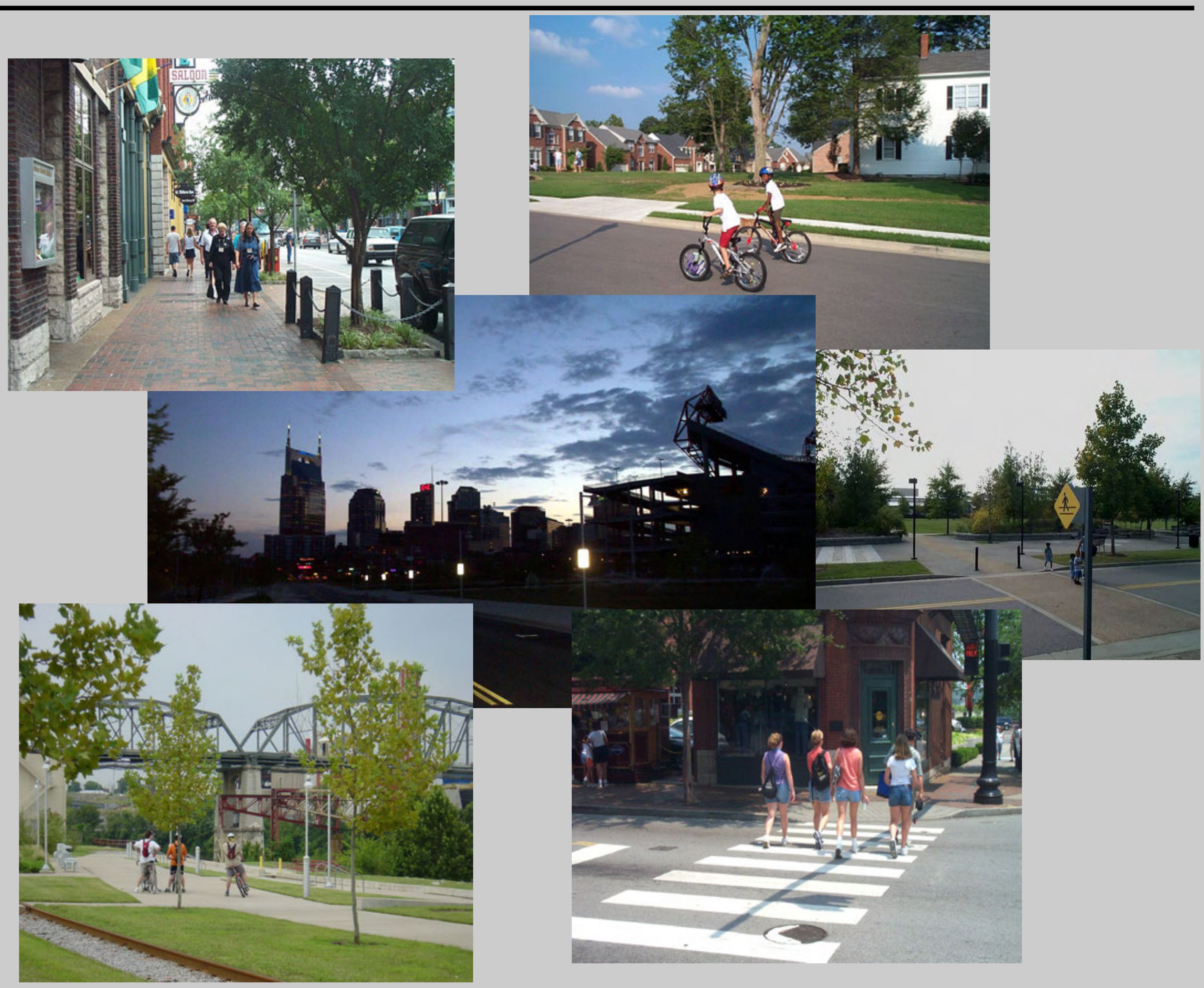
Nashville-Davidson County Strategic Plan for Sidewalks & Bikeways

Amended July 2008



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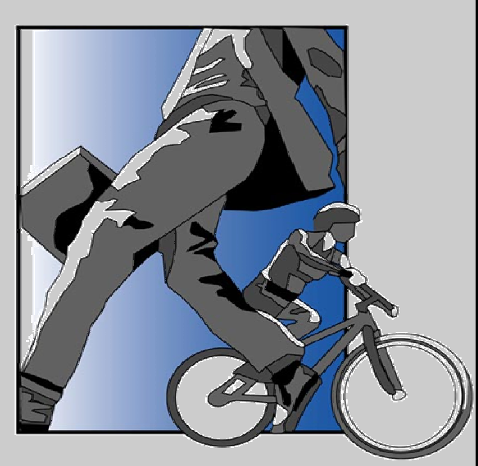

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First Edition: March, 2003
Amended: July, 2008

Amended by: Civic Engineering & Information Technologies, Inc.

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Metro Nashville-Davidson County Strategic Plan for Sidewalks & Bikeways

PREPARED FOR:
THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE

PREPARED BY:
RPM TRANSPORTATION CONSULTANTS, LLC
HAWKINS PARTNERS, INC.
DIGI DESIGN, INC.
SEIGENTHALER PUBLIC RELATIONS, INC.
FEHR & PEERS ASSOCIATES, INC.
PERDUE RESEARCH GROUP, INC.

AMENDED JULY 2008 BY:
CIVIC ENGINEERING & INFORMATION TECHNOLOGIES, INC.

SPECIAL NOTE ON 2008 UPDATES AMENDMENT:

The 2008 Updates Amendment to the Strategic Plan (found on page AM.1 of this document) includes functional changes to the original March 2003 Edition of the Strategic Plan. The Amendment illustrates the changes to the prioritization and selection process of sidewalk and bikeways projects. The Amendment does change the general spirit and goals for planning Sidewalk and Bikeways facilities, so a majority of the concepts, history and elements of the March 2003 Edition of the Strategic Plan remain unchanged.

The Amendment is designed to be a stand-alone document that contains all the functional elements in the current planning context. The 2008 Updates have been included herein as an amendment to chronicle Sidewalk and Bikeways planning in Metro Nashville from March 2003 to July 2008.

Throughout this document, when elements of the original March 2003 edition of the Strategic Plan are superseded by the Amendment, a special note is shown directing the reader to the appropriate section of the Amendment. A sample note is shown below.

2008 Update note: The planning process for the 2008 updates can be found in Amendment 1—Section 2

CITIZENS ADVISORY COMMITTEE (CAC)

The members of the CAC provided feedback throughout the planning process and were selected based on interest and expertise, with an eye toward geographic distribution. The strategic plan impacts the urbanized areas of the county more than rural and suburban areas, and the CAC has been weighted accordingly. Listed below are names of committee members along with their affiliations or expertise, and [area of residence].

Robert Churchwell	Homeowner, concerned citizen [Antioch]
Laurel Creech	Community Health and Wellness Committee (Healthy Nashville, Walk Our Kids to School Day chair 2000, 2001, Team Green) [Sylvan Park]
Gene deManincor	Green Hills Family YMCA, Chamber of Commerce West Area Business member, The Green Hills Action Partnership member [Green Hills]
Michael Douglas	Dickerson Road Merchants Association president, Chamber of Commerce Skyline North Business Council member [Dickerson Road]
John Forbes	Architect, Sight/Hearing impaired advocate
Debbie Frank	North Nashville CDC
Steve Gibson	Nashville Downtown Partnership interim executive director [Downtown]
John R. Haendel	Concerned citizen, Sight impaired advocate, [Vanderbilt]
King Hollands	Organized Neighbors of Edgehill president [Edgehill]
Jeff Jolly	Bicycle shop owner – Hermitage [Mt. Juliet]
Whitney Kemper	Nashville Striders, neighborhood activist [Lockeland Springs]
Hannah McKee	Concerned citizen
Jennifer Nicholson	Active cyclist, [Donelson]
John Norris	Greenways for Nashville, Walk/Bike Nashville, Bicycle Pedestrian and Traffic Calming Advisory Committee (BPTCAC), [Richland - West End]
Jeff Ockerman	Rediscover East Urban Design Committee chair [Lockeland Springs]
Mike Read	Active cyclist and member of many cyclist groups [Green Hills]
Jeff Reilly	Rediscover East Traffic Committee chair [East Nashville]
Jenny Robison	Physical therapist to represent the mobility impaired [West End - Vanderbilt]
Glen Wanner	Walk/Bike Nashville, "Bicycling in Middle Tennessee" author, BPTCAC, TAPS task force [West Meade]

STEERING COMMITTEE

The members of the Steering Committee served as the board of directors throughout the strategic plan process. Listed below are names of committee members.

Rick Bernhardt	Metro Planning Department
Shain Dennison	Metro Parks
Joe Edgens	Metro Public Schools
Renee Jackson	Metro Public Works
Kim Lawson	Metro Fire Department
Mark Macy	Metro Public Works
David Manning	Metro Finance Department
James McAteer	Metro Planning Department
Nancy Nace	Metro Health Department
Tim Sanderson	Metro Transit Authority
Rick Shepherd	Metro Codes Administration
Judy Steele	Metro Development & Housing Agency
Richard Tennent	Metro Legal Department
Nick Thompson	Nashville Electric Service
Diane Thorne	Mayor's Office
Chief Turner's appointee	Metro Police Department

INTERAGENCY MANAGEMENT COMMITTEE
(IMT)

The members of the IMT will work with the consultant on the technical details throughout the strategic plan process. Listed below are names of committee members.

Renee Jackson	Metro Public Works
Talia Lomax-O'dneal	Metro Finance Department
Mark Macy	Metro Public Works
James McAteer	Metro Planning Department
Jim Snyder	Metro Public Works
Diane Thorne	Mayor's Office
Dianna Stephens	Metro Finance Department, ADA Compliance Division

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CHAPTER ONE: INTRODUCTION & PLANNING PROCESS

INTRODUCTION

A city's streets are among its most important public places; in fact, cities generally dedicate far more public land to streets than to any other use. For this reason, streets have a great effect on the quality of life enjoyed by a city's residents. Streets are where neighbors cross paths and share news, where friends gather at a street café for a meal, where children walk to the corner market for ice cream. Streets are where commuters bicycle to work and where a parent teaches a child the joy of riding a bike. Streets connect people to every destination within a city, provide access to public transit, fuel economic development, and are, of course, the corridors for travel for many thousands of motor vehicles every day. Streets perform many essential community functions. Indeed, great streets can define a city.

A city's streets are an important feature of the community they serve.

Following World War II, many U.S. cities began to modify their streets. Streetcar tracks were no longer as important as the automobile. New roads were built primarily to serve motor vehicles, which resulted in fewer sidewalks and fewer safe crossing facilities. Consequently, motorists began traveling more quickly, leaving pedestrians and bicyclists feeling unsafe. Buildings were less accommodating to public rights-of-way. A new suburban style layout of subdivisions offered fewer opportunities to encounter one's neighbors. As streets became less attractive for multiple functions, many citizens began to expect that the only purpose for streets, the largest portion of a city's public realm, was to move motor vehicles. As a result, for many streets, the emphasis shifted from moving people to moving automobiles and other motor vehicles. Today, many Americans have no option other than driving for virtually every trip they take.

The purpose of the Strategic Plan for Sidewalks & Bikeways is to enable Metro to effectively plan and implement facilities that improve safety, enhance mobility, and promote a higher quality of life.

Streets will always serve a fundamental purpose of moving motor vehicles, but they are capable of much more. Like many cities across the United States, Nashville is beginning to recognize the increase in demand of its streets. By building a multi-modal transportation infrastructure that serves not only motorists, but also pedestrians and bicyclists, Nashville is committing to transportation choice, greater mobility, safer streets, cleaner air, less traffic congestion, healthier citizens, stronger communities, a more sustainable economic climate, and a higher quality of life for all Nashvillians. The *Strategic Plan for Sidewalks & Bikeways* is intended to help guide this process.

PURPOSE OF THE PLAN

The purpose of the *Strategic Plan for Sidewalks & Bikeways* is to enable Metro to effectively plan and implement facilities that improve safety, enhance mobility, and promote a higher quality of life. This plan will provide Metro with a blueprint for making walking and bicycling attractive, safe, and practical transportation options for citizens throughout Nashville and Davidson County.

Comprehensive in scope, the plan addresses all aspects of pedestrian and bicycle planning: building well-designed pedestrian and bicycle facilities, promoting the benefits of walking and bicycling, educating users of all modes how to share our streets, and enforcing laws that help improve safety. More specifically, the plan addresses the following objectives:

- To provide safe, comfortable, continuous, direct, and convenient pedestrian facilities for users with all levels of physical ability.
- To reduce the number of injuries and death resulting from crashes between motorists, bicyclists, and pedestrians.
- To ensure that all new streets are safe and comfortable for pedestrians, bicyclists, and motorists.
- To maximize the multi-modal function of existing streets.
- To increase the percentage of trips undertaken in Nashville & Davidson County on foot and by bicycle.
- To encourage increased use of public transportation by improving pedestrian and bicycle access to bus stops and facilitating bus use by bicyclists.
- To minimize conflicts between motorists and bicyclists.
- To establish a methodology for prioritizing sidewalk projects on existing streets.
- To recommend design guidelines for pedestrian facilities and bicycle facilities.
- To develop budget cost estimates and an implementation strategy, and to identify potential funding sources.
- To ensure that all relevant Metro practices, programs and projects address pedestrian and bicyclist needs.

COMMUNITY COMMENTS

In addition to the complete compilation of public comments located in Appendix F, "Community Comments" boxes like this one have been inserted into the text throughout the plan. These comments articulate ideas or reflect concerns that were shared by many Nashvillians during the planning process.

THE PLANNING PROCESS

The various phases of development of the plan occurred over a twelve-month period between September 2001 and September 2002. The process was broken down into six general tasks. These six main planning tasks were:

- Project Initiation and Data Collection
- Evaluation of Existing Pedestrian and Bicycling Conditions
- Assessment of Pedestrian and Bicyclist Needs
- Development of Proposed Pedestrian and Bicycle System
- Development of Design Guidelines
- Documentation

One of the goals of the Strategic Plan for Sidewalks & Bikeways is to offer safe and convenient walking and bicycling facilities in Nashville & Davidson County.

PROJECT COORDINATION

A key component of the strategic plan development was community involvement. One aspect of this involvement was ensuring that the various Metro departments and other agencies were given the opportunity to participate. Three working committees were established in order to facilitate this involvement: the Interagency Management Team, the Steering Committee, and the Citizens Advisory Committee.

The Interagency Management Team was formed to oversee the major project milestones and to monitor the progress of the planning process. This team was made up of representatives from Metro Public Works, the Metro Planning Department, the Metro Finance Department, and the Mayor's Office.

"The lack of sidewalks isolates people of all ages and forces us to use cars when walking or biking would be preferable."

The Steering Committee was created to ensure coordination with Metro departments and quasi-public agencies whose work involves or impacts public rights-of-way. Membership included representatives from the Interagency Management Team as well as the Mayor's Office on Accessibility, Nashville Electric Service, and the Metro Department of Education.

The Citizens Advisory Committee included individuals with interest or expertise in pedestrian and bicycle planning, neighborhood livability, disabled accessibility, public health, and urban design. With members representing neighborhood associations, bicycle clubs, disabled citizens, and other interest groups, this 18-member committee met six times during the planning process.

PUBLIC PARTICIPATION

In addition to formal committees, Nashvillians were provided with opportunities to influence the content of the plan. A multi-faceted public participation process was incorporated into each phase of the planning process. The public response process consisted of public meetings, a telephone survey, a website, direct correspondence, and a media campaign. Public response was overwhelming. More that 200 e-mails, faxes, and comment sheets were received, most of which contained multiple comments. Numerous comments were also received via telephone.

2008 Update note: The planning process for the 2008 updates can be found in Amendment 1—Section 2

PUBLIC MEETINGS

Ten public meetings were held at public venues located throughout Davidson County. These informal meetings provided a forum to present draft plan elements, discuss issues, and allow citizens to express their concerns, offer ideas, and provide feedback. A list of comments received during the meetings can be found in Appendix H.

The first round of four meetings was held in January 2002, during the data collection phase of the planning process. The purpose of these first meetings was to introduce the project to the public and to get feedback on the general issues affecting walking and bicycling in Nashville. Over 230 people participated in these meetings.

Public meetings were held throughout the planning process to promote community involvement.

A second round of four meetings took place in March 2002. In these forums, the planning team presented the results of analyses, introduced the initial sidewalk and bikeway recommendations, and received comments. Roughly 124 people participated in these meetings.

The final two public meetings took place in September and October 2002. At this meetings, the planning team unveiled a final draft of the plan, including all recommendations. There were 36 people who signed the sign-in sheet at the September meeting. However, there were many people who did not sign in at this meeting. Roughly 20 people attended the October meeting.

> *"Sidewalks and bike lanes are essential, but it also means paying major attention to design issues such as trees and landscaping, and also encouraging building siting and design that make places that feel more like human-scale villages: outdoor seating, public art, benches, pocket parks, community gardens, and neighborhood-style buildings."*

TELEPHONE SURVEY

A telephone survey was conducted to determine attitudes toward walking and bicycling in Nashville. The survey involved 1,547 telephone interviews with respondents throughout Davidson County, and was broken down into geographical subareas. The survey performed multiple functions. It provided data on the current levels of walking and bicycling in the county. It also identified factors that would encourage citizens to choose these modes for more trips. Furthermore, the survey provided Nashvillians with an additional opportunity to provide input into the project. The survey is discussed in greater detail in Chapter Three, and the results are presented in Appendix G.

WEBSITE

Throughout the planning process, a site for the plan was posted on the worldwide web. The website provided information on draft recommendations and other pertinent issues. It also served as a means to submit public comments and ideas.

DIRECT CORRESPONDENCE

As previously described, throughout the planning process, the public was encouraged to provide their ideas and comments to the planning team members via mail, e-mail, telephone, or fax. A summary of the comments that were received are presented in Appendix H.

MEDIA CAMPAIGN

The primary goal of media campaign efforts was to encourage community participation throughout the plan development process. With this in mind, media coverage was chosen as the principal tool for informing the community about public meetings and urging citizens to either attend the meetings or provide input via other means. Other tools, such as posters, were also used to foster community participation.

Prior to each round of public meetings, aggressive media efforts focused on public notification of the meetings and encouraging people to attend. Press releases were distributed to local media outlets and posters were distributed throughout the county. Strategically, the first news stories were placed with the major local daily paper, *The Tennessean*, with other articles encouraging meeting attendance appearing in other media outlets. Immediately before each round of meetings, a media alert was issued to the local

The website served as an informational tool for the public throughout the planning process.

press, reminding them to cover the event. Drawing television and newspaper journalists, the media coverage prompted meeting attendance and increased public participation.
Throughout the planning process, press releases were also distributed that focused on the Citizens Advisory Committee, the technology used to conduct the sidewalk survey, the characteristics of a walkable community, and other awareness-raising issues. The releases resulted in multiple newsprint and television reports on the plan.

Involving the public through so many avenues enabled Nashvillians to become involved in a plan that will affect their neighborhoods, streets and communities. Through the open communication between the public and the planning team, Nashvillians voiced their concerns and ideas, while the planning team was able to inform the public as well as highlight the positive effects of a comprehensive sidewalk and bicycle plan.

CHAPTER TWO: THE PLANNING CONTEXT

A. BENEFITS OF WALKING & BICYCLING

INTRODUCTION

While Metro Nashville has made some significant leaps forward in the last several years, providing pedestrian and bicycle facilities has not historically been a high priority. While 752 miles of sidewalks are currently in place on Nashville streets, this is just half the mileage of many comparable cities (see Chapter Four, Section C: Peer City Review for more information). Most of Nashville's sidewalks are on streets in the oldest parts of the city – areas developed prior to the adoption of suburban-style land development patterns that occurred after World War II. Until 2000, there were practically no bike lanes on Nashville's streets.

> *"I look forward to seeing how this strategic planning process helps me in my efforts to have less reliance on my personal vehicle."*

Historically, Nashville's transportation planning efforts focused primarily on facilities for private motor vehicles. Perhaps as a result of this strategy, the Federal Highway Administration (FHWA) reported that, in 1999, Nashvillians had the highest rate of motor vehicle travel in the United States - an average of 37.7 miles per person per day.[1] While population in the Nashville area grew 26% between 1982 and 1997, it was outpaced by vehicle miles traveled, which increased by 115%.[2] During the same period, developed land in the region increased by 87%.[3] Per person, Nashvillians are utilizing more land and dedicating more time to travel than at any point in our history. Also increasing are air quality problems, concerns about the impacts of traffic on quality of life, and frustration from drivers, pedestrians and cyclists alike.

In recent years, however, Nashville's approach to transportation planning has begun to shift. Metro is at the beginning of a process that will involve the adoption of a multi-modal approach to transportation planning. In 2000 and 2001 alone, $35 million in local funds have been dedicated to retrofitting public streets with new sidewalks and repairing inadequate sidewalks. New bike lanes and more greenways are also being developed. In addition, various ordinances have been upgraded to ensure greater participation by private developers in providing sidewalks and bikeways. Significant additional work remains to be done, and this plan is intended to guide that work. However, the benefits of changes that have already occurred are now becoming visible in the Nashville community.

These funding and policy changes reflect a growing recognition, on the part of Metro officials and the public at large, of the variety of benefits offered by increased walking and bicycling. Public input received during the development of this plan reflects intense support and demand for pedestrian and bicycle-friendly streets. Benefits include more transportation choices, reduced

Historically, Nashville's transportation approach has focused on motor vehicle facilities rather than multimodal transportation.

[1] Office of Highway Policy Information, Highway Statistics 1999, Federal Highway Administration, www.fhwa.dot.gov/ohim/hs99
[2] Texas Transportation Institute, *1999 Urban Mobility Study*, http://mobility.tamu.edu
[3] Southern Environmental Law Center, *Where are We Growing? Land Use & Transportation in Middle Tennessee*, 2001.

healthcare costs, air quality improvements, better mobility, safer streets and a higher quality of community life.

MORE WAYS TO GET THERE

Cars and transit are important elements of Nashville's transportation system. Rail will also play a role in the future. These modes are regional in scope and are well-suited to long and middle-distance trips. In contrast, walking and bicycling are local and neighborhood-oriented in scope, and are well-suited to shorter distance trips. A balanced transportation system provides for all modes, allowing travelers to choose the most convenient mode for a given trip. For many travelers, walking or bicycling is the preferred mode for a variety of trips. Indeed, a 1995 Rodale Press study found that 40% of Americans would commute by bicycle if safe facilities were available.[4] A key goal of the *Strategic Plan for Sidewalks & Bikeways* is to provide a more balanced transportation system so that Nashvillians have more viable choices for travel.

The FHWA's 1995 *National Personal Transportation Survey* determined that 40% of all trips are less than two miles in distance. An average cyclist can cover two miles in ten or fifteen minutes. Most pedestrians can cover the same distance in about 30 minutes.[4] In Nashville, the vast majority of these short trips are now made by car. If even half of these trips were shifted to walking or bicycling, traffic congestion would be reduced significantly. In addition, walking and bicycling require less space per traveler than automobiles. Thus, infrastructure that supports walking and bicycling can usually be provided with less of an impact and at a lower cost than other transportation facilities.

Roadway improvements for pedestrians and bicyclists can also enhance safety for motorists. For example, adding sidewalks to a street effectively separates pedestrians and vehicles.

A multi-modal transportation approach can include several benefits including cleaner air and increased mobility.

Also, adding bike lanes means that motor vehicles do not have to weave into an adjacent lane to pass a cyclist.

> *"I don't have a car so that makes my need of sidewalks even greater."*

INCREASED MOBILITY & TRANSPORTATION EQUITY FOR ALL NASHVILLIANS

For many travelers, driving is not an option. In fact, one-third of the people in the United States do not drive.[4] In Davidson County, almost 10% of households do not own a car at all. This number increases significantly in more urbanized areas.[5] Young people, senior adults, and those who choose not to, or cannot afford to, own a car have limited options for transportation in Nashville.

All of these individuals have the same mobility needs as motorists. Walking and bicycling are affordable means of mobility, and available to nearly everyone. Of course, nearly all motorists are also pedestrians and many are cyclists. Most would like to be able to choose what form of transportation they use for a given trip. By facilitating travel by foot or bicycle, travelers of all modes benefit.

[4] www.bicyclinginfo.org/pp/benefits/tranben/index.htm
[5] Housing Characteristics for Davidson County, Tennessee, U.S. Census Bureau, 1990. http://factfinder.censun.gov/servlet

FEWER DEATHS AND INJURIES

Roadway plans should integrate well designed pedestrian and bicycle facilities so that safety is increased for all roadway users. Good pedestrian and bicycle designs would also encourage potential pedestrians and bicyclists to use the public right-of-way. Wide sidewalks that are buffered from moving vehicles and intersections that provide clear guidance to bicyclists on where to position themselves can decrease the likelihood of crashes, while increasing the percentage of pedestrian and bicycle travelers. In 1994, the U.S. Department of Transportation established a goal of doubling the number of pedestrian and bicycle trips while reducing injuries and fatalities by 10%.[6] The means for achieving this goal have largely been focused on engineering, providing more and better quality walking and bicycling facilities. Between 1990 and 2001, annual federal spending on such facilities increased from $6 million to $339 million.[7]

> *"It would be a draw to people moving to Nashville to see the community connected with bike lanes and sidewalks. It takes people out of their cars, away from isolation and back into the community."*

The introduction of design features, such as well-marked, short crosswalks, reduce the amount of time that pedestrians are in potential conflict with motor vehicles at an intersection. Also, for crashes, there is a direct relationship between vehicular speed and the severity of pedestrian injuries. The probability of a pedestrian dying from a crash with a motor vehicle is 3.5% at 15 mph, 37% at 31 mph and 83% at 44 mph.[8] Therefore, reducing speeds on streets can have a direct safety benefit for pedestrians.

Likewise, studies have concluded that bicycle lanes significantly increase cyclists' obedience to stop signs and reduce wrong-way bicycle riding, which are two operations that account for a significant percentage of bicycle/car crashes. Furthermore, motorists are more likely to see, and less likely to cut off, cyclists when a bike lane is present.[9]

Reducing injuries and fatalities for walkers, bicyclists and motorists alike involves education, law enforcement, and engineering. Although each of these elements must work in conjunction with the others, it is engineering that determines the physical environment that all roadway users share. It is difficult for education and enforcement to compensate for a poorly designed roadway.

LOWER PERSONAL TRANSPORTATION COSTS

No other forms of transportation are more economical than bicycling or walking. The League of American Bicyclists has determined that the cost of operating a bicycle for one year is $120.[10] Walking, of course, costs virtually nothing. Providing a good bike and pedestrian infrastructure can free some people from the expense of car ownership, or the need for a second or third car.

ECONOMIC DEVELOPMENT

By making neighborhoods safer and more livable, good pedestrian and bicycle facilities can also raise property values and marketability. A 1998 report by the Real Estate Research Corporation determined that, over the next 25 years, real estate values will rise the fastest in communities that incorporate mixed-use districts and "pedestrian-friendly configurations".[11] Knowing this, forward-thinking land developers not only

[6] Federal Highway Administration, *The National Walking & Bicycling Study: Final Report*, U.S. Department of Transportation, 1994, FHWA-PD-94-023.
[7] http://www.bicyclinginfo.org/insight/fact_sheets/index.htm
[8] Rudolph Limpert, *Motor Vehicle Accident Reconstruction and Cause Analysis*, Fourth Edition, Michie Company, Charlottesville, 1994.
[9] Federal Highway Administration, *A Comparative Analysis of Bicycle Lanes Versus Wide Curb Lanes*, December 1999.
[10] http://bicyclinginfo.org/pp/benefits/econoben/index.htm
[11] ERE Yarmouth and Real Estate Research Corporation, *Defining New Limits, Emerging Trends in Real Estate*, 1998. www.rerc.com

Encouraging physical activity like bicycling and walking supports a healthier lifestyle.

build trails and design their streets for pedestrians and bicyclists, they also plan compact neighborhoods, with schools, shopping centers, and parks within walking and riding distance of home.

Businesses want to be in a city that will help them attract quality employees. Motivated by concerns about gridlock, lack of transportation choices, and a poor quality of life, which can make recruiting and retaining skilled workers difficult, major firms around the country are advocating pedestrian-friendly development patterns.[12]

> *"Thank you for taking on such an important initiative. The plan will be important to the health and safety of Nashvillians and important for the environment."*

Several of the cities that consistently appear in the "best places" lists that people and businesses use to help decide where to locate also happen to have extensive pedestrian and bicycle networks. Frequently listed bike and pedestrian-friendly cities include Austin, Texas; Portland, Oregon; and Madison, Wisconsin.

CLEANER AIR

The Metro Health Department has determined that motor vehicles are responsible for 87% of the carbon monoxide and 83% of the nitrogen oxide emissions in Davidson County.[13] Nitrogen oxide creates ground level ozone, which is a primary contributor to respiratory illnesses. These diseases include asthma, chronic bronchitis, and other health problems to which children and senior adults are especially vulnerable. Due to the number of high ozone days, the American Lung Association gave Davidson County an "F" grade in air quality in 2001.[14]

In contrast, neither bicycling nor walking produces air pollutants. Because these modes are best suited to short distance trips, they can have an even more significant impact on air quality. On an average trip, 60% of the pollution created by an automobile is produced during the first few minutes of operation, before the vehicle's pollution control devices can work effectively.[15] These short trips, the least efficient for driving, are the most efficient for walking or bicycling. In fact, a four-mile trip by bicycle instead of by car keeps about 15 pounds of pollutants out of the air.[16]

SMARTER GROWTH

Generally, the cities in the U.S. with the highest bicycle and pedestrian activity have also encouraged economical land use and compact, mixed-use development. Redevelopment projects are reclaiming urban land for dense, pedestrian-friendly neighborhoods. At the same time, such projects reduce pressure for the development of agricultural and forest lands at the edges of the metropolitan area.

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[12] Todd Litman, *Profiles of Business Leadership on Smart Growth, New Partnerships Demonstrate the Economic Benefits of Reducing Sprawl*, Victoria Transport Policy Institute, 1999. www.vtpi.org
[13] Metropolitan Health Department, Division of Pollution Control, *Metropolitan Nashville & Davidson County, Tennessee, 1999 Annual Report.*
[14] American Lung Association, *State of the Air: 2001*.
[15] http://bicyclinginfo.org/pp/benefits/enviroben/index.htm
[16] World Watch Institute

This approach to land-use planning is also typically pro-active about preserving open space and habitat. In recent years, Metro Parks' greenways program has preserved about 4,000 acres of open space and ensured the protection of riparian areas on all of the major waterways in the county.

HEALTHIER NASHVILLIANS

For years, organizations such as the American Lung Association and the Centers for Disease Control and Prevention (CDC) have promoted the health benefits of regular physical activity. Just a few minutes of exercise a day can reduce the risk of coronary heart disease, high blood pressure, diabetes, colon cancer, and depression. However, Americans are more sedentary today than ever. Recent studies from the CDC have found that 73% of American adults are not as active as they need to be, while 36% of young people are not vigorously active on a regular basis.[17] The CDC reports in the *Journal of the American Medical Association* that the United States has the highest obesity rate of any industrialized nation. Tennessee's obesity rate of 22.7% (up from 12.1% in 1991) is among the highest in the nation.[18]

The CDC points to the automation of the workplace and home, and the fact that the automobile has replaced most trips that were undertaken on foot or bike in the past as reasons for American's inactivity. Indeed, public health officials nationwide are beginning to look at the role the design of our cities has played in making physical activity nearly obsolete. Rather than being integrated into daily activities, many find that physical activity now requires a scheduled and disciplined effort.

When bicycle and pedestrian facilities are integrated into a community's transportation system, walking and riding become available to everyone right outside the front door. In addition, these modes can replace some automobile trips, and incorporate physical activity into everyday travel activities. The difficulty in many of Nashville's neighborhoods is finding a safe place to walk or bicycle. Sidewalks do not exist in many of Nashville's neighborhoods, and bikeways are almost nonexistent. There are significant opportunities to make walking and bicycling more prevalent in Metro Nashville.

CONCLUSION

The range of benefits provided by a pedestrian and bicycle-friendly community is broad. These benefits are quantifiable, such as higher property values, lives saved, and lower public health costs. Many other benefits are less quantifiable but also important; like the ability to share a bicycle ride with one's grandchildren, a simple walk to the corner grocery, or the freedom from driving for every trip. Investing in a pedestrian and bicycle infrastructure achieves multiple objectives and helps ensure a high quality of life for all Nashvillians.

[17] Department of Health & Human Services and Centers for Disease Control and Prevention, *Behavioral Risk Factor Surveillance System – United States*, 1996 and 1998. www.cdc.gov/brfss/ti-surveydata2001.htm

[18] Centers for Disease Control, Journal of the American Medical Association

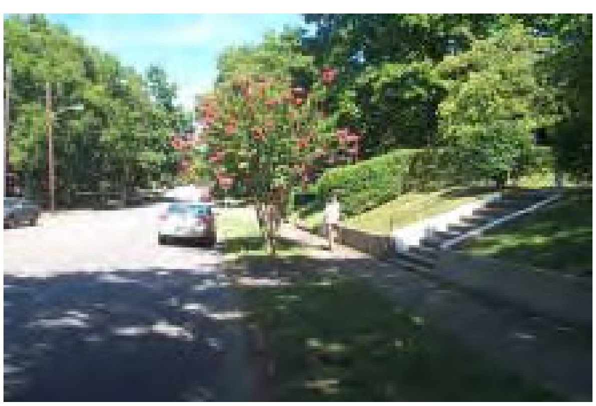
CHAPTER TWO: THE PLANNING CONTEXT

B. HISTORY OF PEDESTRIAN & BICYCLE PLANNING IN NASHVILLE

Metro Nashville has made significant progress in the last several years when it comes to walking and bicycling. However, the city's history, with regards to these issues, extends back to only the recent past. Most of Nashville's sidewalks are on streets in the oldest parts of the city, which consist of neighborhoods built prior to the adoption of more suburban-style land development patterns that were prevalent after World War II. Similarly, with the exception of existing, signed bike routes on some state highways and the bike lanes that used to be present on Charlotte Pike, there were no on-street bicycle facilities in Nashville until 2000. Local bicycle planning efforts began in 1975 when a conceptual bikeway map for urbanized sections of Davidson County was included in a Planning Department memorandum. The now-gone Charlotte Pike bike lanes may have been installed as a result of this map.

> "I actually have to drive somewhere else to walk just so I can feel safe."

Like many other American cities, Nashville's real shift toward pedestrian and bicycle planning began with Congressional approval of the federal Intermodal Surface Transportation and Efficiency Act (ISTEA) in 1991. Along with funding for conventional motor-vehicle related transportation projects, the act provided, for the first time, significant federal funds for walking, bicycling, transit, and other transportation projects directed toward achieving a multi-modal system and air quality goals. With funding available, communities throughout the country began to reexamine their transportation and land use priorities.



Many of Nashville's sidewalks are located in some of the older neighborhoods.

In the same year as the passage of ISTEA, the Metro Greenways Commission was established as a division of the Parks Department to guide development of trails throughout Davidson County. Early on, the commission adopted a Greenways Framework, which identified the seven major waterways in the county as greenway corridors. The framework offered the first comprehensive vision for how greenways could be integrated into the community. The commission's first major project, the Shelby Bottoms Greenway & Nature Park, opened in 1997 with about four miles of phase one trails. Today, there are over twenty miles of trail on the ground throughout the county and twenty-two more miles currently under development.

In 1992, *Mobility 2010: A Transportation Plan for Nashville and Davidson County* was adopted by the Metro Planning Commission. Though the plan did not specifically include any bicycle or pedestrian facilities, the text acknowledged the importance of walking and bicycling as transportation modes. The report states that use of "high occupancy vehicles including carpools, vanpools and public transit, and other alternatives such as bicycling and walking will provide a significantly greater amount of mobility needed in the future."

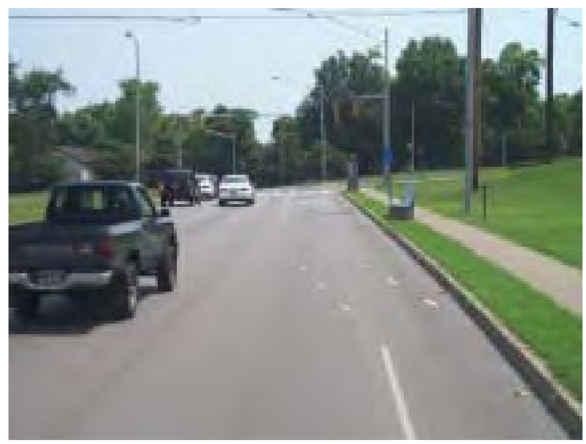
Developed by the Planning Department in 1996, the *Parks, Recreation, & Open Space Plan* provided more thorough planning guidance on bicycle and pedestrian facilities than any previous endeavor. The plan was adopted as part of *Concept 2010,* which was Metro's comprehensive plan. The *Parks, Recreation, & Open Space Plan* also included the Greenways Commission's Greenways Framework, which resulted in integration of greenway considerations into all subarea plans and the development review process. In addition, the *Parks Plan* identified major street corridors on which the installation or enhancement of bicycle and pedestrian facilities was recommended. For one of the first times in a Metro planning document, the text enumerated a set of goals for the development of a multi-modal transportation system.

The JDN Greenway, located on the Cumberland River, was constructed as part of a commercial development project.

Also in 1996, a committee called the Traffic and Pedestrian Safety Task Force (TAPS) was established by the Metro Council. A final report of their findings and recommendations was completed in 1998 and highlights the numerous pedestrian and bicycle deficiencies within the community. Issues addressed by the report included planning needs, design considerations, motorist behavior, transit interface, and Metro policies and ordinances. Some specific watershed recommendations of the task force included the development of a pedestrian and bicycle master plan, creation of a Metro traffic calming program, and creation of a pedestrian and bicycle coordinator position in Metro government.[19]

By 1997, some citizen pedestrian and bicycle advocates involved with the Greenways Commission initiated two street-based projects. With support from the Parks Department, Metro Public Works pursued funding for a Pilot Bikeway Project (PBP) and a countywide pedestrian and bicycle plan. The goal of the PBP was to provide a network of short-distance on-street bicycle facilities in west Nashville neighborhoods, with a connection to downtown through Music Row. This area was selected because of the volume of existing bicycle traffic, and because of the density and mixed-use character of the area. The PBP is currently being implemented.

The Metro-wide pedestrian and bicycle plan has become the *Strategic Plan for Sidewalks & Bikeways*. Since the plan was proposed, the scope has expanded to include detailed guidance regarding compliance issues with the Americans with Disabilities Act (ADA), a thorough condition assessment of existing sidewalks, and other information that will facilitate immediate implementation.



Magnolia Boulevard was identified in the Pilot Bikeway Project as a good candidate for bike lanes.

Nashville's *Downtown Transportation Plan for 2000-2020* identified a study area inside the interstate loop that rings downtown Nashville. The goals identified in the plan address intermodal transportation, land use, freeways, congestion, and visual character. Improving pedestrian circulation was identified as one of the policies in the plan. Key recommendations include constructing pedestrian facilities, expanding the greenway network, and hiring a full-time Metro coordinator for pedestrian and bicycle facilities. Also, bicycle recommendations included integrating study area bicycle

[19] Metro Nashville, *Traffic and Pedestrian Safety Task Force Final Report*, August 1998.

improvements into a community-wide bicycle master plan, and installing bicycle racks and lockers throughout the downtown area.[20]

In fiscal year 2000-2001, Mayor Purcell proposed, and the Metro Council approved, $15 million for sidewalk construction. This is more than had been spent on pedestrian facilities in the five previous years combined. In fiscal year 2001-2002, the Mayor committed an additional $20 million to sidewalks. As Metro's new commitment to a pedestrian and bicycle infrastructure proceeds, this plan is intended to help guide where future sidewalks are built and how they are designed, constructed and maintained.

[20] Metro Nashville, *Downtown Transportation Plan*, August 2000.

CHAPTER TWO: THE PLANNING CONTEXT

C. RELATIONSHIP TO OTHER PLANS

INTRODUCTION

There have been many efforts during the past to make walking and bicycling more integral components of Nashville's transportation system. In 2001, Mayor Bill Purcell took a major step toward achieving a truly multi-modal transportation system by recognizing the need for the *Strategic Plan for Sidewalks & Bikeways*. The plan is not, however, a stand-alone document. The following is a brief description of other planning documents and processes that are relevant to the sidewalk and bikeway plan. Each was reviewed during the development of this plan to ensure that there are common goals and consistency between plans.

> *"Many businesses are located within walking distance of my home but it is difficult to reach them due to the lack of sidewalks and crossing signals."*

PARKS & GREENWAYS MASTER PLAN

Adopted shortly before the completion of this plan, the *Parks and Greenways Master Plan* presents a one hundred year vision for parks and greenways development in Davidson County.[21] The plan refines the Greenways Framework that had been adopted as part of the 1996 parks plan. The earlier framework relied almost exclusively on the Cumberland River and its major tributaries as trail corridors. The new plan affirms the essential role of the waterway-based system, but expands the greenways vision with overland routes that will ensure that trails are also provided in those neighborhoods that are not located near waterways. In addition to providing convenient access to passive recreation, the expanded greenways framework will also facilitate use of the trails for transportation functions.

The Planning Department is beginning to use the concept of Community Transect Zones for a range of land-use and development planning efforts and decisions. There are seven different Community Transect Zones, each having differing levels of development intensity, mix of uses, and public services provided. These zones are described in Chapter Three. The *Parks & Greenways Master Plan* used the transect zones to guide greenway network recommendations. It also proposes that people in core, center and neighborhood transect zones, which are the densest transect zones, will never be more than two miles away from a greenway. The two-mile distance is based on the common planning principle that most bicyclists are willing to travel up to two miles for a transportation trip. The plan further recommends that street-based pedestrian and bicycle facilities be developed to provide access to the off-street trails. Figure 2.1 illustrates this concept.

The *Strategic Plan for Sidewalks & Bikeways* also places a priority on the development of street-based pedestrian and bicycle facilities in the higher density Transect Zones. The greenway network recommended in

The Strategic Plan for Sidewalks & Bikeways is designed to complement other plans for Nashville, like the Parks and Greenways Master Plan.

[21] Nashville and Davidson County, *Metropolitan Parks and Greenways Master Plan*, 2002.

GREENWAY CONCEPT DIAGRAM

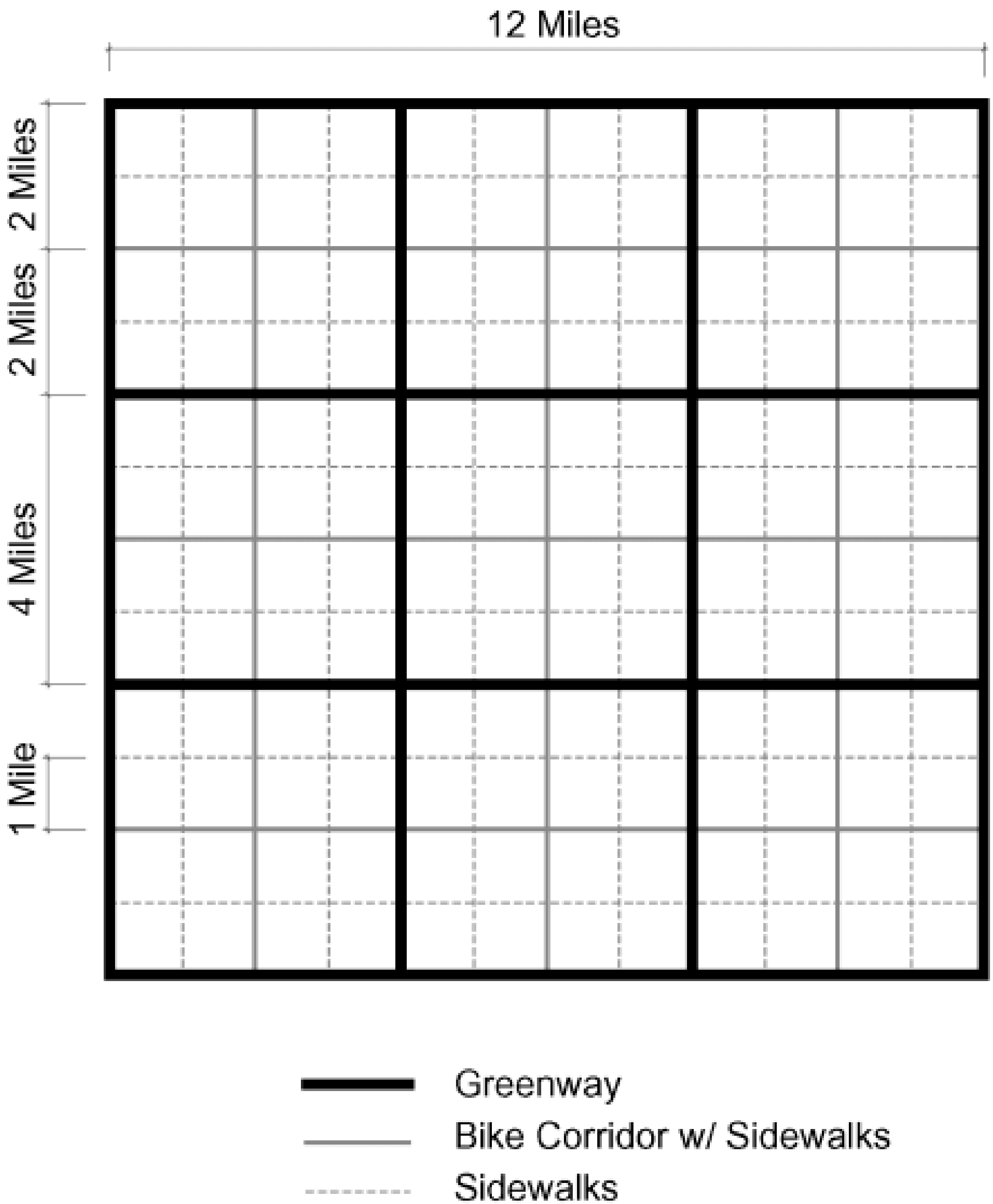
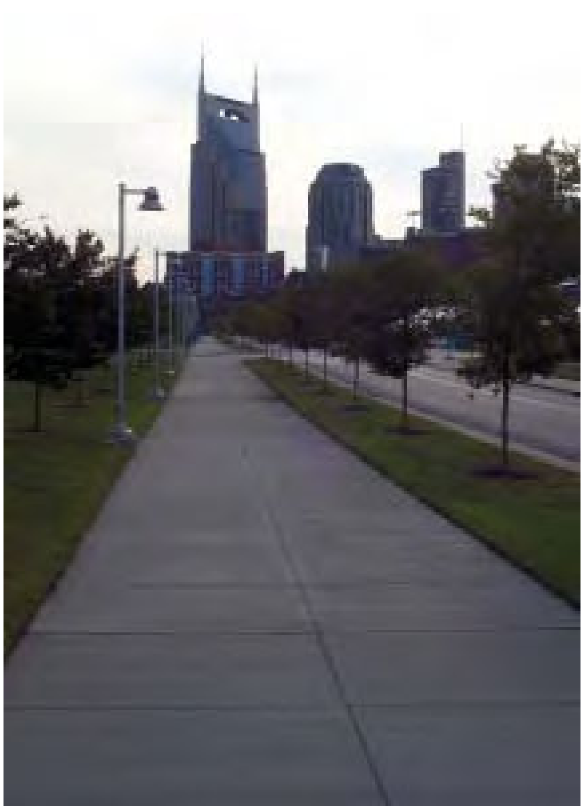


Figure 2.1: Relationship of Pedestrian & Bicycle Facilities to Greenways.

the *Parks & Greenways Master Plan* is intended to overlap with the project recommendations in the *Strategic Plan for Sidewalks & Bikeways* for a comprehensive on and off-street pedestrian and bicycle network. Chapter Three contains further discussions of the greenway system that is recommended in the *Parks & Greenways Master Plan*.

MAJOR THOROUGHFARE PLAN

Currently being developed, the *Major Thoroughfare Plan* will provide a detailed assessment of Nashville's existing and future roadway network. Its purpose is to provide a clear course of action for the development of the community's roadway system over the next twenty-five years. The scope of the plan indicates that pedestrian and bicycle facilities will be addressed as a strategy for reducing traffic congestion and improving the quality of life of Nashville. The team members for the *Strategic Plan for Sidewalks & Bikeways* have consulted on pedestrian and bicycle facilities that are to be incorporated into the new roadway cross-sections to be recommended as part of the *Major Thoroughfare Plan*. Future roadway improvements identified in the *Major Thoroughfare Plan* are important, cost-effective opportunities for bikeway improvements. In most cases, pedestrian and bicycle facilities can be incorporated into the funding and design of future roadway projects.



The 2025 Long Range Transportation Plan identifies the need for both intermodal and multimodal transportation in Nashville.

2025 LONG RANGE TRANSPORTATION PLAN

In 1999, the Nashville Area Metropolitan Planning Organization's (MPO) *2025 Long Range Transportation Plan* was released. An update of *Transportation 2015*, the primary purpose of the new plan is to provide a blueprint for satisfying existing and anticipated demands on the regional transportation system that serves the five-county Nashville metropolitan area. The five counties are Davidson, Rutherford, Williamson, Wilson, and Sumner.

The plan notes that, historically, bicycle and pedestrian facilities have not been given significant consideration in transportation system development throughout the region. It recognizes that new road projects and improvements to existing roads offer opportunities to integrate bicycle and pedestrian facilities. The plan also encourages local governments to develop land use policies and plans that acknowledge the relationship between land use and the transportation system. Toward this end, plan recommendations include reducing travel demand by clustering development and encouraging mixed-use development.

In addition, the *Long Range Transportation Plan* emphasizes that the regional transportation system needs to be both intermodal and multi-modal in order to maximize the efficiency of the transportation system. To accomplish this, it recommends that the region acknowledge and address the wide range of trip needs by the public and offer a practical choice of transportation alternatives to low occupancy vehicles, including walking and bicycling.

The *Long Range Transportation Plan* provides the vision for regional transportation facilities that accommodate all modes. The *Strategic Plan* *for Sidewalks & Bikeways* will provide the tools to implement the non-motorized components of the transportation plan for Metro Nashville.

SUBAREA PLANS

The Metro Planning Department's subarea planning program was developed in 1988. This program geographically divides Davidson County into fourteen subareas, which are presented in Figure 2.2. Each subarea plan addresses demographics, land use policy, and general infrastructure issues. More recently, the subarea planning process has incorporated finer-grain plan components at a neighborhood scale. Because land use and transportation have significant impacts on each other, the subarea plans present an opportunity to ensure that both land use and transportation decisions are coordinated and work toward achievement of the same objectives.

Most of the existing subarea plans include pedestrian and bicycle-related recommendations, including greenways. The recommendations included in existing subarea plans served as some of the base data used in the development of the *Strategic Plan for Sidewalks & Bikeways*. Conversely, as each subarea plan is updated, the *Strategic Plan for Sidewalks & Bikeways* recommendations that apply to the subarea should be incorporated.

TRANSPORTATION IMPROVEMENTS PROGRAM

A new *Transportation Improvement Program* (TIP) is developed by the Nashville Area MPO every three years. The TIP compiles and prioritizes scheduled transportation projects within the region. All of the listed projects are funded, in part, with federal funds that are allocated as part of the 1996 Transportation Equity Act for the 21st Century (TEA-21). Pedestrian and bicycle-related projects qualify for funding through several TEA-21 funding categories. TIP criteria for project selection encourage projects that facilitate non-motorized transportation. TIP projects must comply with air quality conformity requirements. Because the TIP is the sole means of distributing TEA-21 regional transportation funding, every project identified in the *Strategic Plan for Sidewalks & Bikeways* for which federal funds are desired must be included in the TIP.

OTHER PLANNING EFFORTS

The *Strategic Plan for Sidewalks & Bikeways* is Metro's most detailed and comprehensive pedestrian and bicycle-related planning document to-date. Development of the plan itself is the fulfillment of recommendations found in other planning documents. Furthermore, the *Strategic Plan for Sidewalks & Bikeways* provides recommendations that should guide the implementation of the pedestrian and bicycle-related elements of other future plans. The future plans that address these types of facilities within Metro Nashville should refer to this plan in their implementation efforts.

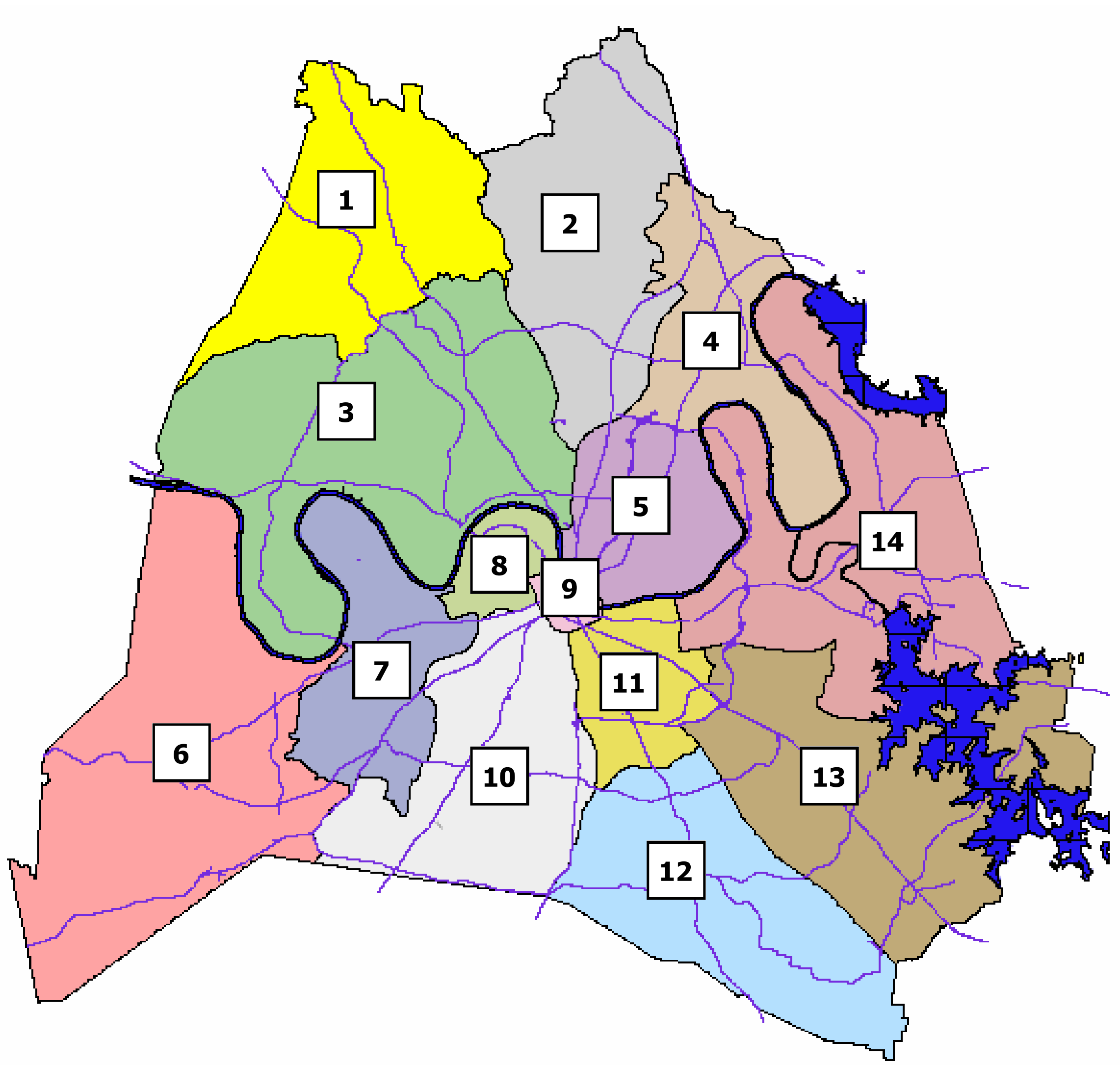


Figure 2.2: The Fourteen Subareas in Davidson County.

