and should include a measure for evaluating success. The project should have a good chance for closure or significant measurable results over a fairly short term (one to two years). Funding emphasis may not be on general operating expenses or staff payroll.

Web site: www.conservationalliance.com/index.m.
E-mail: john@conservationalliance.com.

National Fish and Wildlife Foundation (NFWF)

The National Fish and Wildlife Foundation (NFWF) is a private, nonprofit, tax-exempt organization chartered by Congress in 1984. The National Fish and Wildlife Foundation sustains, restores, and enhances the Nation's fish, wildlife, plants and habitats. Through leadership conservation investments with public and private partners, the Foundation is dedicated to achieving maximum conservation impact by developing and applying best practices and innovative methods for measurable outcomes.

The Foundation awards matching grants under its Keystone Initiatives to achieve measurable outcomes in the conservation of fish, wildlife, plants and the habitats on which they depend. Awards are made on a competitive basis to eligible grant recipients, including federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations. Project proposals are received on a year-round, revolving basis with two decision cycles per year. Grants generally range from $50,000-$300,000 and typically require a minimum 2:1 non-federal match.

Funding priorities include bird, fish, marine/coastal, and wildlife and habitat conservation. Other projects that are considered include controlling invasive species, enhancing delivery of ecosystem services in agricultural systems, minimizing the impact on wildlife of emerging energy sources, and developing future conservation leaders and professionals. Website: http://www.nfwf.org/AM/Template.cfm?Section=Grants where additional grant programs are described.

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 and 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/.

BlueCross BlueShield of North Carolina Foundation (BCBS)

Blue Cross Blue Shield (BCBS) focuses on programs that use an outcome approach to improve the health and well-being of residents. The Health of Vulnerable Populations grants program focuses on improving health outcomes for at-risk populations. The Healthy Active Communities grant concentrates on increased physical activity and healthy eating habits. Eligible grant applicants must be located in North Carolina, be able to provide recent tax forms and, depending on the size of the nonprofit, provide an audit.

BlueCross BlueShield of NC Foundation
P.O Box 2291
Durham, NC 27702
919-765-7347
http://www.bcbsncfoundation.org/

Alliance for Biking & Walking: Advocacy Advance Grants

Bicycle and pedestrian advocacy organizations play the most important role in improving and increasing biking and walking in local communities, states, and provinces. Advocacy Advance Grants enable state and local bicycle and pedestrian advocacy organizations to develop, transform, and provide innovative strategies in their communities. Thanks to

remarkable support from SRAM, Planet Bike, and Bikes Belong, the Alliance for Biking & Walking has awarded more than $500,000 in direct grants, technical assistance and scholarships to advocacy organizations across North America since the Advocacy Advance Grant program's inception. In 2009 and 2010, these one-year grants were awarded twice annually to startup organizations and innovative campaigns to dramatically increase biking and walking. Through the Advocacy Advance Partnership with the League of American Bicyclists, the Alliance also provided necessary technical assistance, coaching, and training to supplement the grants. For more information, visit www.peoplepoweredmovement.org

Health and Wellness Trust Fund: Fit Community Program

To address the growing obesity epidemic, commissioners of the Health and Wellness Trust Fund created a comprehensive program that would promote and help implement proven and innovative interventions to increase people's physical activity and improve nutrition choices.

HWTF partnered with Blue Cross and Blue Shield of North Carolina to launch Fit Together in 2004, a statewide campaign designed to raise awareness around the dangers of unhealthy weight and to equip individuals and communities with the tools they need to address this serious health concern.

In 2005, Fit Together unveiled Fit Community, a program to recognize and reward municipality and county-wide efforts to promote physical activity, healthy eating and tobacco-free programs, policies, environments and lifestyles. The Fit Community application process is a thorough evaluation that can and will benefit your community in numerous unexpected ways. For 2011, all applications due for designation must be submitted to Active Living by Design by 5:00 p.m. on March 18, 2011. For more information, visit www.fitcommunitync.com

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 workdays. Volunteers can also be used for fund-raising, maintenance, and programming needs.

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