CHAPTER THREE: EXISTING CONDITIONS

A. PUBLIC OPINION SURVEY RESULTS

2008 Update note: The public opinion results for the 2008 Updates can be found in Amendment 1, Section 3

According to the survey, almost 75% of those people who do not walk, attribute this to lack of sidewalks in the area.

INTRODUCTION

In addition to the public meetings, Citizens Advisory Committee meetings, and other opportunities that were provided to facilitate public input into the *Strategic Plan for Sidewalks & Bikeways*, a telephone survey was conducted to ensure that opinions from a broad spectrum of Nashvillians were also taken into consideration.

In January 2002, telephone interviews were conducted with 1,547 respondents. To ensure geographic representation, an approximately equal number of interviews were conducted from each of the Metro Planning Department's fourteen subarea planning regions. Although respondent characteristics vary significantly from subarea to subarea, overall age, race, income, and gender percentages were fairly representative of the Davidson County population at large.

"We need sidewalks to sustain a healthy lifestyle."

The report containing the countywide results of the survey is located in Appendix G. The following is a summary of the countywide survey findings.

FINDINGS

Less than half of the respondents agreed with the statement, "In Nashville, walking is a safe, convenient and practical way to get from one place to another." Of those respondents who walk, 59% walk one or more times a week, and of that percentage, 83% walk twice or more weekly. Of those who do not walk, nearly three-quarters attributed it to the lack of sidewalks in their area. Of all the respondents, 55% said that more sidewalks would encourage them to walk more often.

Less than one-third of the respondents agreed with the statement, "In Nashville, bicycling is a safe, convenient and practical way to get from one place to another". Of the 28% of respondents who ride a bicycle, almost all ride for recreation, while about 3% ride for transportation trips. Over half of the respondents who ride do so at least once a month, and 26% ride twice or more weekly. Although 52% of the respondents said that there are no improvements that could encourage them to ride a bike, 48% cited new facilities, such as bike lanes and greenways, as incentives that would encourage them to ride.

The survey results indicate strong support for the development of additional pedestrian and bicycle facilities. An overwhelming 81% of respondents stated that they would like to have more sidewalks and bikeways in Davidson County.

SUMMARY

Overall, the survey provides a snapshot of some attitudes toward walking and bicycling in the Nashville area. The survey suggests that walking is an underdeveloped travel mode in Nashville, that most residents would like to walk more frequently, and that more pedestrian facilities would likely increase the number of trips that citizens would take on foot.

Predictably, a smaller but still substantial number of Nashvillians want facilities that will enable them to ride a bicycle for travel. Virtually all of the cyclists and potential cyclists indicate that additional bicycle facilities would increase their percentage of trips by bike.

In conclusion, the survey indicates that there is a general consensus among Nashvillians that pedestrian and bicycle-friendly streets will improve the quality of life in Metro Nashville. Furthermore, there is high potential to shift a percentage of trips in Davidson County to walking and bicycling modes.

CHAPTER THREE: EXISTING CONDITIONS

B. EXISTING DEVELOPMENT PATTERNS & THE TRANSECT

2008 Update note: Updates to the development patterns and the Transect can be found in Amendment 1, Section 4.

INTRODUCTION

Land use and development patterns create the most fundamental set of physical conditions that influence the decision to walk or bicycle for transportation. Given the proper facilities, most people are willing to walk or bicycle about fifteen minutes for a transportation trip. In fifteen minutes, most people can walk about one mile or bicycle about two miles.[22] As trip time increases beyond this limit, the likelihood of walking or bicycling decreases.

> *"It's not good to live in an environment where you live close to a shopping area but you are forced to drive a car just a few blocks in order to shop because there are no sidewalks."*

A study by the Massachusetts Highway Department evaluated the relationship between land use, street patterns and pedestrian access. This study compared the percentage of residents within walking distance of a small downtown in Massachusetts to a commercial strip and office center in the same region. This study demonstrated that:

- In a small downtown situation, 78% of residents that live within a one-mile radius of the commercial district can walk to downtown within 20 minutes on local streets.
- In a commercial strip and office center scenario, only 38% of people living within a one-mile radius can use local streets to access stores or offices within 20 minutes. The "effective walking radius" is much smaller for residents living within a given radius of these types of land uses because the non-grid street pattern offers fewer connections.[23]

Clearly, land use can have a significant impact on travel mode choice. Land-efficient development with mixed uses and multiple nearby destinations make walking and bicycling attractive modal options for many trips. Sprawl-type development with segregated uses makes walking and bicycling for transportation more difficult.

As previously mentioned, the Metro Planning Department has recently begun to utilize a development pattern classification system called the "Community Transect Zones", which consists of seven different transect zones. The seven transect zones are as follows:

- Core
- Center
- Neighborhood
- District
- Suburban
- Rural Reserve
- Rural Preserve

Each transect zone represents a gradation in existing and desired development character from most rural to most urban. The defining elements of each transect zone include factors such as vegetation patterns, topography, development density, streets and building types, land uses, stormwater systems, and infrastructure. Each transect zone has specific needs and accompanying expectations. The objectives are to ensure that new development is consistent with, and can be accommodated within, each transect zone's built and natural constraints, and that the development is consistent with the zone's needs and expectations.

As a planning tool, transect zones have especially useful applications in helping to guide pedestrian and bicycle-related decisions. Density, mix of uses, and other development characteristics in each transect zone help indicate its underlying degree of suitability for walking and bicycling and

[22] http://www.bicyclinginfo.org/pp/benefits/tranben/index.htm
[23] *Massachusetts Pedestrian Transportation Plan*, 1998.

2008 Update note: An updated Community Transect Zone map can be found in Amendment 1, Page 4-8.

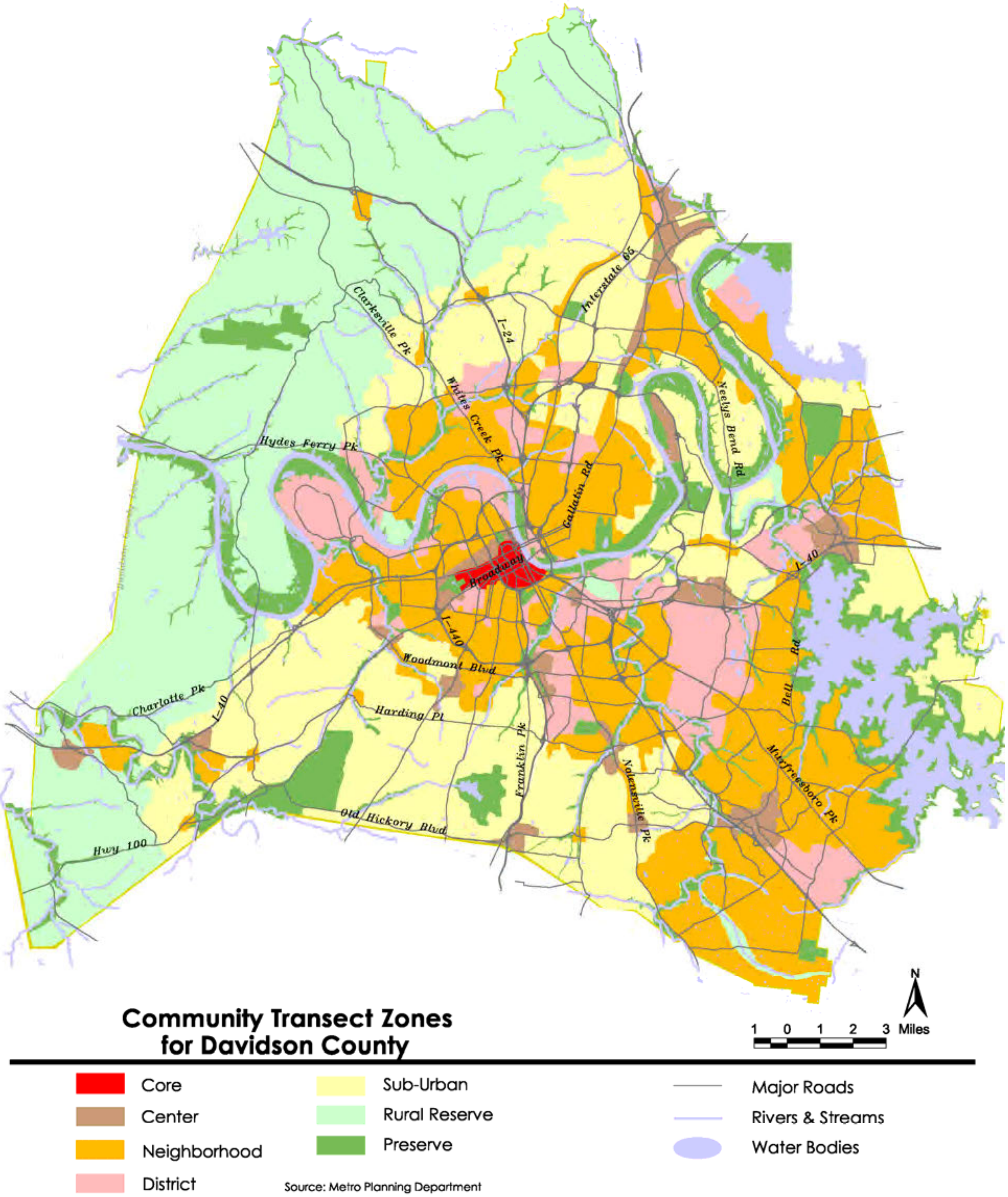


Figure 3.1: Community Transect Zones for Davidson County.

the potential intensity of pedestrian and bicycle infrastructure warranted within the zone.

The community transect zones for Davidson County are shown in Figure 3.1. Each transect zone is discussed in the following text.

CORE TRANSECT ZONE

The core transect is primarily made up of the historic downtown and the associated central business district (CBD). It is highly urbanized and is characterized by large attached structures and skyscrapers that are typically built to the street's edge. These structures are organized within a grid street pattern dominated by local streets. The primary uses constitute a mix of regional commercial, office, entertainment, and civic. Increasingly, high-density residential uses are

The core transect zone, which consists of downtown Nashville, is highly urbanized and is the densest part of the county.

becoming more common, a trend which is expected to continue to grow slowly. Automobile parking can typically be found in multi-story garages and along the street. Surface parking becomes more prevalent further from the center of the core.

Because the core contains the county's densest development and greatest concentration of destinations, it also has the county's highest levels of pedestrian use and attracts Nashville's largest concentration of non-student bicycle commuters. Although most streets have sidewalks, their design quality and condition vary. Most intersections provide minimal pedestrian accommodations. Within the CBD, intersection intervals usually result in motor vehicle speeds that are compatible with bicycles; outside the CBD, traffic volumes and lack of facilities discourage many would-be cyclists.

Wide, well-maintained, landscaped sidewalks, easy-to-cross streets, slow traffic, and related amenities (e.g. pedestrian scale streetlights, benches, trash receptacles) should be defining characteristics of the core. Bicyclists should be able to expect that most access roads into the area will be safe for bicycle travel and that bike parking will be provided throughout the core area. As downtown residential uses increase and as pedestrian and bicycle facilities are improved in areas surrounding downtown, demand for downtown pedestrian and bicycle facilities will grow and quality expectations will increase. Indeed, the lack of such facilities may slow residential development in the core transect.

CENTER TRANSECT ZONE

Center transects are characterized by mixed land uses, with commercial areas that serve multiple surrounding neighborhoods. Specific corridor(s) or areas within a center will often have a concentration of activity, such as a commercial "main street" or district. Centers contain a mixture of uses including residential, but lean mostly toward regional commercial uses that serve local neighborhoods. Residential uses are

Areas near the intersection of Woodmont Boulevard and Harding Road are examples of center transect zones.

primarily multi-family. Since many centers are clustered on specific corridors, major and minor arterial roadways are the dominant roadway types. In some instances structured parking facilities are utilized. The Green Hills Mall and

Rivergate Mall areas are examples of center transect zones.
Currently, many center transects lack a comprehensive sidewalk network to connect commercial destinations to nearby neighborhoods. Existing sidewalks are often substandard or unattractive, and intersections may have marginal accommodations. Sidewalks are typically separated from buildings by deep parking lots. For these reasons, pedestrian activity is generally limited to those who are either very committed to the mode, or have no other options. The design of the arterials that typically traverse centers discourages bicycle use. Center transects are often the areas that Nashvillians cite when complaining that they cannot park once and walk to multiple nearby destinations.

However, center transect development patterns create enormous potential to shift a significant percentage of trips to walking and bicycling. Density, mixed uses, and the connectivity and directness of arterials are the fundamental characteristics that pedestrians and bicyclists want. What is currently lacking are quality pedestrian and bicycle facilities. Indeed, center transects can function as "town centers" where buildings are concentrated and the overall environment is built to a pedestrian scale. Additionally, there is the potential for increasing the mix of uses to include residential opportunities.

"If I could change anything about my neighborhood, it would be that I would like sidewalks. I can't ride my bike or walk because we have nowhere safe. It is dangerous even to wait on the school bus because cars speed up

NEIGHBORHOOD TRANSECT ZONE
Medium density housing characterizes the majority of uses within neighborhood transects. The density of development is greater than three units per acre. Scattered non-residential uses are present, such as commercial areas located in neighborhood centers or commercial corridors along the edges of neighborhoods. These commercial uses are typically built to scales that are compatible with neighborhood development. Areas within the county that are mapped as neighborhood transects, but that are currently undeveloped, are expected to be encouraged to develop as pedestrian-friendly neighborhoods. Neighborhood transects often border center transects. Neighborhood transect zones include Bordeaux, Inglewood and Bellevue areas.

Many older existing neighborhood transects were built with a grid street system that offers multiple routes to most destinations. The presence and quality of existing pedestrian facilities in these neighborhoods vary from zone to zone. When viable commercial businesses are present in the commercial areas within these older neighborhoods, existing pedestrian and bicycle activity may be reasonably high. In neighborhood transects that developed after World War II, the presence of pedestrian and bicycle facilities is less likely. However, the newest subdivisions do incorporate sidewalks per recent amendments to the *Subdivision Regulations*. Pedestrian and bicycle activity in these areas is more likely to be recreational.

Neighborhood transects warrant well-developed pedestrian and bicycle facilities. There is an expectation that residents of all ages and skills can safely and comfortably travel to neighborhood commercial destinations, schools, and nearby center transects by foot or bike. Because many streets are classified as local or minor collectors, there is an expectation that

Neighborhood transects typically consist of medium density housing and are often adjacent to center transect zones.

motorists will travel at speeds that are appropriate for residential areas. Well-designed intersections should ensure that no streets function as barriers between destinations. The quality of the walking and bicycling environment in neighborhood transects is often a gauge by which residents measure quality of life.

DISTRICT TRANSECT ZONE

District transects consist of any one of several single or ancillary uses. Examples of district transects include medical centers, universities, industrial parks, and airports. As elsewhere in Davidson County, most district transects have few or no facilities for pedestrians or bicyclists. Because uses in district transects are unique, the land use characteristics and demand for pedestrian and bicycle facilities vary from district to district. The Nashville International Airport and the Centennial Boulevard Industrial Area are both transect zones.

An industrial park, for example, could have some demand for commuter bicycle and pedestrian connections beyond the park, However, few internal walking or bicycling trips may occur in an industrial park. In contrast, a university campus has a high demand for internal pedestrian and bicycle facilities.

SUBURBAN TRANSECT ZONE

Low-density, single-family residential uses dominate the land use pattern within suburban transects. Generally, densities are less than three units per acre, with very limited commercial or other non-residential uses. The street network is typically coarse, relying heavily on major and minor arterial roadways. Most of the existing subdivisions are accessed via self-contained road systems that typically do not provide connections to adjacent subdivisions. Unless constructed after the mid-1990s, when the *Subdivision Regulations* document was amended, streets often do not include sidewalks. Bicycling activity is mainly limited to recreational youth riding and no specific bicycle facilities are in place. Examples of the suburban transect zone include Crieve Hall and the Green Hills area.

Many areas along Granny White Pike are examples of suburban transect zones.

Due to low population densities, long distances between destinations, and few commercial land uses, there is a low potential for walking and bicycling for transportation in suburban transects. However, there is a significant potential for recreational walking and bicycling in these areas. Therefore, safe walking and bicycling facilities remain quality of life benchmarks for suburban transects. While all streets in new suburban transect developments should be multi-modal, suburban transects may have a lower priority for pedestrian and bicycle retrofit projects than the other more densely developed transects.

RURAL RESERVE ZONE

Rural reserve zones include privately owned and environmentally sensitive open-space farms and large lot (more than five acres) residential uses. Properties in a rural reserve are intended to remain rural in character indefinitely. Much of the northwestern and western portion of Davidson County is considered rural reserve. The potential for walking and bicycling for transportation in this zone is very low, as is the expectation that such facilities should be provided. Recreational bicycling demand on scenic roads with low motor vehicle volumes may be high. In order to maintain rural character, off-street, multi-use trails may also be appropriate in limited locations where destinations are within proximity of each other.

RURAL PRESERVE ZONE

The rural preserve zone is applied to publicly or privately-owned land intended to be permanently maintained as open space for preservation or recreation needs. The potential for walking and

CHAPTER THREE: EXISTING CONDITIONS

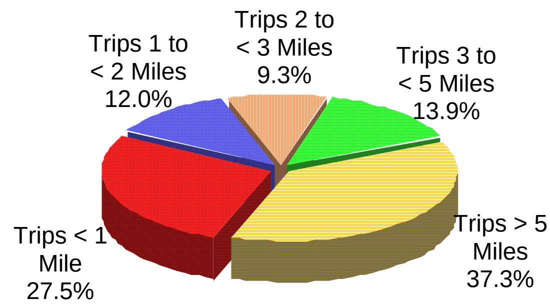
C. EXISTING PEDESTRIAN FACILITIES

biking in this zone is very low, except where multi-use paths may be developed for recreational use by the public. Banks of the Cumberland River and Percy Priest Lake are part of the rural preserve zone.

INTRODUCTION

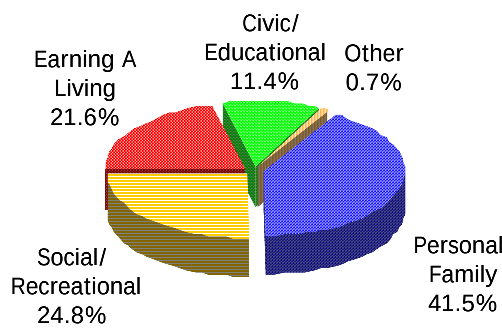
Building upon land use and development patterns, the presence of well-designed pedestrian facilities is the next set of physical conditions that influences one's decision to walk for transportation. Results from the National Personal Transportation Survey are presented in Figure 3.2. According to the survey, 27.5% of all trips are less than one mile in length.[24] This is a practical distance for walking when well-designed and continuous pedestrian facilities exist. Figure 3.3 illustrates the purposes of all modes of transportation trips. As indicated by the figure, the majority of daily trips are for purposes other than recreation. These figures indicate the high potential for pedestrian travel for daily trips in Nashville and Davidson County.

Walking becomes an attractive travel option when sidewalks are wide, obstruction-free, and separated from moving traffic with a buffer area. Well-maintained sidewalks that offer visual interests such as landscaping and storefronts also encourage walking. Street crossings are as important as the sidewalks themselves. At intersections, pedestrians desire a short crossing distance, well-defined crosswalks, the ability to predict drivers' movements, high-visibility corners and adequate crossing time.



Average Distance of Trips
Source: National Transportation Survey, 1995

Figure 3.2: Forty percent of all trips are less than two miles in distance.



Purpose of Daily Trips For
All Modes of Travel
Source: National Transportation Survey, 1995

Figure 3.3: Most trips are non-recreational in purpose.

PEDESTRIAN FACILITIES DEVELOPMENT

Most of the existing sidewalks in Davidson County are located in areas of the city that were developed prior to World War II. These areas are generally located within the old city limits of Nashville, the jurisdictional boundary that applied prior to the merger of the city and county governments in 1963. The areas of the county that have developed very recently also have sidewalks, due to mid-1990s amendments to the *Subdivision Regulations* that required, for the first time, sidewalks on one side of new streets. Since then, the *Subdivision Regulations* have been further strengthened to require, among other provisions, sidewalks on both sides of streets.[25] Where sidewalks are generally lacking are those areas of the county that developed between the 1940s and the mid-1990s. In terms of land mass, more development occurred during this period than at any time before. Some pre-war

[24] http://www.bicyclinginfo.org/pp/benefits/tranben/index.htm
[25] Metro Nashville and Davidson County, *Subdivision Regulations*, 2002.

neighborhoods also do not have sidewalks, or have missing segments within their sidewalk networks.

SIDEWALK INVENTORY

As part of the *Strategic Plan for Sidewalks & Bikeways*, an extensive inventory was conducted of all the existing public sidewalks in Davidson County. The purpose of conducting the inventory was to develop a thorough sidewalk database that could be used to determine the magnitude of ADA problems for sidewalks and ramps, to develop cost estimates for bringing the sidewalks and ramps into ADA compliance, and for planning future sidewalks that would connect to or extend

Data for the project were recorded using hand-held computers and specifically designed software.

existing sidewalks. This thorough condition assessment was conducted for sidewalks only. Pedestrian facilities other than sidewalks, such as crossing facilities or greenway trails, were not evaluated.

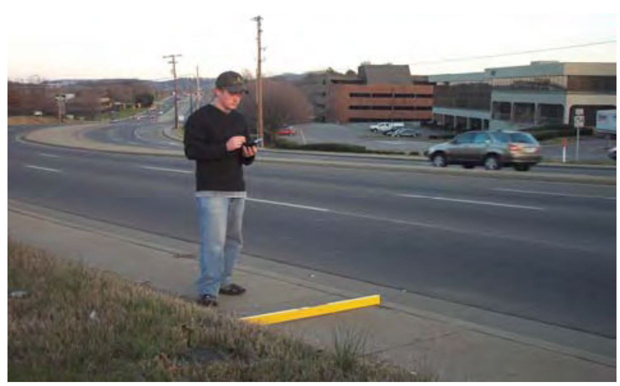
<u>METHODOLOGY</u>

Between November 2001 and May 2002, survey teams inventoried the sidewalks in Davidson County and collected data identifying the location, condition, and characteristics of each sidewalk. All data were recorded using hand-held computers and software that were specially developed for this inventory. The tools that were used to collect data included "Smart Tool" digital levels, measuring wheels and tape measures. All collected data were recorded on a block-by-block basis. For the purposes of this inventory, a block was considered to be a portion of public right-of-way between two consecutively intersecting streets. The characteristics that were identified

A vertical offset in the sidewalk greater than 1/4 of an inch is considered non-compliant by ADA Guidelines.

for each sidewalk are as follows:

- Exact location of sidewalk
- Type of material of sidewalk
- Width of sidewalk
- Total length of sidewalk
- Length of missing sidewalk (Missing sidewalk is defined as a gap between two existing sidewalks that is less than 1/4 mile in length.)
- Length of sidewalk under construction
- Length of damaged (broken or significant cracking) sidewalk
- Horizontal cracks greater than 1/2 inch
- Vertical cracks greater than 1/4 inch
- Cross slopes less than 2%
- Cross slopes from 2% to 3%
- Cross slopes greater than 3%
- Water meter obstructions
- Water hydrant obstructions
- Water manhole obstructions
- Other water obstructions
- Electric pole obstructions



Using "Smart Tool" digital levels, cross slope measurements were taken for the inventory.

The pole in the sidewalk is an example of an obstruction that is non-compliant with ADA guidelines.

Sidewalk characteristics, such as width, were identified by the inventory.

- Electric manhole obstructions
- Electric box obstructions
- Other electric obstructions
- Gas valve or meter obstructions
- U. S. Post Office mailbox obstructions
- Private mailbox obstructions
- Other path of travel obstructions
- Telephone pole obstructions
- Telephone manhole obstructions
- Telephone box obstructions
- Other telephone obstructions
- Sign obstructions
- Traffic signal pole obstructions
- Traffic signal cabinet obstructions
- Tree obstructions
- Commercial driveway obstructions
- Residential driveway obstructions
- New sidewalk ramps (ADA compliant)
- Old sidewalk ramps (ADA noncompliant)
- Missing sidewalk ramps (locations where ramps are required per Metro's standards or per ADA guidelines, but have not yet been installed)

The above characteristics were selected to be inventoried because they identify basic information about each sidewalk, ADA compliance issues, and other potential problems for pedestrians. The resulting data will enable Metro to evaluate the specific needs of each sidewalk and to determine the most appropriate response for each problem. For example, some problems, such as a crack or substandard ramp, may only require replacement of a short sidewalk segment. However, cross slope problems may require the replacement of an entire block. Utility poles and other obstructions may require additional considerations, such as moving the obstructions or realigning the sidewalk.

> *"I am a person suffering from paraplegia. I have noticed that a lot of the new sidewalks are not handicapped-accessible. Telephone poles and mail-boxes are sitting in the middle of the sidewalks."*

<u>INVENTORY RESULTS</u>

Data were collected for all existing public sidewalks in Davidson County. Private sidewalks were not included in the inventory. The inventory identified 762 miles of sidewalk in Davidson County that extend over 7,170 blocks. However, nine miles of this distance consisted of missing sidewalk segments and one mile was under construction during the time of the inventory. Therefore, the actual length of existing public sidewalks was 752 miles.

Figure 3.4 presents the types of sidewalk materials that were encountered during the inventory. As shown, approximately 89.4% of existing public sidewalks, or 672 miles, are constructed of concrete. Approximately 2.5% of existing public sidewalks, or 19 miles, are constructed of brick, asphalt or cobblestone. The remaining 8.1% of sidewalks, or 61 miles, are constructed of "other" materials. Typically, "other" materials represent exposed aggregate concrete. However, this designation also represents materials that were not specifically identified during the inventory, such as paving stones and other landscaping materials.

Figure 3.5 presents the various sidewalk widths that were encountered during the inventory. As shown, 12.8% of sidewalks, or 96 miles, are less than five feet wide. About 85.2% of sidewalks, or 641 miles, are five feet to ten feet wide. Only 2.0% of sidewalks, or 15 miles, are wider than ten feet.

<u>Sidewalk Problems</u>

Sidewalk problems include obstructions, cracks, damaged segments, missing segments, and excessive cross slope. As shown in Figure 3.6, only 0.5% of sidewalk blocks, or 36 blocks, are free of problems. Approximately 25.1% of sidewalk blocks, or 1,798 blocks, have between one and five problems. Approximately 30.3% of sidewalk blocks, or 2,176 blocks, have between six and ten problems. The remaining 3,160 blocks, or 44.1% of sidewalk blocks, have more than ten problems.

One of the problems identified by the sidewalk inventory is damaged sidewalk. A damaged sidewalk segment is considered to be a portion of a sidewalk that is broken or that has significant cracking. As identified by the inventory, 7.3% of sidewalks, or 55 miles, of existing public sidewalks are damaged.

Another problem identified by the sidewalk inventory is excessive cross slope. According to ADA guidelines, the maximum acceptable cross slope for a sidewalk is 2% grade. Figure 3.7 presents the various cross slopes of existing public sidewalks. As shown, 42.0% of sidewalks, or 316 miles, have cross slopes that are 2% or less. Approximately 26.5% of sidewalks, or 199 miles, have cross slopes that are between 2% and 3%. The remaining 31.5% of sidewalks, or 237 miles, have cross slopes that are greater than 3%.

The sidewalk inventory also identified cracks as a problem with existing public sidewalks. As

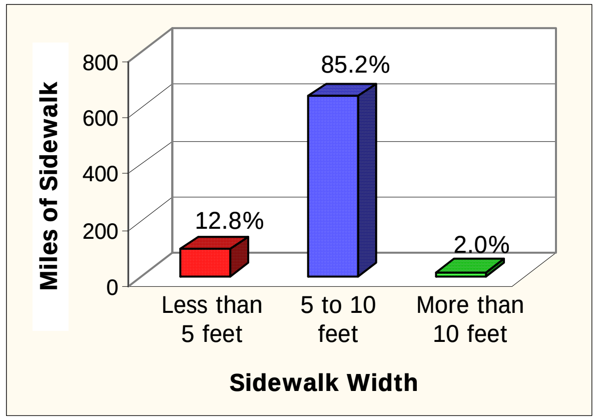


Figure 3.5: Sidewalk widths identified by the inventory.

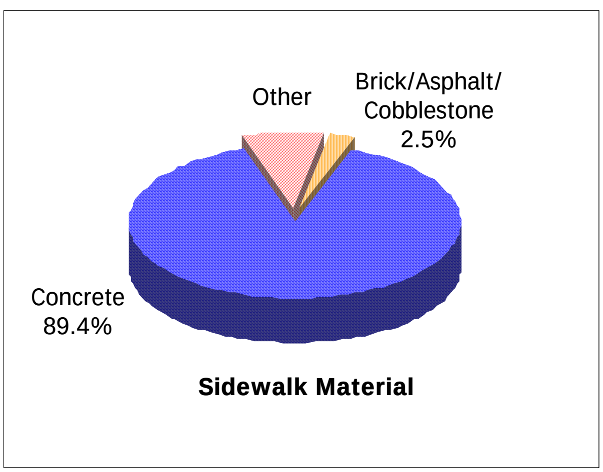


Figure 3.4: Types of sidewalk materials identified by the inventory.

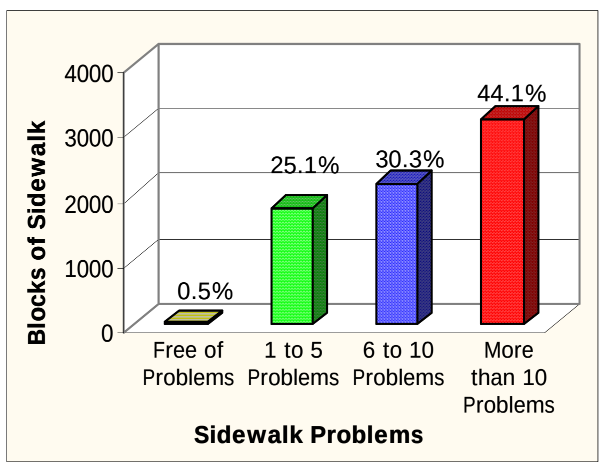


Figure 3.6: Sidewalk problems identified by the inventory.

inventoried, existing public sidewalks contain 30,251 vertical cracks and 18,107 horizontal cracks. The actual occurrence of cracks varies among sidewalk blocks. However, based on 752 miles of sidewalks, the occurrence of cracks is equivalent to approximately 40 vertical cracks per mile of sidewalk and approximately 24 horizontal cracks per mile of sidewalk.

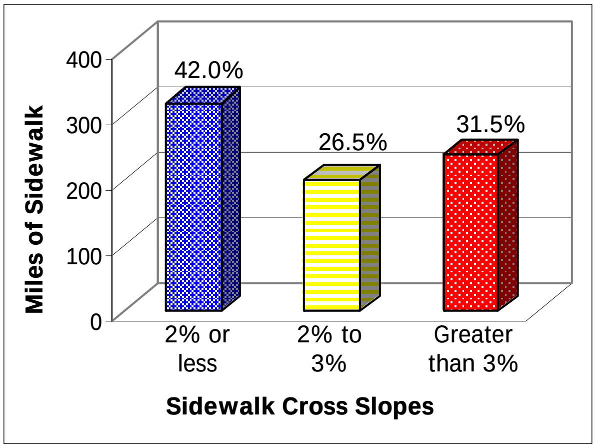


Figure 3.7: Sidewalk cross slopes identified by the inventory.

Other problems identified by the sidewalk inventory include obstructions and sidewalk ramp problems. The inventory results for these issues are presented below.

Obstructions
For the purposes of the sidewalk inventory, an obstruction is considered to be any element that either reduces the usable width of a sidewalk below ADA guidelines or that can serve as a tripping hazard or an obstacle to a disabled person. Obstructions can be vertical elements, such as utility poles or mailboxes, or they can be surface elements, such as manhole covers or poorly constructed driveways that do not provide ADA compliant pedestrian crossings. A total of 28,893 obstructions were encountered during the inventory. These obstructions are quantified in Table 3.1. Some of these obstructions, such as utility manholes, may only require minor adjustments to achieve ADA compliance. Other obstructions, such as utility poles, may require that the obstruction be relocated outside of the sidewalk. However, there will be some situations in which these options are not desirable or feasible. Numerous obstructions along a

This sidewalk segment illustrates a damaged sidewalk, one of the various sidewalk problems identified by the inventory.

sidewalk block or the desire to preserve existing important features, such as numerous canopy trees along a sidewalk block, may warrant realignment of the sidewalk or an expanded furnishings zone. Each sidewalk block will need to be individually evaluated in order to determine the most appropriate method of achieving ADA compliance.

Sidewalk Ramps
Sidewalk ramps should be provided at the corners of roadway intersections where sidewalks are present. Sidewalk ramps are also occasionally installed at midpoints of sidewalk blocks in order to provide mid-block pedestrian roadway crossings. The sidewalk inventory identified 15,964 locations that require sidewalk ramps per Metro's standards and per ADA guidelines. The inventory results for these locations are presented in Figure 3.8. As shown, 64.3% of the required ramps, or 10,261 ramps, are missing. Approximately 26.3% of the required ramps, or 4,202 ramps, are ADA noncompliant. Only 9.4% of the required ramps, or 1,501 ramps, are ADA compliant.

OBSTRUCTION TYPE	UNIT	TOTAL NO. INVENTORIED
Water Meter	Each	2,949
Water Hydrant	Each	139
Water Manhole	Each	145
Water Other	Each	108
Electric Pole	Each	736
Electric Manhole	Each	22
Electric Box	Each	18
Electric Other	Each	24
Gas Valve/Meter	Each	172
Mailbox (U.S. Post Office)	Each	19
Mailbox (Private)	Each	274
Telephone Pole	Each	193
Telephone Manhole	Each	55
Telephone Box	Each	11
Telephone Other	Each	14
Sign	Each	58
Traffic Signal Pole	Each	42
Traffic Signal Cabinet	Each	8
Tree	Each	46
Driveway (Commercial)	Each	9,972
Driveway (Residential)	Each	12,169
PTO Other (Path of Travel - Other)	Each	1,719
TOTAL		28,893

Table 3.1: Number and Types of Obstructions Inventoried

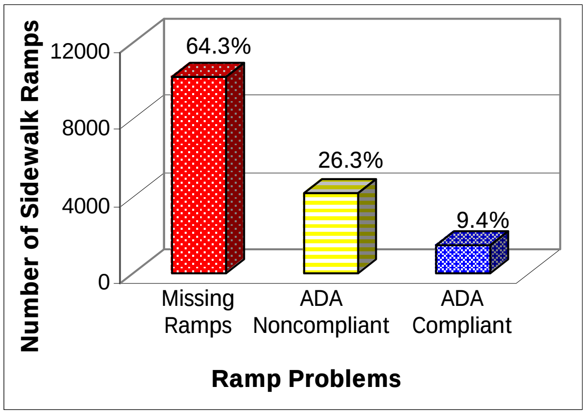


Figure 3.8: Sidewalk ramps identified by the inventory.

This corner is an example of a location that requires a sidewalk ramp per Metro standards and ADA guidelines.

CHAPTER THREE: EXISTING CONDITIONS

D. EXISTING BICYCLE FACILITIES

2008 Update note: Updates to the Existing Conditions for Bicycle Facilities can be found in Amendment 1—Section 5.

Safe bicycling facilities, including wide lanes and an absence of hazards, are needed for riding on roadways.

INTRODUCTION

As with pedestrian facilities, the presence of well-designed bicycle facilities also influences one's decision to bicycle for transportation. According to the *National Personal Transportation Survey*, 40% of all trips are less than two miles in length.[26] This is a practical distance for bicycling when well-designed and continuous bicycle facilities exist.

When riding in the street, bicyclists want enough space to comfortably operate. This usually means wider-than-typical travel lanes or bike lanes. They also look for the absence of hazards, such as debris and storm grates in which a bicycle tire can get stuck. At signalized intersections, bicyclists need to have detectors that sense their presence. The *Pedestrian Design Guidelines* and *Bicycle Design Guidelines*, Appendices B and C respectively, provide more detailed information on the characteristics of well-designed facilities.

"I do not like to hop into a car to go only a few miles, but have no choice."

INVENTORY OF EXISTING ON-STREET BICYCLE FACILITIES

Like many American cities, bicycles have not typically been a focus of Nashville's transportation planning. As a result, bicycle facilities are limited within the community. Though these facilities are sparse, they do provide effective bicycle access for localized areas and offer a foundation for future bikeway improvements. Each of these facilities receives use by the public and exemplifies how bicycle facilities can fit into the existing transportation network. Greenways constitute 13.8 miles of the existing facilities. Another 10.75 miles is made up of on-street bike facilities.

Facilities on two corridors comprise the approximately 10.75 miles of on-street bikeways that exist in Davidson County: the Davidson Street Bicycle Connector, and the state bike route on Highway 70S. The Davidson Street Bicycle Connector is a 5.5-mile corridor that connects the Shelby Bottoms Greenway, Shelby Park, the East Bank Greenway, and the Davidson County Courthouse via the Woodland Street Bridge. The facility includes bike lanes and signed shared roadways. The state bike route on Highway 70S is a signed shared roadway that begins near Interstate 40 in Bellevue and continues to the Cheatham County line. In addition, a total of 1.5 miles on Murphy Road and Magnolia Boulevard have been striped for bike lanes per the Pilot Bikeway Project, although pavement markings, signage and grate replacement have not been completed.

[26] http://www.bicyclinginfo.org/pp/benefits/tranben/index.htm

CHAPTER THREE: EXISTING CONDITIONS

E. EXISTING GREENWAY FACILITIES

INTRODUCTION

Over the last decade, Nashville has made great strides in the development of its greenway system. Metro's recently completed *Parks & Greenways Master Plan* identifies 290 miles of greenway corridors within Davidson County. The planned trail system is built on a framework of Davidson County's network of rivers, lakes and streams. Additional overland greenway corridors that are recommended enhance connectivity.

There are currently about 19 miles of greenway trails, eight of which are paved, multi-use trails. The remaining mileage consists of primitive foot trails. An additional 19 miles of paved trails are expected to be completed by 2004. Figure 3.9 illustrates the existing, developing and planned greenway projects in Davidson County.

INVENTORY OF EXISTING GREENWAY TRAILS & GREENWAYS IN DEVELOPMENT

Specific greenway projects that have been completed, or are currently in active development are described below.

BEAMAN PARK

Beaman Park is a 1,500-acre park located in the northwest portion of Davidson County. The master plan for the park specifies roughly two miles of paved trail and 12 miles of unpaved hiking trails. Phase One development of the park has been funded and design will begin in mid-2002. Although pedestrian and bicycle connections to the park have been conceptually planned, the trail system within the park itself will be internal and will not perform significant transportation functions.

CHARLOTTE PIKE GREENWAY SEGMENT

A greenway was built as part of the JDN/Wal-Mart Supercenter development on Charlotte Pike at River Road. The first phase of this project is approximately one-half mile in length.

EAST BANK GREENWAY

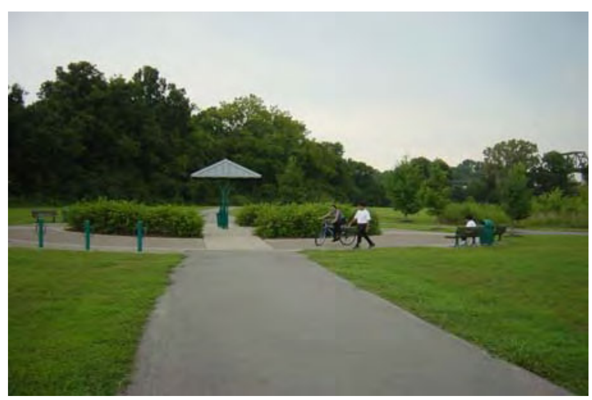
The East Bank Greenway is located on the Titans football stadium grounds, directly across the Cumberland River from downtown's Riverfront Park. The trail is approximately one half mile in length and includes a series of sculptures that conjure images of the East Bank's industrial heritage. It offers prime views of Nashville's skyline. This segment is not currently easy to access for non-motorized travelers.

HARPETH RIVER GREENWAY

The Harpeth River is considered to be one of the most ecologically diverse rivers within Tennessee. The Harpeth River Greenway corridor extends from the Warner Parks to the Cheatham County line. The corridor encompasses nearly 14 potential trail miles. An existing half-mile paved trail segment, known as the Bellevue Greenway, is located parallel to Morton Mill Road. Another half-mile trail segment, which is currently being designed, will connect to Old Harding Pike.

METROCENTER GREENWAY

The Metrocenter Greenway is currently being developed as a part of a Metrocenter Levee improvement project managed by the U.S. Army Corp of Engineers. It includes approximately three miles of trails and will incorporate



The Shelby Bottoms Greenway includes five of the 290 miles of greenway corridors in Davidson County.

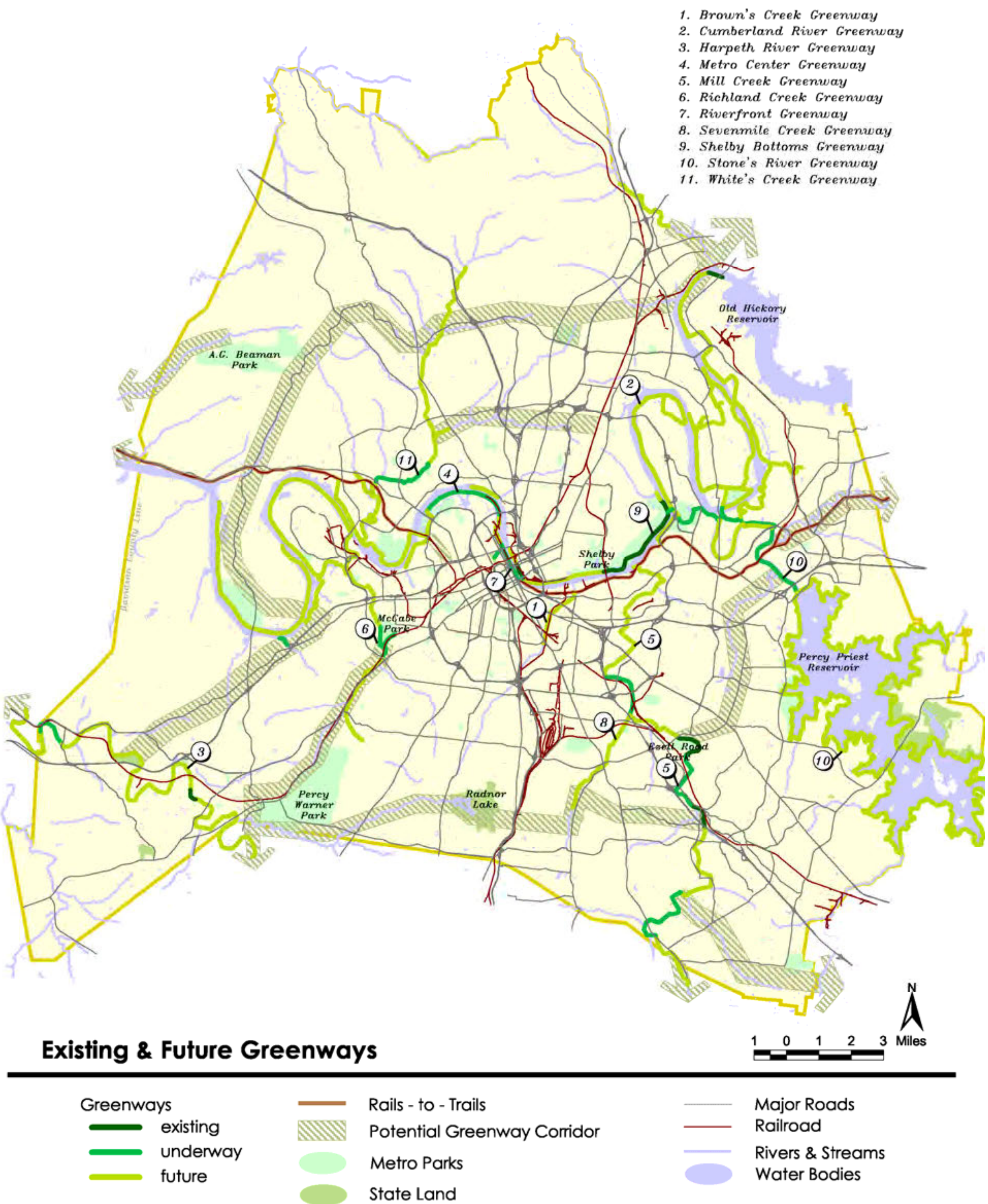


Figure 3.9: Existing & Future Greenways in Davidson County.

trailheads, shade structures, and public art. The greenway is easily accessible to the working population within the Metrocenter business park. The project is expected to be completed in 2002.

MILL CREEK GREENWAY

The Mill Creek Greenway plan consists of 18 miles of multi-use trails, extending from the Williamson County line to the Cumberland River. It passes through a wide variety of natural and urban conditions. Because development has encroached upon its northern segments, the creek creates significant flooding problems during heavy rains. Currently, a one-mile long paved trail segment is located within Ezell Park and a non-contiguous trail segment at the Antioch Community Center is nearing completion. A trail connecting these two segments has been designed and is funded. Construction should begin on this trail in 2003.

"I didn't realize how spoiled I had become and what I had taken for granted until I moved here and found that I could no longer go out my front door and run to anywhere and feel safe."

OLD HICKORY NATURE TRAIL

This trail is located adjacent to the Old Hickory Dam and consists of a one-third mile long paved trail and 1.2 miles of primitive pedestrian trails. The site is a part of the U.S. Corp of Engineers property, and not easily accessible to non-motorized travelers.

RICHLAND CREEK GREENWAY

The Richland Creek Greenway corridor is approximately five miles in length. This corridor has the ability to connect many West Nashville neighborhoods to the planned Cumberland River Greenway and the Lion's Head commercial area on White Bridge Road. Currently, a two-mile long trail segment is being designed for this corridor and is expected to be completed in 2003.

RIVERFRONT GREENWAY

The Riverfront Greenway is a 2.3-mile long trail that will connect Riverfront Park to the Metrocenter Greenway and include a spur to Bicentennial Mall. One mile of this segment, referred to as the Downtown Greenway, is currently under development and will be completed in 2003. The greenway will connect multiple downtown destinations and reclaim urban river frontage.

SHELBY BOTTOMS GREENWAY & NATURE PARK

Shelby Bottoms is an 810-acre park located a few miles east of Nashville's Central Business District. It is adjacent to Shelby Park and is easily accessible by many East Nashville neighborhoods. The trail system includes approximately five miles of paved, multi-use trails and seven miles of primitive trails that are open to foot traffic only.

SHELBY STREET BRIDGE

The Shelby Street Bridge has been an important connector between downtown and East Nashville for almost 100 years. It is currently being renovated as a pedestrian/bicycle bridge with future trolley use. It will provide an essential connection between the Riverfront Greenway on the west bank and the East Bank Greenway.

STONES RIVER GREENWAY

The Stones River Greenway corridor, which includes mileage around Percy Priest Lake, has the potential for nearly 57 miles of trails. Development of a 12-mile long trail segment has been funded and designed, and construction on the first phases of this segment is currently underway. This segment starts at the Percy Priest Dam and follows the Stones River to the Cumberland River. It then extends west through Two Rivers Park until it reaches Opry Mills on the banks of the Cumberland River. A greenway bridge will span the Cumberland and connect the Stones River trail to the Shelby Bottoms Greenway. The resulting continuous off-street facility will connect Hermitage, Donelson, East Nashville, and all points in between. Construction is expected to be completed in 2004.

Upstream from the Percy Priest Dam, the trail corridor roughly follows the shores of Percy Priest Lake, and continues into Rutherford County. The cities of Smyrna, LaVergne and Murfreesboro have all planned their respective Stones River Greenway segments, with several trail miles currently on the ground or in the design phase. Ultimately, this trail is planned to function as a major segment of a Middle Tennessee regional corridor connecting Murfreesboro to Clarksville, with Nashville as the central hub.

WHITES CREEK GREENWAY

The Whites Creek Greenway corridor consists of nearly 11 miles of potential trails that will connect the Whites Creek and Bordeaux neighborhoods with the greater greenway system on the Cumberland River. Development of a two-mile long trail segment has been funded and is currently in design phase. This segment will connect Hartman Park, a commercial area and library on Clarksville Pike, to a trailhead on Ashland City Highway. It is expected to be completed in 2004.

CHAPTER THREE: EXISTING CONDITIONS

F. EXISTING ROADWAY NETWORK

INTRODUCTION

More than any other public space, the roadway network impacts Nashville's citizens each and every day. Everyone is reliant on the network in one form or another as they engage in daily activities. Like many other U.S. cities, Nashville's roadway network has been designed primarily to efficiently move motor vehicles through the community. Accommodating pedestrian and bicycle traffic has, until recently, been much less of a priority. Sidewalks are frequently not present along Nashville's streets and many of those that do exist are substandard or in poor condition. Bicycle accommodations, such as bike lanes and traffic signals that detect bicycles, are conspicuously absent.

EXISTING ROADWAY NETWORK

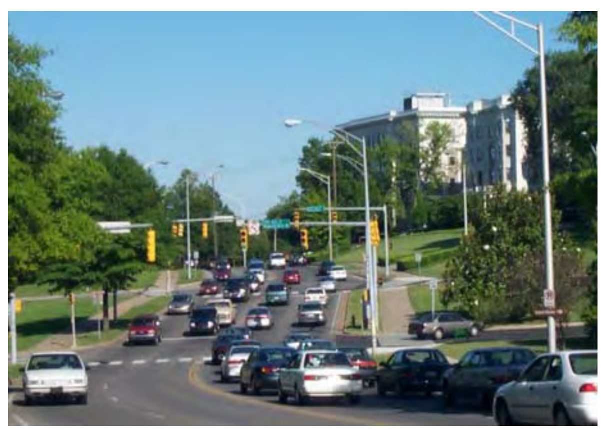
As Figure 3.10 illustrates, Nashville's roadway network forms a radial pattern emanating from the downtown core. The network comprises a hierarchy of streets that is classified according to function. While the *Major Street Plan*, currently in development, may refine the existing classification system, the new system will fit within the general hierarchy of classifications described below.

LIMITED ACCESS

Roads classified as limited access are more commonly understood to be freeways or expressways. These roads are designed to carry large volumes of traffic at high speeds across long distances. Access is controlled through the use of grade-separated interchanges. Generally, bicyclists and pedestrians are prohibited from using limited access roads. However, some interstate highway segments in the United States permit bicycle use, and many local and state–controlled freeways and expressways permit bicycles when the facility provides a connection between destinations that cannot be provided via surface streets. In addition, the wide right-of-way that is typically associated with limited access roads can provide opportunities for multi-use paths that parallel the roadway but are separated by a structural barrier or significant buffer. Interchanges also often present barriers to pedestrians and bicyclists traveling on surface streets. However, these type of barriers can be minimized through appropriate design. Examples of limited access roadways in Davidson County include Briley Parkway, Ellington Parkway, Interstate 40, Interstate 440 and Interstate 65.

MAJOR ARTERIAL

Roads classified as major arterials are designed to carry moderate to high traffic volumes and to serve through traffic. Major commercial land uses are typical along these corridors. Like motorists, bicyclists and pedestrians want the same direct access to destinations that major arterials provide. Accordingly, major arterials will attract significant pedestrian and bicycle activity. Current barriers to pedestrian and bicycle travel on major arterials, particularly the older arterials in commercial areas, include the lack of access management, excessively wide crossings, or few pedestrian and bicyclist provisions at intersections. Examples of major arterial roadways in Davidson County include Murfreesboro Road, Lebanon Pike, Gallatin Road, Franklin Pike, Charlotte Pike, Hillsboro Road, and Old Hickory Boulevard.



Nashville's existing roadway network consists of five general street classifications. Wedgewood Avenue is an example of a major arterial.

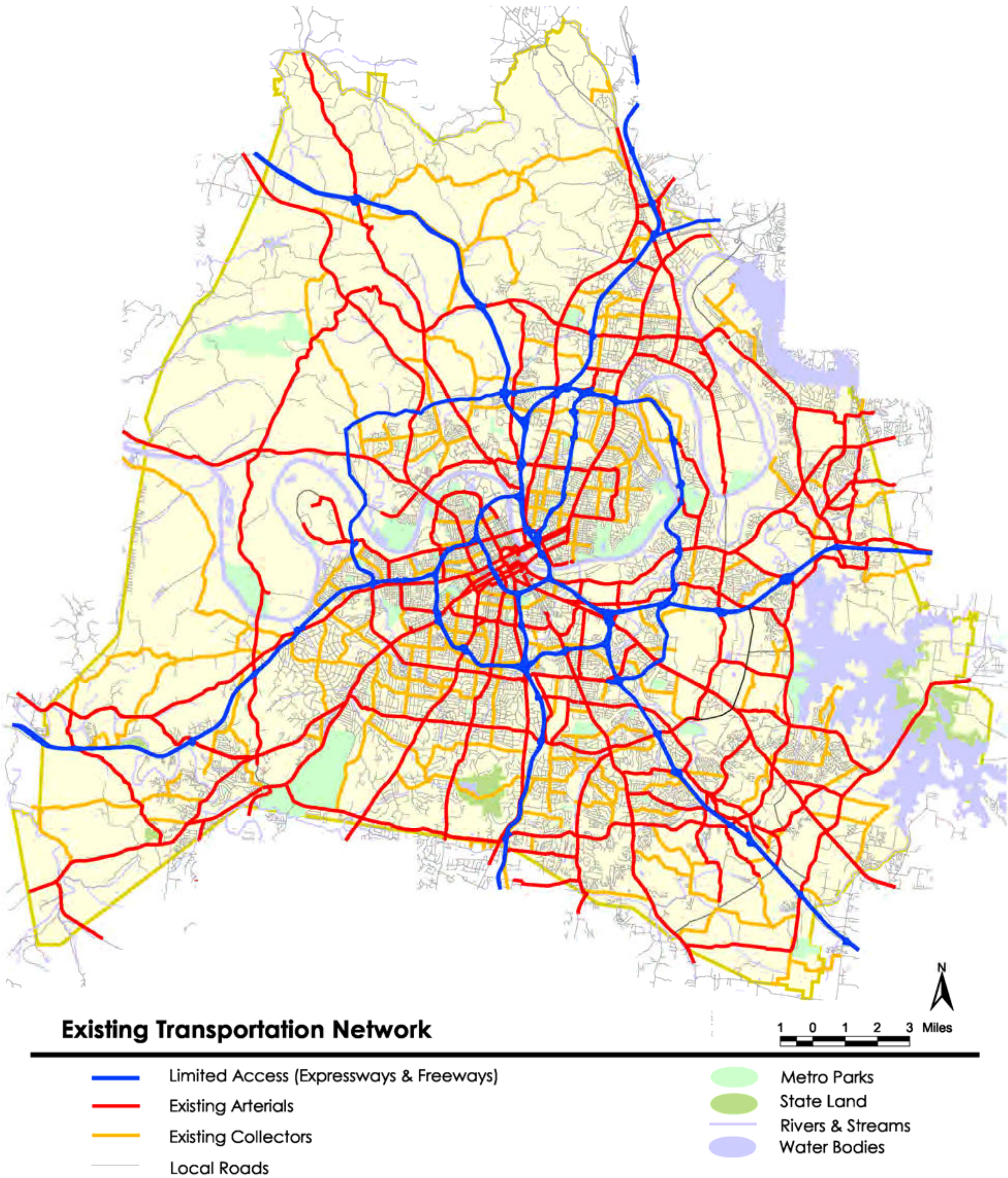


Figure 3.10: Existing Transportation Network in Davidson County.

MINOR ARTERIAL

Roads classified as minor arterials are similar to major arterials, but they often serve lower traffic volumes over shorter distances. Like major arterials, these roads are typically paralleled by commercial development in urbanized areas and are desirable corridors for pedestrian and bicycle travel. Examples of minor arterial roadways in Davidson County include Dr. D.B. Todd Boulevard, Brick Church Pike, Woodmont Boulevard, Blue Hole Road and Centennial Boulevard.

COLLECTOR

Roads classified as collectors have the purpose of moving traffic between arterials and local streets. Collectors are so named because of their function in "collecting" traffic and directing it to major roadways. A secondary function of collectors is to provide access to abutting land uses. Lower speeds and traffic volumes characterize collectors. This classification is well-suited to pedestrian and bicycle travel because it typically provides a connection between residential and commercial areas. It also typically has traffic speeds and volumes that are within the comfort range of most non-motorized travelers. Examples of collector roadways in Davidson County include Lynnwood Boulevard, Belmont Boulevard, James Avenue, Buchanan Street, Ewing Drive and McMurray Drive.

Belmont Boulevard is an example of a collector street.

LOCAL

Roads classified as local are low-volume, low-speed streets that mainly serve local uses, typically residential uses. They can easily accommodate pedestrians and cyclists, and typically do not warrant on-street bicycle facilities. Sidewalks are desirable on local streets. However, when a local street begins to function more like a higher classification roadway because of higher traffic speeds and volumes, walking and bicycling becomes difficult.

CHAPTER THREE: EXISTING CONDITIONS

G. EXISTING POLICIES, PRACTICES, & PROGRAMS THAT AFFECT PEDESTRIAN AND BICYCLE TRAVEL

INTRODUCTION

A range of local, state, and federal policies influence the funding, planning, and design of pedestrian and bicycle facilities in Nashville. Nashville's existing pedestrian and bicycle system is the result of many long-standing policies and practices. The effects of several more recent policy changes, particularly those on the local level, are just beginning to be seen.

METROPOLITAN GOVERNMENT OF NASHVILLE & DAVIDSON COUNTY

SUBDIVISION REGULATIONS (Adopted by MPC)

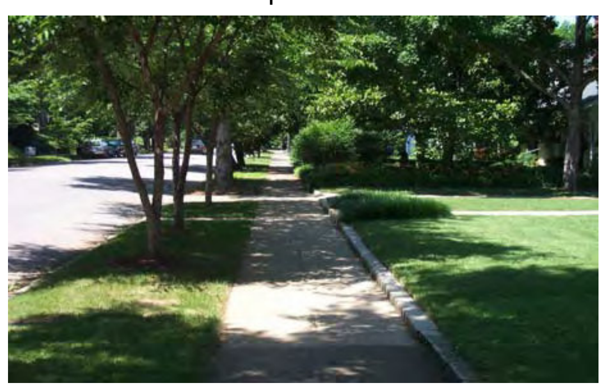
In January 2002, the sidewalk provisions (Section 2-6.1) of the *Subdivision Regulations* were updated. These provisions apply to new streets and are summarized as follows:

- Sidewalks are required on all new streets, except in residential districts with lots of 20,000 square feet or greater.
- Sidewalks are required on both sides of new streets, except in specified, unusual circumstances.
- All sidewalks must be constructed in the public right-of-way or in pedestrian easements per Metro's design standards.
- Sidewalks are to be at least five feet wide with a minimum four-foot wide planting strip.
- Vertical obstructions are not permitted in the sidewalk, except upon approval by Metro Public Works.
- Surface obstructions, such as tree grates, must be placed so as to maintain at least four feet of clear concrete sidewalk surface, unless otherwise approved by Metro.
- ADA-compliant ramps are required at all street crossings.
- Metro may require a public pedestrian access easement to facilitate pedestrian access between a public right-of-way and nearby destinations.

The *Subdivision Regulations* also contain right-of-way width standards for minor local, local, collector, rural, and divided roadways. With the exception of rural residential streets, all of the roadways require five-foot wide sidewalks with planting strips of at least four feet wide. However, the *Subdivision Regulations* do not recognize the need for wider sidewalks and wider planting strips for higher street classifications. Sidewalks are not required on rural streets.

The existing cross-sections do not specify bicycle facilities. Only a couple of the existing street cross-sections have adequate width to accommodate standard bicycle facilities. In order to provide bicycle facilities on the other roadway cross-sections, additional right-of-way width must be obtained or changes must be made to the other cross-sectional elements.

Section 2-7.5 of the *Subdivision Regulations* addresses Open Space Conservation Easements. This provision requires the dedication of a public access easement on waterways identified as greenway corridors in the *Parks and Greenways Master Plan*. In general, easements must be 75 feet wide, measured inland from the floodway.[27] If the primary function of the easement is as an urban transportation connector, then a minimum width of 25 feet is required.



The new Subdivision Regulations require sidewalks to be at least five feet wide, with a planting strip of at least four feet wide.

[27] Metro Nashville and Davidson County, *Subdivision Regulations*, Metropolitan Planning Commission, 2002.

<u>ZONING REGULATIONS (Adopted by Metro Council)</u>

Metro's *Zoning Regulations* were most recently updated in July 2001. The sections of this document that affect pedestrian and bicycle facilities design are described below.

Section 17.12.040.E.26: Screening Walls or Fences establishes standards for the height and transparency of fences. A primary intent is to ensure that tall opaque fences are not installed near intersections. This provision helps to ensure clear sight lines for all public right-of-way users. Otherwise, only fence height is addressed. The requirements do not include horizontal setback requirements from property lines. This issue is important because a fence immediately abutting a sidewalk effectively reduces the usable width of the sidewalk by one to two feet. Pedestrians tend to create "shy" space between themselves and adjacent structures.

Section 17.16.030B: Mobile Home Dwellings requires four-foot wide sidewalks on one side of all private drives in Mobile Home Dwelling districts.

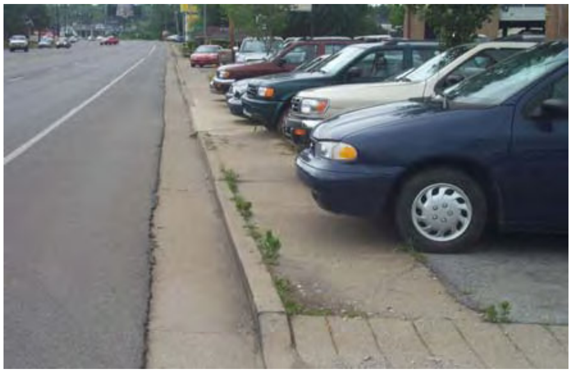
Section 17.20.040: Adjustments to Required Parking identifies conditions in which parking requirements can be reduced by up to a total of 25% within the Urban Zoning Overlay. The parking requirements for a non-residential use can be reduced by 10% when the use is close to mixed-use and residential areas that have complete sidewalk systems in place. A 10% reduction can also be made for uses near a transit route. A traffic study illustrating that the design of a mixed-use development will result in decreased parking demand may also serve as the basis for reduced parking requirements.

Section 17.20.060.H: Parking Area Design Standards includes a provision that requires a curb or other physical barrier to ensure that vehicles do not encroach into usable sidewalk width.

Section 17.20.120: Provision of Sidewalks is summarized as follows:

- Installation of sidewalks on existing streets is required only in multi-family and non-residential developments.
- For multi-family and non-residential developments, sidewalks are required on existing arterial and collector streets when sidewalks are substandard or non-existent. New sidewalks, constructed to standard, are required on any street classification when sidewalks are present anywhere on the same block.
- Sidewalk requirements are waived when the development consists of an expansion to an existing development that results in an increase in value or square footage of up to 25%, or up to 50% over a five-year period.
- On-site, continuous, internal sidewalks that connect building entrances to parking areas, site boundaries and public

The issue of horizontal setback of fences and structures from sidewalks should be addressed to allow pedestrians adequate room to comfortably walk.



The Zoning Regulations require a curb or barrier to prevent cars from encroaching onto the sidewalk.

transportation are required. These sidewalks are required to be at least five feet wide in non-residential developments and at least four feet wide in residential developments.

Section 17.20.180: Visibility is intended to prohibit visual structural obstructions on private property near intersections, which improves safety for all public right-of-way users. However, Metro's own existing practices frequently result in the presence of signal poles, signal boxes and other visual obstructions on street corners. Additional guidance is necessary to minimize the presence of Metro-owned obstacles at corners.

"The real issue is good urban design."

The Sidewalk Standards in the *Zoning Regulations* result in a significant percentage of existing streets, mostly local streets and streets in single family residential districts, that do not get sidewalks when development occurs along them. If sidewalks were to be required on more street classifications and in more zoning districts, the net increase in sidewalk mileage would be significant and would reduce the burden on Metro to provide sidewalks where private developers have not. The exemptions from sidewalk requirements during expansions may also result in some missed opportunities. Similarly, the on-site sidewalk widths required by this provision do not always provide adequate space for pedestrian traffic and can present challenges to disabled persons. Perhaps more stringent sidewalk requirements and a more thorough review process would result in fewer sidewalks that have marginal safety and accessibility values. Finally, the sidewalk requirements in the *Zoning Regulations* are not consistent with those in the *Subdivision Regulations*.

Section 17.36.080: Nonresidential & Mixed-Use Standards applies to PUDs and requires that the individual land components of the master plan be connected with "safe and convenient pedestrian linkages". The Planning Department is increasing their scrutiny of PUDs for compliance with this standard.

Section 17.36.130: Greenway Overlay District articulates the provisions for this overlay district type and offers incentives for dedicating land for greenway purposes. Because greenway overlay districts require a zone change to be applied, Metro has typically used the more streamlined Open Space Conservation Easement provisions of the *Subdivision Regulations* to accomplish similar goals.[28]

MOBILITY 2010: A TRANSPORTATION PLAN FOR NASHVILLE & DAVIDSON COUNTY

Mobility 2010 was adopted in 1992 and includes the Major Street Plan. It will be superceded by a new *Major Street Plan*, which is currently being developed.

The introductory text of *Mobility 2010* acknowledges that "high occupancy vehicles . . . and other alternatives, such as bicycle and walking, will provide a significantly greater amount of the mobility needed in the future". However, the policies, recommendations and design standards that make up the bulk of the plan are primarily directed toward maximizing automobile travel.

Currently, *Mobility 2010* provides roadway cross-sections and right-of-way widths for freeways, expressways, and arterials. Freeways, expressways, and rural arterials have ten-foot wide paved shoulders and no sidewalks. Urban

[28] Metro Nashville and Davidson County, Zoning Regulations, Metro Council, 2001.

arterials, one-way arterials, and scenic arterials include a ten-foot wide area on each side of the travelway that is designated for the construction of sidewalks and planting strips. However, most of these classifications warrant sidewalks and planting strips that are wider than the area allocated by *Mobility 2010*.

Mobility 2010 does not include sidewalk design standards. The area designated at the edges of travelways can accommodate other existing sidewalk design requirements, although higher roadway classifications warrant additional width for pedestrian facilities.

Mobility 2010 does include a design detail for "flared intersections" with wide turning radii and "pork chop" islands. Although such a configuration can incorporate pedestrian facilities, this design encourages motor vehicle speeds that make yielding to pedestrians difficult. Furthermore, the design encourages drivers to look to their left for on-coming traffic rather than looking for pedestrians who may be crossing in front of them.

Mobility 2010 does not include provisions for bicycle lanes, wide outside lanes, and shoulders designed for bicycle use. However, with some reallocations of space, existing right-of-way widths could accommodate bicycle facilities in some cases.

MAJOR STREET PLAN

The *Major Street Plan* is currently in development. It will replace *Mobility 2010*, and will include new cross-section design standards for streets. The *Strategic Plan for Sidewalks & Bikeways* planning team has provided comments regarding draft cross-sections in the *Major Street Plan* to help ensure that pedestrian and bicycle accommodations are incorporated into the cross-sections per the recommendations in the *Strategic Plan for Sidewalks & Bikeways*.

PEDESTRIAN AND BICYCLE FACILITIES DESIGN STANDARDS AND REGULATIONS

The Department of Public Works maintains engineering drawings for residential and non-residential streets (drawings ST-250 through ST-263). These construction details consistently require that sidewalks have a minimum width of five feet and have a four-foot wide planting strip. However, higher street classifications, such as collectors and arterials, may warrant wider sidewalks and wider planting strips.

Metro does not currently have bicycle parking requirements, nor does it have design standards for racks and lockers. In addition, Metro has not adopted any specific design standards for bicycle facilities. The design of existing facilities, such as the Davidson Drive bike lanes and the planned Pilot Bikeway Project, were guided by AASHTO and MUTCD standards.

The engineering drawings that are maintained by the Metro Department of Public Works include a design cross-section for rural residential streets (drawing ST-255). This standard requires an eight-foot wide shoulder with a double bituminous surface. However, such a surface is substandard for shoulder bikeways. In contrast, Metro's current storm grate design standards are compatible with bicycle-friendly design.

Storm grates with bars that are parallel to the flow of traffic can potentially trap narrow bicycle wheels.

MUNICIPAL CODE OF LAWS

There are several sections of Metro's *Municipal Code of Laws* that affect pedestrian and bicycle facilities. These sections are described below.

Chapter 12.60 of *Title 12 ("Vehicles and Traffic")* of Metro's *Municipal Code of Laws, which regulates bicyclists,* was re-written in 1999. The bike code is a set of basic rules establishing the legal method for cyclists to share the road with drivers. Metro grants cyclists the same rights and responsibilities as drivers and establishes that cyclists shall observe the same rules of the road as other vehicles. Several of the statues in the code are basic, "common sense" standards, such as "cyclists shall not cling to vehicles" and "a bicycle shall not have more riders than the bicycle is designed to carry". The code requires front and rear lamps on bicycles at night, and prohibits carrying packages that obstruct a cyclist's grip on the handlebars. It establishes circumstances under which a cyclist may ride away from the right curb (when passing another cyclist, making a left turn, or avoiding debris) and makes it allowable to bicycle on shoulders. It also lays out the rules for bicycle lane use, including when a driver or bicyclist may cross the bike lane line.

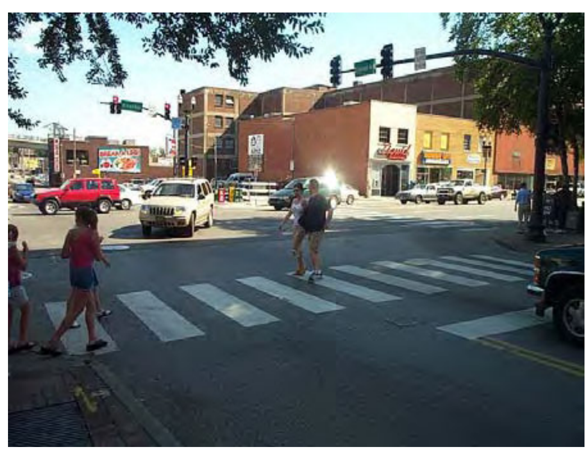
There are some points upon which Metro's code differs from other states and local municipalities from around the country. Metro allows cyclists to utilize sidewalks outside of business districts. When cyclists utilize sidewalks, they must yield to pedestrians. However, they are afforded the same rights and responsibilities as pedestrians when they are on the sidewalk. Some jurisdictions do not allow cyclists to utilize the sidewalks unless they are younger than a certain age or unless their wheels are smaller than a certain radius (about the size of a child's bicycle wheel). Similarly, Metro has a helmet law for child cyclists under 16, but not for adult cyclists. Some jurisdictions have adopted helmet laws for cyclists of all ages. Finally, Metro holds parents and guardians liable if the children under their legal care violate any chapter of Title 12.

Chapter 12.52 of *Title 12* of Metro's *Municipal Code of Laws* addresses pedestrian responsibilities and rights. Pedestrians must obey all traffic laws and traffic control devices, and they must yield to emergency vehicles at all times. When utilizing a marked crosswalk, pedestrians should stay to the right half of the crosswalk. Unless otherwise posted, crosswalks are present at all roadway intersections, regardless of whether or not they include pavement markings. At intersections without traffic control signals, vehicle operators must always stop or yield to crossing pedestrians. Pedestrians always have the right-of-way in marked mid-block crosswalks, but must yield to vehicles when crossing at an unmarked mid-block location. Many jurisdictions state that vehicles must yield the right-of-way to pedestrians at all times, regardless of the presence of a crosswalk or crosswalk markings. However, these jurisdictions typically also state that pedestrians must exercise due care when crossing streets. Metro does allow sight-impaired pedestrians the absolute right-of-way at all times and encourages drivers to yield to the pedestrians on sidewalks.[29]

Section 13.08.050 requires property owners to keep vegetation and other obstructions from encroaching into the public right of way, as well as within twenty-five feet of any intersection. Encroaching vegetation reduces the usable width of a sidewalk, and can make some sidewalks completely impassable. Although this law is on the books, the problems caused by encroaching vegetation remain pervasive throughout Metro.

Section 13.32.030 requires property owners in the Urban Services District to keep land immediately adjacent to public rights of way, including sidewalks, in a condition that does not create a hazard for those using the public right of way. Hazards may include holes, dangerous grades, and obstructions.

Section 13.32.040 requires property owners to clear adjacent sidewalks of snow.



Within Metro, pedestrians have the right-of-way in crosswalks.

[29] Metro Nashville and Davidson County, *Municipal Code of Laws*, 2002.

EDUCATION & ENCOURAGEMENT PROGRAMS

COMMUNITY HEALTH & WELLNESS TEAM (CHW)

The Metro Health Department is the lead agency for CHW, a coalition with membership representing health-related organizations, hospitals, neighborhood associations, the AARP, the YMCA, and other interest groups. CHW seeks to reduce cardiovascular disease by raising the community's awareness of, and encouraging participation in physical activities, particularly walking.

CHW's signature event is Walk Nashville Week, which is held each fall. A range of activities are targeted to different populations, and include Walk for Active Aging, Walk-to-Titans Game Day, and Walk to School Day. CWH also supports neighborhood walkabilty audits.

WALK/BIKE NASHVILLE (W/BN)

Founded in 1997, W/BN is a citizen-based advocacy group whose efforts are directed toward making the Nashville area a more pedestrian and bicycle-friendly community. Activities have included sponsorship of events such as Bike-to-Work Day and co-sponsoring Walk to School Day. In addition, the organization has organized technical workshops, which are targeted at Metro officials and the public, to raise awareness of pedestrian and bicycle-related planning and design issues. Finally, W/BN has actively communicated with Metro government, the MPO, and the media on public projects, plans, and initiatives that have bicycle and pedestrian impacts.

NASHVILLE AREA METROPOLITAN PLANNING ORGANIZATION (MPO)

Nashville's MPO, like other MPOs, serves as a regional transportation planning agency and as a channel for disbursement of federal grant funds from the TEA-21 and other federal sources. MPOs gained considerable authority with the passage of the ISTEA in 1991, which was reauthorized by Congress in 1998 as TEA-21. TEA-21 allows MPOs to determine the best mix of transportation projects that meet their region's needs. This mix is most often determined through a long range transportation plan. Many MPOs adopt generic statements about encouraging bicycle and pedestrian travel, but there is no formula for determining the amount of funds allocated to these modes. Nationally, federal funds expended on bicycle and pedestrian projects have risen significantly in the past 10 years, indicating that MPOs are increasing the percentage of funds used towards these projects.[30]

Nationally, significant funding for bicycle and pedestrian facilities also comes from state sources. Several urban areas throughout the country, especially those having non-attainment status with the EPA, have air quality management districts that are responsible for disbursing state funds that may have come from vehicle registration surcharges or other gas taxes that are earmarked for bicycle and pedestrian projects. Spending priorities are determined on a statewide or regional level.

LONG RANGE TRANSPORTATION PLAN

The MPO's 1999 *Long Range Transportation Plan* (LRTP) establishes sound principles and objectives for development of a multi-modal transportation system. The LRTP focuses its discussion of bicycle and pedestrian facilities on their use for short "intra-zonal" trips, but it does not specifically identify bikeways or walkways as commuting alternatives. The LRTP acknowledges the benefits of providing options to reduce the number of vehicles on the road. However, the specific options that it outlines are HOV lanes and transit alternatives. The LRTP also emphasizes land use patterns that are conducive to multi-modal transportation – citing clustered developments, mixed-use developments, and alternative modes of transportation for short trips as ways to link land use and transportation. Overall, the LRTP recognizes the innate connections between land use and transportation and the desirability of encouraging land use strategies that will reduce dependency on single-occupancy vehicles. Its overall transportation strategy is to provide

[30] Federal Highway Administration, *Transportation Equity Act for the Twenty-First Century*, 1998. http://www.fhwa.dot.gov/hep10/biped/bpbro.html

To reduce the number of vehicles on the road, the LRTP suggests transit options and HOV lanes for commutes, and bicycle and pedestrian facilities for short trips.

transit options and HOV lanes for commuting and to provide bicycle and pedestrian facilities for shorter trips.

The list of recommended transportation projects found in the appendices of the LRTP are primarily for road widening and new roads.[31] When the plan was adopted in 1999, few of the member jurisdictions in the MPO had completed bicycle or pedestrian plans, and few were requesting funds for pedestrian or bicycle-related projects. In more recent budget years, several new pedestrian and bicycle-related projects have been included in the MPO's annual Transportation Improvements Program (TIP).

STATE OF TENNESSEE

TENNESSEE DEPARTMENT OF TRANSPORTATION

Funding

The Tennessee Department of Transportation (TDOT) administers federal Transportation Enhancement Program TEA-21 funds. Historically, a significant percentage of those funds have been used directly by TDOT for various state-focused projects and programs. Such programs have included gateway welcome centers on interstates, an interstate wildflower program, and preservation of historic sites. Bicycle and pedestrian-related uses of these funds have been directed at signed state bike routes, and to encourage local communities to develop their own greenways. Perhaps the best-known Enhancements-funded project in the state is the Tennessee Bicentennial Mall, a history park and urban redevelopment project in downtown Nashville.

Additional Enhancements funds are granted to local communities and other state agencies on an irregular schedule. Selected projects are to fall into one or more of the eligible activities as defined by federal legislation. Recent projects in Nashville that have received Enhancements funds from TDOT include the implementation of the sidewalk recommendations in the *21st Avenue/Broadway Transportation Study*, a greenway bridge to span the Cumberland River and connect the Shelby Bottoms Greenway to the Stones River Greenway, and streetscape improvements on Nolensville Road.

Other sources of TEA-21 funds that the FHWA has determined can be used for bicycle or pedestrian projects, such as the Hazard Elimination Programs, and Urbanized Area Formula Grants, have not historically been directed toward bicycle or pedestrian improvements. There is no dedicated TDOT funding from state sources for pedestrian or bicycle projects.

[31] Metro Nashville, *2025 Nashville Area Long Range Transportation Plan*, 1999.

Policies and Practices

TDOT is currently developing a written policy statement with regard to the incorporation, design, and funding of pedestrian and bicycle facilities in TDOT-funded projects. In the past, bicycle and pedestrian facilities have not been routinely incorporated into state road projects. TDOT officials have publicly stated that they will incorporate such facilities into a project if the local jurisdiction has an adopted plan that calls for the facilities. In practice, the cost of adding such facilities has normally fallen upon the local jurisdiction, rather than being incorporated into the overall cost of the project. Oddly, even some state-designated bike routes have not added bicycle facilities during repaving or improvement projects. Other practices, such as not replacing substandard storm grates during repaving, indicate that heightened awareness of bicycling issues is still needed.

Design Standards

TDOT's design standards are found in the *Standard Roadway & Structure Drawings* manual. There is no specific consideration of bicycles in the design standards, although some roadway cross-sections have widths that can accommodate bicycle facilities. Typically, the TDOT standards for shoulders do not require a surface appropriate for bicycles. Urban roadway cross-sections include minimal sidewalk accommodations which, in most cases, consist of a four and one-half foot wide sidewalk next to the curb. The guide also contains curb ramp design details.

TENNESSEE STATE PARKS

Tennessee State Parks administers funds from TEA-21's Recreation Trails Program, for which greenway trails qualify. In addition, state funds have also been granted to local jurisdictions through the Local Parks & Recreation Fund (LPRF). LPRF grant guidelines give high priority to trail projects. Projects funded through these grants must meet generally accepted greenway design standards.

CONCLUSION

While Tennessee has established a commitment to greenway development, it has not exhibited

Transportation Enhancement Funds in the past have been allocated to such projects as the Tennessee Bicentennial Mall.

significant interest in accommodating pedestrians and bicyclists on streets. As discussed below, federal policy gives states a broader mandate to "mainstream bicycle and pedestrian travel." With this *Strategic Plan for Sidewalks & Bikeways*, Metro is making a commitment to significantly increase the number of street-based pedestrian and bicycle facilities. This commitment will position Metro to meet the FHWA's goals of increasing non-motorized modes to 15% of all trips, and reducing the number of non-motorized users killed or injured in crashes by 10%.[32] Given the volume of state routes in Davidson County and TDOT's control over many funding sources, cooperation from the State of Tennessee will be necessary for Metro to achieve these goals.

FEDERAL GOVERNMENT

FUNDING

TEA-21 is the primary federal funding source for bicycle and pedestrian projects. The Federal Aid Highway Program funds bicycle projects that are "principally for transportation, rather than for recreation, purposes". However, "transportation purposes" are broadly defined as facilities that have an end-point that is different from their point of origin. There are a dozen different funding sources available through TEA-21, which are described in detail in Appendix F.

While TEA-21 prioritizes bicycle and pedestrian projects that will benefit the transportation system as a whole (a circular path within a park, for instance, performs only recreation functions),

[32] Federal Highway Administration, http://www.fhwa.dot.gov

it does not define "transportation" so narrowly that recreational trips are not eligible for funding. The TEA-21 legislation allows states some leverage to set their own priorities in terms of what types of bicycle and pedestrian projects they will fund. Some states have utilized their TEA-21 dollars to fund projects that will primarily benefit commuters. These grant programs require that states estimate the air quality benefit of their projects.[33]

POLICY

The FHWA's *Accommodating Bicycle and Pedestrian Travel: A Recommended Approach* outlines the federal government's bicycle and pedestrian planning policy. The document establishes overall policy as well as performance measures. Many municipalities have adopted this statement as their own and implemented the action items as the core of their bicycle and pedestrian master plans.

One of the objectives of TEA-21 is to integrate bicycle and pedestrian travel into the mainstream transportation system. The legislation asserts that bicycle and pedestrian facilities should offer viable and safe transportation opportunities. TEA-21 requires that bikeways and pedestrian walkways be considered as the rule, rather than the exception, in all federally funded transportation projects. At the very least, transportation projects that receive federal dollars must be designed with the assumption that bicyclists and pedestrians will utilize the facilities. The design of such projects should not preclude bicycle and pedestrian access, and the Secretary of Transportation cannot approve any project that severs a major bicycle or pedestrian corridor without offering an alternative route. If bicycle and/or pedestrian access will not be provided in a federally funded project, there must be extensive documentation supporting the decision. *Accommodating Bicycle and Pedestrian Travel* provides a list of instances when bicycle and/or pedestrian facilities may be excluded. The primary circumstance in which pedestrian and bicycle facilities may be excluded is when the facilities would equal more than 20% of the total documented project cost.[34]

DESIGN

The AASHTO's *Policy on the Geometric Design of Highways and Streets*, known as the Green Book, and the *Guide to the Development of Bicycle Facilities* offer design guidance for accommodating bicycle and pedestrian facilities into transportation projects. There is a similar guide for the design of pedestrian facilities that was published in March 2002. This publication is called the *Pedestrian Facilities Users Guide—Providing Safety and Mobility*. Although the AASHTO policy guides are not federal documents, they are the most widely-accepted national standards for roadway and bikeway design.

For potential liability reasons, many local jurisdictions are hesitant to approve projects that do not comply with the standards found in these documents. In fact, the Green Book offers greater flexibility than is often assumed. In 1997, the FHWA published *Flexibility in Highway Design*. The purpose of this document is to provide additional guidance on accommodating contextual issues such as the natural and built environment; historic, cultural and community features; and access for "other" modes of transportation.

The *Guide to the Development of Bicycle Facilities* outlines planning principles and minimum standards for bicycle lanes, shared-use roads, and off-street trails, signage, pavement markings, and other guidance. Many local communities adopt policies that refine or expand upon these minimum standards.

The MUTCD addresses signage, signals, pavement markings, and other traffic control devices. Guidance specific to pedestrians and bicyclists is included. MUTCD was developed jointly by the FHWA, AASHTO, the Institute of Transportation Engineers and American Traffic Safety Services Association and is accepted nationally as the standard for traffic control devices.

[33] Federal Highway Administration, *Transportation Equity Act for the Twenty-First Century*, 1998. http://www.fhwa.dot.gov/hep10/biped/bpbro.html

[34] http://www.fhwa.dot.gov/environment/bikeped/design.htm

CHAPTER FOUR: ANALYSES

A. BICYCLE COMPATIBILITY ASSESSMENT

INTRODUCTION

Through public input and the application of standard bikeway network planning principles, streets throughout Metro Nashville were identified as potential corridors for bicycle travel. Each of the identified streets was assessed in order to determine the feasibility of adding bicycle facilities to the streets and to determine the suitability of the streets in their existing condition for bicycle travel. The feasibility assessment guided the development of the recommended countywide Bicycle Facilities Vision Map. This map is discussed in Chapter Five. The suitability assessment resulted in a map that can be immediately used by bicyclists to help them in selecting routes for travel that are within their own comfort range and skill level, under existing street conditions. This suitability map, which is shown in Figure 4.1 was developed using the Bicycle Compatibility Index (BCI).

The BCI, which was developed by the FHWA, is a quantitative process by which the compatibility of a street with bicycle travel can be objectively evaluated. The BCI predicts the overall comfort level rating of a bicyclist for a given roadway segment using eight variables, or characteristics, plus adjustment factors. The characteristics for which data were collected are those that a bicyclist typically uses in assessing the "bike friendliness" of a street.

Streets were evaluated to determine their suitability for bicycle facilities.

BICYCLE COMPATIBILITY ASSESSMENT

Each identified street was divided into segments that have uniform characteristics. For each segment, data on the following characteristics were gathered:

- Presence of bike lanes or paved shoulders
- Width of bike lane and shoulders
- Width of the curb lane
- Volume of traffic in curb lane and volume of traffic in other lanes in the same direction
- Speed of traffic
- Presence of parallel parking
- Character of roadside development (residential or other)

The adjustment factor accounts for three additional operational factors: truck traffic volume, parking turnover, and right turn volume.

The collected data were inserted into the BCI formula and each street segment was scored. The resulting score represents how compatible each street segment is for bicycle facilities. Each segment was rated based on the following categories:

- Most suitable
- More suitable
- Suitable
- Less suitable
- Least suitable

About 338 miles of roadway were evaluated using the BCI. Data were collected at non-intersection locations. Accordingly, the BCI map does not reflect conditions found at intersections. The BCI rating for each inventoried road segment is presented in Appendix E.

As illustrated in Figure 4.2, of the inventoried roadway miles, less than 1% are identified as most suitable, 5% are identified as more suitable, 19% are identified as suitable, 46% are identified as less suitable, and 29% are identified as least suitable. Although the BCI illustrates that most of Nashville's roads, in their current condition, are not well-suited to bicycle travel,

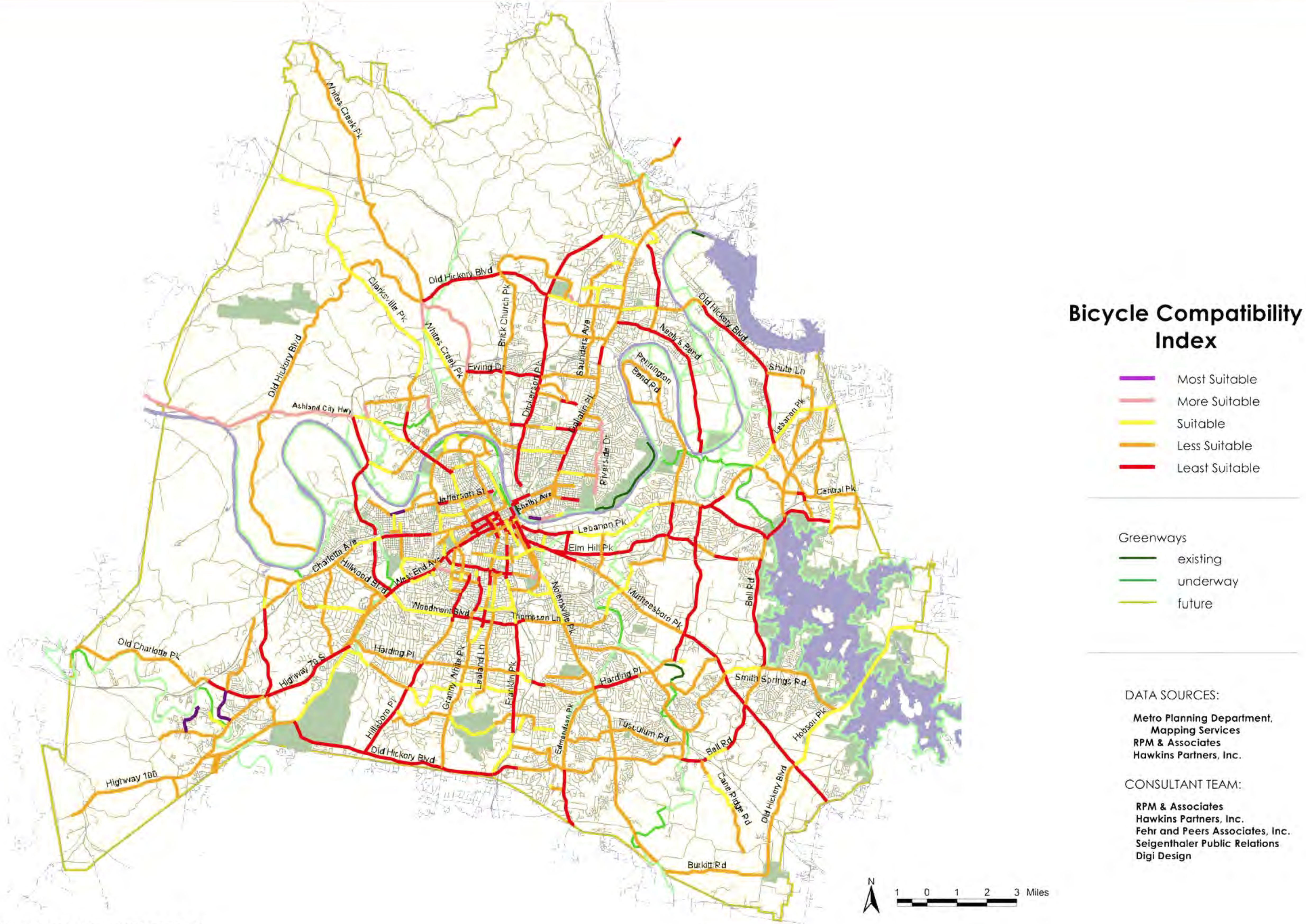


Figure 4.1: Bicycle Suitability Map.

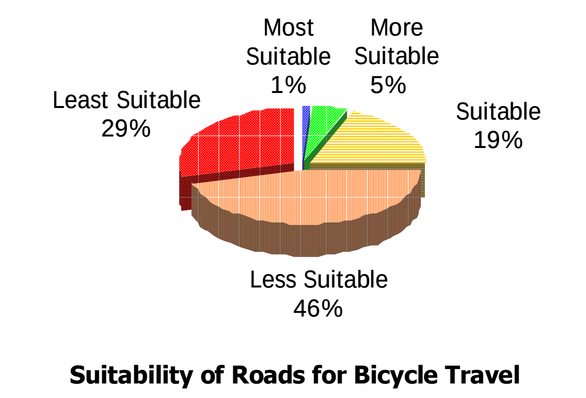


Figure 4.2: The results of the bicycle facility suitability assessment for the identified roadways.

the resulting map can be used immediately by bicyclists to assist them in selecting preferred routes.

It is important to note that the BCI indicates how compatible a street currently is for bicycle travel, not how desirable or easy it is to install bike facilities on that street. For this project, the BCI was used to establish a baseline for how compatible Nashville's streets are for bicycle travel. The results of the BCI were also beneficial in identifying potential bikeways to be included in the Bicycle Facilities Vision Map and in the Phase I Bicycle Facilities Recommendations Map.

Many of the identified roadways can be enhanced to significantly improve their suitability for bicycling. These enhancements may include narrowing conventional travel lanes to accommodate bike lanes, shoulder paving, or other improvements. Additional data were gathered to evaluate the feasibility of a range of possible bicycle improvements on each street segment. Specific improvements for streets are discussed in Chapter Five and shown on the recommended countywide Bicycle Facilities Vision Map.

CHAPTER FOUR: ANALYSES

B. PEDESTRIAN/BICYCLIST CRASHES

INTRODUCTION

One of the goals of this plan is to provide safe environments for pedestrians and bicyclists. One of the steps to achieving this goal is to identify locations where pedestrian and bicyclist safety concerns exist. The sidewalk inventory identified safety concerns with pedestrian paths of travel. However, there are other obstructions to pedestrian and bicyclist travel that affect the safety of pedestrians and bicyclists. In particular, intersections and other roadway crossings expose pedestrians and bicyclists to vehicular traffic, thereby increasing the safety risk for anyone using these facilities. Information gathered from *Pedestrian Crash Types: A 1990's Informational Guide*[35], shows that just under 60% of pedestrian crashes occur when a pedestrian is crossing the street at a mid-block location or at an intersection. Similarly, according to *Bicycle Crash Types: A 1990's Informational Guide*[36] nearly 60% of all bicycle crashes occur when the bicyclist is crossing a street at an intersection or a mid-block location. In order to address the safety issues posed by these situations, it is important to analyze recent crash data for crashes involving pedestrians and bicyclists throughout Davidson County.

> *"It is very scary to cross many of the streets here. Many drivers do not look for pedestrians at intersections."*

Identifying locations where pedestrian and bicyclist safety concerns exist is one of the first steps in providing safe facilities.

PEDESTRIAN/BICYCLIST CRASH ANALYSIS

Pedestrian and bicyclist crash data occurring between January 1999 and October 2001 were analyzed to determine which locations in Davidson County have the highest number of pedestrian/bicyclist crashes. A total of 1,135 crashes occurred during this time period. Table 4.1 identifies the locations that had the highest number of crashes and the number of crashes that occurred at these locations. The available crash reports for these locations were then analyzed. Each crash was classified according to the crash types that are presented in the *Pedestrian Facilities Users Guide – Providing Safety and Mobility*.[37] Appropriate countermeasures, which are also presented in the *Pedestrian Facilities Users Guide*, were then determined for each crash. The results of these analyses are presented in Table 4.2.

Of the crashes that were analyzed, ten crash types were identified. These crash types are as follows:

- Mid-Block Dart/Dash (involves a pedestrian crossing the roadway at a location other than an intersection)
- Turning Vehicle at Intersection (involves a vehicle turning left or right at an intersection)
- Through Vehicle at Intersection (involves a vehicle traveling in the through lane at an intersection)
- Not in Road (involves a crash that occurs outside of the roadway, such as in a parking lot or on the sidewalk)
- Failure to Yield at Unsignalized Location (involves a motorist who does not yield the right-of-way to a pedestrian at an unsignalized intersection)
- Walking (or Biking) Along Roadway (involves

[35] Federal Highway Administration, *Pedestrian Crash Types: A 1990's Informational Guide*, April 1997.
[36] Federal Highway Administration, *Bicycle Crash Types: A 1990's Informational Guide*, April 1997.
[37] Federal Highway Administration, *Pedestrian Facilities Users Guide—Providing Safety and Mobility*, FHWA-RD-01-102, March 2002.

a pedestrian or bicyclist who is traveling on the roadway)

- Backing Vehicle (involves a vehicle that is traveling in reverse)
- Multiple Threat (involves more than one vehicle)
- Bus Related (involves a school bus or other public transit bus)
- Miscellaneous (involves a factor that does not conform to another category)

Motorists in most of the crashes studied stated that they did not see the pedestrians/bicyclists until it was too late. Another commonality among these crashes was the pedestrian's failure to cross the roadway at an intersection. Many of the crashes resulted from a pedestrian darting into the roadway at a mid-block location. Additionally, although not specifically identified in Table 4.2, alcohol played a predominate role in many of the crashes that were studied. Although several possible countermeasures are provided for each crash location, the single most effective countermeasure for the crashes analyzed is motorist, pedestrian, and bicyclist education. By educating motorists, pedestrians, and bicyclists to be more aware of each other and of their surroundings, by emphasizing safe roadway habits, and by increasing the community's awareness of the dangers of alcohol, it is possible to avoid future crashes similar to those that were studied.

In addition to education, installing physical elements at these crash locations can be effective in reducing the likelihood of a crash involving a pedestrian or bicyclist. For example, crosswalk enhancements, such as improving pavement markings, improving visibility, or constructing pedestrian refuge islands can increase motorists' awareness of the potential for pedestrians to cross the road. These

INTERSECTION OR ADDRESS	NUMBER OF ACCIDENTS INVOLVING A PEDESTRIAN	NUMBER OF ACCIDENTS INVOLVING A BICYCLIST	TOTAL NUMBER OF PEDESTRIAN AND BICYCLIST ACCIDENTS
Broadway & 2nd Ave. N.	5	—	5
Broadway & 4th Ave. N.	5	—	5
Jefferson St. & 11th Ave. N.	3	2	5
Lafayette St. & Lewis St.	5	—	5
Monroe St. & 8th Ave. N.	5	—	5
Woodland St. & S. 1st St.	4	1	5
Dickerson Pk. & W. Trinity Ln.	2	2	4
615 Gallatin Ave.	4	—	4
Hillsboro Pk. & Abbott Martin Rd.	4	—	4
Jefferson St. & 10th Ave. N.	4	—	4
Jo Johnson Ave. & 16th Ave. N.	4	—	4
2800 Opryland Dr.	4	—	4
Spring St. & N. 1st St.	4	—	4
Thompson Ln. & Nolensville Pk.	4	—	4

Table 4.1: Locations of four or more Pedestrian/Bicyclist accidents from January 1999 to October 2001

INTERSECTION OR ADDRESS	TOTAL # CRASHES	# CRASHES-CRASH TYPE	POSSIBLE COUNTERMEASURES
Broadway & 2nd Ave. N.	5	1 - Mid-block Dart/Dash 3 - Turning Vehicle at Intersection 1 - Through Vehicle at Intersection	Provide Pedestrian/Driver Education Install Pedestrian Crossing Island Improve Roadway Lighting Install Crosswalk Enhancements Install Raised Pedestrian Crossing
Broadway & 4th Ave. N.	5	2 - Through Vehicle at Intersection 2 – Mid-block Dart/Dash 1 – Not in Road (on sidewalk)	Provide Pedestrian/Driver Education Install Crosswalk Enhancements Install Raised Pedestrian Crossing Install Landscape Materials Install Pedestrian Crossing Island
Jefferson St. & 11th Ave. N.	5	1 – (Bicycle) Failure to Yield (Unsignalized) 2 – Mid-block Dart/Dash 2 - Reports Not Available	Provide Pedestrian/Bicyclist/ Driver Education Improve Visibility at Driveway Install Crosswalk Enhancements
Lafayette St. & Lewis St.	5	2 – Mid-block Dart/Dash 2 – Through Vehicle at Intersection 1 – Turning Vehicle at Intersection	Provide Pedestrian/Driver Education Install Raised Median Install Crosswalk Enhancements Decrease Size of Curb Radii
Monroe St. & 8th Ave. N.	5	1 – Turning Vehicle at Intersection 1 – Mid-block Dart/Dash 1 – Through Vehicle at Intersection 1 – Miscellaneous (Run-Away Tire) 1 – Report Not Available	Provide Pedestrian/Driver Education Install Raised Pedestrian Crossing Install Pedestrian Crossing Island Install Raised Median
Woodland St. & S. 1st St.	5	2 – Turning Vehicle at Intersection 2 - (Biking) Along Roadway 1 - Mid-block Dart/Dash 1 - Report Not Available	Provide Pedestrian/Bicyclist/ Driver Education Install Advanced Stop Lines Install Crosswalk Enhancements Install Bike Lane/Shoulder
Dickerson Pk. & W. Trinity Ln.	4	2 - Turning Vehicle at Intersection 2 - Mid-block Dart/Dash 1 - Through Vehicle at Intersection	Provide Pedestrian/Bicyclist/ Driver Education Install Crosswalk Enhancements Install Pedestrian Signal Install Advanced Stop Lines Install Raised Median
615 Gallatin Ave.	4	3 - Backing Vehicle (vehicle backing out of parking space) 1 - Not in Road (through vehicle in parking lot)	Provide Pedestrian/Driver Education Install Raised Pedestrian Crossing Improve Roadway Lighting Install Crosswalk Enhancements
Hillsboro Pk. & Abbott Martin Rd.	4	1 - Multiple Threat 1- Through Vehicle at Intersection 2 - Reports Not Available	Provide Pedestrian/Driver Education Install Raised Pedestrian Crossing Install Advanced Stop Lines
Jefferson St. & 10th Ave. N.	4	1 - Turning Vehicle at Intersection 1 - Mid-block Dart/Dash 2 - Reports Not Available	Provide Pedestrian/Driver Education Install Curb Extension Reduce Size of Curb Radii
Jo Johnson Ave. & 16th Ave. N.	4	1 - Mid-block Dart/Dash 1 - Miscellaneous (Dark Intersection) 1 - Miscellaneous (Pedestrian Reversed Walking Direction) 1 - Report Not Available	Provide Pedestrian/Driver Education Install Crosswalk Enhancements Install Advanced Stop Lines Improve Roadway Lighting
2800 Opryland Dr.	4	2 - Backing Vehicle 2 - Bus Related	Provide Pedestrian/Driver Education Improve Transit Stop Facilities Install Curb Extension
Spring St. & N. 1st St.	4	1 - Through Vehicle at Intersection 3 - Mid-block Dart/Dash	Provide Pedestrian/Driver Education Install Raised Median Install Crosswalk Enhancements
Thompson Ln. & Nolensville Pk.	4	2 - Bus Related 2 - Mid-block Dart/Dash	Provide Pedestrian/Driver Education Improve Transit Stop Facilities Install Raised Median Install Pedestrian Crossing Island Improve Roadway Lighting

Table 4.2: Crash types and possible countermeasures for intersections having four or more pedestrian/bicyclist crashes from January 1999 to October 2001

enhancements also encourage pedestrians to use the crosswalk rather than crossing at an unmarked, mid-block location. Similarly, advanced stop lines provide a buffer between vehicles and pedestrians, thereby increasing motorists' visibility of pedestrians using the crosswalk. Improving roadway lighting can also be effective in reducing pedestrian related crashes by increasing the visibility at intersections. Although, some countermeasures, such as installing pedestrian crossing islands, may require re-design of the intersection at some locations, many of the countermeasures that are listed in Table 4.2, can be easily accommodated at many existing intersections.

CHAPTER FOUR: ANALYSES

C. PEER CITY REVIEW OF SIDEWALKS

INTRODUCTION

As part of the strategic plan, a survey of peer cities was conducted in order to compare Nashville with other cities and metropolitan areas in terms of miles of sidewalk versus miles of roadway. This study consisted of two parts. First, Nashville's Urban Services District (USD) was compared to other cities who voluntarily responded to the survey. Second, the Metropolitan Nashville area was compared to other metropolitan areas that provided data on the survey. The following descriptions summarize the results of the peer review.

NASHVILLE'S URBAN SERVICES DISTRICT COMPARED TO OTHER CITIES

The cities that participated in this survey were grouped according to the total number of roadway miles that each city has. The survey results for cities having 500 miles of roadway or less are summarized in Table 4.3. A ratio of the number of sidewalk miles to roadway miles is listed for each city. As shown, the average ratio of sidewalk miles to roadway miles for these cities is 1.52:1. Table 4.4 summarizes the survey results for cities ranging between 500 and 1,000 miles of roadway. As indicated, the average ratio of roadway miles for these cities is 1.55:1. The survey results for cities having between 1,000 and 2,000 miles of roadway are summarized in Table 4.5. The average ratio of sidewalk miles to roadway miles for these cities is 0.78:1. Table 4.6 summarizes the survey results for cities with more than 2,000 miles of roadway. As indicated, the average ratio of sidewalk miles to roadway miles for these cities is 0.40:1.

CITY	STATE	MILES OF ROADWAY	MILES OF SIDEWALK	RATIO (Sidewalk Miles to Roadway Miles)
Village of Riverside	Illinois	32	64	2.00 : 1
Orem	Utah	283	500	1.77 : 1
Rockville	Maryland	140	240	1.71 : 1
Billings	Montana	463	770	1.66 : 1
Glendale	California	365	600	1.64 : 1
Prairie Village	Kansas	113	153	1.35 : 1
Champaign	Illinois	220	240	1.09 : 1
St. Louis Park	Minnesota	142	104	0.73 : 1
AVERAGE VALUES		**220**	**334**	**1.52 : 1**

Table 4.3: Ratio of sidewalk miles to roadway miles for cities with 500 miles of roadway or less

CITY	STATE	MILES OF ROADWAY	MILES OF SIDEWALK	RATIO (Sidewalk Miles to Roadway Miles)
Sioux Falls	South Dakota	645	1,200	1.86 : 1
Plano	Texas	943	1,600	1.70 : 1
Louisville	Kentucky	860	1,000	1.16 : 1
AVERAGE VALUES		**816**	**1,267**	**1.55 : 1**

Table 4.4: Ratio of sidewalk miles to roadway miles for cities ranging between 500 and 1,000 miles of roadway

CITY	STATE	MILES OF ROADWAY	MILES OF SIDEWALK	RATIO (Sidewalk Miles to Roadway Miles)
Minneapolis	Minnesota	1,016	2,000	1.97 : 1
Columbus	Ohio	1,895	1,127	0.59 : 1
Nashville (USD)	**Tennessee**	**1,939**	**639**	**0.33 : 1**
AVERAGE VALUES		**1,617**	**1,255**	**0.78 : 1**

Table 4.5: Ratio of sidewalk miles to roadway miles for cities ranging between 1,000 and 2,000 miles of roadway

CITY	STATE	MILES OF ROADWAY	MILES OF SIDEWALK	RATIO (Sidewalk Miles to Roadway Miles)
Charlotte	North Carolina	2,143	700	0.33 : 1
San Jose	California	2,434	5,018	2.06 : 1
Virginia Beach	Virginia	3,395	2,500	0.74 : 1
Ottawa	Ontario	3,412	910	0.27 : 1
San Antonio	Texas	3,820	1,000	0.26 : 1
AVERAGE VALUES		**3,040**	**2,026**	**0.67 : 1**

Table 4.6: Ratio of sidewalk miles to roadway miles for cities with more than 2,000 miles of roadways

Cities that are similar to Nashville in terms of roadway miles include Columbus, Ohio; Charlotte, North Carolina; and San Jose, California. Of these cities, Charlotte has the lowest percentage of sidewalk miles, with a ratio of sidewalk miles to roadway miles equal to 0.33:1. This ratio includes 700 miles of sidewalk and 2,143 miles of roadway. The city that has the highest percentage of sidewalk miles is San Jose, which has a ratio of sidewalk miles to roadway miles equal to 2.06:1. This ratio includes 5,018 miles of sidewalk and 2,434 miles of roadway. Columbus has a ratio of 0.59:1, which includes 1,127 miles of sidewalk and 1,895 miles of roadway. Nashville's USD, which has a ratio of 0.33:1, ranks between Columbus and Charlotte. This ratio includes 639 miles of sidewalk and 1,939 miles of roadway.

METROPOLITAN NASHVILLE AREA COMPARED TO OTHER METROPOLITAN AREAS

Four metropolitan areas, Lexington, Kentucky; Indianapolis, Indiana; Jackson County, Florida (Jacksonville); and Portland, Oregon, were asked to participate in this portion of the survey. As shown in Table 4.7, Indianapolis and Portland are the only respondents who have data available regarding the number of sidewalk miles and roadway miles located within the metropolitan area. Of these cities, Indianapolis has the highest percentage of sidewalk miles, with a ratio of sidewalk miles to roadway miles equal to 0.93:1. This ratio includes 2,855 miles of sidewalk and 3,077 miles of roadway. Portland has a ratio of sidewalk miles to roadway miles equal to 0.46:1, which includes 2,117 miles of sidewalk and 4,561 miles of roadway. Compared to these metropolitan areas, Metro Nashville has the lowest percentage of sidewalk miles, with a ratio of sidewalk miles to roadway miles equal to 0.35:1. This ratio includes 752 miles of sidewalk and 2,154 miles of roadway. In order for Metro Nashville to have a ratio equal to Portland's ratio of 0.46:1, Metro would need to construct approximately 239 miles of new sidewalks along existing roadways.

METROPOLITAN AREA	STATE	MILES OF ROADWAY	MILES OF SIDEWALK	RATIO (Sidewalk Miles to Roadway Miles)
Lexington	Kentucky	Data not available		
Jackson County	Florida	Data not available		
Indianapolis	Indiana	3,077	2,855	0.93 : 1
Portland	Oregon	4,561	2,117	0.46 : 1
Metro Nashville	**Tennessee**	**2,154**	**752**	**0.35 : 1**

Table 4.7: Ratio of sidewalk miles to roadway miles for Metro Nashville and other metropolitan areas

CHAPTER FIVE: RECOMMENDATIONS

A. RECOMMENDED PEDESTRIAN FACILITIES

2008 Update note: The Sidewalk Priority Index (SPI) is replaced with the PGI and Matrix system as found in Amendment 1, Section 4

SIDEWALK PRIORITY INDEX (SPI)

Each year Metro must determine where to focus the resources that have been allocated toward the construction of new and replacement sidewalks. One of the objectives of this plan is to provide an objective method for prioritizing sidewalks and other pedestrian improvements that will maximize benefits to pedestrians. To this end, the planning team developed an innovative concept termed the Sidewalk Priority Index (SPI).

The SPI is intended to ensure that sidewalks are first constructed where existing need is the greatest and where the potential for pedestrian traffic is the greatest. In general, pedestrian activity is directly attributable to factors such as the density of development, mix of land uses, and proximity to major destinations. The greater the intensity of these factors, the higher the potential for walking, and the greater the need for pedestrian facilities.

"Neighborhoods and urban areas should be the primary focus of additional sidewalks."

The methodology of the SPI was based on a quantitative overlay system that is often used in regional environmental modeling. By overlapping a series of maps, each representing one of several characteristics, one can easily visualize the concentration of resources in a particular area. If each characteristic is assigned a number value based on its importance or potential for a given condition, then the cumulative intensity of all characteristics at a specific location can be determined. The SPI effectively adapts this methodology by identifying the specific characteristics that most affect the potential for walking. Figure 5.1 illustrates how the SPI utilizes the quantitative overlay concept.

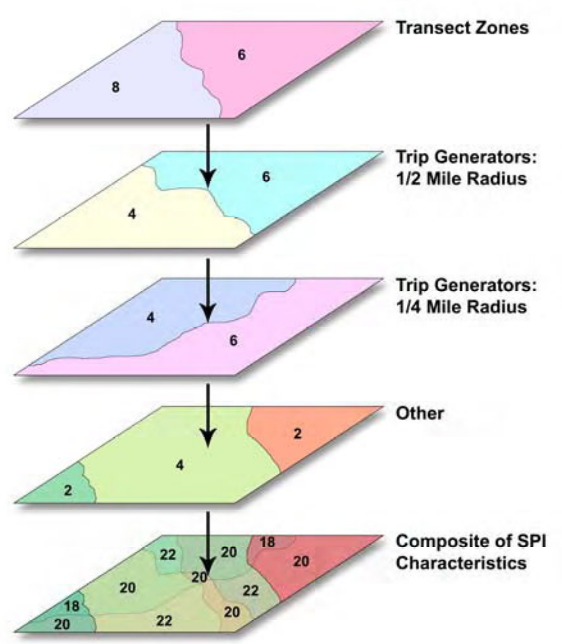


Figure 5.1: The quantitative overlay concept used to determine the SPI.

In order to develop an accurate representation of the community's values regarding sidewalks, the Citizen's Advisory Committee and other citizens of the community assisted the planning team in identifying the characteristics for the SPI. These characteristics were assigned weighted values based on each characteristic's potential to generate or impact pedestrian traffic. For a given location, the cumulative value of the identified characteristics is the SPI value for that location.

Table 5.1 identifies each characteristic and its associated value. Appendix D contains maps that identify the locations of these characteristics, and it also contains a calculation sheet for the SPI. As shown in the figure, the characteristics have

TRANSECT ZONES		
Core		Add 8
Center		Add 8
Neighborhood		Add 6
	0.25 Mile Radius of "Neighborhood Center" or "Commercial Corridor"	Add 2
District	Medical Center	Add 2
	Industrial	Add 2
Suburban		Add 2
	0.25 Mile Radius of "Neighborhood Center" or "Commercial Corridor"	Add 2
Rural Reserve		Subtract 2
Preserve		Subtract 2
TRIP GENERATOR: 1/2 MILE RADIUS		
Public Schools	Elementary/Middle	Add 8
	High	Add 4
Libraries and Civic Buildings		Add 5
Parks and Greenways		Add 5
Colleges and Universities		Add 6
Senior and Assisted Living Facilities		Add 4
Public Housing		Add 6
TRIP GENERATOR: 1/4 MILE RADIUS		
Hospitals		Add 4
Transit Routes		Add 6
OTHER		
Arterial Roads		Add 4
Collector Roads		Add 2
Urban Services District		Add 2
Missing Segment (Within 0.25 Miles of Existing Sidewalk)		Add 4

Table 5.1. SPI characteristics and their numerical values.

been grouped into the following categories:

- Transects
- Trip Generators: 1/2 Mile Radius
- Trip Generators: 1/4 Mile Radius
- Other

The "Transects" category contains characteristics that represent land use and density. The "Trip Generators: 1/2 Mile Radius" category contains characteristics, or destinations in this case, that have the potential to generate walking trips within a 1/2 mile radius of the identified destination. This category is similar to the "Trip Generators: 1/4 Mile Radius" category, which contains destinations that could potentially generate walking trips within a 1/4 mile radius of the identified destination. Important characteristics that affect walking, but do not correspond to the previously mentioned categories are contained in the "Other" category.

TRANSECT ZONES

As discussed in Chapter Three, the Metro Planning Department is beginning to utilize a land development pattern categorization method called Community Transect Zones. There are seven transect zones, ranging on a scale from most urban to most rural. The zones are used to define a hierarchy of expected development, level of public services provided, and design vocabulary.

The transect zone concept is utilized for the SPI because it is the best available tool that sums up a range of development pattern characteristics. Each zone represents the relative intensity and make-up of development in a given area, and thus a measure of it's pedestrian demand.

Core and Center Transects

Based on density, mix of uses, and grid street systems, core and center transects create the highest potential for walking. They have each been assigned a value of eight, the highest value of all transects.

Neighborhood Transects

The neighborhood transect offers the next highest potential for walking and has a value of six. Areas in this transect that are within a quarter-mile of a "neighborhood center" or "commercial corridor" rank an additional two points because they offer walking potential that equals the core and center transects.

District Transects

The district transect is applied to any large, single-use area, such as an industrial district or an airport. Although the district transect is usually applied to areas with little pedestrian potential, some uses do have significant demand for internal sidewalk systems and/or transit access. Accordingly, medical center uses and industrial uses within this transect zone rate two points.

Suburban Transects

Due to low density, a predominance of non-grid roads, and single uses, suburban transects have relatively low potential for transportation walking and have been assigned a value of two. Streets near a "neighborhood center" or "neighborhood commercial corridor" within this transect zone attract a higher volume of pedestrians and have been assigned an additional two points.

Rural Reserve and Preserve Transects

In order to preserve the rural, or undeveloped character of areas within these transects, they have been assigned a value of minus two. For situations in which the sum of other SPI factors warrant a sidewalk in one of these transects, a rural side path facility may be the most appropriate approach.

TRIP GENERATORS: 1/2 MILE RADIUS

Public Schools

Schools can generate many daily walking trips by students, whose ages typically make them among the most vulnerable pedestrians. Areas within a quarter-mile of elementary and middle schools were assigned a value of eight, the highest score of any proximity characteristic. High schools have been assigned a value of four because they are more regionally based.

Libraries and Civic Buildings

Because libraries and civic buildings provide services to a wide range of users, including children, senior adults, and disabled people, areas within one-half mile of these facilities have been assigned a value of five.

Parks and Greenways, like this trail at Shelby Bottoms, attract many recreational users.

Parks and Greenways

Parks and greenways attract recreational users of all ages. Greenways, specifically, are part of the pedestrian infrastructure itself and are used for transportation purposes. Accordingly, areas within one-half mile of parks and greenways have been assigned a value of five.

Colleges and Universities

Colleges and universities generate heavy pedestrian activity. Factors contributing to this activity include a young population, businesses that cater to students, and the fact that many students do not own vehicles. In addition, students, faculty, and staff often live nearby. Accordingly, areas within one-half mile of universities and colleges have been assigned a value of six.

Senior and Assisted Living Facilities

Those living in senior or other assisted living facilities often cannot drive or do not own cars. The ability to walk to nearby destinations helps them to maintain independence. If involved in a pedestrian/car crash, these pedestrians are more likely than others to be hurt seriously, and thus benefit significantly from good pedestrian facilities. For these reasons, a value of four has been assigned to all areas within one-half mile of senior or assisted living facilities.

Public Housing

Many public housing residents rely on walking and transit for transportation. Indeed, some residents may be dependent on these modes for travel to work and for achieving financial independence. Areas within one-half mile of public housing developments have been assigned a value of six.

TRIP GENERATORS: 1/4 MILE RADIUS

Hospitals

Hospitals are large employment centers and generate a considerable amount of pedestrian activity and transit use. Areas within a quarter-mile of hospitals have been assigned a value of four.

Transit Routes

Almost all bus users begin and end their trips as pedestrians. Accordingly, safe and continuous pedestrian facilities are an integral component of a public transit system. Areas within a quarter-mile of a transit route have been assigned a value of six.

OTHER

Arterial Roads
Arterial roads are the major through-streets in a roadway system and provide direct access to many destinations. In addition, the speed and volume of motor vehicle traffic intensifies pedestrians' need for separate facilities. Accordingly, proposed sidewalks on major and minor arterial streets have been assigned a value of four.

Collector Roads
In contrast to most local roads, many collector roads provide direct access to neighborhood destinations and have higher traffic volumes and speeds. These conditions increase pedestrian demand and safety concerns. Accordingly, collector roads have been assigned a value of two.

Urban Services District
Areas within the Urban Services District (USD) have been assigned a value of two. Residents in the USD pay a higher tax rate than those in the general services district, and, therefore, should receive additional consideration for services such as sidewalks. Furthermore, most areas in the USD have a higher density of development and mix of land uses, creating greater pedestrian demand.

Missing Segments
Missing sidewalk segments have been assigned a value of four. By definition, a missing sidewalk segment is a gap of up to a quarter-mile in length between two existing sidewalk segments. This factor recognizes that completing a sidewalk network and providing continuity of facilities generally has greater value to pedestrians than installing a stand-alone sidewalk elsewhere.

USING THE SPI

Using the quantitative overlay concept, the SPI characteristics are layered to derive a composite score for a particular geographic area or street, as shown in Figure 5.2. The areas or streets with the greatest concentrations of pedestrian characteristics receive the highest scores, and therefore should have the highest priorities for sidewalk installation.

The consultant team utilized Geographic Information Systems software and land use data from the Planning Department to prepare a map showing the resulting SPI values for all of Davidson County. This map is shown in Figure 5.3.

The SPI provides an objective methodology for selecting and prioritizing sidewalk projects. The process offers clear guidance on where the presence of sidewalks will provide the greatest public benefits. However, professional judgment will still be necessary in some cases. For example, it will be necessary to establish priorities among projects with the same, or very similar scores. In addition, some projects will require the evaluation of unique factors, such as pending development projects or site conditions that may need to be taken into consideration.

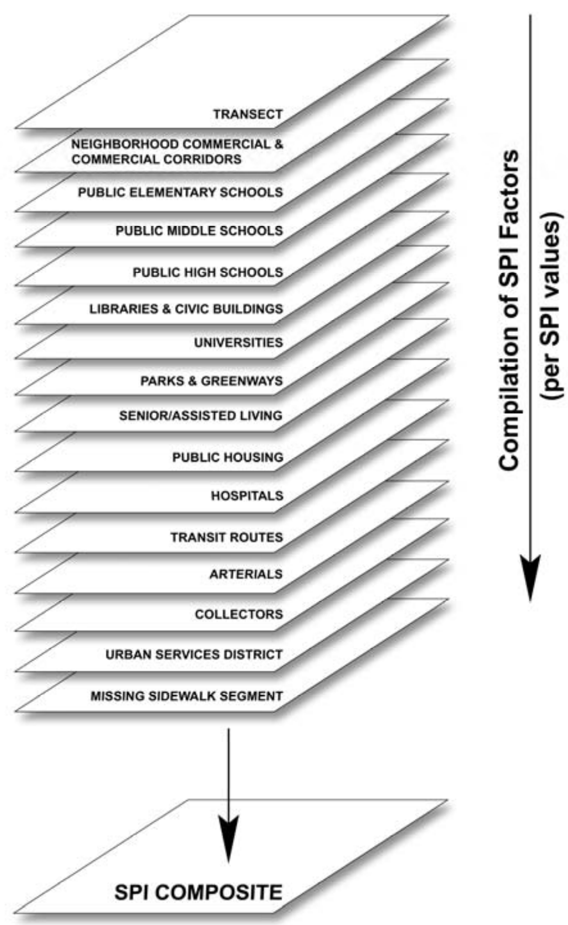


Figure 5.2: The SPI characteristics are layered to generate a composite score for a particular geographic location.

2008 Update note: The SPI Values Map is replaced by the PGI Rankings Map as found in Amendment 1, Page 4-18

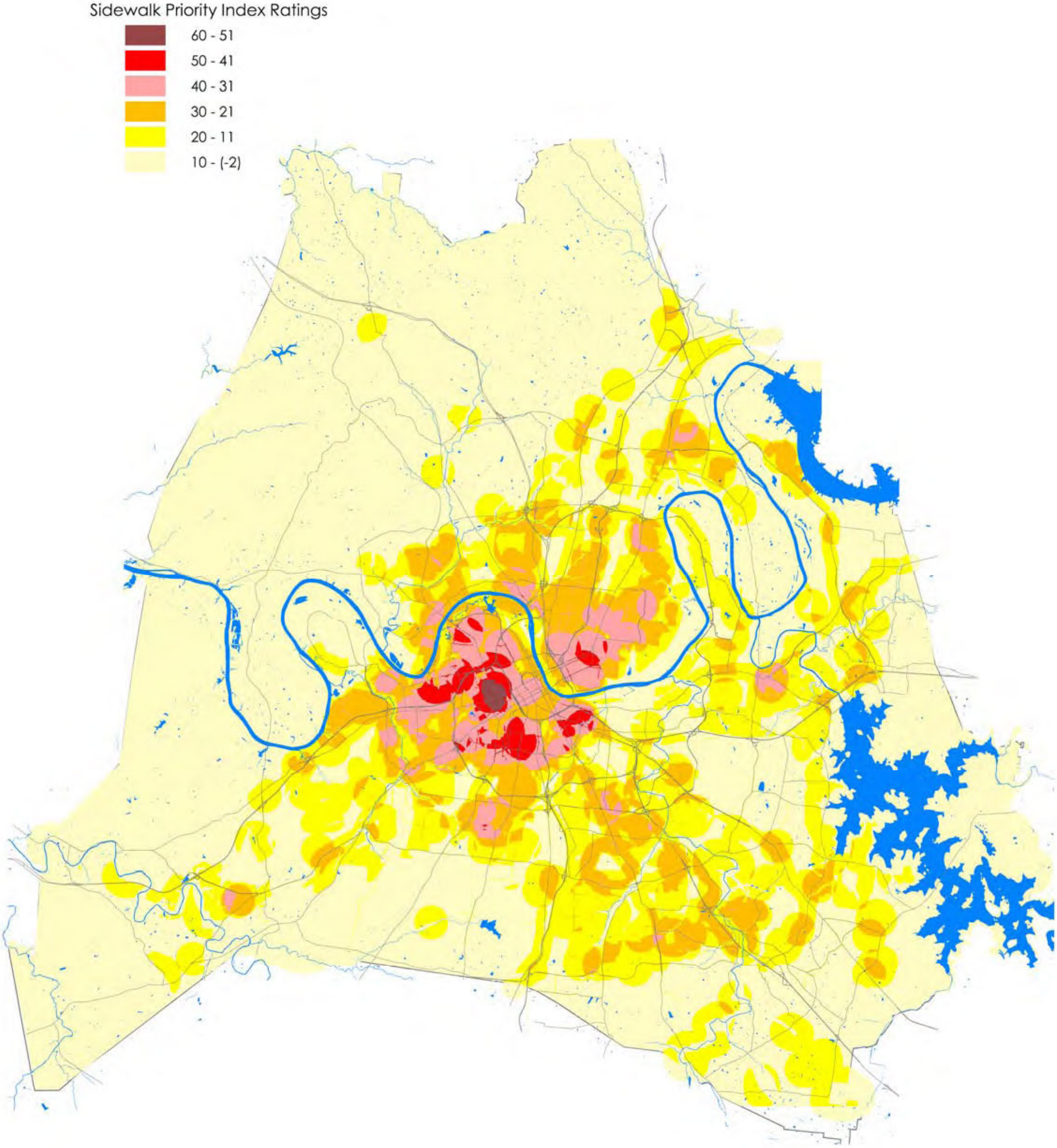


Figure 5.3: SPI Values Map

It is recommended that the SPI calculation be reviewed annually for Davidson County with the information supplied. Doing so will ensure that the sidewalk priorities reflect new development or other land use changes in Davidson County. Because the SPI characteristics and number values themselves may need to be refined over time, it is recommended that they be re-evaluated at least every two years.

THE PEDESTRIAN FACILITIES DESIGN GUIDELINES

The complete *Pedestrian Facilities Design Guidelines* are located in Appendix B. The standards and practices outlined in that document are intended to provide guidance on the design of pedestrian-specific facilities. They are also intended to provide guidance on the integration of pedestrian accommodations into all projects that have the potential to affect pedestrian travel in Davidson County. Application of the guidelines will ensure consistency in the design of the facilities. Consistency will provide pedestrians with assurance regarding the safety and quality of the walking facilities that they will encounter. It will also encourage both pedestrians and motorists to operate predictably with each other on public right-of-way.

The design guidelines were developed by the consulting team in response to the specific needs, objectives, and circumstances of Nashville and Davidson County. They are based on standard and emerging practices used throughout the country. The standards recommended in the guidelines are consistent with the requirements of the ADA. The ADA is a federal law that ensures that public facilities are designed in a manner that provides access to those with physical mobility impairments. Specifically, the pedestrian design guidelines comply with *Building a True Community; Final Report of the Public Rights-of-Way Access Advisory Committee,* the most authoritative existing guide to accessible right-of-way design available when this plan was developed. The Pedestrian Facilities Design Guidelines are divided into sections that include:

The Pedestrian Facilities Design Guidelines were developed to provide guidance on the design of pedestrian specific facilities in Metro Nashville.

- The sidewalk corridor, which consists of facilities that allow people to walk along a street
- Intersections, which address facilities that allow people to cross the street
- Pedestrian enhancements such as curb extensions, raised crosswalks and pedestrian refuges
- Other design issues, such as construction zones and transit stops

These sections offer detailed counsel on Metro-specific issues related to sidewalk construction on new streets, sidewalk construction on existing streets, pedestrian improvements at existing intersections, and sidewalk construction during roadway widening projects.

THE SIDEWALK CORRIDOR

The Sidewalk Corridor is a term applied to that portion of the public right-of-way located between the edge of motor vehicle, bicycle and/ or parking lanes, and the outside edge of the right-of-way. The primary function of a Sidewalk Corridor is to provide a safe, comfortable, and convenient route for walking that is separated from vehicle travel paths. A Sidewalk Corridor may also accommodate other functions or fixtures, such as utility poles and street furniture.

Sidewalk Corridors should possess the following qualities:

- Accessible: Sidewalk Corridors should be

easy to use for travelers of all abilities.
- Adequate Width: Sidewalk Corridors should be wide enough so that pedestrians can pass each other comfortably.
- Direct: Sidewalk Corridors should provide direct routes that minimize out-of-direction travel for pedestrians.
- Continuous: The design of Sidewalk Corridors should ensure that the pedestrian path of travel is easily identifiable along the entire length of the corridor.
- Safe: Sidewalk Corridors should provide pedestrians with real and perceived safety.
- Landscaped: Sidewalk Corridors should be designed to accommodate street trees and other landscaping.
- Compatible with the community: A Sidewalk Corridor should be designed to contribute to the land use, design, and transportation objectives of the neighborhood through which it travels.[38]

As shown in Figure 5.4, Sidewalk Corridors are divided into three distinct zones:

- Furnishings Zone
- Pedestrian Travelway
- Frontage Zone

Each zone varies in width depending on street classification. In general, the greater the traffic volume or speed, the wider the width of each zone. Table 5.2 shows the recommended widths for each zone, based on street classification.

The Furnishings Zone (FNZ) provides a physical buffer between the pedestrian path and vehicular traffic. It also provides a space for streetscape features such as trees, utility poles, mailboxes, newspaper boxes, and other similar

A sidewalk in Chicago featuring a furnishings zone, a pedestrian travelway, and a frontage zone.

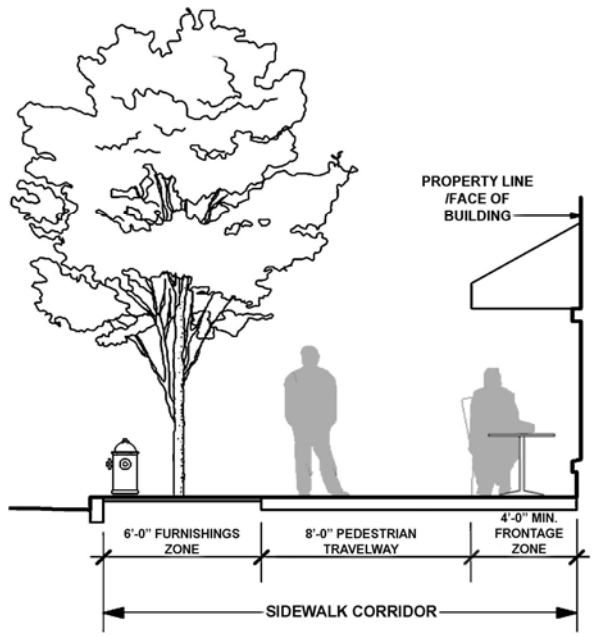


Figure 5.4: Sidewalk Corridor Zones for Arterial Streets

	Local streets or equivalent	Collector streets or equivalent	Arterial streets or equivalent
Pedestrian Travelway	Five feet minimum	Six feet minimum	Eight feet minimum
Furnishings Zone	Four feet minimum	Five feet minimum	Six feet minimum
Frontage Zone	NA	NA	Four feet minimum

Table 5.2: Recommended minimum widths for zones within the sidewalk corridor.

[38] Access Advisory Board, _Building A True Community; Final Report of the Public Rights-of-Way Access Advisory Committee_

features. Depending on street classification, the FNZ should be at least four to six feet wide.

The Pedestrian Travelway (PT) is the portion of the sidewalk corridor which provides unobstructed travel by pedestrians, i.e., the sidewalk. Depending on street classification, the PT should be at least five to eight feet wide.

The Frontage Zone (FTZ) is the area between the pedestrian travelway and the edge of the right-of-way or building face. Typically applied only to urban commercial streets, the FTZ provides space for street cafes, window shopping, bus stop furnishings and other features. The FTZ, where applicable, should be at least four feet wide.

In some instances, it may be appropriate to build alternate types of pedestrian facilities. Such facilities include off-street pedestrian connectors and rural pedestrian facilities. Off-street connectors are short-distance paths that provide direct access to a destination, or a linkage between conventional sidewalks, which would otherwise require out-of-direction travel on streets. Rural pedestrian needs may be best accommodated with facilities that are designed to be compatible with their rural context, such as a path that is separated from the un-curbed road with a swale or other physical barrier.

INTERSECTIONS

Without good pedestrian accommodations, intersections can become significant barriers to

Good crosswalks should be short and highly visible to provide adequate crossing for pedestrians, like this crosswalk in Philadelphia.

Curb extensions are effective in reducing crossing distances for pedestrians at intersections.

pedestrian travel. Because they place pedestrians and vehicle operators in conflict with one another, intersections warrant careful attention to pedestrian accommodations. Intersections should be designed to possess the following characteristics:

- Short Crossings: In general, curb-to-curb crossing distance should be as short as possible.
- Highly Visible: Pedestrians should be easy for motorists to see, and vice versa.
- Obstruction-free: Corners should be free of obstructions that reduce visibility and accessibility.
- Adequate Size: Corners should be large enough to accommodate sidewalk ramps, landings, transit stops, and the expected volume of pedestrians.
- Obvious: Signs, markings and signals should clearly indicate to pedestrians, motorists and bicyclists how, where, and when all right-of-way users will operate.
- Accessible: Ramps, landings, pedestrian pushbuttons, and all other features should be easy to use for travelers of all abilities.
- Separation from traffic: Corners and medians should be designed to discourage vehicles from encroaching into pedestrian areas.
- Direct: Facilities should offer direct routes between sidewalks, and should not require significant out-of-direction travel.

The design guidelines for intersections address corner design, curb ramps, pavement markings, traffic signals, and other issues.

CHAPTER FIVE: RECOMMENDATIONS

B. RECOMMENDED BICYCLE FACILITIES

2008 Update note: Updated recommended Bicycle Facilities, including updated Vision Plan maps can be found in Amendment 1, Section 5.

INTRODUCTION

Within Metro Nashville, bicyclists can legally travel on any street unless, as in the case for interstates, they are specifically prohibited. Therefore, planning, design and operation of streets within Metro should anticipate the presence of bicycles. The recommendations presented in this section are intended to enhance Nashville's cycling environment by identifying specific facilities that should be implemented. Bicycle facilities include bicycle lanes, wide outside lanes, signed shared roads, and off-street trails (greenways). Each of these facility types is discussed briefly in the design guidelines summary, which is located in this chapter, and in detail in *Appendix C: Bicycle Facilities Design Guidelines*.

With a couple of exceptions, the *Strategic Plan for Sidewalks & Bikeways* focuses primarily on street-based bicycle facilities. The on-street facilities described in this plan are intended to overlap with the off-street trail facilities identified in the *Parks & Greenways Master Plan*. This result is intended to be a comprehensive bikeway network. Bicyclists are legal users on all streets within Metro Nashville.

DEVELOPMENT OF THE RECOMMENDATIONS

Through public input and the application of standard bikeway planning principles, a network of streets was identified as constituting desirable corridors for bicycle travel. Each of the selected streets possesses some or all of the following characteristics:

- Existing bicycle traffic demand
- Direct connectivity between major and/or multiple destinations
- Land development patterns that induce bicycle transportation, such as densely developed, mixed-use areas
- Desirable for bicycle travel as identified by the public
- Connectivity that is similar to nearby major corridors that might provide an alternate route with more favorable conditions
- Proximity to major destinations that attract and generate bicycle activity, such as campuses, greenway trailheads, and employment centers
- The ability to contribute to a network that offers reasonable access throughout the county

Data were collected for each identified street in order to determine the suitability of the streets in their existing conditions for bicycle travel and to determine the feasibility of adding bicycle facilities to the streets. The suitability assessment resulted in the Bicycle Compatibility Index (BCI), which was discussed in Chapter Four. The feasibility assessment involved

Areas generating bicycle traffic near campuses, greenways, and centers of employment were identified to be desirable corridors for bicycle travel.

gathering information that could be used to determine what measures would be needed in order to install bicycle facilities on the identified streets. The following information was gathered for this purpose:

- Pavement width
- Presence of curb and gutter
- Number of travel lanes
- Outside lane width
- Presence of a center turn lane
- Posted speed limit
- Shoulder width
- Presence of parking lanes
- Presence of problem grates

Because these conditions often changed along the length of a single street corridor, streets were divided into segments that had similar characteristics.

With this information, a strategy was developed for incorporating bicycle facilities into each identified street segment. For example, some streets have adequate existing shoulder width to accommodate bike lanes, but the shoulders must be paved to order to perform that function. Other streets have excessively wide conventional travel lanes that could be re-striped to provide bike lanes or wide outside lanes, while still maintaining adequate lane widths.

BICYCLE FACILITIES VISION MAP

The countywide Bicycle Facilities Vision Map shown in Figure 5.5 presents a recommended bicycle network plan in which existing constraints are not taken into consideration. The map is divided into south, north, and central portions of the county in Figure 5.6. The purpose of the vision map is to ensure that any future opportunity for the incorporation of bicycle facilities is not lost. The vision map essentially maximizes bike lanes without regard for existing right-of-way widths or competing demands on right-of-way. As conditions change and opportunities present themselves, the vision map will allow for a street with recommended changes such as wide outside lanes to be upgraded to bike lanes. Circumstances that might create such opportunities could be streetscape improvement projects, district redevelopment projects, shifts in traffic circulation patterns, or other similar changes.

At the beginning of the planning stage for any bikeway project, the Bicycle Facilities Vision Map should be consulted. Project corridor(s) should be re-evaluated to determine whether conditions have changed or new opportunities exist. Where possible, bicycle facilities should be upgraded to the facility types identified on the vision map.

IMPLEMENTATION STRATEGY

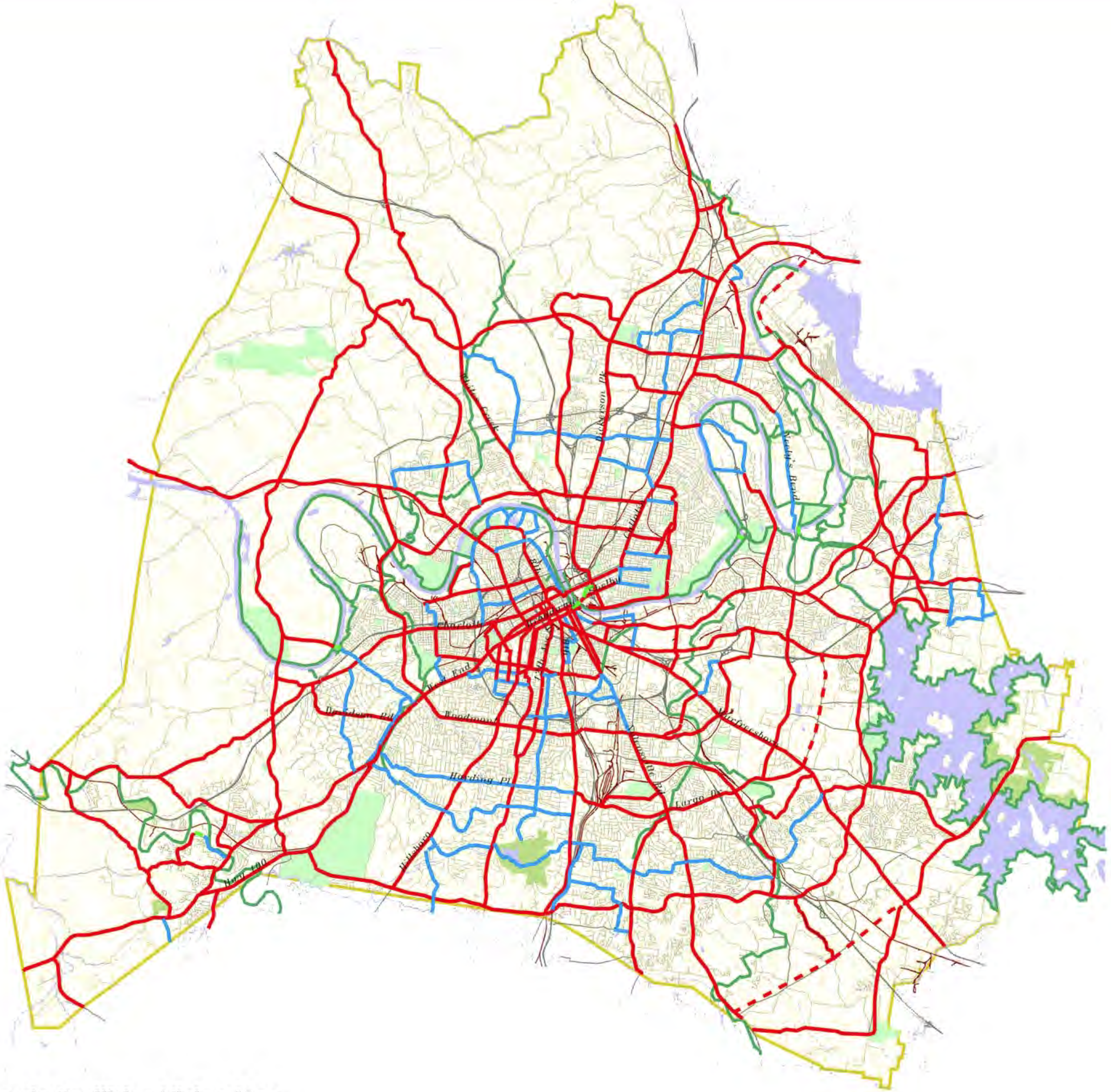
In consideration of the magnitude of the recommendations presented, it is anticipated that numerous phases of work will be necessary to accomplish the goals and objectives of the bicycle plan. This study presents an initial set of recommended projects that will serve as a first step toward achieving the integrated network of bicycle facilities outlined in the vision plan.

<u>PHASE ONE RECOMMENDATIONS</u>

Figure 5.7 illustrates the bicycle facilities that are recommended for the first phase of the implementation. In general, the identified corridors were selected because they are located within the central city, which has the land development patterns that most strongly support bicycle transportation. Specific corridors were selected based on the following criteria:

- They provide connectivity between major destinations, such as downtown Nashville and university campuses
- They are corridors on which concentrations of attractors are located
- They are direct
- They extend in each major direction from downtown Nashville
- They have logical termini at major intersections, destinations, or other bicycle facilities.

The map also illustrates existing or funded bicycle facilities, including the Pilot Bikeway Project, and several existing or funded greenways.



Nashville-Davidson County

strategic plan

for
SIDEWALKS & BIKEWAYS

Bicycle Facilities Vision

- Bike Lane
- Bike Lane on Proposed Road
- Proposed Greenway Segment
- Wide Outside Lane
- Existing & Future Greenways

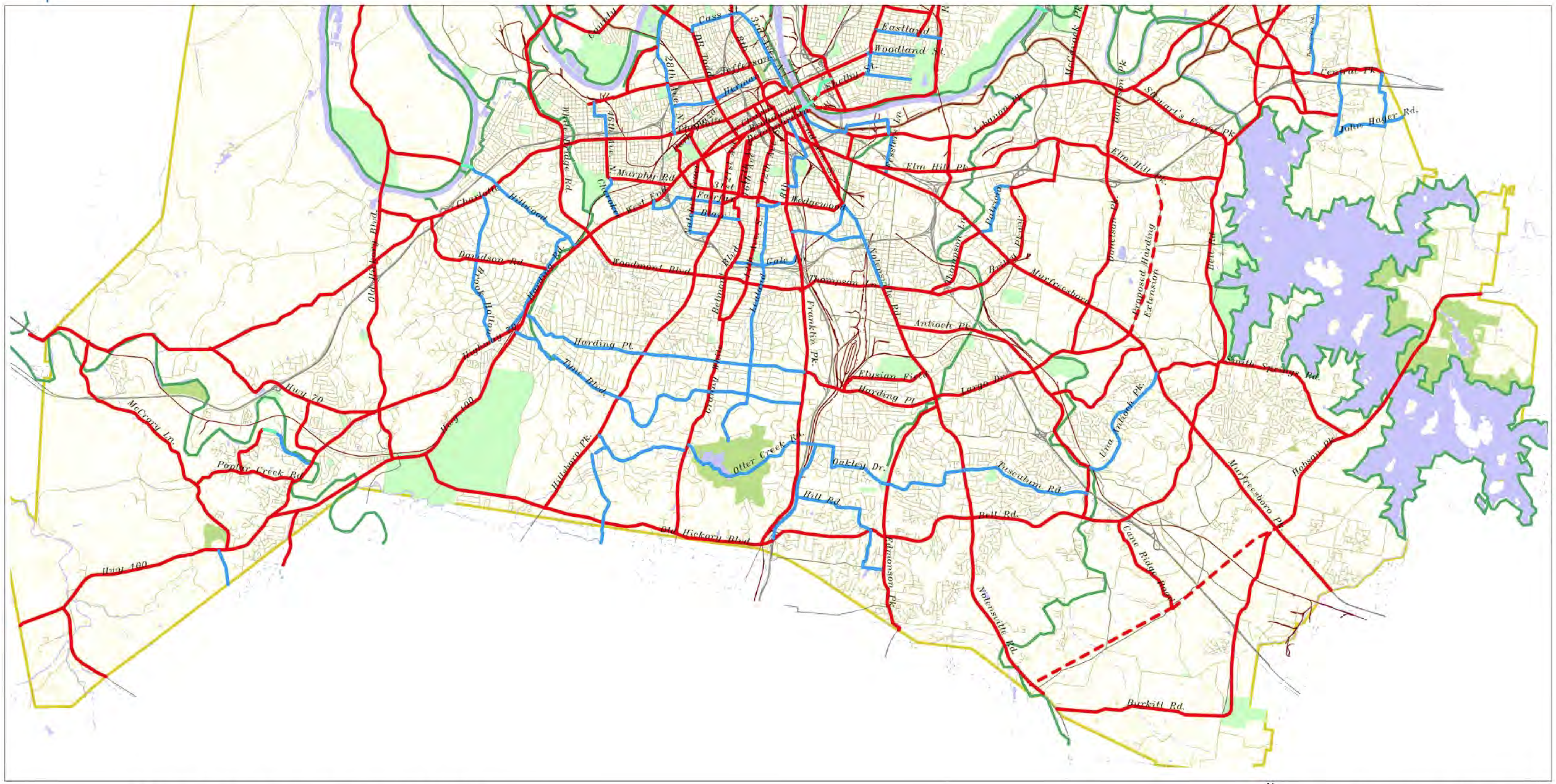
DATA SOURCES:

Metro Planning Department, Mapping Services
RPM & Associates
Hawkins Partners, Inc.

CONSULTANT TEAM:

RPM & Associates
Hawkins Partners, Inc.
Fehr and Peers Associates, Inc.
Seigenthaler Public Relations
Digi Design

Figure 5.5: Bicycle Facilities Vision Map.



Bicycle Facilities Vision: South

N

1 0 1 2 Miles

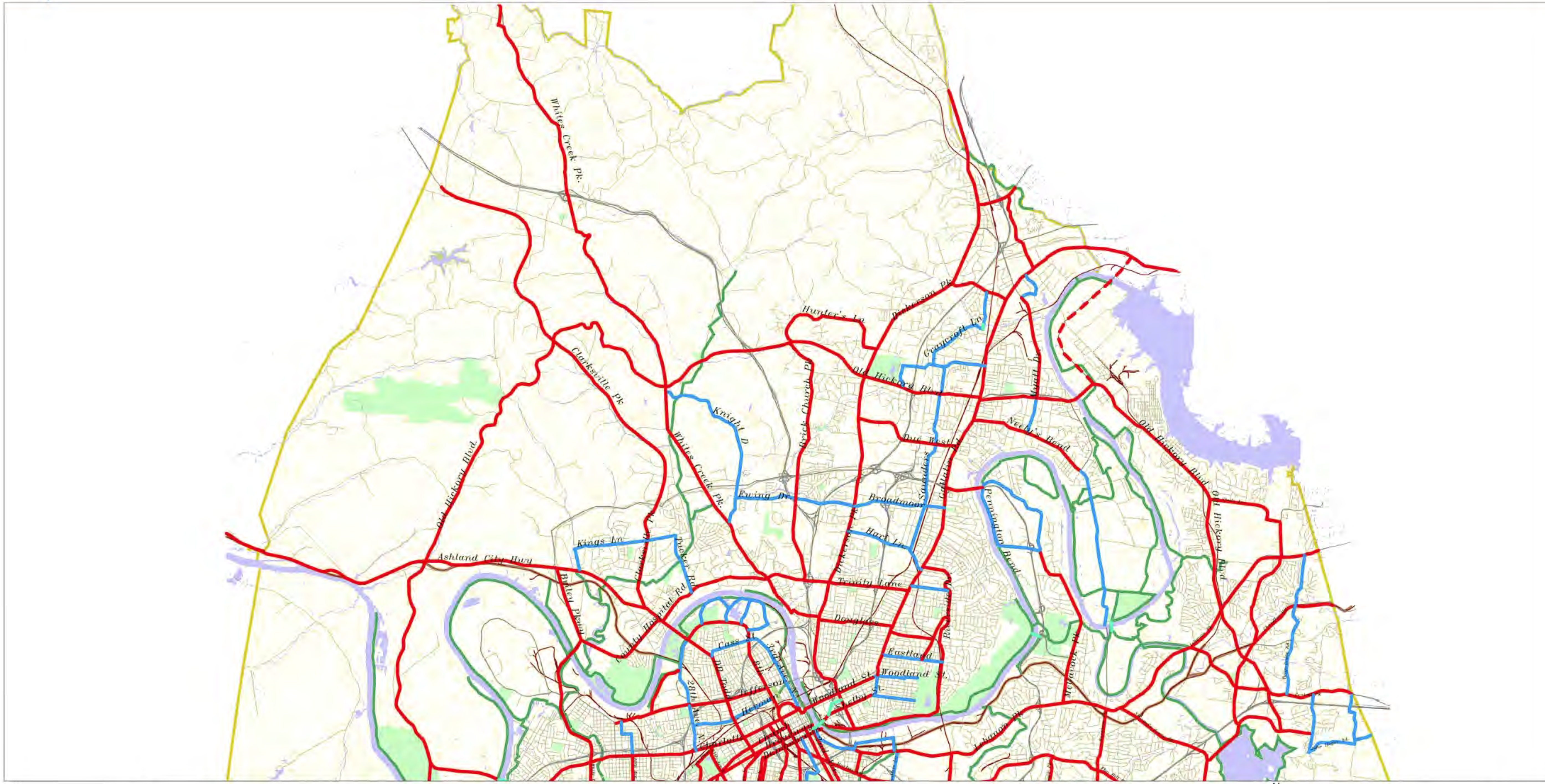
Bicycle Facilities
- Bike Lane
- Bike Lane on Proposed Road
- Wide Outside Lane
- Proposed Greenway Segment

Greenways
- Existing & Future Greenways
- Rails with Trails

Roads
Railroad

Metro Parks
State Land
Rivers & Streams
Water Bodies

Figure 5.6a: Bicycle Facilities Vision Map (South).



Bicycle Facilities Vision: North

N

2 0 2 Miles

Bicycle Facilities	Greenways	Roads	
Bike Lane	Existing & Future Greenways	Railroad	Metro Parks
Bike Lane on Proposed Road	Rails with Trails		State Land
Wide Outside Lane			Rivers & Streams
Proposed Greenway Segment			Water Bodies

Figure 5.6b: Bicycle Facilities Vision Map (North).

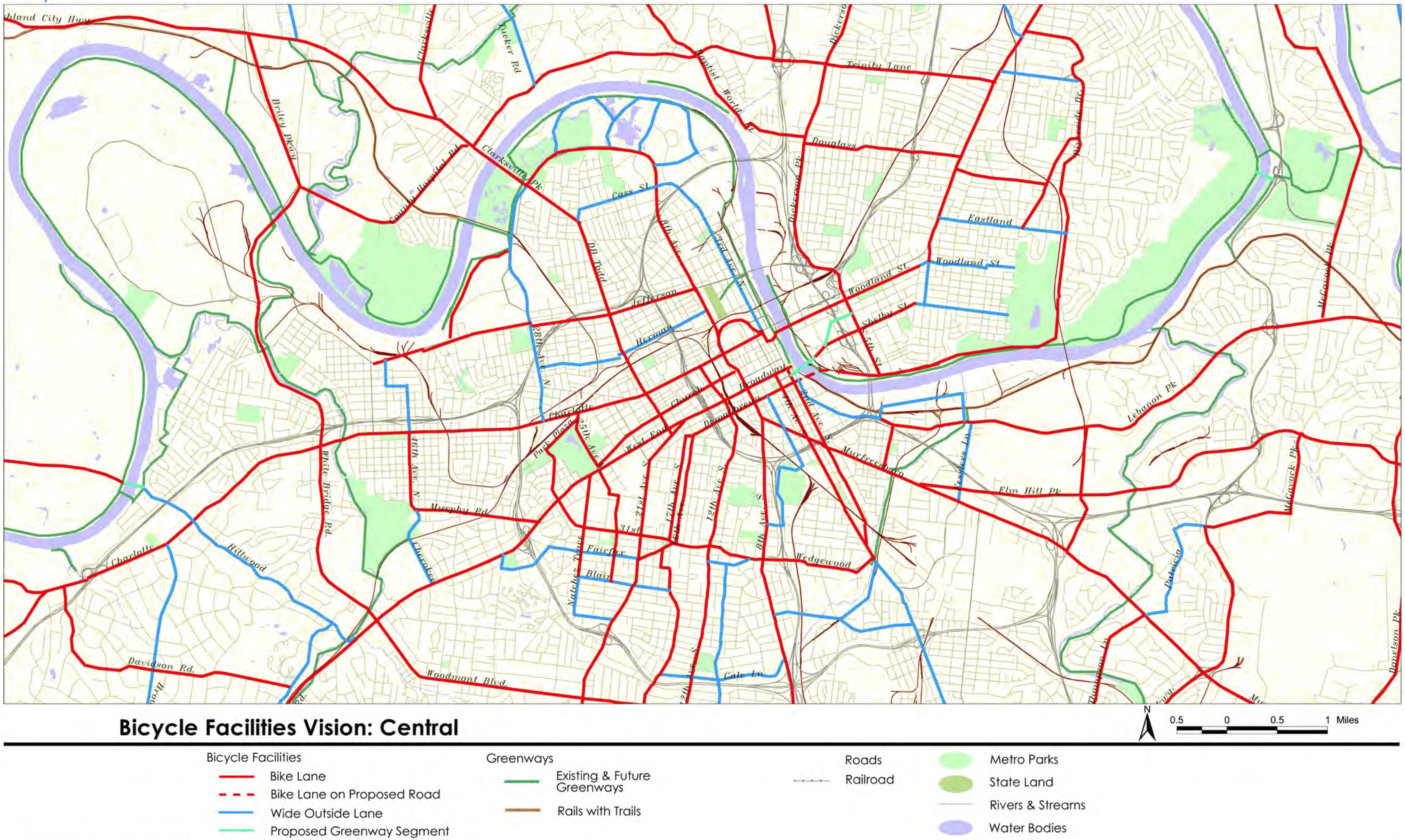


Figure 5.6c: Bicycle Facilities Vision Map (Central).

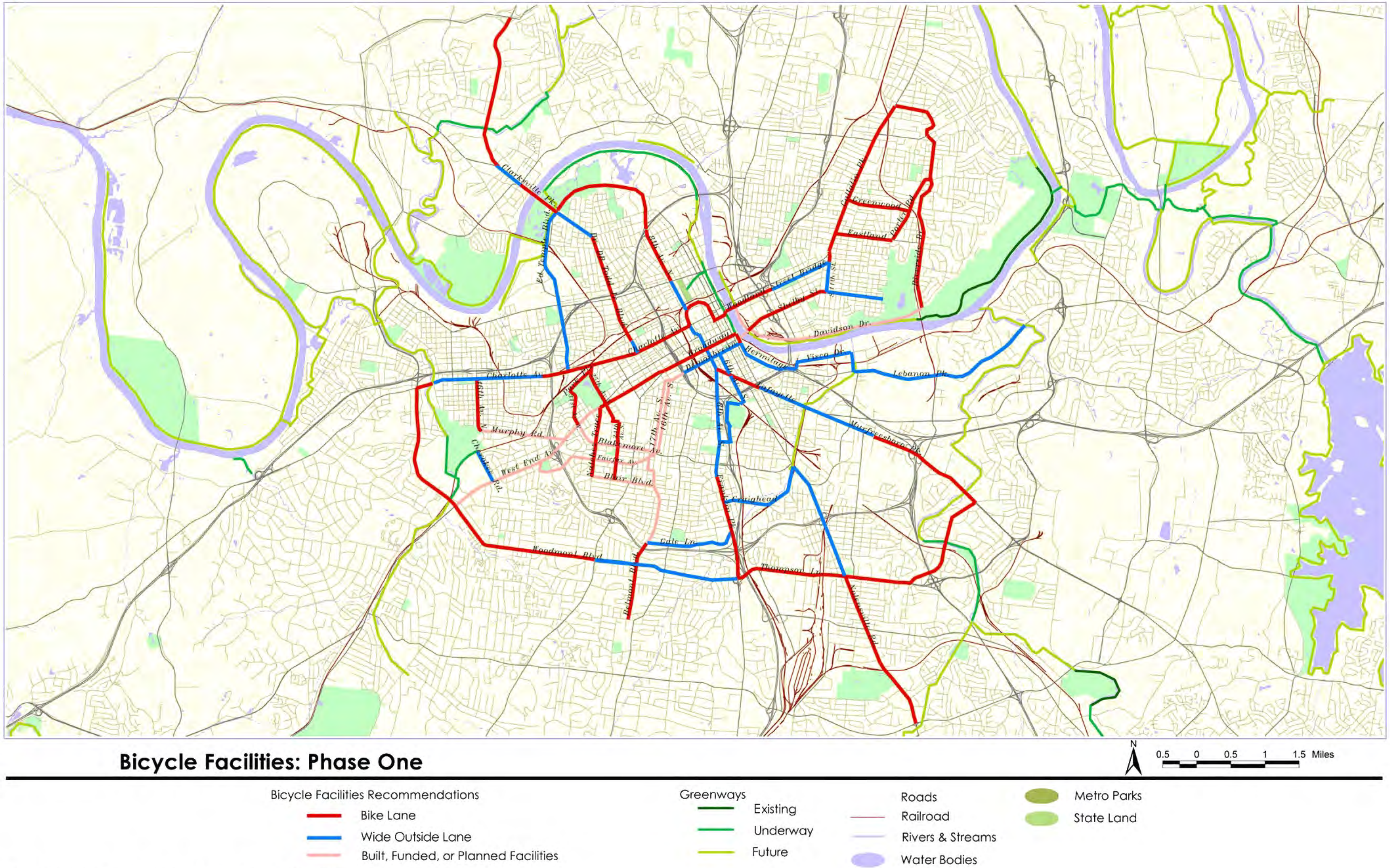


Figure 5.7: Phase 1 Bicycle Facilities Recommendations

DESIGN GUIDELINES SUMMARY

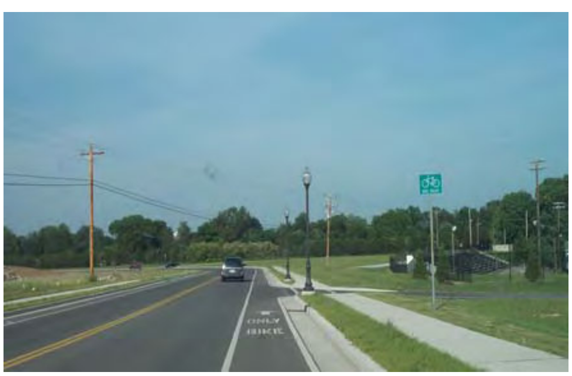
The complete *Bicycle Facilities Design Guidelines* are located in Appendix C. The standards and practices outlined in the document are intended to provide guidance on the integration of bicycle facilities into the various projects that have the potential to affect bicycle travel in Davidson County.

Application of the design guidelines will ensure consistency in facilities design. Consistency will provide cyclists with assurance regarding the type and quality of the bikeways that they will encounter. It will also encourage both cyclists and drivers to operate predictably with each other on public right-of-way. Consistency and predictability encourage bicycle use and are cornerstones of a safe multi-modal transportation infrastructure.

"Establish bike lanes on major roads leading into town, particularly."

The guidelines were developed by the consultant team in response to the specific needs, objectives, and circumstances of Nashville & Davidson County. They are based primarily on AASHTO standards and other standard practices used throughout the country.

The types of bicycle facilities that are contained in the guidelines include bicycle lanes, shared roadways and multi-use trails (greenways). Guidance on related design issues such as intersections, common hazards, end-of-trip facilities, and maintenance are also included.



Bicycle lanes should be designed for one-way travel in the same direction as the adjacent motor vehicle traffic.

Bicycle Lanes

A bicycle lane is a travel lane that is separated from conventional travel lanes with a lane stripe and is designated for exclusive or preferential use by bicyclists. The width of bicycle lanes ranges from four feet to six feet wide. They are one-way facilities that are placed on both sides of a street, and they carry bicyclists in the same direction as adjacent motor vehicle traffic. In addition to lane striping, pavement markings and signage identify bicycle lanes.

Another type of bicycle lane is a shoulder bikeway. Shoulder bikeways are paved shoulders that are at least four feet in width and are separated from conventional travel lanes with a lane stripe. This type of facility is typically applied to a rural roadway that does not have curb and gutter. However, shoulder bikeways can also be used on streets that have curb and gutter if an adequate shoulder is in place. Because shoulders can be used for other functions such as a location to temporarily park a damaged vehicle, pavement markings are not typically used on shoulder bikeways. However, signage is used to identify shoulder bikeways.

Shared Roadways

On a shared roadway, bicyclists and motorists share the same travel lane. There are three types of shared roadways:

Shared roadways accommodate both vehicles and bicycles.

- Wide outside lanes (WOLs)
- Signed shared roadways (SSRs)
- Local streets

With the exception of WOLs, motorists on these types of facilities typically have to weave into the adjacent lane in order to safely pass a bicyclist.

WOLs are 14-foot wide conventional travel lanes that are shared by bicyclists and motorists. The extra width provided by WOLs allows motorists to give a wide berth to cyclists when passing, and it increases the comfort level of bicyclists. On collector and arterial streets where physical constraints preclude bike lanes, WOLs are a desirable alternative. WOLs are identified with signage and can also incorporate pavement markings.

> *"Bike-friendly businesses and secure places to park your bike would greatly encourage bike travel in Davidson County— in addition to the obvious need for bike lanes."*

SSRs are typically reserved for arterial or collector streets that have high bicycle traffic demand, but cannot accommodate bike lanes or WOLs due to severe physical constraints. Ideally, SSRs are temporary solutions for short-distance segments that are only applied until design solutions incorporating more desirable bicycle facilities can be installed. Although SSRs do not offer extra width for bicyclists, they do have bike-safe storm grates, bicycle-sensitive traffic signals, signage, and the other standard features that apply to other bicycle facilities types.

Based on typical motor vehicle traffic volumes and speeds, local streets do not typically require any specific treatment in order to accommodate bicyclists. Signage may be used to identify a through-bike route that follows a local street.

<u>Multi-Use Trails (Greenways)</u>

Multi-use trails are more popularly known as greenways. Greenways do not allow motor vehicle traffic, but do permit a range of non-motorized uses including bicycling, walking, running and in-line skating. Greenways are typically built in an independent right-of-way, park or easement. However, they may also be located within road right-of-way, while being separated from motor vehicle traffic by open space or a structural barrier.

Greenways primarily attract recreational users. However, because they typically wind through a community and connect destinations, they also offer an excellent opportunity to function as non-motorized transportation routes. For children, or any cyclist uncomfortable with sharing the roads with vehicles, greenways may be the preferred facility. Greenways are also an excellent training ground for building the skills to ride on the road.

Greenways provide facilities for recreational and transportation trips for bicyclists, pedestrians or in-line skaters.

Good intersection design indicates a clear path to both bicyclists and motorists.

Intersections

Most conflicts between roadway users occur at intersections. Accordingly, intersections are where the most guidance is needed for bicyclists and all other users. Good intersection design gives those approaching an intersection a clear indication of the path that they are to follow and a clear indication of who has the right-of-way, allowing all to operate in a predictable manner. Except where severe physical constraints are present, bike lanes should generally extend to the stop bars at an intersection. Traffic signal detectors should be designed and maintained to detect bicyclists, and pavement markings should indicate where the bicyclist should be positioned in order to activate the detector.

Bicycle racks provide good short-term storage and should be located near building entrances.

Other Bicycle Design Issues

Regardless of the type of bicycle facility, or even the presence of a designated bikeway route, all streets should be designed and maintained to eliminate the common hazards that create safety problems for bicyclists. Features or issues that require specific consideration for their effect on bicyclists include:

- Storm grates
- Pavement surface quality
- At-grade railroad crossings
- Rumble strips
- Roadway bridges
- Construction zones

Bicycle Parking

The fear of bicycle theft or vandalism can discourage bicyclists from riding. Like motorists, bicyclists require secure and conveniently located facilities for bike storage at destinations. In general, bike racks are useful for short-term bike storage, such as a trip to the store. Bike lockers or covered bike racks are preferred for long-term storage, such as a trip to work. Bike racks should allow a bicycle frame and at least one wheel to be secured with a U-style lock. Bike lockers are completely enclosed and provide storage for a bicycle and its accessories from weather and vandalism. Both types of facilities should have adequate clearance around them for maneuvering, and should be located near building entrances.

> *"It is imperative that bike lanes be kept clear of debris."*

Maintenance

Bicycles have just two, high-pressure, narrow wheels. Accordingly, well-maintained roads are important for bicyclists safety. Specific issues of concern include the following:

- Frequent sweeping of streets that have bike facilities to remove debris
- Timely repair of potholes and other surface irregularities
- A practice that ensures that to the greatest extent possible utility cuts parallel to the flow of traffic are located outside of the bicycle path of travel
- Development of a Metro program to ensure quick response to reports of bikeway hazards

CHAPTER FIVE: RECOMMENDATIONS

C. RECOMMENDED PROGRAMS & SPECIAL PROJECTS

METRO BICYCLE & PEDESTRIAN PROGRAM

In the early 1990s when the Greenways Commission of Metro Parks was established, there was a new focus on bicycle and pedestrian planning. The Greenways Commission was charged with development of off-street, multi-use trails and addressing issues raised by key Metro Council representatives regarding the needs of pedestrians. Since that time, the Nashville Area MPO and staff members in various Metro departments, including Parks, Planning, and Public Works, have dedicated time to planning and programming efforts directed toward improving conditions for walking and bicycling.

With the development of this plan, it is recommended that a more formal Metro Pedestrian & Bicycle Program be established. Successful programs have been in existence for decades in many cities throughout the country. Most programs share some common characteristics. They have full-time, dedicated staff, citizen involvement, facilitated through an advisory committee, and routine integration of pedestrian and bicycle considerations into government endeavors that impact pedestrian and bicycle issues.

<u>COORDINATOR AND OTHER STAFFING ISSUES</u>: **Create a full-time Pedestrian & Bicycle Coordinator position for Public Works.** The coordinator's primary responsibility would be to implement the Sidewalk & Bikeway Plan. Specific tasks would include the following:

- Review roadway improvement projects for compliance with the Sidewalk & Bikeway Plan (with Public Works, TDOT, MDHA)
- Advise and assist in the review of development projects for integration of pedestrian and bicycle considerations (with Metro Planning Department)
- Evaluate and advise on sidewalk retrofit projects (with Metro Public Works)
- Initiate and manage other pedestrian and bicycle capital projects (with Metro Public Works)
- Coordinate implementation of other Sidewalk & Bikeway Plan recommendations (with all relevant agencies)
- Manage a Spot Improvements Program, as outlined in the Ordinances, Policies & Practices section (Appendix J)
- Serve as staff to a new pedestrian & bicycle advisory committee (see discussion below)
- Serve as Metro's liaison to bicycle, pedestrian and neighborhood advocacy organizations
- Facilitate education, encouragement and enforcement activities
- Maintain a Pedestrian and Bicycle Program website
- Identify and pursue funding for implementation of the Sidewalk & Bikeway Plan

Generally, rather than take primary responsibility for education, encouragement and promotional activities, the coordinator should facilitate, support, and offer resources, where appropriate, to organizations that currently undertake these activities. Existing organizations include the Community Health & Wellness Team, Walk/Bike Nashville, the Harpeth Bike Club, and Greenways for Nashville.

> *"A pedestrian access department, or one person in charge of pedestrian access who manages a city-wide pedestrian access plan would be a logical step."*

The program and the coordinator should be housed in the Engineering Division of Metro Public Works. To ensure program success, Public Works should be prepared to provide a high level of institutional support for the new staff position, as well as integration of pedestrian & bicycle considerations into all transportation projects. Furthermore, the success of the program hinges on the coordinator's freedom to maintain clear lines of communication with the public on relevant transportation projects.

It is critical that other Metro staff members besides the coordinator have knowledge and expertise in pedestrian and bicycle planning and design. The volume of development projects reviewed by the Planning Department, roadway improvement projects undertaken by Public Works, other capital projects and planning endeavors that have pedestrian and bicycle impacts preclude a single coordinator from being able to adequately address every project.

Furthermore, pedestrian and bicycle facilities are integral components of roadway design. Expertise in the design of such facilities is a necessity for every roadway designer. While a ped/bike coordinator or outside consultants can perform critical roles, those who make day-to-day engineering decisions will have a significant impact on how effectively the provisions of this plan are implemented. A shared knowledge base among all staff members who participate in transportation and land planning projects will ensure that pedestrian and bicycle considerations are institutionalized.

Current key staff members at Public Works, including the Engineering Division staff, Codes Administration, and the Planning Department, should develop greater pedestrian and bicycle planning expertise through continuing education. Nationally recognized experts in the field could be periodically retained by Metro to train staff members. Also, there are seminars and short courses offered throughout the country.

> *"Perhaps some of our elected officials and their staffs could start bicycle commuting (or walking) to their offices on a regular basis to serve as an example and to popularize the concept."*

Knowledge of pedestrian and bicycle design issues should be required for key new Planning, Codes and Public Works staff members, including all Transportation Engineers. Building expertise within these departments is essential to ensuring livable streets and a high quality, multi-modal transportation infrastructure.

ADVISORY COMMITTEE:

Although their forms vary, nearly every city with a strong pedestrian and bicycle program has a pedestrian and bicycle advisory committee. A committee that meets on a regular basis is the most effective way to channel public input on projects, promote walking and bicycling, increase program visibility, and encourage buy-in from the public.

A permanent Metro Pedestrian & Bicycle Advisory Committee (PBAC) should be established by Metro. Made up of twelve to fifteen members, the committee should include citizen representatives with interest and expertise in pedestrian and bicycle-related issues. Key Metro agencies, including Public Works, Planning, Codes, Parks, and the Health Department, should be represented with ex officio membership.

BIKE RACKS AT METRO BUILDINGS

To ensure bicycle accessibility at all Metro buildings, encourage bicycle travel, and illustrate government support for a multi-modal transportation system, **bicycle racks should be installed at Metro buildings** per the bicycle design guidelines. At buildings with a large employee population, bike lockers or covered racks are warranted.

METRO EMPLOYEE BICYCLE POOL PROGRAM & SHOWERS

In order to encourage bicycling, many cities have developed a version of Portland's "Yellow Bike" program, in which bicycles are made available free of charge to the public or to governmental staff. The bikes are ideal for short trips in a downtown area where there is a concentration of employees. **Metro should provide a bicycle pool, with bikes and helmets at key Metro urban offices with large employee populations.** Such a program would be especially effective in downtown Nashville and at the Howard School building. Another possibility would be for Metro to use donated bikes. Also, in the future there is the possibility that such vehicle pools could include other transportation modes such as the "segway."

Providing shower facilities will also facilitate Metro employee commuting by bicycle or foot. **Shower facilities should be incorporated into the renovation of existing Metro buildings and the design of new buildings.**

SCHOOL-RELATED ISSUES

The Centers for Disease Control & Prevention have determined that only about a quarter of American school children walk or bicycle to school.[39] The effects of this circumstance are significant.

Schools should be built on neighborhood streets with low speeds and traffic volumes.

As noted in the Education and Encouragement section of this plan, children under nine years of age are too young to develop many of the skills required for safe interaction with motor vehicles. Their peripheral vision is narrower than that of adults, they are less able to estimate the approaching speed of a vehicle, and they are unfamiliar with the operating conventions of motorists. Accordingly, elementary school children are especially vulnerable pedestrians dependant on well-designed streets and alert, slow-moving drivers.

In addition, a child's ability to safely walk or bicycle in his/her neighborhood is a cornerstone of community livability. Most parents, who freely walked around their own childhood neighborhoods, now have little choice but to chauffeur their own children to nearly every activity. The children lose the ability to easily go to a friend's house, to the playground, or to school, and too often remain isolated at home.

Childhood obesity and related diseases are reaching epidemic proportions, in part, because physical activity has been eliminated from daily routines. Sedentary children are not afforded the enhancements to life that walking and bicycling can provide. Like active adults, active children have better concentration, enhanced memory and learning abilities, more creativity, and better problem solving skills than those who are inactive. Mood is also enhanced for hours after exercise.

With fewer children walking to school, there are more cars on the roads, especially around schools. Parents driving their children to school make up as much as 25% of typical morning commuting traffic. It can become a vicious cycle. The more that children are driven to school, the worse street conditions become for children to walk and the less desirable it is to walk.

Recent Metro sidewalk expenditures, public comments received during the development of this plan, and the recommended Sidewalk Priority Index reflect Nashville's public commitment to making the walk to school a safe, comfortable, and common activity.

[39] http://www.bikefed.org/center_lines.htm

Outlined below are additional recommendations to further enhance walkability around schools.

SCHOOL SITE PLANNING CONSIDERATIONS

As discussed in the Policy Recommendation section**, criteria should be developed to ensure that new elementary schools are located on neighborhood streets with low traffic volumes and speeds, and within walking distance of a large proportion of students' homes. In addition, the site design of schools should give priority to pedestrian and bicycle access.**

All schools should have bicycle racks that comply with the standards outlined in the bicycle design guidelines.

SAFE ROUTES TO SCHOOL

Various programs generally referred to as "Safe Routes to School" are emerging in cities and states throughout the country. These programs fund the installation of high-quality pedestrian facilities on the streets within walking distance of schools. In addition to sidewalks, a range of pedestrian accommodations are incorporated in the street designs. As Metro transitions into the use of more pedestrian enhancements, which are discussed in the design guidelines, on urban streets throughout the county, it may be appropriate to begin the introduction of some of these features on streets near schools.

Like many other pedestrian-related projects, "Safe Routes to School" projects can be good candidates for federal transportation funding. Congress will reauthorize the TEA-21 in 2003 and may include provisions specifically related to funding safe routes to school. Meanwhile, such projects currently qualify for several existing TEA-21 funding programs and could, of course, also be funded locally.

In cooperation with The Planning Department and Metro Public Works, the Metro Board of Education should identify and map safe routes to schools. This is a common approach in other states. These streets should be priorities for the installation of appropriate and innovative pedestrian design features as identified in the Pedestrian Design Standards.

Metro should encourage the Tennessee Department of Transportation (TDOT) to establish a funding program for local safe routes to school projects. In addition to federal funds administered by TDOT, state funds should be available for such endeavors.

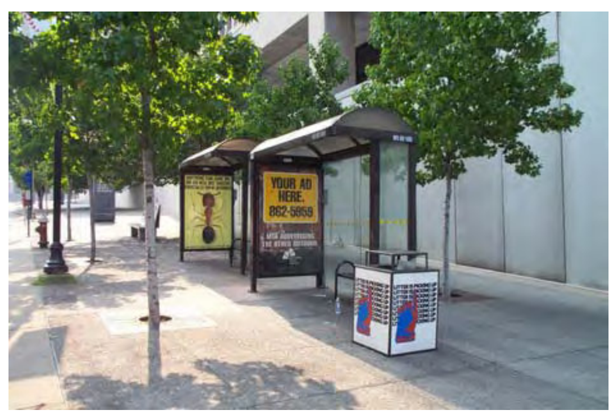
SPECIAL CAPITAL PROJECTS

<u>BUS STOPS</u>

The Pedestrian Design Guidelines provide a range of recommended standards for the location and configuration of bus stops. Several of the recommendations involve land or easement acquisition or other potentially cost-intensive investments. In order to ensure that such investments are maximized, **it is recommended that a bus stop master plan be developed.** The plan should include the following components:

- Identification of all existing stop locations
- Evaluation of existing stop locations and a plan for additions, deletions and relocations
- Identification and prioritization of land acquisition and bus stop enhancement needs
- Uniform design standards for bus stop furnishings and crossings
- A funding strategy for implementation

A paved passenger waiting area should also be



A bus stop master plan is recommended to address bus stop locations and design in a comprehensive manner.

integrated into the sidewalk design at high-volume bus stops on the corners of arterial and collector streets. Sidewalk ramps accessing the bus stops as well as bicycle storage facilities should also be included. Also, in order to increase multi-modal travel, bike racks should be installed on MTA buses.

ARTERIAL RE-ENGINEERING

Not only have many major arterial roadways in Nashville historically served as gateways to the city, but their shops, offices and other commercial activity have also fueled the city's economy. However, many of the commercial businesses along these roadways are not as vibrant or productive as they once were.

Because major arterial roadways usually travel through older parts of the city, they are usually flanked by densely developed residential neighborhoods that are within easy walking distance. In spite of poorly-designed or non-existent pedestrian facilities, many people continue to walk from their homes to the arterial roadways for daily needs. Unfortunately, many of these same streets have high pedestrian/car crash rates. The lack of sidewalks, continuous parking lot access, and few crosswalks place pedestrians in near-constant conflict with motorists. Likewise, most of these roads are not as safe or efficient as they should be for motorists and need to be evaluated to identify potential safety improvements.

"I think aesthetics and street trees are extremely important."

On major arterial roadways, the installation of well-designed pedestrian facilities will be very difficult to achieve without more fundamental changes to overall street design. **Re-engineering projects should be undertaken for the following roadways:**

- Charlotte Pike
- Dickerson Road
- Gallatin Pike
- Murfreesboro Road
- Nolensville Road

These projects should consider access management, traffic signal consolidation, innovative design treatments (particularly at intersections), pedestrian and bicycle facilities such as refuge islands and curb extensions, and landscaping.

Not only will re-engineering maximize the efficiency and safety of the corridors for motorists, pedestrians, bicyclists, and transit users, well-designed street improvements can fuel reinvestment and ensure continued and enhanced viability of these corridors as "Main Streets" for their respective areas of the county. In addition, on-going efforts on Hillsboro Pike, especially efforts to improve pedestrian conditions in the Green Hills Activity Center, should proceed.

WEST END AVENUE

Like the arterial streets discussed above, West End Avenue travels through a densely developed, mixed-use area and offers nearly all of the goods and services one might need on a daily basis. However, congestion on West End Avenue tends to frustrate motorists, and it is very difficult for pedestrians to cross the roadway. Bicyclists on West End Avenue are also confronted with frequent barriers.

With its density of development, volume of office workers, popularity as a running route, and the presence of destinations such as Vanderbilt University and Centennial Park, West End Avenue has perhaps the highest pedestrian volumes in Nashville beyond the downtown core. Although most segments of the corridor have sidewalks, intersections remain uncomfortable to cross.

Significant pedestrian and bicycle improvements should be planned and installed along the West End corridor, with a particular focus on intersection design. Enhanced crossing facilities can include curb extensions, refuge islands, more frequent crosswalks, pedestrian signal improvements, driveway consolidation, and other features as outlined in the Pedestrian Design Guidelines.

While pedestrian and bicycle enhancements can be retrofitted to the street, the avenue has additional potential waiting to be tapped. Like Saint Charles Avenue in New Orleans, Michigan Avenue in Chicago, and Monument Avenue in Richmond, VA, West End Avenue can and should be the grandest street in Nashville, both in terms of its streetscape and the form and function of the buildings that line it. The street has the potential to function beautifully for all travel modes, incorporate landscaping and other streetscape amenities, and attract well-designed new investment that reinforces the urbanity of the street. **A master plan should be developed for West End Avenue that includes re-engineering of the corridor, architectural design standards, and economic development considerations.** The pedestrian and bicycle improvements outlined in the previous recommendation would be a component of this more comprehensive plan.

A master plan for West End Avenue should be developed including landscaping and multimodal transportation design.

DOWNTOWN INTERSTATE INTERCHANGES

Freeway interchanges direct high volumes of motor vehicles onto urban streets. They are also the only way to travel across a freeway, acting as critical links that can connect or divide the communities on either side.

In Nashville, pedestrians and bicyclists have not historically been taken into consideration during interchange design. Because interchanges form a ring around downtown Nashville, they function as barriers to bicycle and pedestrian commuters, lunchtime walkers, and special events attendees.

In refinement of the interchange gateway improvements recommended in Nashville's 2000 *Downtown Transportation Plan*, **pedestrian and bicycle improvements should be incorporated into all of the interchanges in the downtown interstate loop.** In addition to those techniques outlined in the pedestrian and bicycle design guidelines, the design of interchanges should achieve the following:

- Ensure that motorists exiting the freeway decelerate to speeds appropriate for urban streets before they reach intersections
- Ensure that motorists entering the freeway begin to accelerate to freeway speeds only after leaving urban street intersections
- Provide wide pedestrian travelways that are physically separated from vehicular traffic
- Provide well-marked, direct, and short pedestrian crossing facilities
- Place pedestrians in a safe and highly-visible corner location while waiting to cross a roadway
- Provide pedestrian crossing signals with frequent crossing time intervals and generous clearance time intervals
- Incorporate trees and other landscaping to reinforce the slow-speed, urban nature of the interchange

I-440 BIKE PATH

When Interstate 440 was constructed in the early 1980s, its design included provisions for a bike path. The path was to provide a connection between Elmington Park and Sevier Park, and it was to be located within the interstate right-of-way, outside of the sound walls. The bike path was a central component of the environmental mitigation required by the federal government for approval to construct the interstate and was, in fact, featured on the cover of the Environmental Impact Statement (EIS) document.

Although the existing Brightwood Avenue overpass includes a grassy area and parking spaces that were originally intended to serve a trailhead, no other elements of the bike path have been constructed. It is unclear why the bike path has not yet been constructed and whether there remains any outstanding obligation to construct the path.

In the early 1990s, the Greenways Commission of Metro Parks evaluated the feasibility of the I-440 bike path under current physical conditions. The Commission concluded that some feasible options remain for a non-motorized, multi-use facility along the interstate corridor, although the path would need to be modified from its presumed original route. Given the opportunities and constraints along the corridor, it appears likely that a continuous bicycle/pedestrian facility could be developed that incorporates a combination of off-street trail (greenway), improved alleys, and on-street bikeways. Such a facility would perform a very strong transportation function.

The status of mitigation requirements for Interstate 440 should be determined to conclude whether the bike path was amended out of the EIS and, if not, whether there is an outstanding obligation to build the path.

CHAPTER FIVE: RECOMMENDATIONS

D. RECOMMENDED EDUCATION & ENCOURAGEMENT ACTIONS

Along with engineering and enforcement, education and encouragement (E & E) are two of the "Four Es" that make up a successful pedestrian and bicycle program. Encouragement and promotional initiatives help to increase the number of pedestrians and bicyclists, along with the acceptance of walking and bicycling as travel modes. Educational efforts help ensure that roadway users of every mode know how to operate safety.

While E & E are essential, the first and best way to increase safety and usership is to ensure that walkers and bicyclists have a well designed and maintained multi-modal transportation infrastructure. High quality pedestrian and bicycle facilities ensure that non-motorized travelers have equal access to public right-of-way. Furthermore, such facilities help legitimize non-motorized travel to motorists, and foster mutual respect between all right-of-way users. E & E augment the provision of facilities by maximizing their use and ensuring that people know how to use them.

E & E efforts should be directed at target audiences that include children and adult pedestrians, bicyclists, and motorists. There are countless strategies and approaches to E & E. Many existing curricula are available, and many communities have ever-changing, creative events, programs, campaigns and other initiatives that can serve as models. The discussion below outlines, by target audience, the fundamental themes and principles that should guide any E & E effort. While some specific projects are recommended, the intent is to provide a basis for ideas to be generated by those Metro and non-Metro agencies that will be implementing this portion of the plan.

E & E should be incorporated into Metro's Pedestrian and Bicycle Program. Like the most successful programs in the country, Metro should facilitate and coordinate much of their E & E efforts through other agencies that have shared interests rather than assuming sole responsibility for E & E efforts. By facilitating others' E & E efforts, the staff can devote more attention to planning and design issues. **Walk/Bike Nashville, the Community Health & Wellness Team, the Harpeth Bike Club, and other organizations already have successful E & E events and programs. Metro should support and help expand these efforts.**

CHILD BICYCLISTS

The key messages that child bicyclists should receive are:

- Wear a helmet.
- Obey all traffic laws.
- Look both ways before crossing a street.
- Always ride with the flow of traffic.
- Be predictable.
- Be visible.

Age-specific bicycle education curricula are available for children from preschool to high school. The primary focus of most programs is building basic bicycling skills. Although these programs are about safety, the emphasis should be on the positive aspects of cycling. Child cyclists should learn that bicycling is a physical activity that has multiple life-long benefits. A disproportionate focus on danger only discourages cycling. Children are best reached with in-school, hands-on activities that are coupled with rewards and incentives. Such rewards can include free or reduced-cost helmets, bike accessories, certificates, or fun-day events. **A bicycle course that teaches vehicular cycling, with an emphasis on the enjoyable aspects of two-wheeled travel, should be offered as part of the physical education curriculum at Metro elementary schools.**

Bicycle rodeos provide great learning opportunities. The annual event coordinated by the TMA Group in Franklin is a good model that

Bicycle rodeos, such as the TMA Group's annual bicycle rodeo in Franklin, Tennessee, provide excellent learning opportunities for children.

could be expanded to reach a broader audience in schools.

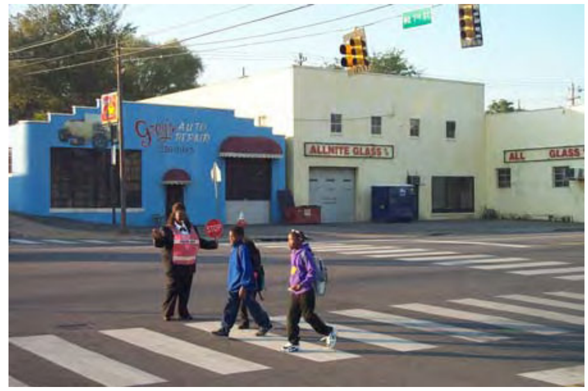
The Tennessee Department of Transportation offers *Safe Cycling: Do You Know the Rules?,* a bicycle safety video for children, that can augment hands-on training.

An educational pamphlet with simple text and bold graphics that can be used alone, as part of a class, or by parents should be developed and available on the web. Such a pamphlet is currently being developed by the Metropolitan Planning Department.

CHILD PEDESTRIANS

Children need to develop safe walking skills. Young children have narrower peripheral vision than adults, they are not familiar with driver behavior, and they have not yet developed the skills to gauge the speed of approaching cars. For these reasons, young children are more dependent than other pedestrians on well-mannered motorists. On streets where children walk, live and play, streets should be designed to encourage motorists to travel at low speeds. Basic walking skills for young pedestrians are most effectively modeled and communicated by parents.

The most successful educational programs are targeted at children who are nine years of age and older. Again, schools are the best place to



Children should be taught proper walking skills both by parents and through creative school-related programs.

ensure that the broadest audience of children is reached.

Nashville's annual "Walk-to-School Day", coordinated each fall by the Community Health & Wellness Team, can include an educational component to increase children's pedestrian safety skills. In addition, this event has proven to be successful at raising awareness of walking conditions around schools, quality of life on neighborhood streets, and motorist behavior.

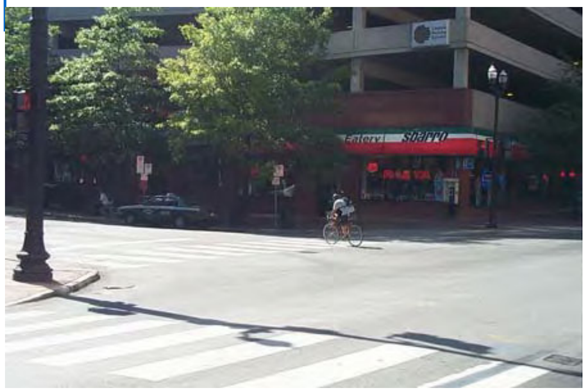
Other creative, school-related encouragement activities can include walking pools and bicycle pools. Often, such activities are developed in conjunction with "Safe Routes to Schools" projects, which are discussed in Section D.

ADULT BICYCLISTS

The key messages adult bicyclists should receive are:

- Be alert.
- Obey all traffic laws.
- Always ride with the flow of traffic.
- Be predictable.
- Be visible and use lights at night.
- Wear a helmet.
- Avoid riding on sidewalks.
- Do not drink and ride.

E & E efforts for adult bicyclists should focus on teaching the rights and responsibilities of the road. E & E efforts must recognize that the



Adult bicyclists should be educated on safe riding practices as well as which roads are best for bicycling.

range of adult bicyclists includes those who frequently ride for transportation on busy city streets, those who may ride just a few times a year for recreation, and everyone in between. Messages should be tailored to each group.

Some highly motivated cyclists will be responsive to organized events and activities such as the cycling skills courses that the Harpeth Bike Club has conducted during previous years. "Bike-to-Work Day", an annual event organized by Walk/Bike Nashville, is also a good opportunity to distribute educational literature, build the bicycling community, and promote awareness of bicycle commuters. Some adults are less likely to participate in organized activities, but they may be motivated to educate themselves. They may also respond to broader educational efforts.

"Public education should be a top priority."

Both joiners and non-joiners should have easy access to good information. *Decide to Ride: A Guide to Safe Riding in Nashville* is a brochure that was developed by the Metro Planning Department and covers all of the basic issues. This brochure can be distributed in hard copy and made available on-line.

A Davidson County road map with suitability ratings for popular streets should be produced and distributed at area bike shops, and an electronic version of the map should be made available on-line. The suitability rating to be used on the map is discussed in detail in Chapter 4 Section A. The map could include the shopping areas, transit stations, parks, city buildings, and other local attractions. The on-line map should be updated as new bike facilities are installed on Metro streets and should be made available for download. The printed map should be updated annually. A bicycle commuter brochure can also be produced and distributed that addresses the issues and concerns specific to those who ride to work.

2008 Update note: Additional Cycling-related education recommendations can be found in Amendment 1, Section 5.4.

ADULT PEDESTRIANS

Because walking is the most fundamental mode of travel, many assume that there is little to learn about "how" to walk. Unlike bicyclists, most pedestrians do not consider walking as part of their identity. These circumstances can make it difficult to reach pedestrians. However, as walking is rediscovered as a simple and practical mode of transportation, pedestrians are becoming more visible in Nashville. Official pedestrian regulations, as well as many of the general rules of smart walking, are unknown to many pedestrians. Promoting good pedestrian skills is an excellent way to encourage walkers to safely assert their rights and responsibilities on public right-of-way.

The Metro Planning Department is developing a brochure entitled *Ped Ed: A Guide to Safe Walking in Nashville*, which outlines the rules of the road for pedestrians. The pamphlet should be made available to motivated audiences such as those in urban neighborhoods, environmentally or fitness-oriented groups, and on-line for anyone who has an interest.

Older adult pedestrians should be targeted in all E & E efforts. Many seniors are more reliant than others on walking for transportation and

maintaining their independence. Walking may also be the most practical form of exercise available to some older adults. Because seniors can be fragile, crashes involving senior adults are even more likely to have devastating consequences than crashes involving other pedestrians.
The Community Health & Wellness Team, with support from the Metro Health Department, sponsors “Walk Nashville Week.” This event includes daily activities each day of the week that encourage walking for fitness and health, including the “Walk for Active Aging.” In addition, this event can be an excellent venue to teach traffic safety skills and to promote a walkable environment.

MOTORISTS

Almost all motorists are pedestrians at one time or another and many are cyclists. However, once they get behind the wheel, some tend to view these other roadway users as nuisances. From the comfort of a fast, quiet car, many motorists forget that pedestrians and cyclists are dependent on motorists’ behavior for their safety and that bicyclists and pedestrians have an equal right to be on public right-of-way. All roadway users have a responsibility to share the roads in a safe and predictable manner.

Care should be taken so that motorist E & E efforts are not perceived as antagonistic. Perpetuating negative ways of thinking will not incline a motorist to be more tolerant of slower moving bicyclists or pedestrians. Mutual respect should set the tone for all endeavors. Perhaps the most immediate challenge in Nashville is to ensure that more motorists know that pedestrians and bicyclists have a right to use public right-of-way, and that drivers must accommodate them. The other key messages motorists should receive are:

- Be alert for pedestrians and bicyclists.
- Obey all traffic laws.
- Be predictable.
- Be patient.
- Do not honk unnecessarily.
- Give room when passing.
- Yield to pedestrians.

Most motorists are not motivated to learn about pedestrians and bicyclist. The message must be brought to them. Efforts directed toward motorist education should foster a broad and general public awareness of pedestrians and bicyclists.
The Metro Planning Department is developing a motorist’s guide to sharing the road. The brochure can be distributed at various Davidson County locations, such as at county clerk offices.

A broad promotional campaign should also convey educational messages. Simple roadsharing tips can be placed on bus benches, bumper stickers, and at other locations. Public service announcements, utility bill inserts, and other promotional media can convey more detailed information.

Long-term efforts should be made to expand the now-limited information about bicyclists and pedestrians that is presented in the *Tennessee Department of Safety Driver Handbook*. Furthermore, it is desirable to have pedestrian and bicycle-related questions added to the state drivers licensing exam.

OTHER RECOMMENDATIONS

Neighborhood associations can help educate and promote awareness of sidewalk maintenance responsibilities, such as keeping vegetation from encroaching into the sidewalk and keeping driveway gravel off of sidewalks. Most associations have well-developed communications networks that include newsletters, e-mails, and regular meetings. In addition, neighborhood associations may wish to offer hedge trimming to elderly residents, or to anyone who might have difficulty maintaining vegetation that encroaches into the sidewalk.

CHAPTER FIVE: RECOMMENDATIONS

E. RECOMMENDED TRAFFIC LAW ENFORCEMENT ACTIONS

Law enforcement is the fourth and final "E" that, together with engineering, education and encouragement, makes up a successful pedestrian and bicycle program. The other three Es can be considered preventative enforcement. For example, a motorist who understands that bicyclists have a right to be on the road and must sometimes venture into the middle of a lane to avoid an obstacle, is not likely to honk at or threaten a bicyclist. Likewise, a knowledgeable cyclist will obey traffic signals and will not ride against the flow of traffic. The provision of pedestrian and bicycle facilities also reduces conflicts by providing each mode with its own space.

For many errant roadway users enforcement is necessary. Users of each travel mode should be held accountable for sharing public right-of-way responsibly, and each should be targeted by different law enforcement endeavors in a balanced strategy. Indeed, just as there are good and bad drivers, there are good and bad bicyclists and pedestrians. However, a low-speed pedestrian or bicyclist is no match for a high-speed automobile or truck. While pedestrians and bicyclists can contribute to unsafe conditions, it is motor vehicles that create most of the risk of injury and death on public streets, and it is drivers who carry the greatest liability risk.

POLICE OFFICER TRAINING

Police officers who understand the safety issues that confront pedestrians and bicyclists are key to enforcement efforts. Without these police officers, others may follow the philosophy that if pedestrians and bicycles want to be safe, then they should stop walking or bicycling and should start driving. In order to create an atmosphere in which walking and bicycling are legitimized as travel modes, pedestrians and bicyclists need to know that law enforcement officials consider their safety to be as important as the safety of motorists.

Many police departments throughout the country provide regular training sessions and programs at which pedestrian and bicycle-related enforcement issues are addressed. Such programs raise awareness among officers, ensure that enforcement is part of routine activities, and provide training for special initiatives and operations, such as those described below. **It is recommended that such training activities and programs be routinely incorporated into the Metro Police Department training curriculum,** both as part of recruit training and as continuing education.

Community relations campaigns can also be incorporated into many enforcement initiatives, with an emphasis on public safety and community livability. Police officers can distribute brochures on bicycle and pedestrian-related regulations, along with warnings or citations. Speed crackdowns on neighborhood streets are an excellent opportunity to forge bonds with the community. Also, as discussed in the Education and Encouragement Section, police can lead bike rodeos in schools and elsewhere.

Training sessions for the Metro Police Department addressing pedestrian and bicycle-related enforcement issues are recommended.

ENFORCEMENT FOR DRIVERS

No motorist would choose to hit a pedestrian or bicyclist, but many do not realize that they significantly increase their chances of doing so with speed, inattention, or lack of respect. Many drivers simply travel too fast to look out for pedestrians, or fail to slow down quickly enough to yield or avoid a crash. Other drivers may be intentionally aggressive or intimidating, such as driving too close to bicyclists or shouting at them, without thinking about the life-threatening hazards such behaviors create.

Because police officers cannot be on every street all of the time, good driving behavior begins with streets that are designed to induce appropriate travel speeds. Traffic law enforcement augments the preventative benefits of well-designed streets. Enforcement can take many forms, but should focus on high-crash locations and the behaviors that cause the most common crashes. Targeting morning speeders on a street near a school, for example, will improve walking conditions for children, who are the most vulnerable pedestrians. A focus on compliance with yield requirements at urban crosswalks during peak travel periods is another targeted approach that can maximize limited enforcement resources.

"There seems to be a growing mindset among drivers that bikes are a nuisance on city streets. Education for both riders and drivers should be part of any plan."

An increasingly popular enforcement initiative being used in communities throughout the country is a pedestrian sting operation. During such an operation, police officers who are dressed in bright civilian clothing, attempt legal pedestrian crossing maneuvers at problematic locations. Motorists who do not yield are stopped by motorcycle police. The success of such a program is not necessarily based on the number of warnings and tickets issued. Instead, the key to such as operation is based on an accompanying media strategy. If ten people are warned or ticketed and one thousand people hear about it on the evening news, the level of awareness of pedestrian-related laws increases exponentially.

The Metro Beautification & Environment Commission's existing anti-litter program offers a good enforcement and encouragement model that could be transferred to traffic law compliance. Interested bicyclists and pedestrians could be provided with pre-printed cards on which they could record the license plate numbers of motorists who have performed illegal maneuvers. The cards could then be sent to Metro's Pedestrian & Bicycle Program office, which is recommended as part of this plan. Then, staff could mail the offending motorist an educational sheet on pedestrian and bicycle-related traffic laws.

ENFORCEMENT FOR PEDESTRIANS

Self-preservation keeps most pedestrians from walking in a manner that intentionally places them in conflict with moving cars. Accordingly, few police departments are motivated to create specific pedestrian enforcement programs. Pedestrians know that, regardless of who may be at fault in a potential crash, they are far more likely to be injured or killed than a motorist. This knowledge serves as a deterrent for "bad walking" and is more successful than the risk of a citation.

Historically, most enforcement efforts directed toward pedestrians have focused on jaywalking. However, jaywalking does not typically make up a significant percentage of pedestrian/motor vehicle crashes. Instead, such efforts have typically been motivated by a desire to keep jaywalking pedestrians from congesting traffic. Although jaywalking enforcement can be effective for this purpose in very dense urban areas, it is not an effective safety improvement strategy. In addition, pedestrian enforcement is more difficult on streets that have poorly-designed pedestrian facilities. If a pedestrian does not see an obvious safety advantage to crossing at a crosswalk, for example, it might be difficult for a police officer to justify enforcement based on safety concerns.

In general, pedestrian concerns are more effectively addressed through educational programs such as those discussed in the previous section. In particular, pedestrian-directed enforcement activities tend to be most effective when targeting alcohol-impaired pedestrians, since these types of pedestrians are involved in a disproportionate percentage of all fatal pedestrian/motor vehicle crashes.

ENFORCEMENT FOR BICYCLISTS

Like motorists, bicyclists are capable of contributing to unsafe conditions on roadways. The most successful bicycle enforcement programs in the country tend to focus on actions that contribute most to bicycle/motor vehicle crashes and they focus on the locations where such crashes are most frequent.

Various studies have evaluated crash type statistics, and only minor variations in results have occurred. In general, these studies have determined that the bicyclist actions that contribute most to crashes are:

- Failing to stop or yield as required at intersections
- Riding at night without required head lamps, rear lamps, and reflectors
- Riding against the flow of traffic
- Riding on the sidewalk

Enforcement activities that selectively target these types of violations would be the most effective use of limited enforcement resources. Generally, such enforcement activities are more logistically feasible, and better received by the bicycling public, when administered by police on bicycles rather than in squad cars.

CHAPTER SIX: IMPLEMENTATION & FUNDING

A. RETROFITTING EXISTING ROADWAYS WITH SIDEWALKS

INTRODUCTION

The recommended sidewalk standards for residential areas can be applied relatively easily within the design and construction of new developments. Unfortunately, future sidewalks were not considered when many of the existing developments were constructed. As a result, the application of a standard sidewalk to an existing street is typically more difficult and expensive due to the constraining factors that are present. These roadways will require special design considerations in order to retrofit them with sidewalks.

Large canopy trees, such as those on Albion Street, make it difficult to retrofit the street with sidewalks.

CONSTRAINTS TO RETROFITTING EXISTING ROADWAYS WITH SIDEWALKS

There are a variety of factors that affect a street's ability to accommodate a standard sidewalk. These factors include existing right-of-way width, location of existing features such as trees and mailboxes, and site related factors such as ditches and other topography issues.

Westwood Avenue is an example of a street that may be difficult to retrofit with sidewalks due to limited right-of-way width, landscaping, mailboxes, and other similar features.

Ditches, such as those on Stokes Lane, may require the installation of storm sewers, or some other drainage solution, in order to accommodate sidewalks.

In many instances, the right-of-way width of an existing roadway is too narrow to accommodate all of the existing cross-sectional zones and the addition of a new sidewalk. Figure 6.1 illustrates the cross-sectional zones that may be present along any given roadway. Special considerations should be evaluated when attempting to retrofit an existing, narrow right-of-way with sidewalks. It may be necessary to acquire additional right-of-way or reduce the width of one or more cross-sectional zones.

Existing features along the roadway also make it difficult, if not impossible, to retrofit an existing roadway with sidewalks. Because obstructions are not permitted in the pedestrian travelway, accommodating a new sidewalk may require that some existing features are removed or relocated. For some features, this may not be an issue. However, there may be instances when this action is not desirable. For instance, it may be undesirable to remove large canopy trees that contribute to the character of a community. Also, above ground utilities and utility poles may be expensive to relocate. Rather than destroying the character of a neighborhood street or excessively increasing construction costs, other options may be more desirable. Acquiring additional right-of-way or reducing the width of one or more cross-sectional zones may permit a new sidewalk to be constructed without disturbing the existing features.

Site related issues can also make it difficult or impractical to accommodate a new sidewalk along an existing roadway. As previously mentioned, future sidewalks were not considered when many existing roadways were constructed. As a result, the existing topography is not always ideal for sidewalk construction. Steep slopes along the edge of the roadway may require excessive grading, often encroaching onto the adjoining property, in order to accommodate a new sidewalk. Drainage ditches also require special attention when retrofitting an existing roadway with sidewalks. If both the existing ditch and a new sidewalk cannot be accommodated within the existing right-of-way, it may be necessary to acquire additional right-of-way, redesign the ditch, install a storm sewer, or provide some other stormwater management system.

RETROFIT PROCEDURES

In order to ensure that all issues will be considered when attempting to retrofit an existing roadway with new sidewalks, a procedural flowchart has been developed. This flowchart, which is presented in Figure 6.2, outlines the decision-making process that should guide the design of sidewalk retrofit projects. The flowchart is comprised of a series of questions that are to be asked in sequential order. All of the questions require either a yes or no answer. As each question is answered, another question is asked until a solution has been reached.

METHODOLOGY

The intent of the flowchart is to provide a method of evaluation for accommodating a new sidewalk along an existing roadway. The flowchart is designed to yield results that minimize the negative impacts of the sidewalk on the surrounding neighborhood while maintaining sidewalk standards. It is preferred that new sidewalks be accommodated within existing right-of-way. Therefore, this is the first question that is asked on the flow chart.

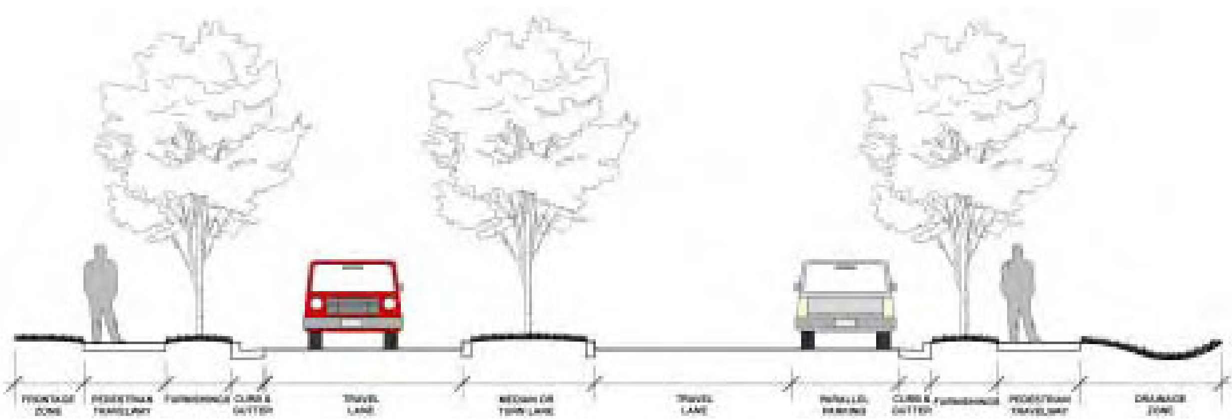
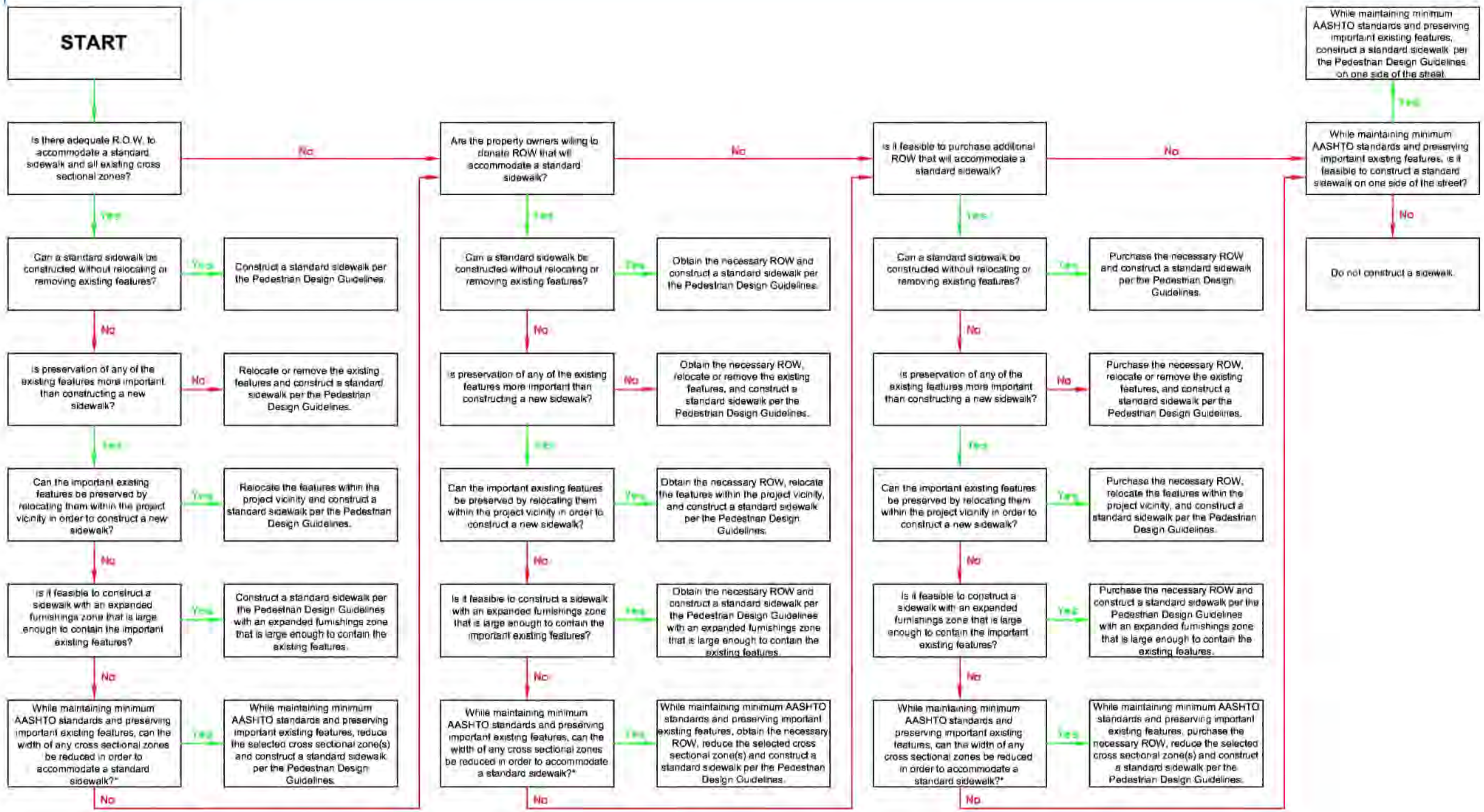


Figure 6.1: Cross-sectional zones



*ACCEPTABLE CROSS SECTIONAL ZONES FOR REDUCTION

(Metro's Approval is Required)

Travel Lane	(minimum width = 10 feet; if necessary, reduce to 0 feet, however acceptable LOS must be maintained)
Parking Lane	(minimum width = 7 feet; if necessary, reduce to 0 feet, however required number of parking spaces must be maintained)
Median	(minimum width = 4 feet; if necessary reduce to 0 feet)
Shoulder	(minimum width = 4 feet; if necessary reduce to 0 feet)
Ditch	(must maintain required flow capacity, may require storm sewer installation)
Furnishings Zone	(minimum width = 2 feet, can only be reduced if all other options have failed)

Figure 6.2: Decision-making process flowchart.

If the existing right-of-way is wide enough to accommodate a standard sidewalk, then the existing features along the roadway should be evaluated to determine their importance or possibility of relocation. If there are no existing features in the path of the proposed sidewalk, or if the obstructing features can be relocated, then a sidewalk can be accommodated. However, if there are obstructing features that cannot be relocated, other options should be considered. For instance, can the width of the furnishings zone be expanded to accommodate the features and allow for a new sidewalk? If not, can the width of one or more cross-sectional zones be reduced in order to accommodate the features and a new sidewalk? Guidelines for reducing the widths of cross-sectional zones are provided at the bottom of the flowchart. Any reduction in the widths of cross-sectional zones must meet or exceed minimum AASHTO and Metro standards.

If the first series of questions does not permit construction of a sidewalk, or if the existing right-of-way is not wide enough to accommodate a sidewalk, then the possibility of obtaining additional right-of-way through donation should be considered. If this is possible, then the first series of questions is asked again, based on the assumption that the adjoining property owners are willing to donate the required right-of-way.

If the second series of questions does not permit construction of a sidewalk, or if the adjoining property owners are not willing to donate additional right-of-way, then the possibility of purchasing additional right-of-way should be considered. The same series of questions should be asked again, based on the assumption that it is feasible to purchase the required additional right-of-way.

If all of the above options fail, then the possibility of constructing a standard sidewalk on only one side of the roadway should be explored. Per the *Pedestrian Design Guidelines*, sidewalk are required on both sides of roadways. Therefore, this option should be explored only as a last resort. If a sidewalk cannot be accommodated on only one side of the roadway and all of the previously identified conditions cannot be met, then a sidewalk should not be constructed along the roadway.

The sidewalk retrofit flowchart provides a method for determining the most appropriate means for accommodating a new sidewalk along an existing street by evaluating the right-of-way width, existing features, and other site-related factors.

CHAPTER SIX: IMPLEMENTATION & FUNDING

B. COST ESTIMATE SUMMARY

INTRODUCTION

The previous chapters of this strategic plan identify the conditions of the existing pedestrian and bikeway systems in Metro Nashville, including sidewalk problems that must be corrected in order to comply with Metro and ADA standards. These chapters also contain recommendations that will improve the existing facilities and expand the pedestrian and bikeway networks. The information contained in these chapters can be, and should be, utilized by Metro to develop a program that will systematically correct existing sidewalk and bikeway problems and provide for new facilities. An important step in developing such a program is to determine the costs that are associated with the improvements and the timeframe in which the improvements are to be made.

This chapter outlines the anticipated costs that are associated with correcting the existing pedestrian facility problems, expanding the pedestrian facility network, and constructing the recommended Phase I bikeway routes. It also contains discussions regarding the timeframe for completing the improvements and the associated budgetary considerations.

PEDESTRIAN FACILITIES

SIDEWALK REPAIR COSTS

The sidewalk inventory, which is described in Chapter Three, identified problems with existing sidewalks in Metro Nashville. The results of this inventory have been utilized to develop an estimate of cost for correcting the identified problems. Because the problems were identified on a sidewalk block-by-sidewalk block basis, meaning that the exact location of each problem along a block was not identified, certain assumptions were necessary for developing the cost estimate. These assumptions include, but are not limited to, the following:

- It is assumed that all obstructions are equally spaced along the sidewalk block.
- It is assumed that a ten-foot long section of sidewalk will be removed and replaced for each obstruction that is removed, adjusted, or relocated.
- It is assumed that sidewalk sections with cross slopes of 3% or greater will be removed and replaced.
- It is assumed that a segment that has less than 70% of sidewalk per block is considered to have missing segments.
- It is assumed that, if 70% or more of a sidewalk block needs to be removed and replaced, then the entire length of the sidewalk block will be removed and replaced.

Based on the assumptions, and on unit costs that were provided by Metro, an estimate of cost for correcting the existing sidewalk problems was developed. This estimate is presented in Table 6.1.

SIDEWALK RAMP REPAIR COSTS

The sidewalk inventory also identified problems with existing sidewalk ramps in Metro Nashville. Based on the results of the ramp inventory, and on unit costs that were provided by Metro, an estimate of cost for correcting the existing ramp problems was developed. This estimate is presented in Table 6.2.

NEW SIDEWALK CONSTRUCTION COSTS

As required by current Metro Subdivision Regulations, and by the recommendations contained within this strategic plan, sidewalks are to be constructed along both sides of all new arterial, collector, and local roadways. In many cases, these new sidewalks will be constructed by developers. It is assumed that the cost of these sidewalks will be associated with the road construction costs. Therefore, the estimated new sidewalk costs that are presented in this chapter are based on the construction of new sidewalks along existing roadways.

There are various factors that can drastically affect the cost of constructing a new sidewalk

ITEM	ESTIMATED COST
Remove and Replace Sidewalks	$65,198,200
Install Missing Sidewalks	$919,500
Adjust Water Meters	$821,700
Relocate Water Hydrants	$372,600
Adjust Water Manholes	$57,500
Adjust/Relocate Other Water Obstructions	$36,900
Relocate Electric Poles	$18,494,900
Adjust Electric Manholes	$8,000
Adjust/Relocate Other Electric Obstructions	$15,700
Adjust Electric Boxes	$6,100
Relocate Signal Cabinets	$40,300
Adjust Gas Valves/Meters	$55,000
Relocate Mailboxes (U.S. Post Office)	$4,700
Relocate Mailboxes (Private)	$48,200
Relocate Other Path of Travel Obstructions	$400,500
Relocate Telephone Poles	$4,853,700
Adjust Telephone Boxes	$12,800
Adjust Telephone Manholes	$20,300
Adjust/Relocate Other Telephone Obstructions	$3,700
Relocate Signs	$13,100
Relocate Signal Poles	$636,700
Remove Trees	$34,000
Remove & Replace Driveways (Commercial)	$18,946,800
Remove & Replace Driveways (Residential)	$20,687,300
TOTAL ESTIMATED COST TO CORRECT SIDEWALK PROBLEMS	**$131,688,200**

Table 6.1: Estimated cost to correct existing sidewalk problems

ITEM	ESTIMATED COST
Remove and Replace Existing Ramps	$6,303,000
Install Missing Ramps	$15,391,500
TOTAL ESTIMATED COST TO CORRECT RAMP PROBLEMS	**$21,694,500**

Table 6.2: Estimated cost to correct existing ramp problems

along an existing roadway. For example, relatively low costs are associated with constructing a sidewalk within an existing right-of-way that has gentle slopes and that is wide enough to accommodate a sidewalk without disturbing existing utilities and other existing features. However, the presence of any of the following conditions will increase the construction costs:

- Right-of-way that is too narrow to accommodate a sidewalk (additional right-of-way must be obtained in order to accommodate a sidewalk)
- Steep slopes within the right-of-way (extensive grading will be required in order to construct a sidewalk)
- Ditches or other stormwater drainage issues (a storm sewer may need to be installed in order to accommodate a sidewalk)
- Fences, retaining walls, utilities, or other features that are located within, or near to, the right-of-way (these features may need to be relocated in order to accommodate a sidewalk)
- Curb and gutter that must be replaced or removed to accommodate a sidewalk
- Driveways that must be replaced or removed to accommodate a sidewalk

In order to determine a realistic unit cost for new sidewalk construction, Metro's recent sidewalk construction projects were analyzed. Figure 6.3 presents three projects that are typical of those that were analyzed, and it identifies factors that contributed to construction costs. Of these projects, the Bowfield Drive sidewalk project had the lowest unit cost, averaging about $60 per linear foot of sidewalk. This project was able to utilize existing storm sewer drains. The Greenland Avenue sidewalk project had an average unit cost of about $97 per linear foot of sidewalk and included 250 feet of 24 inch diameter reinforced concrete pipe for stormwater drainage. The White's Creek sidewalk project had the highest unit cost, averaging about $128 per linear foot of sidewalk. This project required the installation of 500 feet of 48 inch diameter reinforced concrete pipe and 15 stormwater catch basins.

For the purposes of this study an approximate average of these sidewalk costs was used for estimates. It was assumed that a new sidewalk will cost $100 per linear foot of sidewalk. The number of miles of new sidewalks that can be constructed each year will depend on the amount of money that is allocated for new sidewalk construction.

<u>RECOMMENDATIONS FOR PEDESTRIAN IMPROVEMENT ALLOCATIONS</u>

Metro's annual sidewalk budget should include allocations for the following types of projects:

- Sidewalk repairs (correcting sidewalk problems)
- Ramp repairs (correcting ramp problems)
- New sidewalks
- Pedestrian enhancements (crosswalk improvements, pedestrian signals, etc.)
- Maintenance

The amount of money that is allocated to each type of project must ensure that all ADA non-compliant ramps are replaced by 2005, as required by Metro's agreement with the Department of Justice regarding ADA problems. The allocations should also ensure that the remaining ramp and sidewalk problems are corrected within a reasonable timeframe. Another important goal is to increase the total number of miles of sidewalks, while providing for other pedestrian enhancements and maintenance. Based on these goals, the allocation for each type of project will vary, depending on the amount of the annual sidewalk budget. In 2002 Metro's allocated $20 million to sidewalks. The allocations presented in this strategic plan assume that the annual sidewalk budget for 2003 will be $20 million and that it will increase by 1.5% per year to account for inflation.

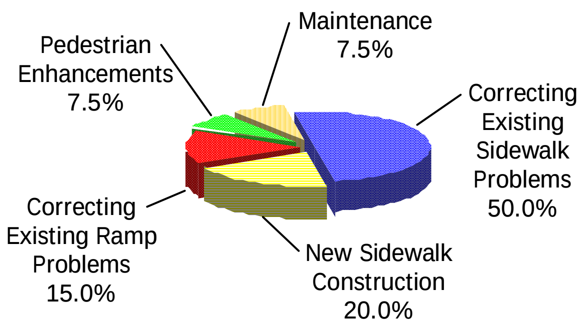
Figure 6.4 presents the recommended allocation for each type of project. Based on these allocations and on a $20 million budget, all of the ADA non-compliant ramps can be replaced by 2005, all of the remaining ramp and sidewalk problems can be corrected by 2015, and approximately 116 miles of new sidewalks can be constructed by 2015. Additional new sidewalks that will be constructed within subdivisions by developers or as part of roadway widening projects are not included in this 116 mile estimate.

Project:	Bowfield Drive, from Reeves Road to Richards Road
Cost:	$60 per linear foot
Storm Sewer Component:	Utilized existing storm drains

Project:	Greenland Avenue, from Kennedy Avenue to Murray Place
Cost:	$97 per linear foot
Storm Sewer Component:	250 feet of 24 inch diameter reinforced concrete pipe

Project:	White's Creek Pike, near Joelton elementary and middle schools
Cost:	$128 per linear foot
Storm Sewer Component:	500 feet of 48 inch diameter reinforced concrete pipe 15 catch basins

Figure 6.3: Examples of unit costs for new sidewalk construction along existing roadways



Recommended Allocation of Pedestrian Improvement Funds

Figure 6.4: The recommended allocation of funds for pedestrian improvements

ALLOCATION OF PEDESTRIAN IMPROVEMENT FUNDS

Metro should develop a method for distributing pedestrian improvement funds throughout Davidson County. Most importantly, this method should be based on need. The Sidewalk Priority Index (SPI), which is presented in Chapter Five, is a powerful tool that can be used to prioritize pedestrian improvement projects. In particular, this method should be used to evaluate repair projects and new construction projects. However, it can also be used to evaluate pedestrian enhancement projects and maintenance projects.

In addition to considering the community's need for pedestrian improvements, it is also important that the distribution method benefit as many neighborhoods in Davidson County as possible. One tool that can be used to achieve this is the Metro Maintenance Zones. The maintenance zones, which are presented in Figure 6.5, divide Davidson County into five zones. Each zone could receive pedestrian improvement funds based on a variety of factors. For instance, each zone could receive funds for sidewalk and ramp repairs based on the percentage of sidewalk and ramp problems that are located in each zone. New sidewalk construction funds, pedestrian enhancement funds, and maintenance funds could be distributed to each zone based on its population density, or some other need-based factor. Each maintenance zone could then utilize the SPI to determine which of its projects have the highest priorities within the zone.

BICYCLE FACILITIES

PHASE ONE BICYCLE ROUTE COSTS

An estimate of cost for constructing the recommended Phase One bike routes, which are presented in Chapter Five, was developed. This estimate, which is presented in Table 6.3, assumes that the bicycle routes will be constructed in conjunction with routine roadway maintenance or other road improvement projects. Therefore, this estimate only includes the bicycle components, such as pavement markings, signage, etcetera. It does not include other components that may be necessary to accommodate the bicycle routes, such as pavement widening or pavement overlays.

FUNDING

There are funding mechanisms available for the development of pedestrian and bicycle facilities. Appendix F identifies a variety of federal funding sources and grant sources that may be utilized by Nashville.

ITEM	ESTIMATED COST
Signs	$419,600
Pavement Markings	$960,800
Grate Replacement	$229,300
Planning & Engineering	$202,300
TOTAL ESTIMATED COST FOR PHASE ONE BICYCLE ROUTES	$1,812,000

Table 6.3: Estimated cost to construct the Phase One Bike Plan

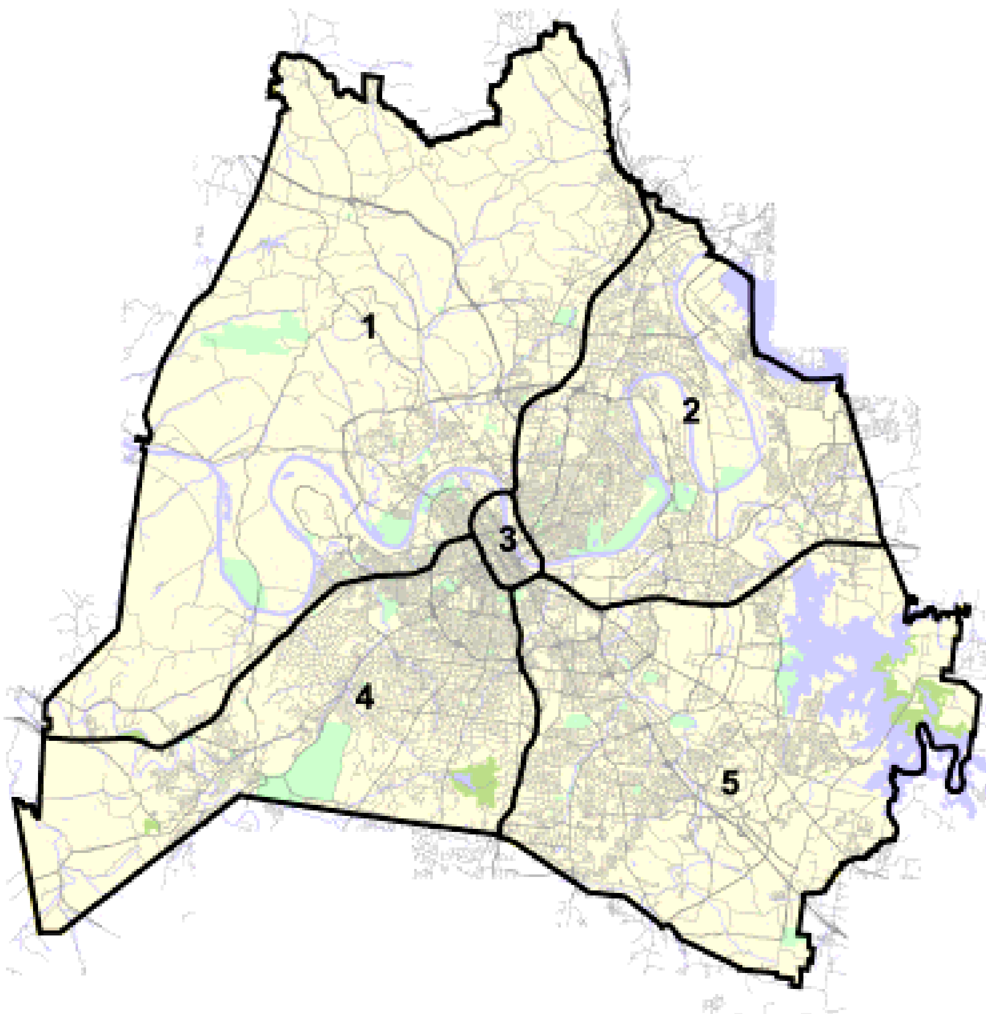


Figure 6.5: Maintenance Zones.

CHAPTER SIX: IMPLEMENTATION & FUNDING

C. BENCHMARKS

INTRODUCTION

Although implementation of the recommendations contained within this plan will contribute to the success of the plan, it does not alone guarantee that the plan will be successful. The real success of the plan will be determined by the effects that it has on the community. The benchmarks that are presented in this Chapter are some of the desirable results that, if achieved, will indicate success.

BENCHMARKS

According to the 2000 Census, there are 274,028 employed persons over the age of 16 in the Metro Nashville area. Of this number, approximately 78% drive alone to work, 13% carpool, and 1.8% take public transit. Of the remainder, less than 1% (0.9%) use other means of transportation while 5.4% walk or work from home.[40] These statistics represent commute trips. According to a 1998 Travel Behavior Study prepared for the Nashville Area MPO, 93% of all trips are made by car. Approximately 1.6% of all trips are on foot, while less than 1% (0.1%) are made by bicycle.[41]

The Federal Highway Administration set goals in 1999 to increase the non-motorized mode share to 15% and reduce the number of injuries and fatalities by 10% by the year 2020.

Increasing the mode share for commute trips to 15% is unlikely, even on a 20-year horizon, given the current infrastructure and land use patterns in Metro Nashville. However, the following benchmark is more reasonable:

- Double the non-motorized mode share by 2022 from 1.7% to 3.4%.

Tracking the percentage of trips made by bicycling or walking is one way to measure air quality improvement, reduced congestion, and the success of the Plan. Due to the land use patterns in Metro Nashville, some sections of the City, such as the Central Business District, must achieve a higher mode split. The amount and continuity of bicycle and pedestrian facilities, including end-of-trip facilities such as bicycle parking, showers, and lockers, is key to achieving the above mode split goal. The following benchmarks will help achieve the overall goal for mode split and measure top-down support for the Plan:

- Implement 35% of all recommended facility improvements within the first five years.
- Implement 65% of all recommended facility improvements within ten years.
- Implement 100% of all recommended facility improvements within twenty years.

The second major benchmark relates to the rate of injury accidents involving bicycles and pedestrians. Reducing injuries and fatalities is an impetus behind the formation of a Bicycle and Pedestrian Plan. An important component of increasing the number of trips made by bicycle or on foot is to have a preventative strategy to improve public health. Reducing the number of injury accidents per capita addresses the same goal. The following benchmark is recommended:

- Reduce the rate of injuries to bicyclists and pedestrians by 10% by 2022.

Collision data for Metro Nashville suggest that, on average, 400 collisions are reported each year involving bicyclists or pedestrians.[42] Many more go unreported to police, particularly for bicyclists, as bicycle accidents often do not involve a motor vehicle. In order to achieve the success of this goal, the following supporting benchmarks are also recommended:

- Provide three to five events per year promoting walking or bicycling within the first five years.

[40] US Census Bureau
[41] Nashville Area Travel Behavior Study, NuStats International, 1998.
[42] Collision data for the period from 1/99 through 10/01 show 1,135 total collisions involving bicyclists or pedestrians.

- Ensure that 50% of all school-age children receive bicycle or pedestrian safety education within the first ten years.

Finally, although it is not a benchmark, it is recommended that the same public opinion survey conducted as part of initial planning efforts be conducted again at five year intervals to measure changing attitudes about bicycling and walking. The survey will measure the effectiveness of education and promotion efforts.

APPENDIX A: DEFINITIONS & ABBREVIATIONS

Americans with Disabilities Act (ADA) – A federal law that ensures that public facilities are designed in a manner that provides access to those with physical mobility impairments.

Approach - All lanes of traffic moving towards an intersection or a mid-block location from one direction, including any adjacent parking lane(s). (MUTCD)

Bicycle Compatibility Index (BCI) – A methodology developed by the Federal Highway Administration that can be used to evaluate a roadway segment's compatibility for allowing efficient operation for both bicycles and motor vehicles.

Bicycle Facility - A general term denoting improvements and provisions to accommodate or encourage bicycling, including parking facilities, maps, all bikeways, and shared roadways. (NCDOT-*North Carolina Bicycle Facilities Planning and Design Guidelines*)

Bicycle Lane (Bike Lane) - A portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. (AASHTO-*Guide for the Development of Bicycle Facilities*)

Bicycle Route (Bike Route) - A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number. (NCDOT-*North Carolina Bicycle Facilities Planning and Design Guidelines*)

Bicycle Pools - A group of cyclists who bike together to work, school, shop, or home. This, like walking pools, provides an incentive to bike and promotes safety and enjoyment.

Bikeway - A thoroughfare suitable for bicycles – may either exist within the right-of-way of other modes of transportation, such as highways, or along a separate and independent corridor. [GS 136-71.7] (NCDOT-*North Carolina Bicycle Facilities Planning and Design Guidelines*)

Center Transect Zone (Center) – A Community Transect Zone that is characterized by mixed land uses, with commercial areas that serve multiple surrounding neighborhoods.

Central Business District (CBD) – An exclusive business center in the core of the city, often including high-rise office buildings and increased travel demand.

Citizens Advisory Committee (CAC) – A committee that was developed to ensure wide range of involvement in the development of the *Strategic Plan for Sidewalks & Bikeways*. Members of the committee included individuals throughout Davidson County with interest or expertise in pedestrian and bicycle planning, neighborhood livability, disabled accessibility, public health, and urban design.

Collector - A roadway classification that is designated to roadways that connect local streets to arterial streets. In urbanized areas, collector streets provide land access and traffic circulation within residential and commercial developments.

Community Transect Zones – A development pattern classification system that was developed by the Metropolitan Planning Department. This classification system consists of seven zones, each representing a gradation in existing and desired development character from most rural to most urban.

Core Transect Zone (Core) – A Community Transect Zone that primarily consists of the historic downtown area and the associated central business district. The core transect is highly urbanized.

Cross Slope - The slope of a sidewalk, road, or other surface that is perpendicular to the direction of travel.

Crosswalk - (a) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the centerline; (b) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines of other markings on the surface. (MUTCD)

District Transect Zone (District) – A Community Transect Zone that is characterized by several single or ancillary uses, such as medical centers, universities, industrial parks and airports.

Easement – The right to use, for a specific purpose, land that is owned by another individual.

Floodway - The channel of a stream that has current, direction, and velocity during a flood, and in which debris may be carried. (Metro Zoning Regulations)

Frontage Zone (FZ) - The area between the pedestrian travelway and the edge of the right-of-way that provides space for street cafes, window shopping, bus stop furnishings, and other features. The frontage zone is typically only applied to urban commercial streets.

Furnishings Zone (FNZ) – A physical buffer that is located between the pedestrian path of travel and the vehicular path of travel. The FNZ, which can be paved or landscaped, provides space for streetscape features.

Geographic Information Systems (GIS) - An information technology that is composed of hardware, software, and data and that is used to gather, store, edit, display, and analyze geographical information.

Greenways - Linear parks and trails connecting neighborhoods to schools, shopping areas, downtown, offices, recreation areas, open spaces and other points of activity. (www.nashville.org/greenways)

Greenways Commission - A division of Metro Parks charged with the planning and development of greenways throughout Davidson County.

High Occupancy Vehicle (HOV) - A motor vehicle carrying at least two or more persons, including carpools, vanpools or buses. (MUTCD)

HOV Lane - Any preferential lane designated for exclusive use by high-occupancy vehicles for all or part of a day – including a designated lane on a freeway, other highway, street or independent roadway on a separate right-of-way. (MUTCD)

Interagency Management Team – A committee that was formed to manage the development of the *Strategic Plan for Sidewalks & Bikeways* and monitor the progress of the planning process. The committee included representatives from Metro Public Works, the Metro Planning Department, the Metro Finance Department, and the Mayor's Office.

Intersection - (a) The area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways that join at any other angle may come into conflict; (b) The junction of an alley or driveway with a roadway or highway shall not constitute an intersection. (MUTCD)

Island - A defined area between traffic lanes for control of vehicular movements or for pedestrian refuge. An island includes all end protection and approach treatments. Within an intersection area, a median or an outer separation is considered to be an island. (MUTCD)

Limited Access – A roadway classification that is designated to roadways that are designed to carry large volumes of traffic at high speeds across long distances and that have access controlled by grade-separated interchanges or other methods. Examples of limited access roadways are freeways and interstates.

Local – A roadway classification that is designated to roadways that are designed to carry low traffic volumes at low speeds. Local streets mainly serve local, typically residential, uses, and are designed to provide vehicular access to abutting property and to discourage through-traffic.

Major Arterial – A roadway classification that is designated to roadways that are designed to carry moderate to high traffic volumes and to serve through-traffic. Major commercial land uses are typically located along these roadways.

Median - The area between two roadways of a divided highway, measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and opposite approaches of the same intersection. (MUTCD)

Minor Arterial – A roadway classification that is designated to roadways that are designed to carry low to moderate traffic volumes and to serve through-traffic over short distances. Commercial land uses are typically found along these roadways in urbanized areas.

Multi-Modal Transportation - A general term that represents the variety of travel modes available, including automobile, bicycle, foot, rail, transit, air, sea and any other way to travel from an origin to a destination.

Neighborhood Transect Zone (Neighborhood) – A Community Transect Zone that is characterized by medium density housing and scattered non-residential uses, such as commercial areas located in neighborhood centers or commercial corridors that are along the edges of neighborhoods.

Obstruction – Any object or feature that reduces the pedestrian travelway below the minimum acceptable widths outlined by the ADA, any surface feature (such as a manhole or meter box) that is offset a distance of ¼ inch or greater from the travel surface, or any driveway crossing the travel surface that does not comply with ADA standards.

Pedestrian - A person afoot, in a wheelchair, on skates, or on a skateboard. (MUTCD)

Pedestrian Travelway (PT) - The portion of the sidewalk corridor which provides unobstructed travel by pedestrians, i.e., the sidewalk.

Right-of-Way - A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way. (AASHTO-*Guide for the Development of Bicycle Facilities*)

Roadway - That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm or shoulder even though such sidewalk, berm or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used herein shall refer to any such roadway separately, but not to all such roadways collectively. (MUTCD)

Roadway Network - A geographical arrangement of intersecting roadways. (MUTCD)

Rumble Strip - A series of intermittent, narrow, transverse areas of rough-textured, slightly raised or depressed road surface that is installed to alert road users to unusual traffic conditions. (MUTCD)

Rural Preserve Transect Zone (Rural Preserve) – A Community Transect Zone that is characterized by privately-owned land intended to be permanently maintained as open space for preservation or recreational needs.

Rural Reserve Transect Zone (Rural Reserve) – A Community Transect Zone that is characterized by privately owned and environmentally sensitive open-space farms and large lot residential uses.

Shared Roadway - A roadway which is open to both bicycle and motor vehicle travel. This may be an existing roadway, a street with wide outside lanes (WOLs), or a road with paved shoulders. (AASHTO-*Guide for the Development of Bicycle Facilities*)

Shoulder - The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use and for lateral support of sub-base, base and surface courses. (AASHTO-*Guide for the Development of Bicycle Facilities*)

Shoulder Bicycle Lane (Shoulder Bike Lane) – A paved shoulder on a roadway that provides a suitable area for bicycling with few conflicts with faster moving motor vehicle traffic.

Side path (Sidewalk) - A path that is made with either a hard or soft surface and is separated from an uncurbed roadway with a buffer area of at least five feet. The buffer area typically contains a ditch or swale.

Sidewalk - The portion of a street or highway right-of-way designed for preferential or exclusive use by pedestrians. (AASHTO-Guide for the Development of Bicycle Facilities)

Sidewalk Priority Index (SPI) – A method developed by the consulting team for the *Strategic Plan for Sidewalks & Bikeways* that prioritizes sidewalk projects based on factors such as land use and density, proximity to destinations, roadway classifications, proximity to the Urban Services District, and missing sidewalk segments.

Signed Shared Roadways - A roadway that is shared by motorists and bicyclists and that has been designed by signing as a preferred route for bicycle use. Shared roadways are typically reserved for arterial or collector streets that have high bicycle traffic/demand, but cannot accommodate bike lanes or WOLs due to severe physical constraints. (AASHTO-*Guide for the Development of Bicycle Facilities*)

Sign - Any traffic control device that is intended to communicate specific information to road users through a word or symbol legend. Signs do not include traffic control signals, pavement markings, delineators or channelization devices. (MUTCD)

Speed Limit - The maximum (or minimum) speed applicable to a section of highway as it is established by law. (MUTCD)

Steering Committee – A committee that was created to ensure coordination with all relevant Metro departments and quasi-public agencies whose work involves or impacts public right-of-way. Among others, committee members included representatives from Mayor's Office on Accessibility, Nashville Electric Service, and the Metro Department of Education.

Streetscape Features – Features that are commonly located along a roadway, such as trees, utility poles, mailboxes, newspaper boxes, and other similar features.

Stop Line - A solid white pavement marking line extending across approach lanes to indicate the point at which a stop is intended or required to be made. (MUTCD)

Subareas - The 14 divided sections of Davidson County based on demographics, land use policy, and general infrastructure issues.

Suburban Transect Zone (Suburban) – A Community Transect Zone that is characterized by low-density, single-family residential uses.

Traffic - Pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars and other conveyances either singularly or together while using any highway for purposes of travel. (MUTCD)

Traffic Control Devices - All signs, signals, markings and other devices used to regulate, warn or guide traffic, placed on, over or adjacent to a street, highway, pedestrian facility or bicycle path by authority of a public agency having jurisdiction. (MUTCD)

Traffic Control Signal (Traffic Signal) - Any highway traffic signal by which traffic is alternatively directed to stop and permitted to proceed. (MUTCD)

Travelway - That portion of a public right-of-way that is improved for use by self-propelled vehicles or bicycles, including paved or gravel areas and any other area intended for vehicle movement. (Metro Zoning Regulations)

Vehicle - Every device in, upon, or by which any person or property can be transported or drawn upon a highway, except trains and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle. (MUTCD)

Walking Pools - A group of pedestrians who walk together to work, school, shop or home. This provides an incentive to walk and promotes safety and enjoyment.

Wide Outside Lane (WOL) - A right-hand lane of a shared roadway that is typically 14 feet wide to better accommodate both bicyclists and motor vehicles in the same lane. (American Planning Association—*Bicycle Facility Planning)*

APPENDIX B:
PEDESTRIAN FACILITIES DESIGN GUIDELINES

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APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

A. INTRODUCTION

Wide, attractive sidewalks with good lighting give pedestrians a sense of security and comfort.

> *The Pedestrian Facilities Design Guidelines and the Bicycle Facilities Design Guidelines, which are in Appendices B and C, respectively of the Strategic Plan for Sidewalks & Bikeways report, were developed to function as stand-alone sections. Therefore, certain information and recommendations that apply to both pedestrian and bicycle facilities are repeated in the Design Guidelines.*

Most motorists derive their senses of security and comfort from the vehicle that they are driving. Drivers can also generally assume that the roadways on which they travel have been designed to optimize their safety.

Pedestrians, whose senses of safety and comfort are almost entirely dependant upon the design of streets on which they travel, must usually travel on right-of-ways that have not been engineered with them in mind. Many streets are too hostile or risky for walking, and many intersections leave pedestrians feeling too vulnerable to attempt crossing. These factors keep walking from being a practical travel option for many trips and for many people.

A well-designed street legitimizes walking. Well-designed sidewalks are roomy, there is buffer space separating pedestrians from moving cars, crossing opportunities are frequent, intersections are short and easy to cross, and street trees provide shade. On these streets, pedestrians feel confident that they have been provided with a reasonable level of safety.

Good streets not only provide a safe place to walk, they are among the most important places in the public realm. Neighbors meet to discuss shared concerns; shops and cafes spill onto the sidewalk; architecture, street lighting, furniture and other features each contribute to an environment that attracts people and encourages them to interact. While most motorists generally prefer fewer other motorists on the road, a pedestrian is generally the happiest when sharing the sidewalk with lots of other people.

Well-designed pedestrian facilities also support other travel modes. Nearly everyone is a pedestrian at some point on each trip. Providing a pedestrian infrastructure supports transit use, makes it easy for drivers to park once at an area with a concentration of activities, and walk to multiple destinations. Bicyclists benefit because they can easily walk to a destination from bike parking facilities. In addition, many of the design features that benefit pedestrians also result in better cycling conditions.

PURPOSE OF THE DESIGN GUIDELINES

The design guidelines and practices outlined in this document are intended to provide guidance to engineers, planners, designers, and others in integrating pedestrian accommodations into the various projects that have the potential to affect pedestrian travel in Nashville & Davidson County. Application of these design guidelines will ensure consistency in facilities design. Consistency not only provides walkers with an assurance of the type and quality of facilities that they will encounter, it encourages pedestrians, cyclists and drivers to operate predictably with each other on public right-of-way. Consistency and predictability encourage walking, and are cornerstones of a safe multi-modal transportation infrastructure.

The design recommendations included in this document represent many of the best practices currently in use, which have been augmented or refined based on the specific needs, objectives, and circumstances of the Nashville area. Further additional guidance has been included that addresses the issues that surround the retrofit of pedestrian facilities on existing streets.

While comprehensive, the guidelines do not cover every design issue that may be encountered. Where such issues are not covered, appropriate engineering principles and judgment must be applied in providing for the safety and convenience of pedestrians, bicyclists, and motorists. Facility designers should also always take into consideration the human and environmental factors that contribute to or detract from, pedestrian comfort and safety.

RELATED PLANNING ISSUES

LAND USE

Like bicycling, the practicality of walking for travel is often determined by the pattern in which land is developed. Given the proper facilities, most people are willing to walk for about fifteen minutes, or one-half mile, for transportation trips. This distance has become a benchmark planning principle for those designing walkable communities. Almost all driving, transit and bicycling trips also include walking at both ends, making walkability a critical issue at almost every destination.

Some land use patterns that encourage both walking and bicycling include:

- Development densities that allow people to live close to destinations such as schools and stores.
- Mixed-use zoning that allows commercial and residential land uses in the same area, along with standards that ensure compatible building design.
- Locating buildings close to the street, which can slow traffic and offers easier pedestrian access.

Some common land development practices that discourage pedestrian and bicycle travel include:

- Segregated land uses that create long distances between destinations.
- Commercial properties set far back from the street with large parking lots in between. Such sites also typically include access for automobiles only.
- Large lots in residential areas that create greater distance between home and other destinations.

The top example in Figure 1 illustrates a land use pattern that encourages various types of travel. As shown, the mixed-use development within the grid pattern, and the proximity to residential areas promotes walking or biking to various destinations. The illustration at bottom shows how segregated developments discourage walking and bicycling to these destinations because of the distances from homes and between the destinations themselves.

ROADWAY NETWORK

In the decades following World War II, planning practices shifted from traditional urban patterns to non-grid road systems with cul de sacs and other features that reduce connectivity. This approach tends to concentrate traffic on collector and arterial streets, can result in single points of access to many destinations, and often requires significant out-of-direction travel. While indirect travel routes aren't always a major deterrent to drivers, they can result in added travel time and inconvenience for pedestrians.

An interconnected grid of streets offers many routes and points of access to destinations for pedestrians, cyclists and motorists. When retrofitting a non-grid network, off-street connector trails can sometimes provide the directness of route – to schools, shopping, or other destinations – that the street system doesn't offer. For example, providing a connector trail from the end of a neighborhood cul de sac to a library can decrease parking demands at the library and reduce the vehicular load on nearby roadways.

ACCESS MANAGEMENT

Urban collectors and arterials with commercial frontage are attractive to both pedestrians and drivers because they usually provide the best access to destinations, and the most direct routes through a community. Although traffic speeds and volumes on such roadways can discourage walking, it is the intersections, driveways and curb cuts where accidents are most likely to occur. Unlimited access creates many conflicts between cars entering or leaving the roadway, and pedestrians walking along the roadway, as illustrated in Figure 2.

Limiting or consolidating driveways, and using other access management design tools such as curbed medians benefits both pedestrians and drivers. Advantages include:

- The number of conflict points is reduced
- Vehicles are redirected to intersections with appropriate traffic control devices
- Improved traffic flow can reduce the need for road widening, perhaps allowing part of the right-of-way to be reclaimed for pedestrian facilities

Also, studies have shown that access management techniques can effectively improve safety and traffic flow without negatively impacting adjacent businesses. It is recommended that access management designs also consider the potential for negative impacts on both pedestrians and cyclists. For example, pedestrian crossing opportunities should not be reduced, and redirecting motor vehicle traffic should not significantly increase out-of-direction travel for pedestrians and cyclists.

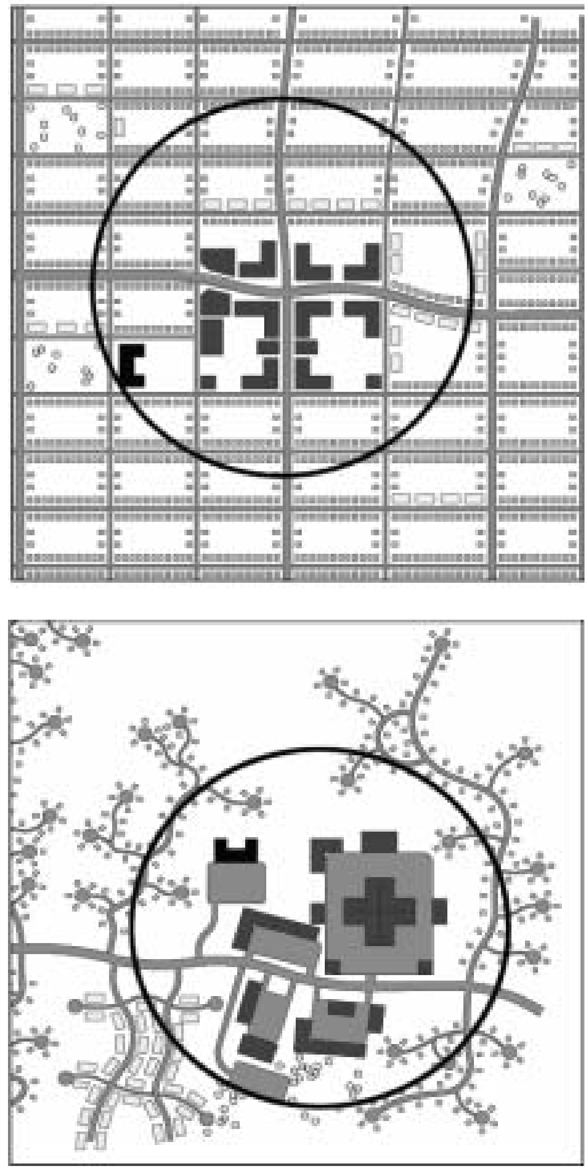


Figure 1: The illustration at top shows a half-mile radius around the commercial center of a densely developed, mixed-use area with grid network of streets. This development pattern encourages walking and bicycling. The illustration at bottom shows a low-density, segregated development pattern, which discourages pedestrian and bicycle travel.

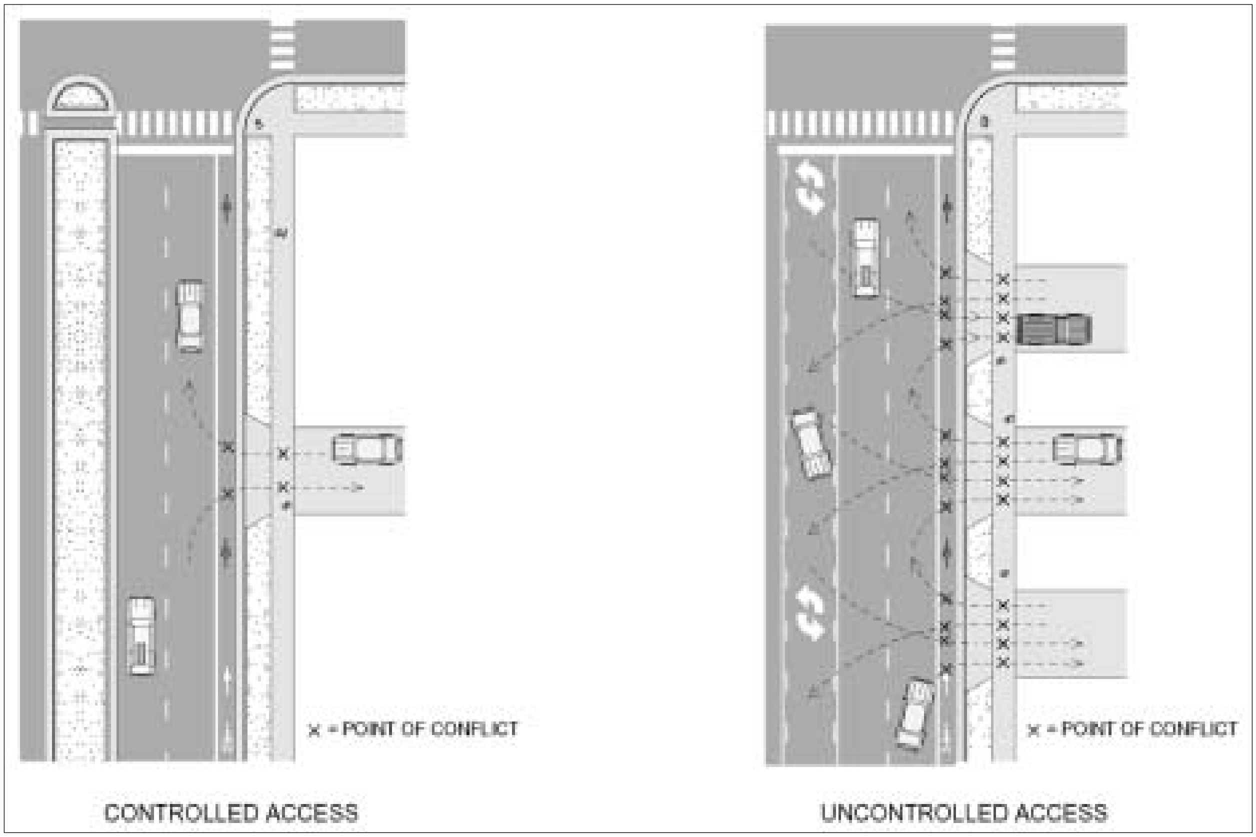


Figure 2: Access management reduces the number of conflict points between motorists, bicyclists and pedestrians.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

B. APPLICATION OF THE DESIGN GUIDELINES

Application of the Design Guidelines will result in sidewalks that are attractive and accessible for all users.

The design guidelines are intended to be applied to the following projects:

- Sidewalk retrofit projects on existing roads
- Widening projects on existing roads
- Intersection improvement projects on existing roads
- New roads

While application of the guidelines to new roads is straightforward, the retrofit of existing streets can introduce a range of complicating factors. Limited right-of-way, physical constraints, competing interests, and other circumstances can make it difficult to fully achieve ideal pedestrian facilities. Where additional guidance is warranted, issues specific to retrofit are included in each section. The intent of the retrofit discussion is to provide guidance on maximizing pedestrian benefits where flexibility in the application of the guidelines is necessary.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

C. THE AMERICANS WITH DISABILITIES ACT

Sidewalks need to be constructed to be accessible to all users regardless of age or ability.

The Americans with Disabilities Act (ADA) of 1990 is a federal civil rights statute that prohibits discrimination against people who have disabilities. Under ADA, designing and constructing facilities for public use that are not usable by people with disabilities constitutes discrimination.

The Access Board is an independent federal agency that is responsible for developing accessibility design guidelines for public facilities to ensure compliance with ADA provisions. Presently, adopted federal ADA standards provide detailed guidance on the design of buildings but limited guidance on the design of public rights-of-way.

In January 2001, the Access Board issued a draft set of design recommendations for public rights-of-way entitled *Building a True Community: Final Report of the Public Rights-of-Way Access Advisory Committee*. At the time this Strategic Plan for Sidewalks and Bikeways was prepared, the Access Board's report was under review by the federal Department of Justice and the Department of Transportation. Acknowledging that the adopted final rules may differ, the Access Board recommended that agencies begin implementing the recommended design standards before final adoption, since they offer the most authoritative existing guide to accessible right-of-way design. The guidelines offer minimum – not optimum – standards to ensure accessibility; alternatives to the specifications are acceptable provided that they result in equivalent or greater accessibility.

To the degree that the design guidelines recommended in this plan address ADA issues, they are compliant with *Building a True Community*.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

D. THE SIDEWALK CORRIDOR

This sidewalk on 2nd Avenue is an example of a Sidewalk Corridor in a core transect.

As shown in Figure 3, the Sidewalk Corridor is that portion of the public right-of-way located between the edge of motor vehicle, bicycle and/ or parking lanes, and the outside edge of the right of way. The primary function of a Sidewalk Corridor is to provide a safe, comfortable, and convenient route for walking that is separated from vehicle movements. A Sidewalk Corridor may also accommodate other functions or fixtures, such as utility poles and street furniture.

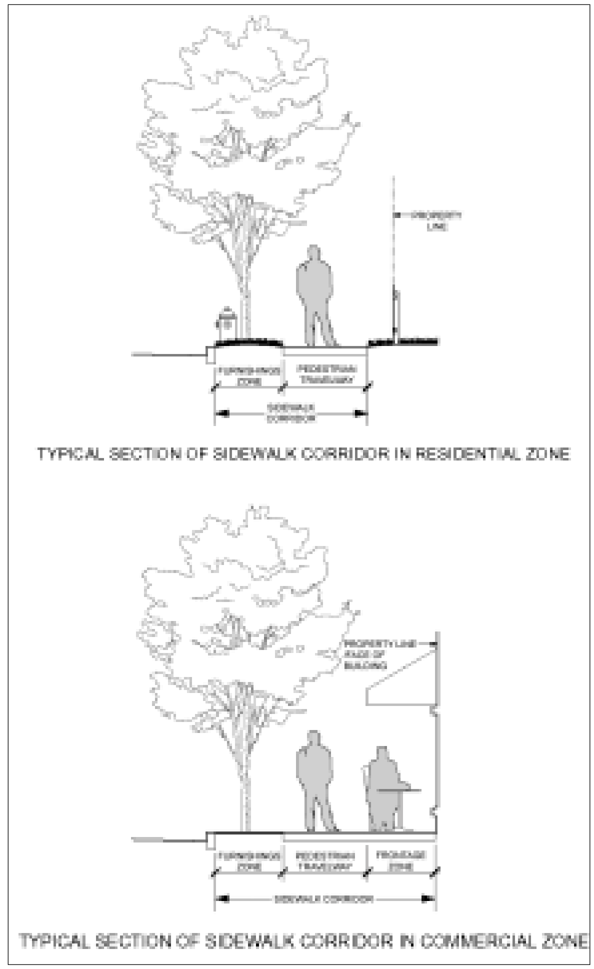


Figure 3: The Sidewalk Corridor incorporates all of the functions accommodated in the area between the curb and the edge of the right-of-way.

DESIGN OBJECTIVES

The following qualities are recommended for Sidewalk Corridors:

- Accessible: Sidewalk Corridors are easy to use for travelers of all abilities.
- Adequate Width: Sidewalk Corridors allow pedestrians to pass each other comfortably.
- Direct: Sidewalk Corridors provide direct routes that minimize out-of-direction travel for pedestrians.
- Continuous: The design of Sidewalk Corridors ensures that the pedestrian path of travel is easily identifiable along the entire length of the corridor.
- Safe: Sidewalk Corridors provide pedestrians with real and perceived safety.
- Landscaped: Sidewalk Corridors are designed to accommodate street trees and other landscaping.
- Compatible with the community: A Sidewalk Corridor is designed to contribute to the land use, design, and transportation objectives of the neighborhood through which it travels.

SIDEWALK CORRIDOR ZONES

The range of functions within a Sidewalk Corridor may be best understood by dividing the corridor into three distinct areas: the Furnishings Zone, the Pedestrian Travelway, and the Frontage Zone. Each of these areas varies in width, depending on roadway classification and other factors, and is discussed in greater detail in the following sections. Since Metro roadway classifications are currently being updated, the following recommendations should be applied to any future equivalent roadway classifications.

For each roadway classification, Figure 4 shows recommended minimum widths for the three Sidewalk Corridor zones. The recommendations are based on traffic volumes, traffic speeds, and land use. In some instances, project specific judgment may determine that additional width will better achieve community goals.

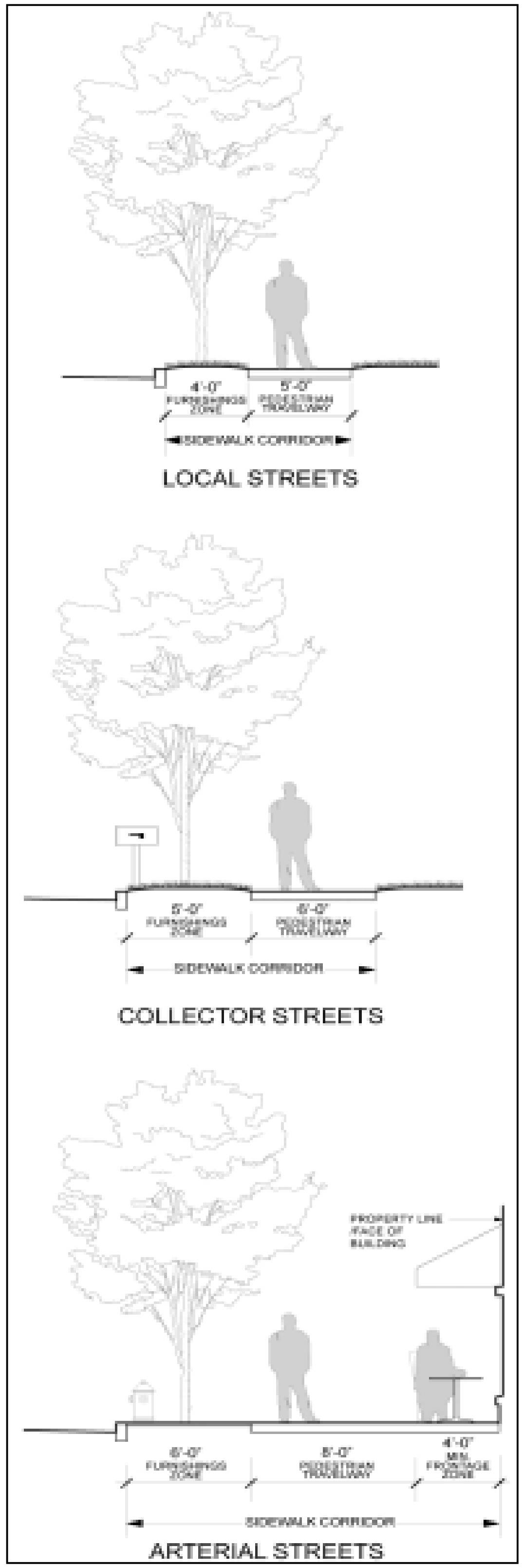


Figure 4: Recommended widths for each zone within the Sidewalk Corridor, per street classification.

<u>LOCAL STREETS OR EQUIVALENT</u>
Local streets are recommended to be built to the current adopted standard, with a five-foot Pedestrian Travelway and a four-foot Furnishings Zone. The five-foot sidewalk provides adequate passing space for the typical volume of pedestrian traffic on a residential street, and the four-foot buffer can sustain trees and offers a comfortable buffer from low-speed, low-volume vehicular traffic, which is desirable on such streets.

<u>COLLECTOR STREETS OR EQUIVALENT</u>
Collector streets have moderate to high-speed motor vehicle traffic and warrant a wider buffer between pedestrians and moving vehicles to maintain pedestrian comfort. A five-foot Furnishings Zone is recommended. Because such streets can have a lot of commercial activity and multiple destinations, it is recommended that the width of the Pedestrian Travelway be increased to six feet, to accommodate a larger volume of pedestrians.

<u>ARTERIAL STREETS OR EQUIVALENT</u>
Because of the density of development, mix of uses, and urban character on these streets, a high volume of pedestrian activity is expected and needs to be accommodated. Such streets

will have a main street style character where sidewalks are used for many activities in addition to walking. A Furnishings Zone width of six feet will accommodate tree wells and furnishings such as benches and bike racks. To provide for heavy pedestrian traffic, an eight foot wide Pedestrian Travelway is recommended. A Frontage Zone is also recommended for this category of street. The Frontage Zone provides width for café tables, product displays, and room for people to stand and window-shop without blocking through-pedestrians. The width of the Frontage Zone may vary depending on the scale and density of development on the street, but is recommended to be at least four feet wide to accommodate one bay of outdoor seating.

Retrofit Considerations

Matching Existing Conditions

Existing sidewalks throughout Davidson County exhibit a broad range of widths and other design characteristics. The result can be a Sidewalk Corridor that changes in cross-section several times along a single street, any segment of which may not meet current standards. New and replacement sidewalks are recommended to be consistent with the cross-sections presented in this document. The net effect over time will be increased consistency of design network-wide.

It may be appropriate for a new or replacement sidewalk to match the design characteristics of existing nearby sidewalks when the new sidewalk is less than 300 feet long, and is on the same block as the existing sidewalk. Where possible, it is recommended to locate changes in cross-section at intersections. Figure 5 illustrates an appropriate design for locations in which mid-block transitions between new and existing sidewalks are necessary.

Providing Pedestrians With Their Share of the Right-Of-Way

One of the more challenging tasks of building pedestrian facilities is finding space on physically constrained existing roads. Such roadways may not be candidates for major widening projects which could incorporate pedestrian improvements, and pedestrians, bicyclists and motorists must compete for limited existing right-of-way.

When existing right-of-way precludes constructing sidewalks of the recommended widths, it may be possible to reduce curb-to-curb widths and reallocate some of that width to the Sidewalk Corridor. Providing high quality sidewalks may be worth a reduction in motor vehicle capacity on some corridors. A traffic study can determine whether lane reductions will result in an acceptable level of service for motor vehicles. Alternatively, the desirability of good quality pedestrian facilities may warrant the acquisition of additional right-of-way on some roads.

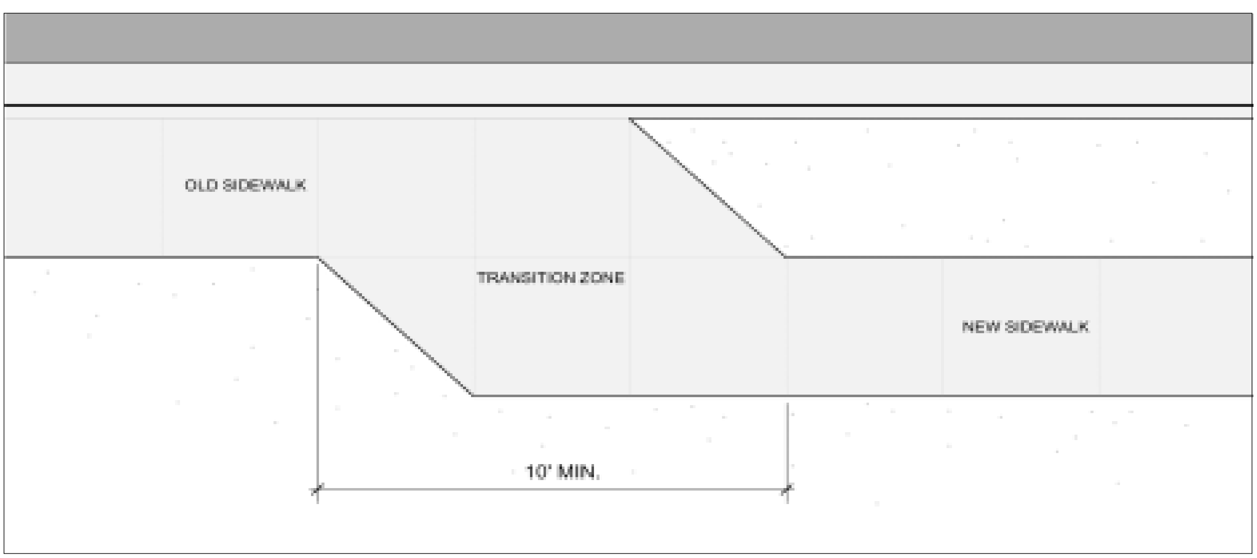


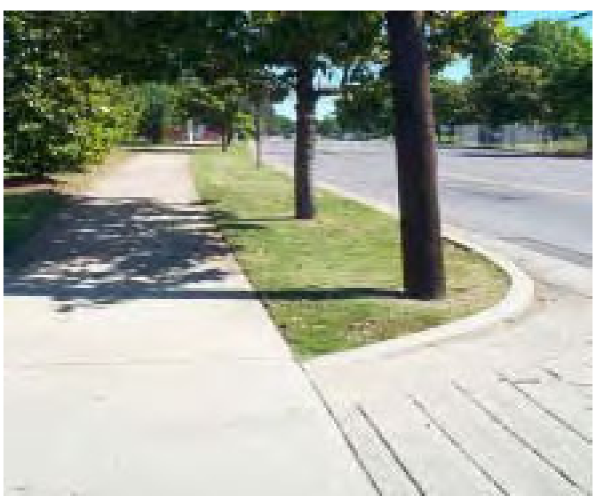
Figure 5: A transition zone is necessary when a new sidewalk and an old sidewalk meet mid-block.

THE FURNISHINGS ZONE

Sometimes referred to as the appurtenance strip, planting strip, utility strip, or buffer strip, the Furnishings Zone actually performs all of these functions and is nearly as important in providing a good walking environment as the sidewalk itself.

The Furnishings Zone increases pedestrian comfort by providing a physical buffer between the sidewalk and vehicular traffic. Physical separation becomes more important to pedestrians as vehicular speeds and volumes increase. The Furnishings Zone also functions as an area within which most adjunct streetscape features can be accommodated. These features include utility poles, fire hydrants, signposts, newspaper racks, street trees, mailboxes, street furniture, sandwich boards, parking meters, bicycle racks, and other furnishings and objects. Providing a Furnishings Zone helps ensure that obstructions and adjunct street functions do not encroach into the Pedestrian Travelway. In addition, the Furnishings Zone can fully or partially contain the slope of a driveway ramp, making it easier to comply with ADA standards. Finally, the presence of a Furnishings Zone usually allows curb ramps to be installed on direct alignment with sidewalks and crosswalks.

Depending on roadway classification, minimum Furnishings Zone width varies from four feet to six feet. In most areas, the Furnishings Zone is seeded in grass. In a commercial district, it is typically more desirable to accommodate trees in tree wells, and otherwise pave the Furnishings Zone to the curb to accommodate additional street functions.



The Furnishings Zone serves many functions: as a buffer between the pedestrians and moving cars; a location for utility poles and street signs; and as a zone for street trees.

Retrofit Considerations

Sidewalks without a Furnishings Zone, particularly when located on high-traffic streets, tend to offer a low quality walking experience, lacking a sense of comfort or safety. Such sidewalks often also require pedestrians to contend with multiple obstructions, and cannot be enhanced with street trees. The overall result can be a sidewalk that doesn't get much use. On constrained streets it is recommended that additional right-of-way or long-term easements are acquired to achieve to-standard Furnishings Zone width.

THE PEDESTRIAN TRAVELWAY

The Pedestrian Travelway is intended for unobstructed travel by pedestrians, exclusive of physical barriers. The Pedestrian Travelway must meet all of the requirements of the ADA, including minimum widths, maximum slopes, and freedom from obstructions.

The width of the Pedestrian Travelway can vary from five to eight feet, depending on the classification of the roadway and expected or desired pedestrian volumes. The Pedestrian Travelway should provide enough width for pedestrians to comfortably pass each other.

With or without a Frontage Zone, every Pedestrian Travelway is recommended to have an outside shoulder of at least one foot in width, with a maximum slope of 1:6, as shown in Figure 6. In some instances, providing this shoulder will require a construction easement.

Any railing, retaining wall, fence or other structural feature installed as part of a roadway project is recommended to be located at least one foot beyond the outside edge of the Pedestrian Travelway in order to maintain the full functional width of the sidewalk. In some instances, it may be desirable to pave this shoulder area.

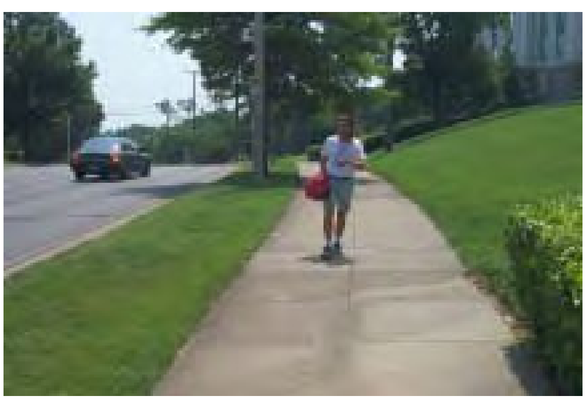
Retrofit Considerations

On constrained Arterials and Collectors located outside of Core, Center, and Neighborhood transects, the Pedestrian Travelway width can be reduced to five feet. It is recommended that a six-foot wide Furnishings Zone is maintained for arterials, and a five-foot wide Furnishings Zone is maintained for collectors.

Fixed, Metro-owned obstructions, such as street signs and fire hydrants are recommended to be moved to the Furnishings Zone during retrofit. Arrangement for utility poles to be relocated to the Furnishings Zone, or otherwise outside of the Pedestrian Travelway is also recommended. See related pole relocation policy recommendations in Appendix J.

Technically, a bus bench is not a fixed obstruction and does not conflict with ADA, but in practice, bus benches can function as obstructions that violate the spirit of ADA. On constrained streets, it would be desirable to obtain additional right-of-way or long-term easements to accommodate bus benches and shelters outside of the Pedestrian Travelway, and in either the Furnishings Zone or the Frontage Zone.

In some instances, the obstruction in a Sidewalk Corridor is a street tree. Because trees enhance the pedestrian environment, it is recommended that any mature, healthy street tree that has been included on the list of approved trees in Metro's tree ordinance is retained if possible dur-



The Pedestrian Travelway should not contain any obstructions and be wide enough to allow people to pass comfortably.

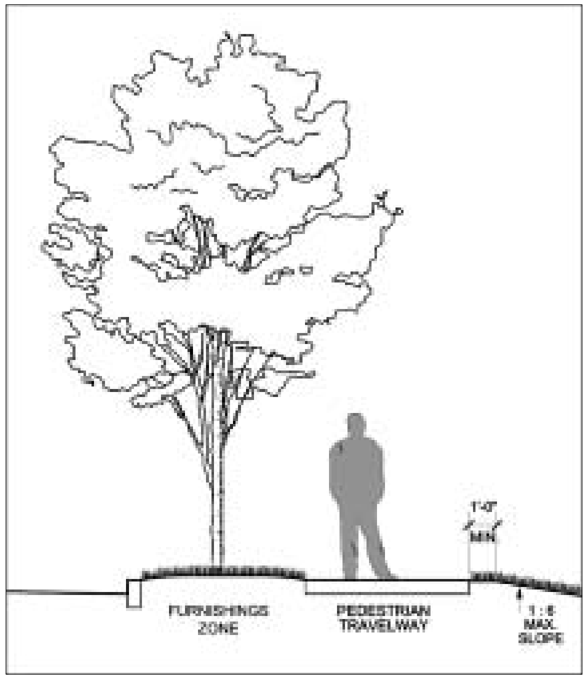


Figure 6: The Pedestrian Travelway should include an outside shoulder.

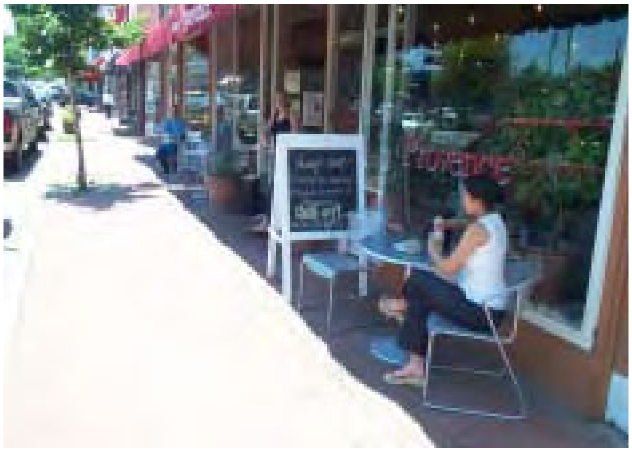
ing sidewalk retrofit. Sidewalk realignment to retain a good street tree is usually of net benefit to pedestrians.

It is recommended that the clear width of the Pedestrian Travelway be at least four feet wide.

<u>THE FRONTAGE ZONE</u>

On some roadways, the Frontage Zone is the area between the Pedestrian Travelway and the edge of the right-of-way, and provides space for adjacent functions, such as obstructions, sidewalk cafes, window shopping, and product displays, where allowed by Metro Code.

On non-commercial streets with a Frontage Zone, tall and bulky obstructions, such as utility poles and signal boxes are recommended to be consolidated into the Frontage Zone. Doing so keeps the obstructions from creating visibility problems, and increases the likelihood that trees can be provided in the Furnishings Zone. On urban commercial streets with storefronts, the Frontage Zone would ideally be kept clear in order to function as space for window shopping functions as described previously.



The Frontage Zone provides space for adjunct street functions such as café seating or bus stop shelters.

The Frontage Zone can also serve adjunct functions, such as providing space for transit shelters, bike racks and other street furnishings.

Retrofit Considerations

In many cases, existing Frontage Zone width will have to be reallocated in order to achieve to-standard Furnishings Zone and Pedestrian Travelway widths. If remaining Frontage Zone exists, consider adding extra width to Furnishings Zone or Pedestrian Travelway zones. Otherwise, it is recommended that tall and bulky obstructions are consolidated into the Frontage Zone.

DRIVEWAYS

Except at signalized commercial driveways, pedestrians have the right-of-way at all times when crossing driveways. Design can help communicate this fact and ensure greater safety. When a driveway conveys the visual message that motorists are passing through pedestrian territory, motorists are more likely to make slow turns and to yield to pedestrians.

<u>GENERAL DESIGN PRINCIPLES</u>

The standard sidewalk scoring pattern is recommended to be maintained through the driveway cut, as shown in Figure 7. The result is a driveway that is bisected by a continuous Pedestrian Travelway rather than the other way around. Where possible, driveway ramps are recommended to be contained entirely within the Furnishings Zone, allowing the Pedestrian Travelway to traverse the driveway without a change in cross slope.

<u>COMMERCIAL DRIVEWAYS & PUBLIC ALLEYS</u>

It is recommended that signalized commercial driveways be designed to meet the standards for conventional roadway intersections.

Unsignalized commercial driveways are also recommended to be designed according to current

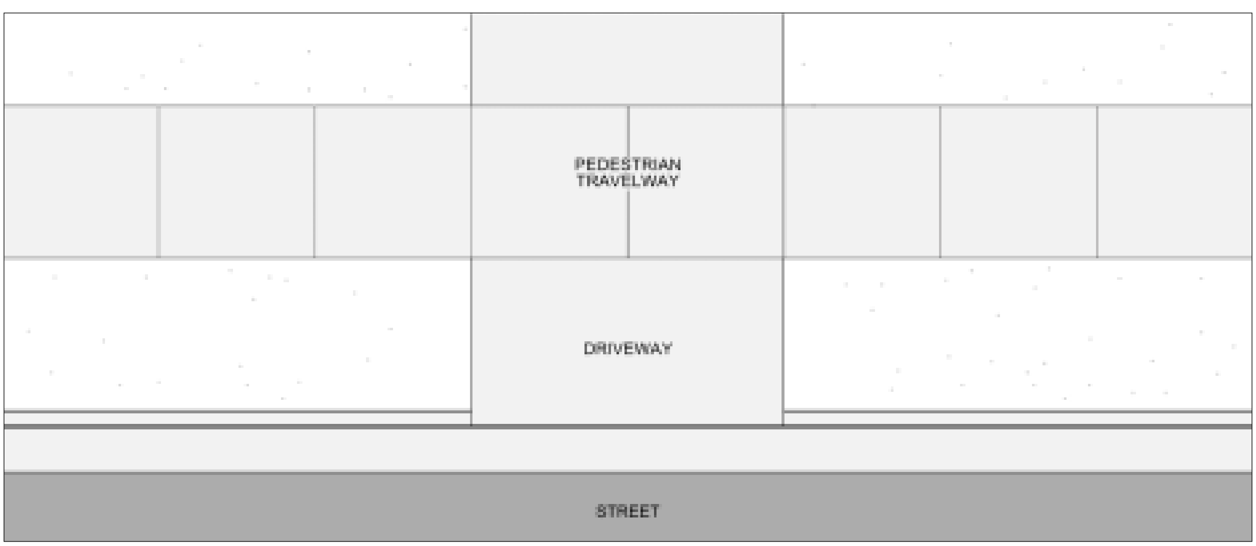


Figure 7: The Pedestrian Travelway shown crosses the driveway without a change in cross slope or scoring pattern, as recommended.

standards (with a concrete ramp), amended to require that standard sidewalk scoring patterns be maintained through the driveway cut.

In general, three-lane driveways are not recommended unless there is a documented need. Where a three-lane driveway is warranted, consideration should be given to incorporating a pedestrian refuge median.

It is recommended that the guidelines for unsignalized commercial driveways (with a concrete ramp) be applied to public alleys.

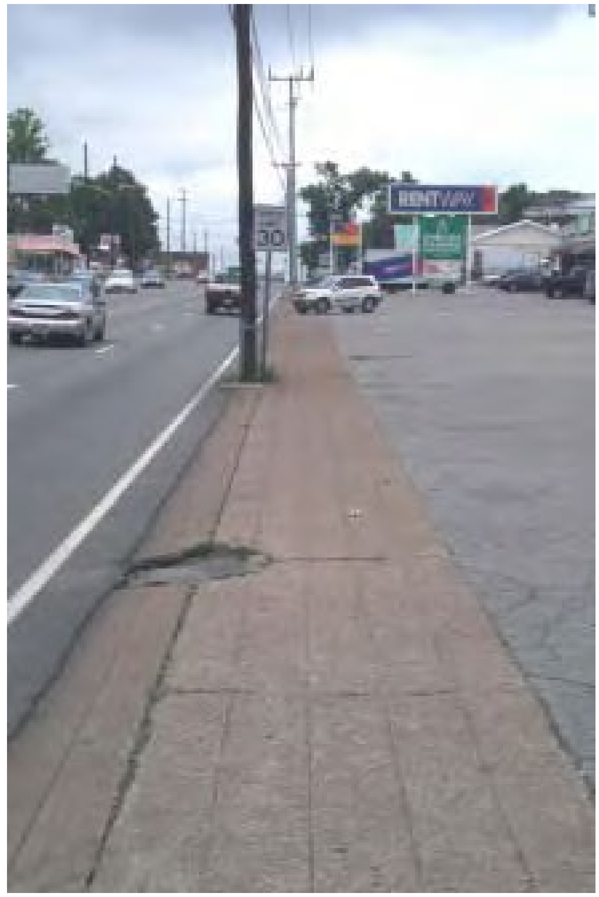
Retrofit Considerations

By nature, driveways create conflicts between pedestrians and motorists, and can complicate ADA compliance. It is recommended that Metro coordinate with property owners before sidewalk construction begins to consolidate driveways and eliminate driveways that are no longer in use.

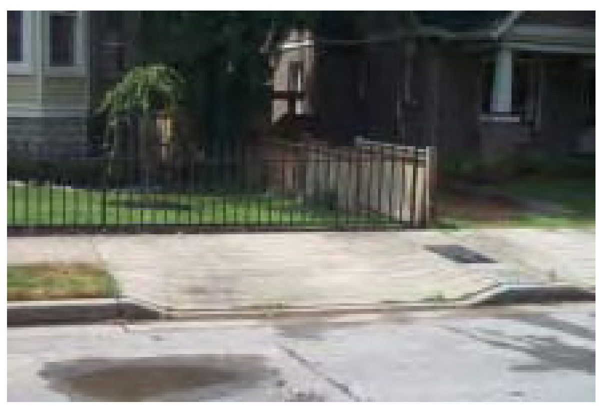
Many older commercial Arterials can be problematic. Many Arterial roadways provide continuous access along commercial frontage. Since few curbs or other physical barriers to vehicles exist, pedestrians have near-continuous exposure to traffic.

In older residential neighborhoods, there may be numerous abandoned driveways that can be eliminated during sidewalk replacement. Often, the presence of fencing, landscaping, or other barriers will indicate that the driveway is no longer in use.

Although requiring additional planning with affected property owners, driveway consolidation and removal reduces sidewalk construction labor and results in higher quality pedestrian facilities.



Consolidation of continuous driveways on older commercial streets during retrofit projects can minimize pedestrian/ motorist conflicts.



Eliminating driveways that are no longer in use reduces sidewalk construction costs and produces higher quality pedestrian facilities.

ENCROACHMENTS

Pedestrians tend to travel a foot or so away from adjacent features such as fences. In order to ensure that such features are far enough from the Pedestrian Travelway that the full functional width of the sidewalk is maintained, a one-foot setback from frontage property lines is recommended for physical structures, including building frontage, fences, and walls.

Adjacent property owners are required to maintain vegetation in a manner that does not encroach into the Pedestrian Travelway.

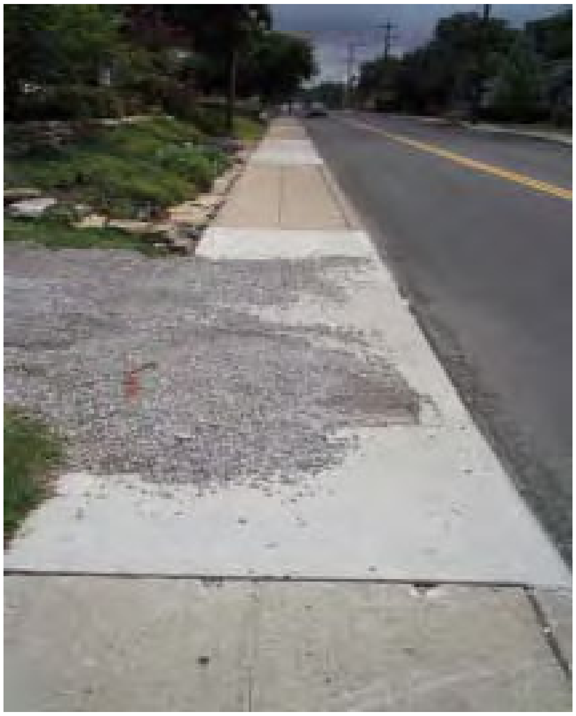
Retrofit Considerations

<u>Parked Vehicles</u>
Where parking lots are adjacent to a sidewalk, and there is no landscaping, curb, or other physical barrier between parked cars and the sidewalk, the installation of wheel stops, or other structural means is recommended to preclude encroachment into the Sidewalk Corridor by motor vehicles. The placement of wheel stops or curbs should ensure that the “nose” of a car does not encroach into the sidewalk.

<u>Vegetation</u>
Encroaching vegetation can also reduce the usable width of a sidewalk, or make it impassable. Currently codes require private property owners to maintain vegetation in a manner that does not result in sidewalk encroachments. Awareness of this requirement is lacking and the regulation is rarely enforced.

<u>Gravel</u>
The movement of vehicles across a gravel alley or driveway usually tracks gravel onto the sidewalk. The presence of loose gravel can make a sidewalk impassable for those in wheelchairs or otherwise have limited mobility. To ensure that gravel does not migrate to sidewalks, it is recommended that public alleys and driveways be paved back fifteen feet from the edge of the roadway, as shown in Figure 8.

Installation of wheel stops, curbs, or another structural feature, as shown in the right photograph, is recommended to ensure that parked cars do not encroach into the Sidewalk Corridor.



Gravel from driveways and alleys can migrate onto sidewalks and make them impassable for persons with disabilities.

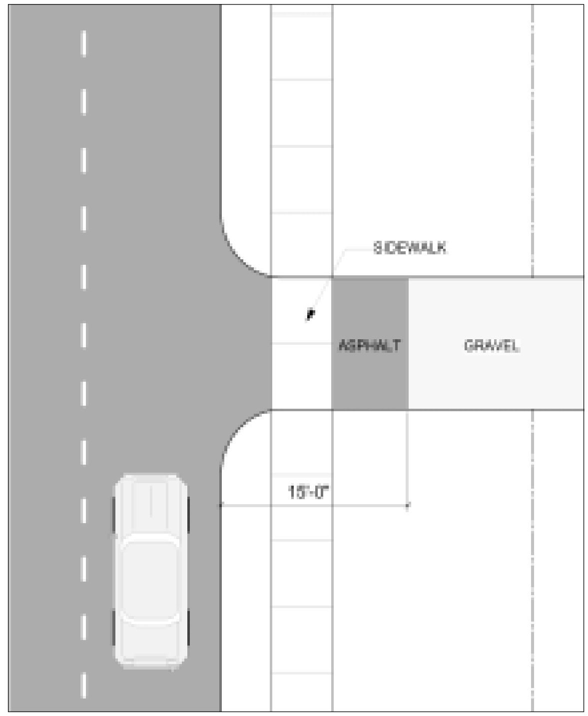
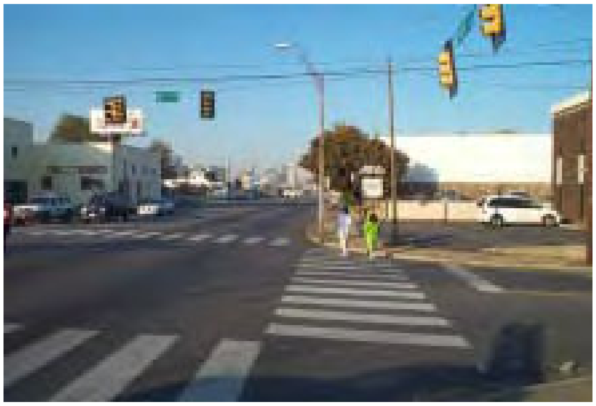


Figure 8: Paving the first fifteen feet of a gravel alley or driveway will preclude gravel migration.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

E. INTERSECTIONS



Crosswalks should be marked clearly at all intersections.

In addition to being able to comfortably walk along a roadway, it is equally important for pedestrians to be able to safely cross a roadway. By nature, intersections place one group of travelers in the path of others. Walking travelers often find themselves with a lack of accommodations and guidance where they are at the greatest risk.

Rather than functioning as a barrier between sidewalk segments it is desirable for the design of corners, crosswalks, and other intersection features to provide a seamless pedestrian facility.

At signalized intersections, pedestrians have the right-of-way when they are crossing with the green light. The Metro Code also addresses pedestrian crossings at locations other than signalized intersections. The code states that pedestrians always have the right-of-way at unsignalized intersections regardless of whether or not the crosswalk has pavement markings. Pedestrians also always have the right-of-way at mid-block crosswalks, which by definition include pavement markings. The design of intersections is recommended to acknowledge and reinforce operational regulations.

Retrofit Considerations

Integration of pedestrian improvements to intersections, where needed, are recommended for sidewalk retrofit projects. If intersections remain barriers to pedestrian travel along a new Sidewalk Corridor, the new sidewalk may not get as much use as possible, or may increase pedestrian traffic at intersections or mid-block crossings that are not designed to safely accommodate them.

In some instances, crossing facilities and other pedestrian improvements will be warranted at intersections on streets where the sidewalks themselves do not require upgrade.

DESIGN OBJECTIVES

It is recommended that all intersections be designed with an assumption that pedestrians will be present. The following characteristics are recommended for the intersection designs:

- Short Crossings: In general, curb-to-curb crossing distance is as short as possible.
- Highly Visible: Pedestrians are easy for motorists to see, and vice versa.
- Obstruction-free: Corners are free of obstructions that reduce visibility and accessibility.
- Adequate Size: Corners are large enough to accommodate sidewalk ramps, landings, transit stops, and the expected volume of pedestrians.
- Obvious: Signs, markings and signals clearly indicate to pedestrians, motorists and bicyclists how, where, and when right-of-way users will operate.
- Accessible: Ramps, landings, pedestrian pushbuttons, and other features are easy to use for travelers of all abilities.
- Separate from traffic: Corners and medians are designed to discourage vehicles from encroaching into pedestrian areas.
- Direct: Facilities offer direct routes between sidewalks, and do not require significant out-of-direction travel.

CORNERS

MINIMIZING OBSTRUCTIONS

Corners must accommodate a range of pedestrian activities, concentrations of pedestrians, and other pedestrian-related physical features such as curb ramps, landings, and pushbutton posts. In addition, sight lines between pedestrians and vehicle operators must remain clear for safe interaction. Furthermore, pedestrians' attention should be focused on vehicular activity and signals, rather than avoiding obstacles.

In general, an obstruction-free area, as shown in Figure 9, is recommended for the space between the curbs and a continuation of the adjacent property lines, or within ten feet of an intersection, at a minimum. Except for pushbutton posts and other pedestrian enhancements, it is recommended that no vertical or surface features encroach into this area.

Retrofit Considerations

While the removal of existing fixed obstructions along an entire Sidewalk Corridor may not be feasible, the range of functional and safety concerns at an intersection warrants selective relocation of utility poles, signal boxes, hydrants, street signs, and other obstructions at corners.

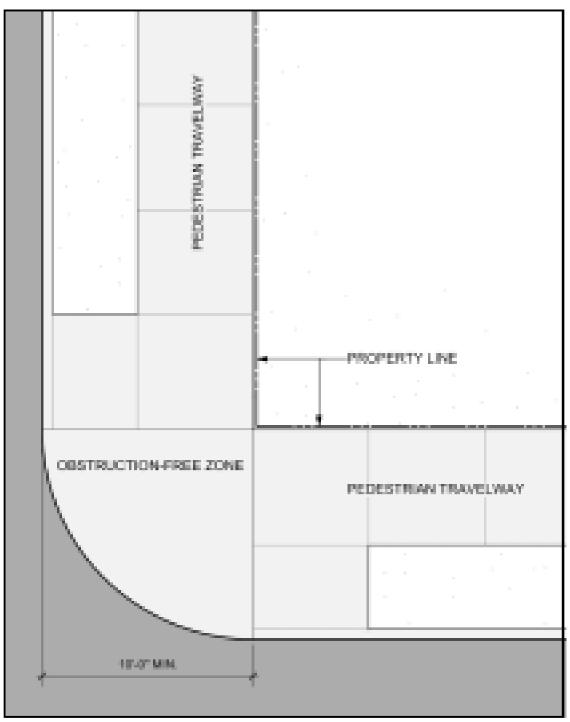


Figure 9: Street corners should be obstruction-free.

CURB RADIUS

As shown in Figure 10, a shorter curb radius can significantly reduce the amount of time that a pedestrian is in the roadway and in potential conflict with vehicles. The shorter the crosswalk, the safer for pedestrians. A tighter radius also provides more space at corners, better visibility and sightlines, allows more flexibility in the placement of ramps, and reduces vehicular turning speed.

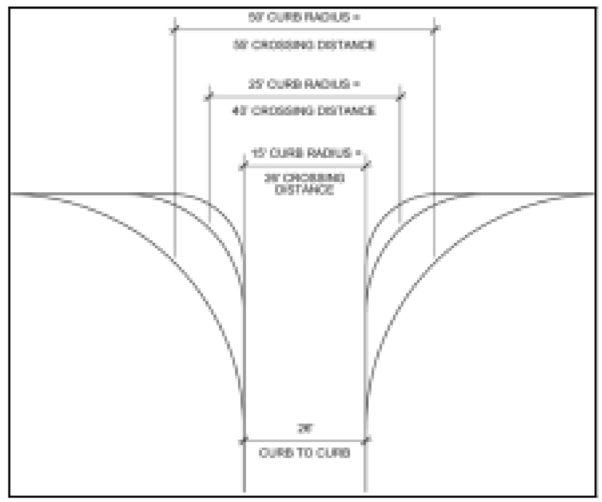


Figure 10: The shorter the curb radius, the shorter the street crossing distance for pedestrians.

The curb radius should be no greater than that needed to accommodate the turning radius of vehicles expected to use the intersection. Arterial streets with a high volume of truck or bus traffic may warrant a 25-foot or greater radius. However, AASHTO's *A Policy on Geometric Design of Highways and Streets* states that "for arterial street design, adequate radii for vehicle operation should be balanced against the needs of pedestrians and the difficulty of acquiring additional right-of-way or corner setbacks." As illustrated in Figure 11, the presence of on-street parking or bicycle lanes results in a longer effective turning radius at an intersection. This is an effective way to minimize the curb radius, but still provide adequate turning paths for large vehicles.

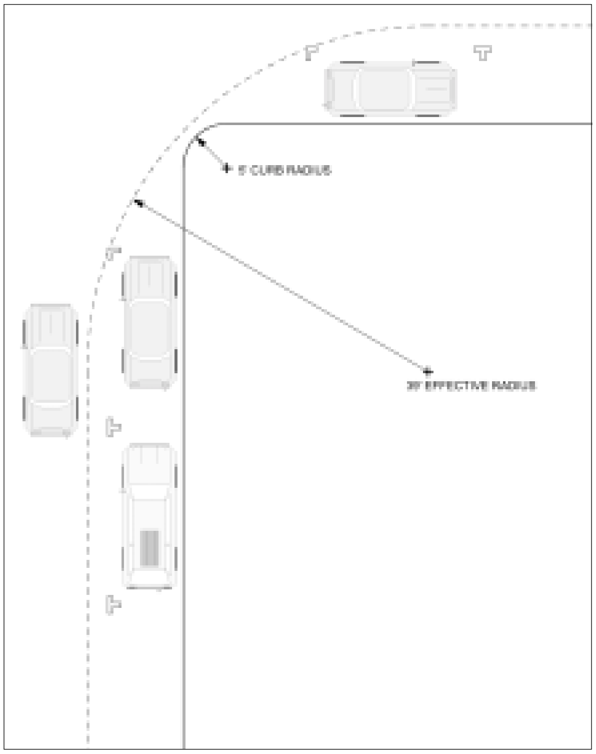


Figure 11: The presence of parking lanes or bicycle lanes significantly increases the effective turning radius, allowing the actual curb radius to be reduced to less than fifteen feet for many applications.

Retrofit Considerations

As part of the routine intersection improvements that should occur during sidewalk retrofit, it is recommended that curb radii be reduced to the minimum length necessary where physically feasible. Doing so will result in an improved pedestrian environment.

<u>CURB RAMPS</u>
Curb ramps allow sidewalk users to make the transition from sidewalks to the street grade. Ramps are especially important for those with limited mobility, wheelchairs, and baby strollers. Like all other sidewalk features, curb ramps must meet ADA standards. Metro's current ramp design standards meet ADA. The recommendations below relate to the number and location of ramps.

<u>Number and Location of Ramps</u>
In general, a curb ramp is recommended for each crosswalk at a corner, as shown in Figure

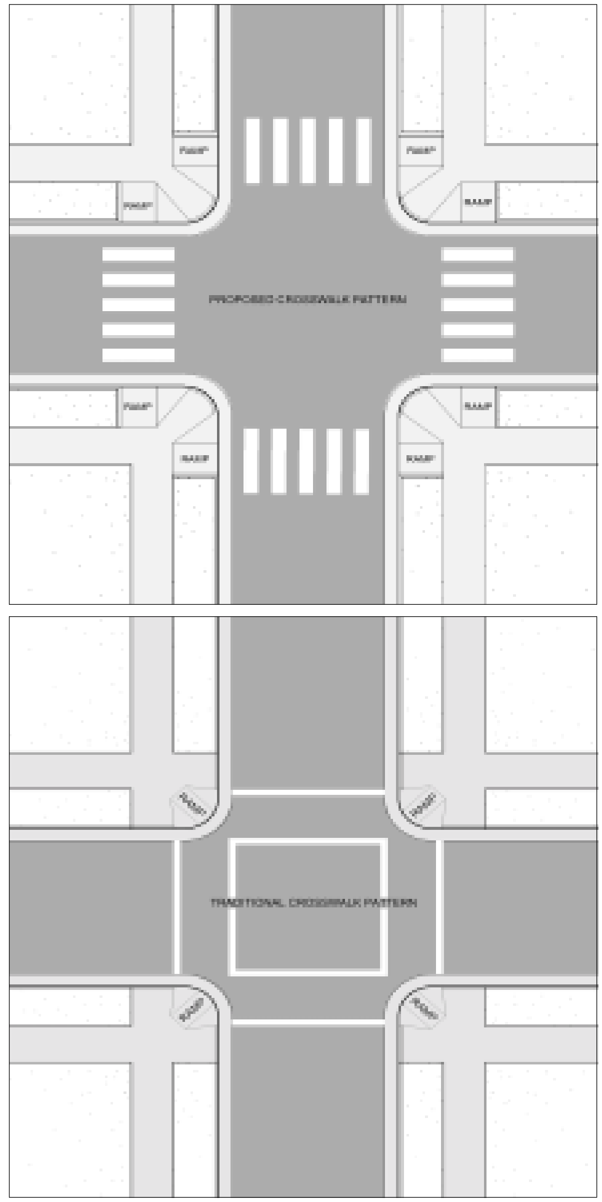


Figure 12: To ensure that crossing distances are minimized and that ramps are on the same alignment as crosswalks, corners should include curb ramps for both crosswalks, as shown at top. Diagonal curb ramps, as shown at bottom, require wheelchair users to re-align their wheelchair while in the street in order to remain in the crosswalk.

12. Although separate curb ramps are preferred, in some cases, diagonal ramps will be required because of intersection geometrics or other considerations. Diagonal ramps are acceptable per ADA and in some cases, existing

conditions will dictate diagonal ramps. However, there are disadvantages associated with diagonal ramps. A diagonal ramp shared by both crosswalks diverts the casters on a wheelchair toward the center of the intersection, where the user must then re-orient the chair back on alignment with the crosswalk. This circumstance creates maneuvering problems at the same moment in which the user must also be watching for oncoming traffic. In contrast, a two-ramp corner allows each curb ramp to be on direct alignment with the crosswalk.

In addition, a diagonal ramp can make it harder for pedestrians to see right-turning vehicles.

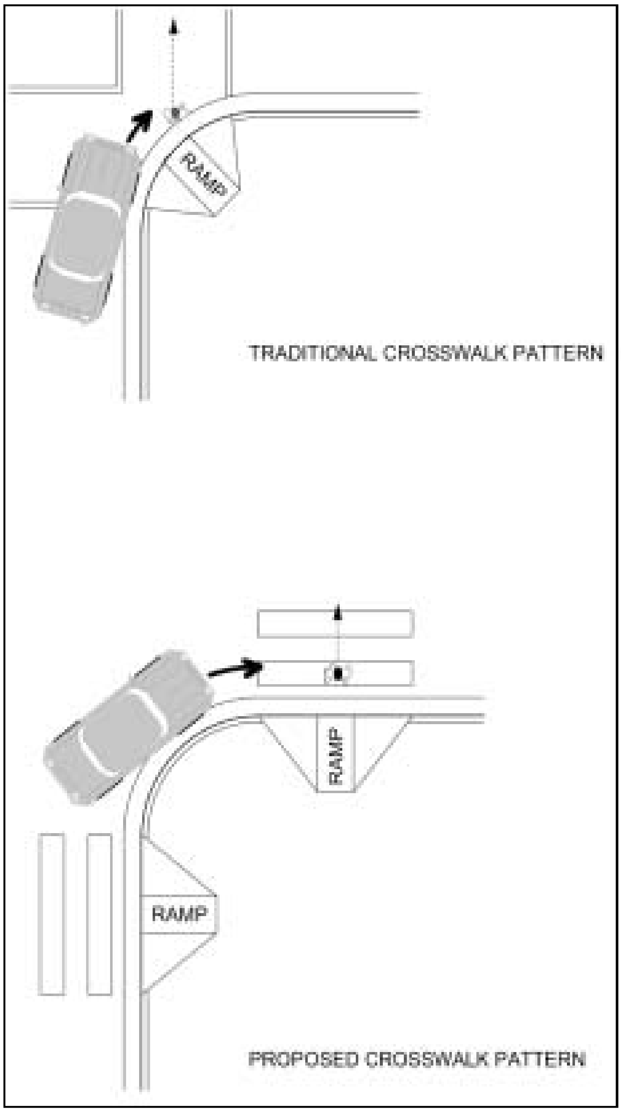


Figure 13: With diagonal curb ramps, cars approach from behind, rather than beside, as with a two-ramp corner.

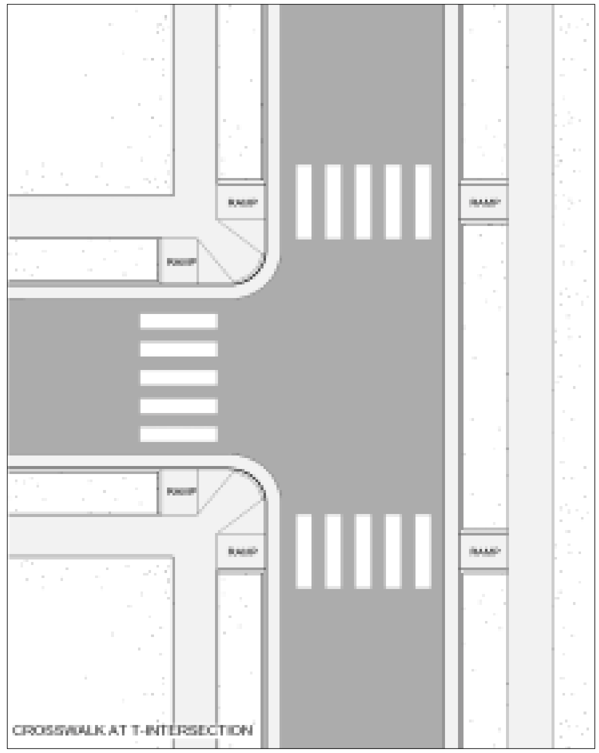


Figure 14: Since legal crosswalks are located at each leg of a T-intersection, so, too, should curb ramps.

Right turning vehicles will approach pedestrians from the rear, rather than the side, as is the case with most two-ramp configurations, as shown in Figure 13. Furthermore, a diagonal ramp typically requires more crossing time and distance than a two-ramp corner, which increases the potential for pedestrian/vehicle conflicts and increases motor vehicle delay.

Like four-way intersections, crosswalks are present at every leg of a T-intersection regardless of whether or not pavement markings are present. For this reason, it is recommended that ramps are also installed at each end of every crosswalk at T-intersections, including the top-bar, as shown in Figure 14.

Retrofit Considerations

Efforts should be made to provide two ramps at corners wherever feasible. Techniques that may facilitate this include reducing the curb radius and installing curb extensions.

A recurring problem has been that the most constrained corner of an intersection usually dictates the location of the ramps at all corners.

For example, as shown in Figure 15, the presence of a single storm drain or other obstruction that forces a diagonal ramp at one corner results in diagonal ramps at all corners. Instead, the selective relocation of storm drains, utility poles and other obstructions will maximize the opportunity for two ramps at every corner. In some instances, crosswalk locations will have to be adjusted to be on alignment with ramps.

CROSSWALKS

Like corners, the design and function of crosswalks significantly affects the ability of a pedestrian to safely travel across a street.

A well–designed crosswalk will attract pedestrians because the safety and convenience advantages of crossing at that location will be evident. The crossing distance will be minimal, the crossing time will be adequate, and it will be clear to both pedestrians and drivers when and where the other has the right-of-way.

In contrast, a pedestrian may go out of the way to avoid an intersection with inadequate pedestrian accommodations. Long crossing distances, short crossing times, and lack of pedestrian signals can leave a pedestrian without any guidance as to when it is safest to cross. The movements of cars are often unpredictable and the pedestrian is left feeling vulnerable. At such intersections, a pedestrian may instead choose to cross mid-block, where it is easier to gauge the speed of approaching vehicles, and cross when the crossing opportunity is optimal. While such a solution may feel safer, it is a poor option, especially for children and senior adults, and discourages walking for everyone.

As well as the design objectives previously discussed, which apply to all intersection features, it is recommended that crosswalks have the following additional characteristics:

- Frequent: Crosswalks are located at frequent enough intervals to ensure that pedestrians do not have to travel significantly out of direction to cross a street.
- Prompt: At signalized intersections, pedestrians do not have to wait an unreasonable period of time before being given an opportunity to cross.
- Minimal exposure: Crosswalks are designed with the fewest possible conflict points with traffic and a short crossing distance, or be divided into short multiple crossing segments.
- Direct: Crosswalk markings are on align-

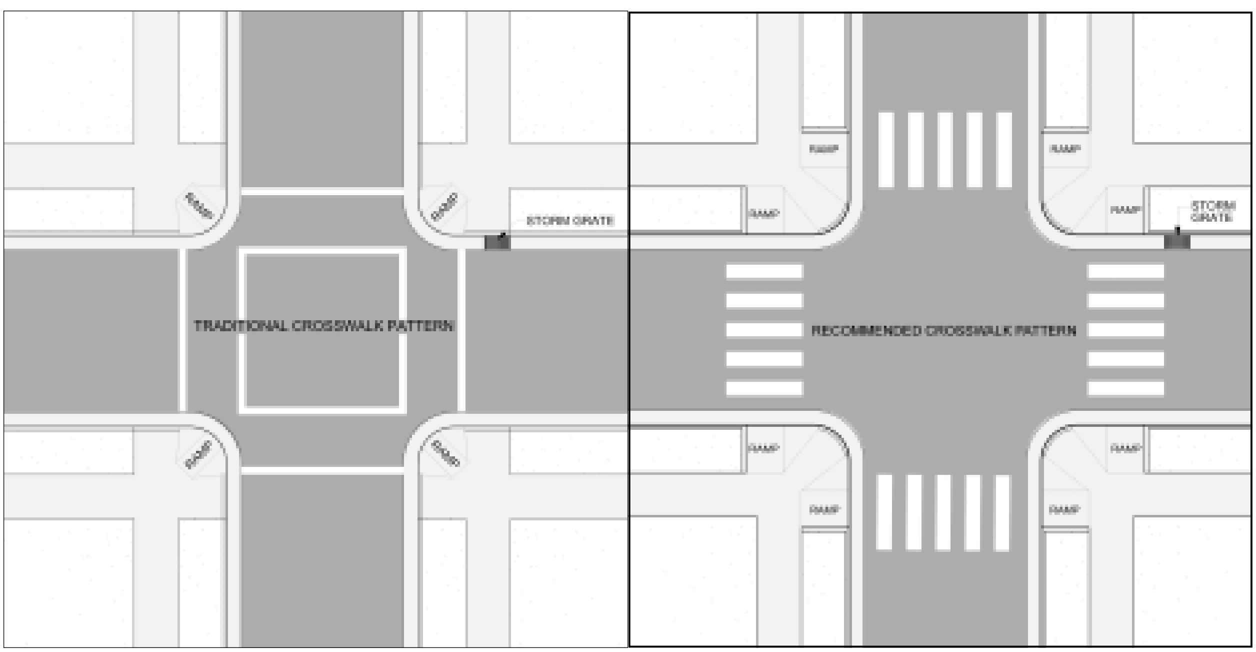


Figure 15: When an obstruction, such as a storm grate, conflicts with the ability to install two curb ramps per corner, as shown at left, the obstruction can be relocated, as shown at right.

ment with connecting sidewalks.

- Adequate crossing time: The time provided at signalized intersections to cross the roadway needs to be adequate for sidewalk users of all abilities.

GENERAL DESIGN CONSIDERATIONS

Installation of crosswalk markings are recommended for each leg of intersections on

- Arterial and Collector streets
- Signalized intersections on all street classifications
- Local streets near schools, parks and other locations with high pedestrian activity

It is recommended that crossing prohibitions only be considered in very limited circumstances, such as where it would be extremely dangerous for pedestrians to cross due to severely limited sight distance, or other safety constraints.

The method of marking a crosswalk impacts visibility, ADA compliance and other issues. In general, crosswalks marked with brick or cobblestone pavers alone are less visible to motorists than those marked with reflective white thermoplastic tape, particularly at night or during rain. When pavers are used, reflective tape is recommended to be considered for use in conjunction. Bumpy paving materials such as cobblestones can be noisy and create problems for bicyclists, pedestrians and those with limited mobility.

Pavement markings have typically been the only design tool applied to crosswalks. In fact, markings are just one option in a progression of design treatments. Any combination of pavement markings, curb extensions, pedestrian refuges, signal improvements, and other techniques should be taken into consideration when determining the best treatment at a given crossing.

FREQUENCY OF CROSSING OPPORTUNITIES

Generally, pedestrians will not travel significantly out of direction in order to cross a roadway. This tendency is even more pronounced when the pedestrian perceives that the design of an out-of-direction crosswalk will not offer additional safety benefits. Instead, pedestrians will cross where it is most convenient, or perceived to be the safest.

The distance between safe opportunities to cross a street is recommended to be proportionate to the frequency of uses along the street that generate crossing movements. In areas with a lot of commercial activity, mixed uses, high or medium density, bus stops, schools, parks, or libraries, crossing opportunities should be frequent. In general, such streets are recommended to have well-designed pedestrian crossing facilities spaced at intervals of no less than 300 feet. In low-density areas with single land uses, good crossing opportunities may be less frequent.

Retrofit Considerations

On many existing streets, the distances between intersections with pedestrian accommodations are great and their designs sometimes offer few safety advantages. Older commercial arterial and collector streets can be problematic. Located in densely developed areas with residential and commercial uses in close proximity, these streets have high levels of pedestrian activity and heavy traffic. As sidewalks are retrofitted or replaced on these and all streets, installation of crossing facilities is recommended at appropriate intervals.

MID-BLOCK CROSSWALKS

Providing marked crosswalks at mid-block locations is viewed by many pedestrians as an effective way to improve pedestrian safety. However, studies have shown that mid-block crosswalks, if inappropriately used, can actually create more safety problems than they solve. Nevertheless,

Mid-block crosswalks may be appropriate where there is a significant demand for crossing and no nearby intersection crosswalks exist.

since pedestrians have a right to cross streets, it is incumbent upon engineers and planners to plan, design and install safe crossing facilities for pedestrians.

According to the MUTCD, mid-block crosswalks should be provided at "appropriate points of pedestrian concentration", or "where pedestrians could not otherwise recognize the proper place to cross." However, because of safety concerns, the MUTCD also states that "Crosswalk lines should not be used indiscriminately" and that an engineering study should be performed before installing mid-block crosswalks. This guidance from the MUTCD recognizes that even though mid-block crosswalks are appropriate and desirable in certain situations, the tradeoffs associated with a mid-block crossing should be carefully studied before a crosswalk is installed.

A recent study by the FHWA evaluated the safety aspects of crosswalks by analyzing five years of pedestrian crashes at 1,000 marked crosswalks and 1,000 matched unmarked comparison sites. The study's report, which was released in February 2002 and titled "Safety Effects of Marked vs Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines", presents detailed conclusions and recommendations for mid-block crosswalks. This report concludes that "under no conditions was the presence of a marked crosswalk alone at an uncontrolled location associated with a significantly lower pedestrian crash rate compared to an unmarked crosswalk. The report further states that "On many roadways, particularly multi-lane and high-speed crossing locations, more substantial improvements are often needed for safer pedestrian crossings, such as providing raised medians, installing traffic signals (with pedestrian signals) when warranted, implementing speed-reducing measures, and/or other practices." Other recommended practices include enforcement and education programs. It is clear from this report and from other research that appropriately located mid-block crossings require special attention to design in order to optimize pedestrian safety.

Based on this information, it is recommended that future considerations for mid-block crossings by Metro be evaluated thoroughly to determine if a crosswalk is appropriate for the location being studied. When a mid-block crosswalk is determined by Metro Public Works to be justified, the need for engineering enhancements in addition to the crosswalk markings should also be considered. The FHWA report identifies the following as possible measures for helping pedestrians cross streets safely at mid-block locations:

Pedestrian refuges, like this median island, can reduce the amount of time pedestrians must wait to cross a street safely.

- Providing raised medians or refuge islands
- Reducing the effective street crossing distance by narrowing the road or providing curb extensions
- Providing adequate nighttime lighting for pedestrians
- Providing access management (e.g., consolidation of driveways)
- Designing safer intersection for pedestrians (e.g., crossing islands, tighter turn radii)
- Using various pedestrian warning signs, flashers, and other traffic control devices

MINIMIZING CROSSING DISTANCE

The curb-to-curb distance at crosswalks is recommended to be as short as possible. This reduces crossing time, minimizes exposure to vehicles, and increases convenience and safety.

There are several design tools and pedestrian enhancements that can result in shorter crosswalks.

Curb Radius
As discussed earlier in this section and shown in Figure 10, excessive curb radii can significantly increase crossing distance and the amount of time a pedestrian spends in the roadway. It is recommended that curb radii be reduced to the shortest practical length possible, while still accommodating the vehicular traffic that will be at the intersection.

Curb Extensions
Also called pedestrian bulbs or bulb outs, curb extensions project the curb into the roadway and reduce the overall curb-to-curb width. Curb extensions usually extend into the road the width of on-street parking lanes as shown in Figure 16. Typically used at corners, curb extensions can also be applied at mid-block crossings and the top-bar of T-intersections.

Curb extensions are an excellent design tool that offers multiple benefits:

- They increase visibility at corners, allowing pedestrians to safely stand at the edge of the travel lane instead of at the edge of the parking lane;
- They preclude parked cars from blocking crosswalks, curb ramps and sight lines;
- They may preclude the necessity to move sidewalk obstructions, since the corner is moved instead; and
- They can provide space for adjunct sidewalk functions, such as for a bus stop or bike rack.

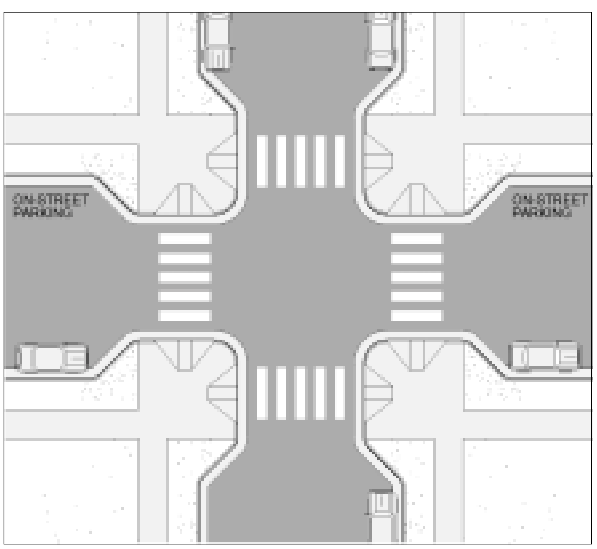


Figure 16: Curb extensions provide multiple benefits to pedestrians.

Curb extensions are not recommended to project into bike lanes, shoulders, or wide outside lanes on shared bikeways.

Pedestrian Refuges
Pedestrian refuges allow a pedestrian to cross one segment of a street to a curbed area between travel lanes, before continuing across the next segment of travel lanes. This type of facility has been shown to significantly reduce car/ pedestrian crashes.

One of the most effective pedestrian refuge designs is a median island, which allows the pedestrian to traverse each direction of traffic separately. The presence of a median refuge can significantly reduce the amount of time that a pedestrian must wait for an adequate gap in the traffic stream. As shown in Figure 17, median

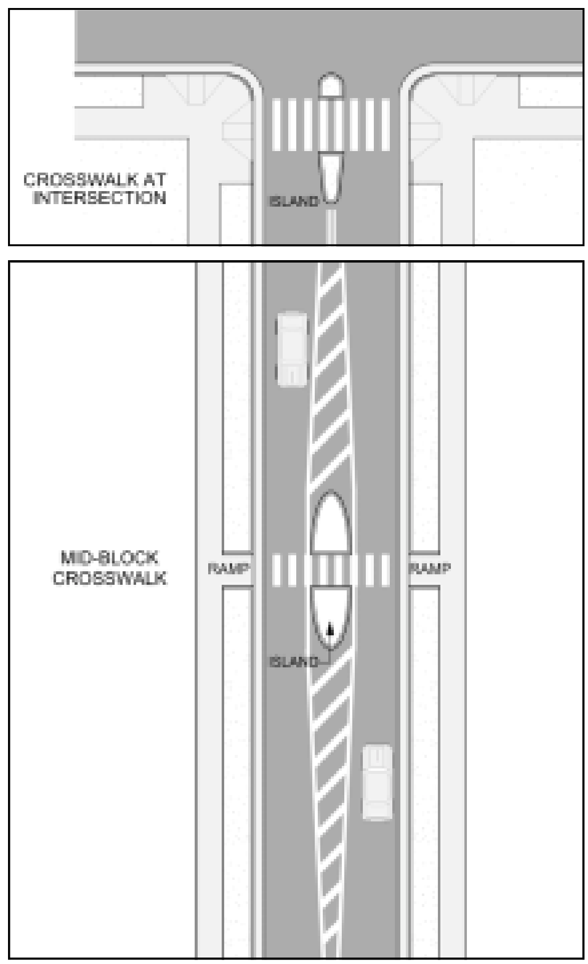


Figure 17: A pedestrian refuge island significantly improves pedestrian safety and comfort when crossing at an intersection or mid-block.

refuges can be installed at intersections and at mid-block crossings, and do not require a continuous median along the entire roadway corridor.

Although pedestrian refuges should be considered for any roadway with significant existing or desired pedestrian volumes, incorporating pedestrian refuges as a routine practice on very wide crossings is recommended. In general, five lanes, or about 55 feet, is the maximum desirable uninterrupted distance for a pedestrian to encounter at intersections.

Retrofit Considerations

For intersections where existing slip lanes will not be removed, it is recommended that "pork chop" islands are curbed, and incorporate ramps and other features that will allow them the function as pedestrian refuges, as shown in Figure 18.

Lane Width Reduction

Retrofit Considerations

Under certain circumstances and conditions, AASHTO policies recognize the appropriateness of lane width less than 12 feet wide. For example, AASHTO states that "Although lane widths of 3.6 m [12 ft] are desirable on both rural and urban facilities, there are circumstances where lanes less than 3.6 m [12 ft] wide should be used. In urban areas where pedestrian crossings, rights-of-way, or existing development become stringent controls, the use of 3.3 m [11 ft] lanes is acceptable. Lanes 3.0 m [10 ft] wide are acceptable on low-speed facilities and lanes 2.7 m [9 ft] wide are appropriate on low volume roads in rural and residential areas."

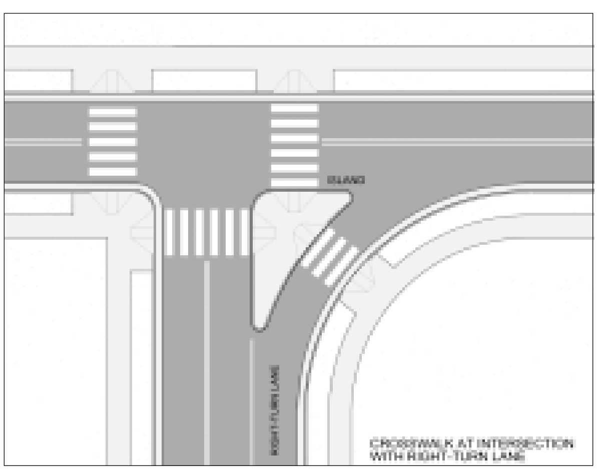


Figure 18: Pedestrian refuge islands can also be incorporated into intersections with slip lanes.

When streets are re-striped, it is recommended that Metro Public Works follow AASHTO's guidance and evaluate the need for narrower lanes in order to improve pedestrian crossings. The extra width achieved by narrowing existing lanes can be reallocated to curb extensions or striped pedestrian bulbs. Lane narrowing should take into consideration the presence of bicycle facilities on the street and not result in substandard bikeway widths at intersections.

Lane Number Reduction

Retrofit Considerations

On some roadways, pedestrian or land use objectives may warrant the removal of a travel lane, as shown in Figure 19, or a turn lane at an intersection. The width from the removed lane can be reallocated to pedestrian facilities and result in narrower crossing distances. A traffic study can determine whether lane reductions will result in an acceptable level of service for motor vehicles. Level-of-service analysis for intersections is not recommended to dictate the design for the entire length of roadway. Providing high quality pedestrian corridors and crossing facilities for some corridors may be worth a reduction in motor vehicle capacity.

On other streets, such as low volume four-lane roads, re-striping with a center turn lane and two conventional travel lanes can, in fact, improve traffic flow. "Road diet" is a term increasingly applied to such a strategy.

T-INTERSECTIONS & TANGENT INTERSECTIONS

T-INTERSECTIONS

T and offset intersections introduce some unique issues to pedestrian crossings. Like a conventional four-way intersection, legal crosswalks are present at each leg of a T-intersection unless posted otherwise. At the top-bar of the T, a crosswalk will have a conventional corner at one

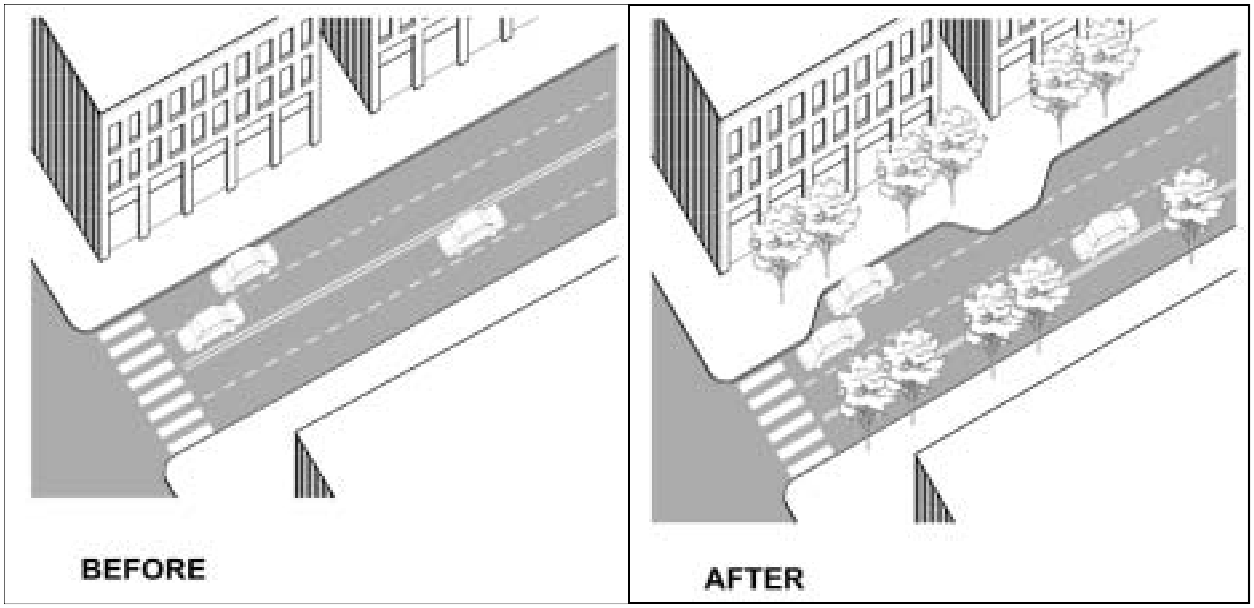


Figure 19: On some streets, providing width for pedestrians, parking, or other functions may warrant the removal of a travel lane.

end and a straight section of sidewalk at the other end, as shown in Figure 14.

Pavement markings for crosswalks at T-intersections are recommended to follow the general guidelines for the placement of crosswalk markings at standard intersections.

With or without pavement markings, curb ramps are recommended at all crosswalks at a T-intersection.

On-street parking often blocks crosswalks at the top-bar of T-intersections. It is recommended that the design, signage, and regulatory enforcement be provided to ensure that parked cars do not encroach into the crosswalk.

At an offset intersection, where two T-intersections are close to each other, it may be of greatest benefit to enhance selected crosswalks and eliminate others, as shown in Figure 20. Generally, the enhanced crosswalks should offer enough evident benefits to pedestrians that signage prohibiting crossing at the eliminated crosswalks would be unnecessary.

Figure 20: At off-set intersections, it may be of most benefit to pedestrians to enhance some crossings and eliminate others.

TANGENT INTERSECTIONS

Generally, good design practice calls for intersections to be designed with cross streets intersecting at right angles. Among the disadvantages of an intersection at which roads intersect at sharp angles: crosswalk distances increase significantly, motorists may make turns at a higher speed, and turning vehicles may approach pedestrians from behind rather than from the side.

In general, crosswalks are located on alignment with sidewalks. However, at some tangent intersections, particularly on wide streets, the crosswalk should be marked at right angles to cross-traffic, as illustrated in Figure 21. This reduces the amount of time that pedestrians are exposed to vehicles, reduces crossing distance, and is the instinctive path of travel for most pedestrians.

PEDESTRIAN SIGNALS

Traffic laws dictate that at those intersections with traffic signals but no pedestrian signals, pedestrians have the right-of-way in crosswalks when parallel vehicular traffic has the green light. Intersections without pedestrian signals can be difficult for pedestrians:

- When traffic signals are located or oriented in a manner where the signal heads are not visible to pedestrians standing at a street corner.
- If the amount of time that a pedestrian needs to cross the street is not taken into consideration in determining green light time intervals.

For these reasons, pedestrians can be left with little guidance as to when it is safe to cross the street or whether the green light interval will be long enough to permit a safe crossing.

Pedestrian signals, when correctly programmed, ensure that the following accommodations are provided:

- Specific guidance is provided to pedestrians as to when they have the right-of-way in the crosswalk.
- Traffic signal intervals are set to provide enough time for pedestrians to cross the street.

The MUTCD identifies the situations in which pedestrian signals shall be used and the situations in which pedestrian signals should be used. Since the presence of pedestrians should be assumed on all roadways, since Metro is committed to the creation of a multi-modal transportation system, and since MUTCD encourages the practice, all signalized intersections should include pedestrian signals and crosswalk markings at each leg of the intersection.

Other crosswalk locations where pedestrian volumes are high, such as at a school, may warrant the installation of a dedicated pedestrian-actuated traffic signal.

Many local and state transportation agencies throughout the country are developing innova-

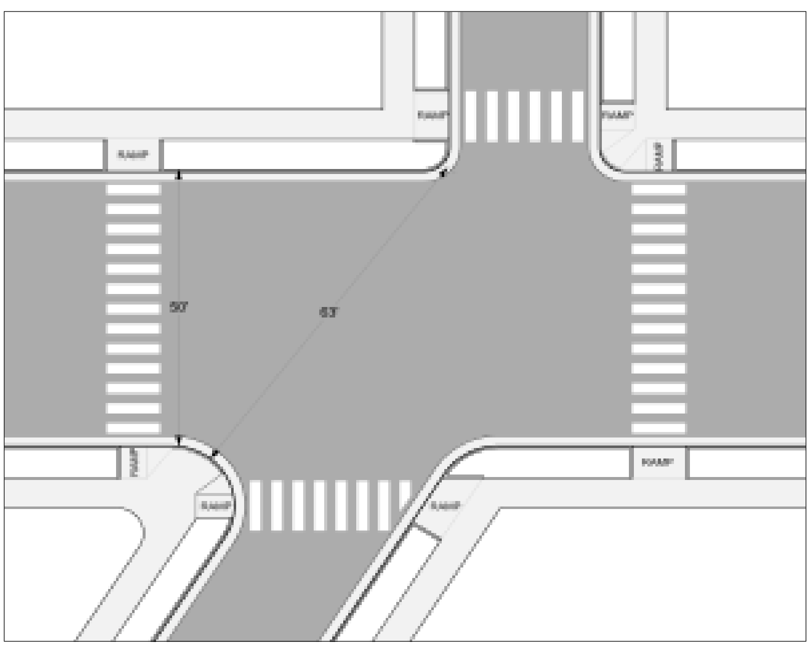


Figure 21: When a crossing is at a wide, tangent intersection, a shorter, safer crossing is usually more desirable to pedestrians than a direct crossing.

tive pedestrian crossing designs. Designs including the Pedestrian Light Control Activated (PELICAN) crossing, High-intensity Activated Crosswalk (HAWK) signals, warning beacons, TOCAN crossings, and other innovations are becoming common practices elsewhere. It is recommended that Metro monitor these and other techniques in order to stay up to date on innovative techniques for pedestrian accommodations.

PEDESTRIAN PUSHBUTTONS

Pedestrian pushbuttons are intended for use at intersections where traffic signals would not otherwise provide a regular WALK signal, and green light time intervals are not necessarily long enough to provide adequate pedestrian crossing time. When the pushbutton is depressed, these considerations are accounted for in the signal operation.

Motorists don't have to push a button to get the right-of-way and, in general, neither should pedestrians. Furthermore, pedestrian pushbuttons are becoming more technologically complex and expensive in response to ADA needs. While all pushbuttons must meet ADA, the preferred solution for pedestrians of all abilities is to design intersections that preclude the need for pushbuttons, while still ensuring safe and frequent crossing opportunities.

Where intermittent pedestrian traffic warrants the use of pushbuttons, there are several factors to be taken into consideration to ensure that they are easy to use, and offer clarity to pedestrians rather than confusion.

The following criteria are recommended for pedestrian pushbuttons:

- The pushbutton is located no more than five feet from the extension of the crosswalk lines.
- The pushbutton is located within ten feet of the edge of the curb, shoulder or pavement.
- On corners where two pushbuttons are located on the same corner, they are separated by at least ten feet.
- The pushbutton is accessible from the level landing at the top of the curb ramp.
- The pushbutton box is oriented toward the pedestrian and conspicuously visible from the pedestrian's position standing at the curb on alignment with the crosswalk.
- An arrow indicator accurately identifies which crosswalk the button will affect.
- Standard pedestrian signal instructions are mounted near pushbuttons.
- A pushbutton is present at every non-fixed-time leg of a signalized intersection.
- Pushbuttons include an illuminated confirmation light to acknowledge to the pedestrian that a call has been detected (as with elevator buttons).

The MUTCD contains general guidance on ensuring that pedestrian pushbuttons are accessible to pedestrians of all abilities. *Building a True Community* provides further guidance on pedestrian pushbutton requirements, including locator tones.

SIGNAL TIMING

Per MUTCD, pedestrian signals are recommended to utilize universal symbolized messages rather than letters. The MUTCD uses the term "Walking Person" to refer to the white illuminated figure that symbolizes the WALK interval; and "Upraised Hand" to refer to the orange illuminated figure that symbolizes the DON'T WALK intervals.

Walking Person (WALK)

The WALK interval is the period during which pedestrians should step from the curb and into the crosswalk. Although they must yield to pedestrians, motorists may be turning through the crosswalk.

The MUTCD generally requires that at least seven seconds be dedicated to the WALK signal, although it can be reduced to as little as four seconds at intersections with very low pedestrian volumes. In general, it is recommended that only those intersections in very low-density areas of Davidson County with very low pedestrian volumes should have WALK intervals of less than seven seconds.

Flashing Upraised Hand (Flashing DON'T WALK)

The flashing DON'T WALK interval provides time for pedestrians already in the crosswalk to continue to the opposite curb, but pedestrians should not attempt to begin a crossing.

The amount of time dedicated to this interval is based on crossing distance and walking speed. The MUTCD and *Building a True Community* contain some slight but important differences in determining these two factors.

The MUTCD generally recommends a walking speed of four feet per second but suggests that a speed of less than four feet per second can be used where slow moving pedestrians are present. *Building a True Community* recommends a minimum walking speed of 3.5 feet per second at all intersections, since all intersections are expected to have universal access. The MUTCD recommends that the crossing distance equal the distance between the curb and the middle of the farthest travel lane; *Building a True Community* recommends that the crossing distance equal that of the crosswalk plus one curb ramp. In light of ADA needs and Metro's commitment to a pedestrian infrastructure, it is recommended that the guidance presented in *Building a True Community* be applied.

Since intersection design determines the length of a crosswalk, the length of the flashing DON'T WALK interval can be significantly reduced by shortening the curb-to-curb distance, as discussed previously in the Section, Curb Radius. This strategy reduces the length of time that pedestrians must be in the roadway in conflict with vehicles, and can allow the intersection to function at a higher level of service for motorists. The introduction of curb extensions, for example, typically reduces crosswalk length by about sixteen feet, or five seconds, resulting in significant net congestion mitigation and air quality benefits.

In some instances, traffic signal programming results in additional time in excess of the minimum pedestrian signal timing requirements. Historically in Metro, the extra time has been added to the flashing "DON'T WALK" interval. This practice results in delay and confusion to pedestrians: the flashing signal tells them that they should not begin to cross when, in fact, they may have ample crossing time. Instead, it is recommended that any excess time be added to the WALK interval, leaving the Flashing DON'T WALK interval consistent with true clearance standards.

Steady Upraised Hand (Steady DON'T WALK)

The steady DON'T WALK signal indicates that pedestrians do not have the right-of-way in the crosswalk and should not enter the roadway. It is typically equal to the period of time during which parallel traffic has a red light.

RIGHT TURNS ON RED

Permitting right turns on red came into common practice in the 1970s as a fuel conservation technique. Although there are fuel conservation benefits, the practice discourages walking since it permits motorists to drive through a crosswalk even when pedestrians have the WALK signal. Motorists are typically focused on finding a gap in the cross-traffic to their left, rather than on cross-pedestrian traffic coming from both the left and right, to whom they are supposed to yield.

Per MUTCD, installation of NO TURN ON RED signs are recommended for every intersection with an exclusive pedestrian phase and at any intersection where conflicts with pedestrians are frequent. In practice, then, turns on red are not recommended at any intersection where existing or desired pedestrian volumes are significant.

Where right turns on red are warranted and crosswalks are marked, MUTCD recommends installation of a TURNING TRAFFIC MUST YIELD TO PEDESTRIANS sign.

RIGHT TURN SLIP LANES

Free flowing turn designs, such as slip lanes, are intended to reduce traffic congestion by allowing right-turning vehicles to bypass a signalized intersection. Because they encourage higher-speed turns, often without stop controls, slip lanes can function as significant barriers to pedestrian travel. Slip lanes are not recommended for areas where significant pedestrian activity exists or is desired. Generally, a standard corner with a short turning radius provides better service to pedestrians.

Where a traffic warrant justifies its use in an area of low pedestrian activity, there are several recommended slip lane design issues that can minimize barriers to pedestrian travel:

- “Pork chop” islands are recommended to be curbed and incorporate ramps and other features that will allow them to function as pedestrian refuges, as discussed in the pedestrian refuges section and shown in Figure 18.
- It is recommended that crosswalks are marked.
- It may be appropriate to add signage to remind drivers that they must yield to crossing pedestrians.
- On the cross street, a merge lane is preferable to a dedicated lane, as turning motorists will be more likely to travel at a lower speed, and can more easily yield to pedestrians.
- Figure 22 illustrates a slip lane design that benefits pedestrians by further reducing the turning speed, and improves sight lines for both drivers and pedestrians. Drivers are more likely to see pedestrians directly in front of them and pedestrians can look to their left instead of over their shoulder, for approaching cars.

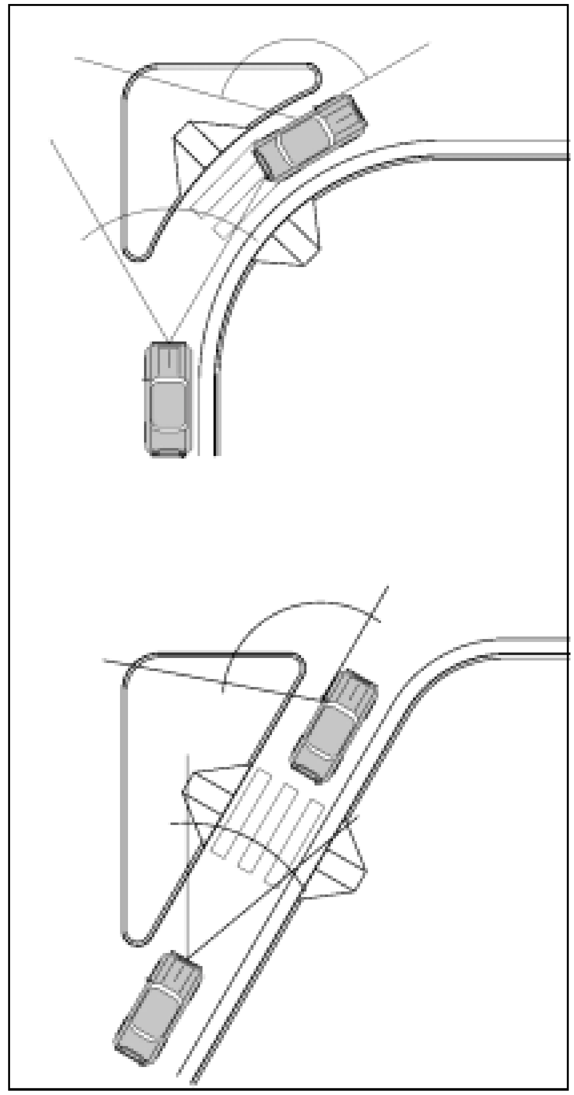


Figure 22: By improving visibility and inducing slower turning speeds, the slip lane design shown in the lower drawing increases the likelihood that motorists will see and yield to pedestrians. The upper drawing encourages higher-speed turns and has poorer visibility.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

F. PEDESTRIAN ENHANCEMENTS

Raised pedestrian crosswalks can enhance safety for pedestrians crossing a street.

Pedestrian enhancements involve the introduction of physical and visual elements into the streetscape that encourage pedestrian travel and safety. There are many pedestrian enhancements that may be appropriate for application on Metro streets.

Retrofit Considerations

In selecting roadways for pedestrian enhancement measures, and selecting the types of improvements to use, existing or desired pedestrian activity should be taken into consideration. Where possible, the pedestrian enhancements should achieve multiple objectives. The same project on a street with sidewalks and strong latent pedestrian demand is much more likely to provide the whole range of safety and quality of life benefits. In addition, motorists are more likely to understand and support a pedestrian enhancement that has a positive function, and isn't merely a nuisance to them.

RAISED CROSSWALKS

A raised crosswalk is a modified speed table. By adding crosswalk markings to a speed table, a raised crosswalk can be a good application where a high-visibility mid-block crossing is warranted, such as at a school, trail crossing, or other high-volume mid-block location.

RAISED INTERSECTIONS

A raised intersection encourages slow movements through an intersection with high pedestrian volumes on all crosswalk legs. As shown in Figure 23, the design is essentially a speed table for the entire intersection. Approaches are ramped up to the crosswalks at curb height, which eliminates the need for curb ramps. Bollards may be necessary at corners to preclude encroachment by vehicles onto sidewalks.

CURB EXTENSIONS

Curb extensions are discussed on page B.23.

PEDESTRIAN REFUGES

Pedestrian refuges are discussed on page B.23.

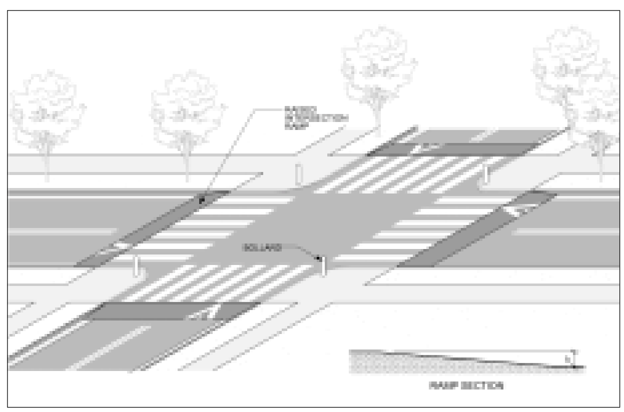


Figure 23: A raised intersection encourages slow movements through an intersection with high pedestrian volumes on all crosswalk legs.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

G. OFF-STREET PEDESTRIAN CONNECTORS

Unlike sidewalks, off-street connectors are pedestrian facilities that are independent of the street network, as shown in Figure 24. Typically short-distance, off-street connectors provide direct access to a destination, or linkage between conventional sidewalks, which would otherwise require an out-of-direction street-based route.

When an off-street connector is intended for pedestrian use only, the pavement width is recommended to be five feet or greater. If the connector is intended to accommodate bicycles and other non-motorized modes of travel, it is recommended that the minimum pavement width is ten feet, and that the connector otherwise complies with the design guidelines for greenways.

Off-street connectors can allow pedestrians a more direct route than the street network.

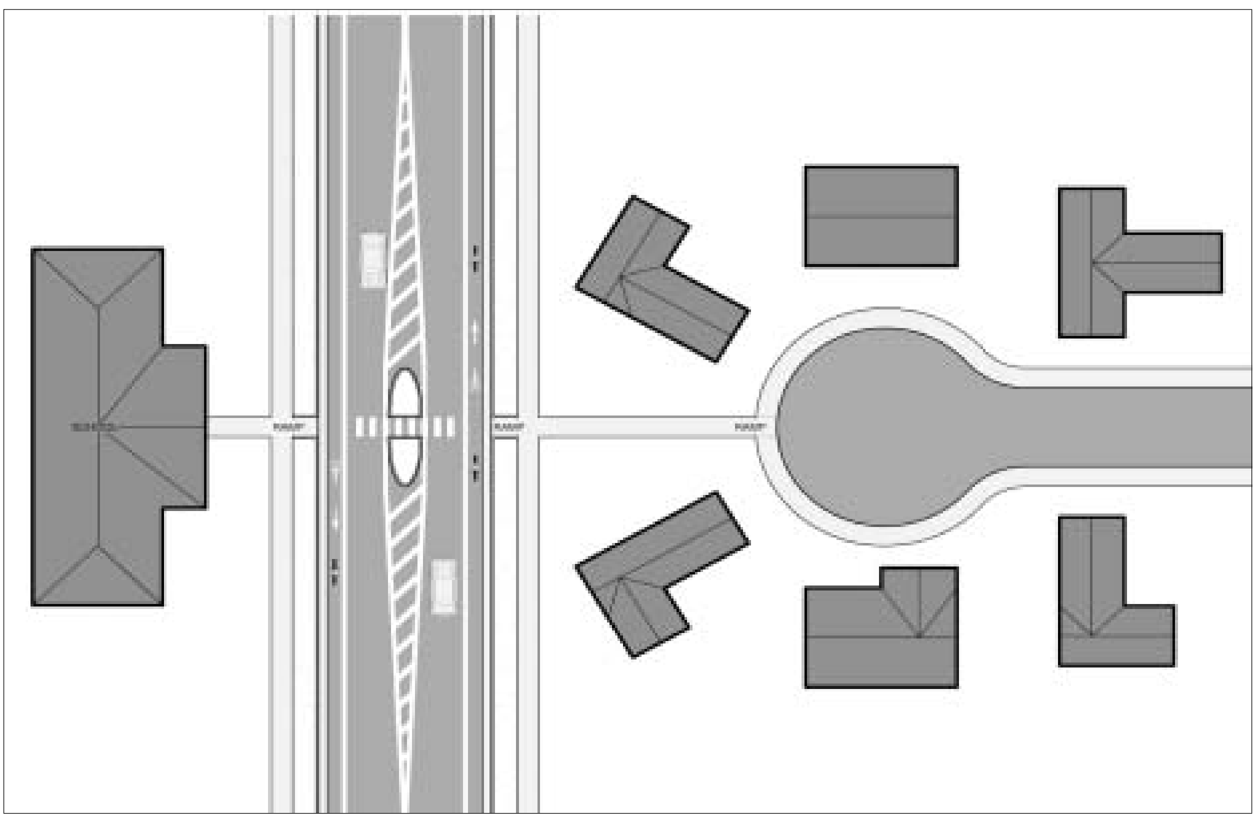


Figure 24: An off-street pedestrian connector can provide a more direct route to a destination, or between pedestrian facilities, than the street network can.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

H. RURAL PEDESTRIAN FACILITIES

Metro roadway design standards mandate that all new roads be built with an urban-style cross-section that includes curbs, gutters and conventional sidewalks. Conventional sidewalk standards are also applied to widening projects on existing roads.

Many existing roads, however, have rural-style cross-sections without curbs and gutters, and are not slated for retrofit with them as part of any larger widening project. When such streets are located in an area with medium or high-density, residential or in a mixed-use or commercial area, sidewalk retrofit projects are recommended to incorporate curbs and gutters.

In some low-density areas, however, it may be appropriate to deviate from the standard guidelines in order to provide any pedestrian facilities at all, or to ensure that the design of the facilities are compatible with the rural context. In such areas, distances between destinations may be high and pedestrian demand may be fairly low. However, major community destinations, such as a school, school bus stop, scenic road, or regional nature park may create enough demand to warrant a pedestrian facility.

Although the traffic volume may be low on a rural roadway, traffic speeds are often quite high. Side paths and shoulders are two types of rural facilities that can increase pedestrian safety and comfort by providing space outside of the vehicular travelway for walking.

SIDE PATHS

A typical rural roadway can accommodate pedestrians with a side path. A buffer area of at least five feet is recommended to separate a side path from the road shoulder. This buffer area often contains a ditch or swale on either side of the roadway to accommodate stormwater. A path located on the far side of the swale provides a comfortable buffer between pedestrians and traffic.

A side path, which may have a surface that is either hard or soft, as long as it meets ADA standards, provides a high-quality pedestrian facility on rural roads.

At all intersections and at other points where pedestrian crossings are needed, it is recommended that culverts provide passage over swales. It is also recommended that other appropriate roadway crossing facilities are incorporated into the facility.

Paths may be attractive to bicyclists and other non-pedestrians, which can create user conflicts. If it is desirable for the path to function as a multi-use facility, it is recommended to be ten feet wide and otherwise meet the bicycle design guidelines for greenways.

SHOULDERS

Although they are the least preferred of pedestrian facilities types, paved shoulders do provide a walking area that is separate from moving traffic, as shown in Figure 25. In areas with very low development density, where right-of-way width precludes standard sidewalks or paths, paved shoulders can meet the needs of both pedestrians and cyclists. Shoulders intended for use as pedestrian facilities are recommended to be at least five feet wide, but otherwise meet all the standards for shouldered bike lanes as outlined in the bicycle design guidelines.

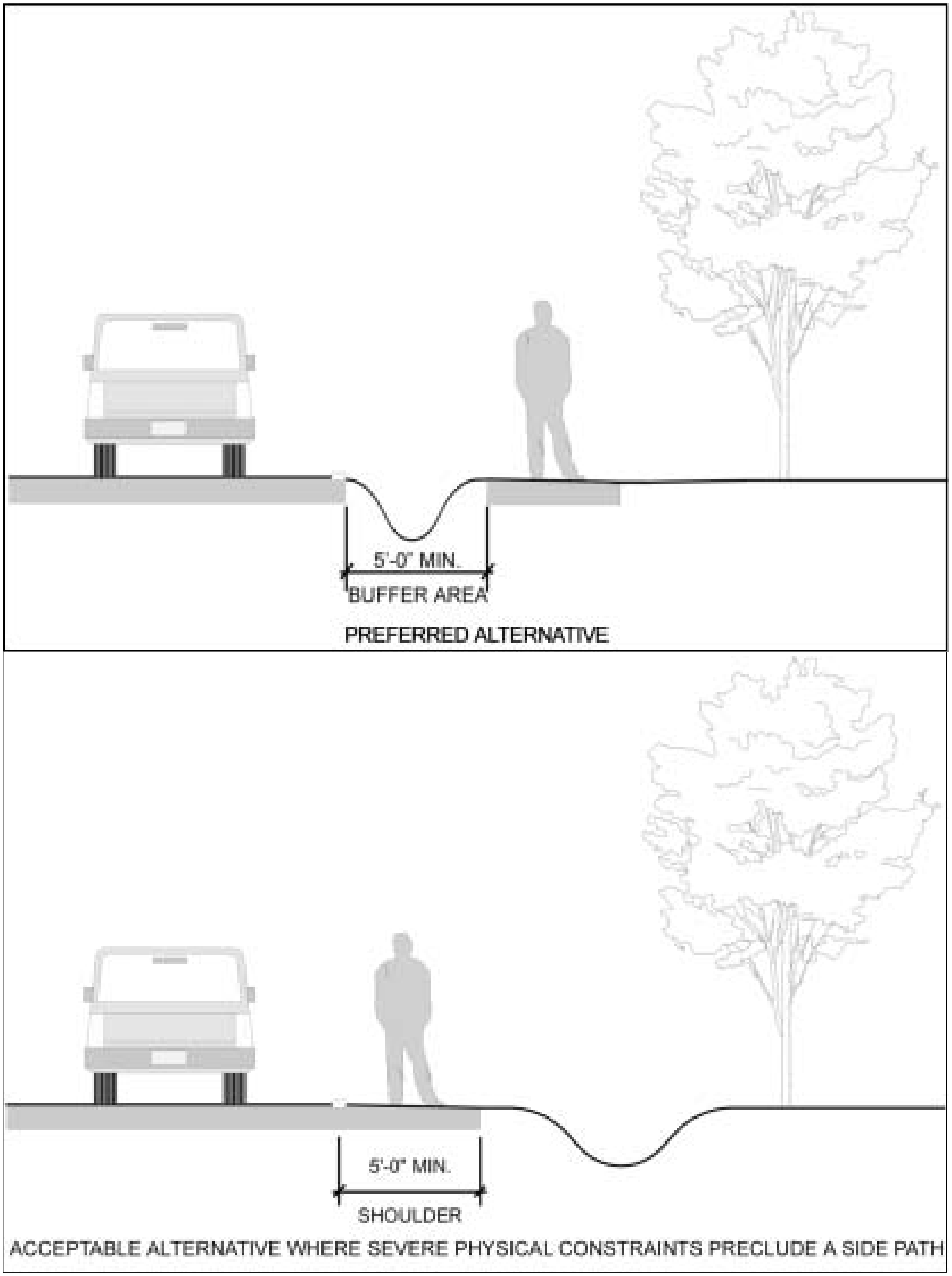


Figure 25: The preferred alternative, as shown in the top figure, is a five-foot minimum buffer area that may include a ditch and will provide enough space for a side path. Where severe physical constraints preclude a side path on rural roads, a paved, five-foot shoulder, shown in the bottom figure, can provide space for walking outside of the travelway for motor vehicles, and doubles as a bicycle facility.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

I. OTHER PEDESTRIAN DESIGN GUIDELINES

CONSTRUCTION ZONES

Construction zones can be challenging to all roadway users. Motorists, bicyclists and pedestrians, alike, may be distracted by changing or unfamiliar traffic configurations and roadside activity, and the design of temporary facilities may be less accommodating than those normally encountered. Pedestrians are particularly vulnerable when adequate accommodations are not provided. Furthermore, providing alternative circulation paths is recommended whenever an existing pedestrian route is blocked by construction or other temporary conditions.

Except in very low-density areas, it is recommended that the presence of pedestrians should be assumed at construction sites and safely accommodated, even on streets where no sidewalks exist. It is recommended that sidewalks and other pedestrian ways not be used as construction staging areas unless alternate pedestrian routes are provided.

The following characteristics are recommended for temporary pedestrian accommodations through construction zones:

- Direct & convenient: The pedestrian path of travel follows, as nearly as possible, the path of travel prior to the construction project. A detour route that requires pedestrians to walk significantly out of direction should be avoided since it may be bypassed in favor of a more convenient, less safe direct route.
- Obvious: The pedestrian path of travel is clearly delineated and evident through location, design, and signage.
- Safest option: A detour that routes pedestrians across a street and back, for the convenience of construction, introduces a range of new safety conflicts for pedestrians. A pedestrian who perceives that the accommodations are not safe, may be inclined to select a different route.
- Forewarning: When re-routing pedestrians to the opposite side of a street is unavoidable, signage is located at the nearest crosswalks to indicate that crossing is necessary. If pedestrians are forced to backtrack from notification signage to a safe crosswalk, they will tend to skirt the construction site or to try a mid-block crossing outside of a crosswalk. In some instances, a temporary marked crosswalk may be warranted.

Construction projects should include temporary facilities to accommodate pedestrians.

- Separate: Pedestrian facilities are separate from vehicular facilities, work site vehicles, equipment, and operations. When pedestrians and these other functions are located so as to be in closer than normal proximity, a physical barrier may be necessary. The pedestrian path of travel is routed to minimize construction vehicle crossings.
- Coordinated with signals: Where traffic signals are present, they are set to take into consideration pedestrian crossing needs. Existing pedestrian signal heads are adjusted or relocated as necessary during construction. In some instances, installation of a temporary pedestrian signal may be necessary to ensure safe crossing.

LIGHTING

Good lighting helps ensure that walking at night does not involve significantly greater safety risks than daytime walking. Street lighting should improve the visibility of pedestrians to motorists, as well as the overall security and comfort of pedestrians. Lighting is especially important at intersections and other pedestrian crossing areas. In shopping districts or other areas with high concentrations of pedestrians, it is recommended that continuous pedestrian-scaled street lights are spaced to provide a uniform level of light.

Pedestrian-scale lighting increases safety and visibility for all right-of-way users, and enhances the streetscape.

Retrofit Considerations

As sidewalks are constructed, it is recommended that intersections are evaluated for adequacy of light at corners and in crosswalks. Where necessary, installation of new or additional lighting is recommended to ensure pedestrian visibility.

TRANSIT STOPS

Transit and walking are interdependent. Since virtually every transit trip includes walking, good pedestrian facilities are essential to the viability of transit. A bus stop should be a safe, dignified, and comfortable place to wait, and provide seating, shelter from rain, shade, separation from traffic, and good lighting. Other desirable features include trash receptacles and bike racks.

Bus stops are recommended to be located in highly visible locations at convenient and logical intervals. In general, it is recommended that bus stops are placed at the far side of an intersection, which encourages pedestrians to cross behind the bus and improves their visibility to oncoming vehicles, as shown in Figure 26. Bus stops at the far side of the intersection can provide better stopping points after buses have made a left turn at an intersection, and can ease merging back into traffic because of breaks in traffic provided by traffic signals. Also, far side stops are preferred where dedicated right turn lanes exist. A bus stop located at the near side of an intersection places the bus in a position that blocks the sight lines between pedestrians and approaching motorists. Pedestrians must step from in front of the bus into the next travel lane.

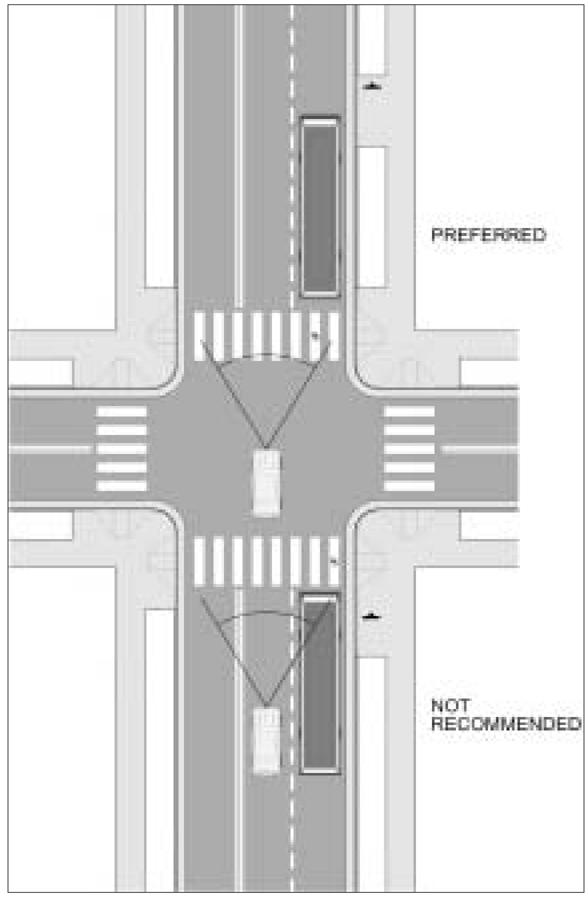


Figure 26: It is typically safer for a transit stop to be located on the far side of an intersection, as shown in the upper illustration, rather than the near side of an intersection, as shown in the lower illustration.

The Furnishings Zone between sidewalks and curbs is recommended to be paved at bus stops to improve access between the sidewalk and the stopped bus. Paved waiting areas are recommended to consist of a minimum six feet wide by twelve feet wide concrete pad in the Frontage Zone, and an eight feet wide by 25 feet wide pad in the Furnishings Zone.[1]

Bus stop facilities can be placed in the Furnishings Zone or Frontage Zone rather than the Pedestrian Travelway.

Retrofit Considerations

Roadway improvement projects are recommended to identify bus stop locations and ensure that sufficient right-of-way is acquired for, and that sidewalk design incorporates, bus stop considerations.

[1] http://www.pacebus.com/content/documents/devguidelines/waitarea.htm

It is recommended that benches, shelters and other bus stop furnishing not encroach into the Pedestrian Travelway area of the Sidewalk Corridor. All such features can be located in either the Furnishings Zone or the Frontage Zone. Although a bus bench is not a fixed obstruction and does not technically conflict with ADA requirements, in practice, a poorly located bench can make a sidewalk impassable and should be considered in the same manner as fixed obstructions.

On constrained streets, it is recommended that additional right-of-way or long-term easements be acquired to meet ADA and accommodate bus stop furnishings.

Appendix J of this plan includes additional policy and planning recommendations regarding transit stops.

APPENDIX B: PEDESTRIAN FACILITIES DESIGN GUIDELINES

J. EMERGING PRACTICES & INNOVATIONS

The passage of the Intermodal Surface Transportation Enhancements Act in 1991, ADA, and the emergence of New Urbanism are examples of influential trends in land use and transportation planning that have recognized the pedestrian as a fundamental component of a successful, safe, and vibrant community.

This document addresses planning and engineering considerations for a range of broadly applicable pedestrian design features. The recommendations reflect common practices throughout the United States and elsewhere.

There are other innovative designs, evolving practices, and new technology that may offer additional solutions to specific pedestrian issues.

Adoption of these design guidelines should not preclude the application of innovative or unique design approaches that offer enhanced pedestrian safety, comfort or convenience.

APPENDIX C:
BICYCLE FACILITIES DESIGN GUIDELINES

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APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

A. INTRODUCTION

The bicycle facilities design guidelines intend to help integrate consistent bicycle facilities in Nashville and Davidson County.

The guidelines in this document are based primarily on the national guidelines established by the American Association of State & Highway Transportation Officials (AASHTO) in their 1999 *Guide for the Development of Bicycle Facilities*. The guidelines are also consistent with the 2001 Manual on Uniform Traffic Control Devices (MUTCD).

While the two nationally-recognized manuals provide a foundation, this document provides additional guidance on issues that are not addressed, or not addressed in depth, in those publications. Existing guidelines from other cities and states, along with other documents, were also considered. Furthermore, the guidelines have been developed in response to the specific needs, objectives, and circumstances of Nashville & Davidson County.

The Pedestrian Facilities Design Guidelines and the Bicycle Facilities Design Guidelines, which are in Appendices B and C, respectively of the Strategic Plan for Sidewalks & Bikeways report, were developed to function as stand-alone sections. Therefore, certain information and recommendations that apply to both pedestrian and bicycle facilities are repeated in the Design Guidelines.

PURPOSE OF THE DESIGN GUIDELINES

The design practices and standards outlined in this document are intended to provide guidance to engineers, planners, designers, and others in integrating bicycle accommodations into the various projects that have the potential to affect bicycle travel in Davidson County.

Application of these design guidelines will ensure consistency in facility design. Consistency not only provides cyclists with an assurance of the type and quality of bikeways that they will encounter, it encourages both cyclists and drivers to operate predictably with each other on public rights-of-way. Consistency and predictability encourage bicycle use, and are cornerstones of a safe multi-modal transportation infrastructure.

While comprehensive, the guidelines cannot cover every design issue that may be encountered. Where such issues are not covered, appropriate engineering principles and judgment must be applied in providing for the safety and convenience of bicyclists, pedestrians and motorists. Facility designers should also take into consideration the human and environmental factors that contribute, to or detract from, bicycling comfort and safety.

RELATED PLANNING ISSUES

<u>LAND USE</u>

Like walking, the convenience of bicycling for travel is often determined by the pattern in which land is developed. Given the proper facilities, most people are willing to walk about one-half mile for commute trips, and one-quarter mile for other types of trips. These distances have become benchmark planning principles for those designing walkable communities. In fifteen minutes, most cyclists can cover about two miles, making bicycles an even more versatile mode of travel.

Some land use patterns that encourage both bicycling and walking include:

- Development densities that allow people to live close to destinations such as schools and stores.
- Mixed-use zoning that allows commercial and residential land uses in the same area, along with standards that ensure compatible building design.
- Locating building fronts close to the street, which can slow traffic and offers easier bicycle access.

Some common land development practices that discourage bicycle and pedestrian travel include:

- Segregated land uses that create long distances between destinations.
- Commercial properties set far back from the street with large parking lots in between. Such sites also typically include access and parking facilities for automobiles only.
- Large lots in residential areas that create greater distance between home and other destinations.

The top example in Figure 1 illustrates a land use pattern that encourages various types of travel. As shown, the mixed-use development within the grid pattern, and the proximity to residential areas promotes walking or biking to various destinations. The illustration at bottom shows how segregated developments discourage walking and bicycling to these destinations because of the distances from homes and between the destinations themselves.

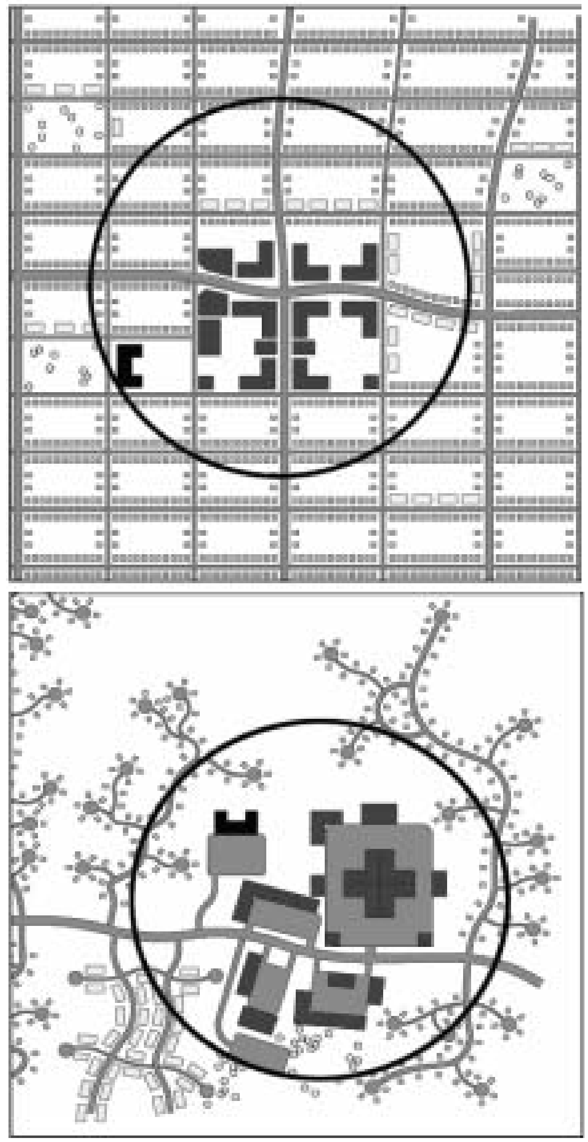


Figure 1: The illustration at top shows a half-mile radius around the commercial center of a densely developed, mixed-use area with grid network of streets. This development pattern encourages walking and bicycling. The illustration at bottom shows a low-density, segregated development pattern, which discourages pedestrian and bicycle travel.

<u>ROADWAY NETWORK</u>

In the decades following World War II, roadway network planning practices shifted from traditional urban patterns to more strictly hierarchical, non-grid road systems with cul de sacs and other such features. This approach tends to concentrate traffic on collector and arterial streets, can result in single points of access to many destinations, and often requires significant out-of-direction travel. While indirect travel routes aren't always a major deterrent to drivers, they can result in added travel time and inconvenience for cyclists.

An interconnected grid of streets offers many routes and points of access to destinations for cyclists, pedestrians and motorists. When retrofitting a non-grid network, off-street connector trails can sometimes provide the directness of route – to schools, shopping, or other destinations – that the street system doesn't offer. For example, providing a connector trail from the end of a neighborhood cul de sac to a library can decrease parking demands at the library and reduce the vehicular load on nearby roadways.

ACCESS MANAGEMENT

Urban collectors and arterials with commercial frontage are attractive to both bicyclists and drivers because they usually provide the best access to destinations, and the most direct routes through a community. Although traffic speeds and volumes on such roadways can discourage cyclists, it is at the intersections and driveways where accidents are most likely to occur. As shown in Figure 2, unlimited access creates many conflicts between cars entering or leaving the roadway, and cyclists riding along the roadway.

Limiting or consolidating driveways, and using other access management design tools such as curbed medians benefits both cyclists and drivers. Advantages include:

- The number of conflict points is reduced
- Vehicles are redirected to intersections with appropriate traffic control devices
- Improved traffic flow can reduce the need for road widening, perhaps allowing part of the right-of-way to be reclaimed for bicycle facilities

Access management design also needs to consider the potential for negative impacts on both cyclists and pedestrians. For example, pedestrian crossing opportunities should not be reduced, and redirecting motor vehicle traffic should not significantly increase out-of-direction travel for pedestrians and cyclists.

ROADWAY DESIGN STANDARDS

The roadway design standards adopted by the Metropolitan Government of Nashville & Davidson County need to include cross-sections that incorporate the bicycle facilities recommended in this plan.

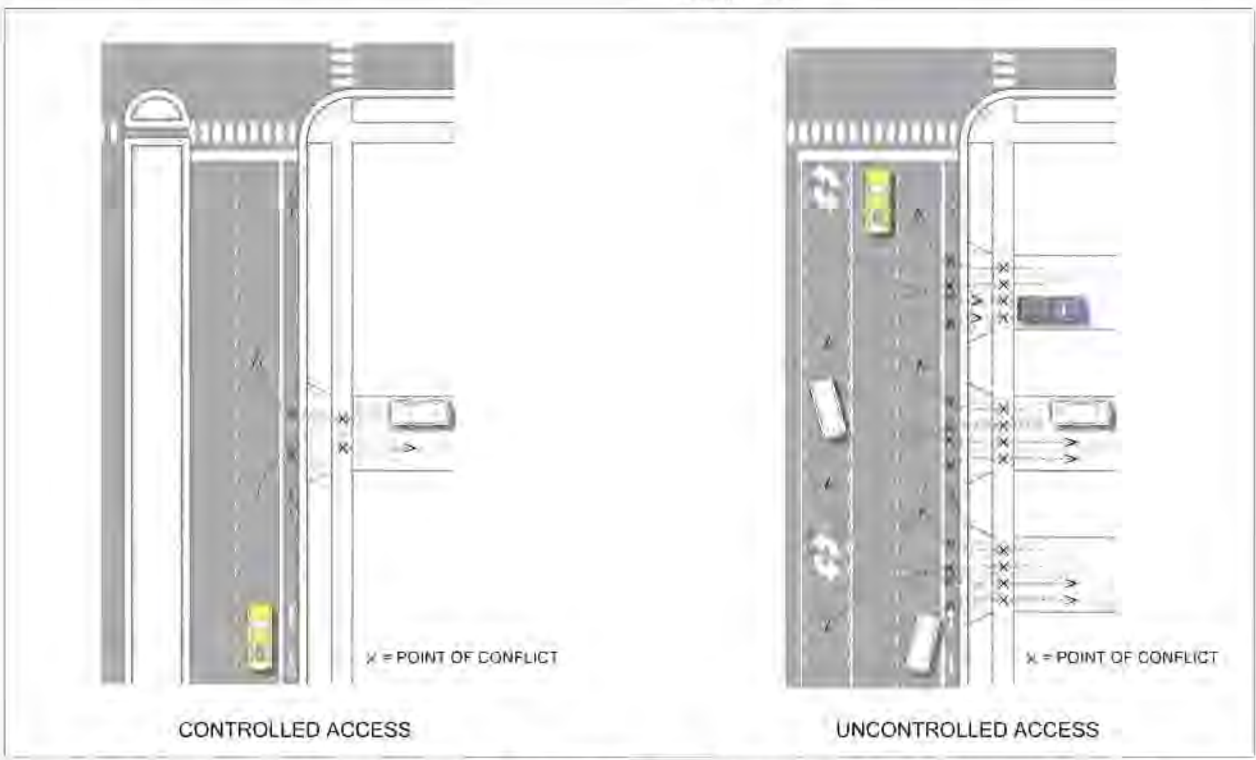
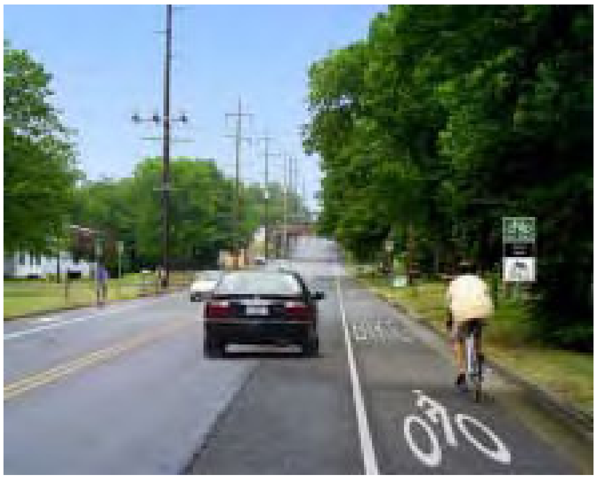


Figure 2: Access management reduces the number of conflict points between motorists, bicyclists, and pedestrians.

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

B. BICYCLE FACILITY TYPES



Bicycle lanes are one-way facilities, separated from the travel lane by striping, and are identified by pavement markings and signage.

BICYCLE LANES

DEFINITION & APPLICATION
A bicycle lane is a portion of the roadway separated from conventional travel lanes with a stripe, and designated for exclusive or preferential use by bicyclists. They are one-way facilities placed on both sides of a street in order to carry bicyclists in the same direction as motor-vehicle traffic. Bike lanes also help to increase the total capacity of roadways by segregating users, and are the preferred facility for most urban arterials and collectors. In addition to lane striping, pavement markings and signage identify bike lanes.

Shouldered bike lanes also fall into the bike lane category. These are paved shoulders separated from travel lanes with a lane stripe, and are typically found on rural-style roadways without curbs and gutters. Bicycle-related pavement markings are not typically used on shouldered bikeways, since the shoulders can also be used as an emergency lane for vehicles.

Where exclusive bus lanes exist, and pavement width precludes the striping of separate bike lanes, shared bus/bicycle lanes are a third bike lane type that can increase bicycle safety and comfort.

WIDTH (See Figure 3)
A bicycle lane or shoulder bikeway is recommended to be four to six feet wide, measured from the face of the curb or the edge of pavement.

When a gutter pan is present, the bike lane is recommended to be no less than four feet wide, measured from the gutter pan seam.

When on-street parking or guardrails are present, a bike lane or shoulder is recommended to be no less than five feet wide.

Bike lanes and shoulders are also recommended to be wider than the four-foot minimum when the following circumstances are present:

- When conventional travel lanes are less than ten feet wide
- When motor vehicle traffic speeds are in excess of 35 MPH
- When motor vehicle volumes are greater than 5,000 vehicles per day
- When high truck volumes are present
- When there are steep grades

SHOULDER BIKEWAYS
On streets without curbs, paved roadway shoulders provide space for bicyclists to travel separate from motor vehicle traffic. Shoulders also benefit motorists by offering improved sight distances and highway capacity, along with an area that can be used during breakdowns. Because they perform multiple functions, shoulders are not typically marked for the exclusive use of cyclists. If bicycle volumes are high, however, it may be desirable to mark and sign shoulder bikeways as bike lanes.

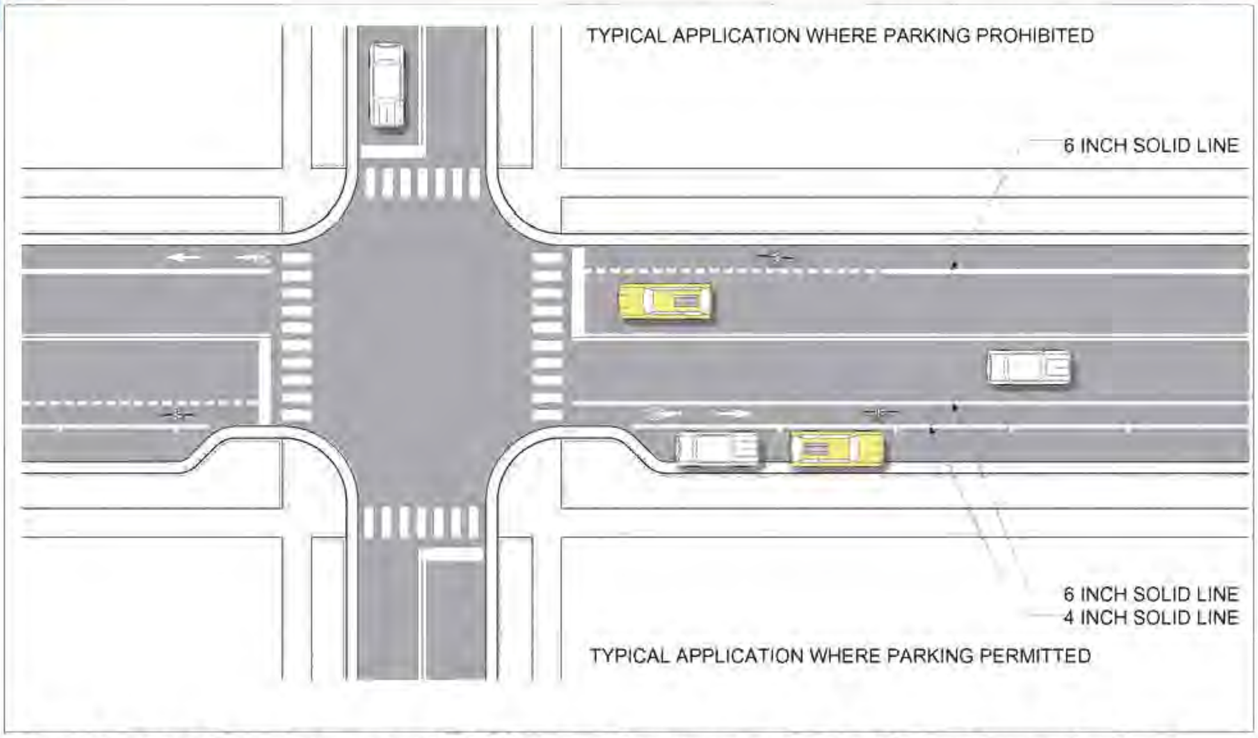


Figure 3: This figure shows typical bike lane details on streets with parking and without parking. Note that the curb extensions at the intersection do not extend into bike lanes.

<u>BUS/BIKE LANES</u> (See Figure 4)
Where exclusive bus lanes exist, and pavement width precludes the striping of separate bike lanes, shared bus/bike lanes reduce conflicts with cars and increases cyclist comfort. Care must be taken to ensure the appropriateness of this type of facility; bus/bike lanes with very high bus volumes can create significant conflicts with bikes.

<u>Application Principles & Design Considerations</u>

- Where pavement width permits, a five-foot bike lane is recommended between the bus lane and other travel lanes. This placement eliminates the weave-and-merge conflicts common to a bus/bike lane. Buses will be passing bicycles on the right, but fewer merging and turning movements will reduce overall conflicts.
- If pavement width is limited, it may be appropriate to re-evaluate the value of the dedicated bus lane. If bus service is infrequent and level of service can be reasonably maintained using conventional travel lanes, it may be advantageous to eliminate the bus lane and use that pavement width to restripe with bike lanes.

Shared bus/bike lanes, like this one in Philadelphia, can be a good alternative when there is not enough pavement width for separate bus and bike lanes.

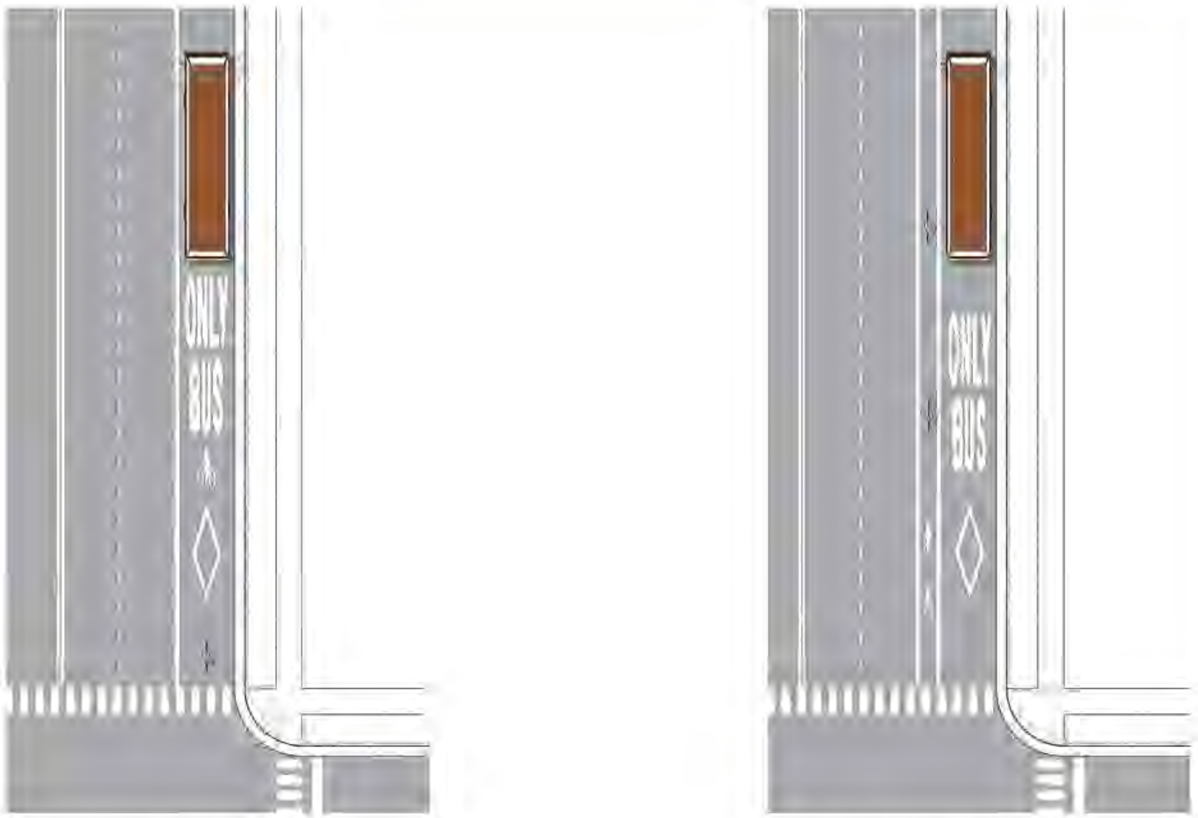


Figure 4: The diagram at the left shows a combined bus/bike lane. The diagram at the right shows a street with both a bike lane and a bus lane.

- If pavement width is limited and the dedicated bus lane is warranted, a shared bus/bike lane may be an acceptable solution, particularly where bus traffic volume is light or express. Such lanes are recommended to be 14 feet wide.
- In addition to roadway signage, signs directed at bicyclists may also be placed on the back of buses to reinforce the "pass on left" rule. Special care should be taken to educate bus drivers and cyclists as to the proper shared use of the lane (for example, an emphasis on the importance of the bus driver using turn signals when approaching or leaving a stop).

OTHER CONSIDERATIONS

Bicycle lanes need to be separated from other travel lanes with a six-inch, single solid white line.

When on-street parking is present and a bike lane is recommended, the bike lane should always be placed between the parking lane and conventional travel lane; never between the curb and parking lane.

Bike lane widths exceeding six feet are generally not recommended, since they can be used for parking or conventional travel lanes.

On one-way streets, bike lanes are recommended for the right side of the roadway. It may be appropriate to consider locating the bike lane on the left side of the street when doing so offers significantly fewer conflicts - such as those caused by multiple intersections or dual right turn lanes.

Shared roadways consist of a combined travel lane for motorists and bicyclists.

SHARED ROADWAYS

DEFINITION & APPLICATION

On a shared roadway, bicyclists and motorists share the same travel lanes. Except in cases where wide outside lanes are provided, motorists will typically have to weave into the adjacent lane in order to safely pass a bicyclist. There are several design variations on shared roadways:

WIDE OUTSIDE LANES (WOLs)

On major collector and arterial streets, where physical constraints preclude bike lanes, wide outside lanes are the preferred alternative. WOLs are recommended to be 14 feet wide, excluding the gutter pan. If more than 14 feet is available, bike lanes should be considered.

Where on-street parking is present, it is recommended that parking spaces be marked to encourage cars to park close to the curb.

Because they provide less operating space than bike lanes, and are not designated for exclusive bicycle use, some cyclists will be uncomfortable using WOLs. However, WOLs allow most motor vehicles to pass bicyclists without weaving into the adjacent lane, and provide a greater degree of comfort to cyclists than a typical 11 foot or 12 foot lane.

LOCAL STREETS

Local streets should be able to safely accommodate bicyclists without any special treatment. Where operating speeds are up to 25 MPH, and traffic volume is not greater than 3,000 vehicles per day, most bicyclists can comfortably share the roadway with motor vehicles.

Many local streets, however, carry more traffic at greater speeds than is intended or desired. Such streets may be good candidates for bike lanes if adequate width is available.

SIGNED SHARED ROADWAYS (SSRs)

SSRs are streets that have been identified as desirable routes for bicycle travel but which do not provide additional roadway width for bicyclists. Typically, such roadways are physically constrained and adding additional width is not feasible. However, all other conditions on such roadways must maximize optimal conditions for bicyclists.

In general, bike lanes and WOLs are preferable to SSRs. However, SSRs may be the only option on corridors with constrained roadway widths. SSRs may be applied on corridors with high bicycle demand or connectivity between destinations, where bike lanes or WOLs cannot be accommodated. SSRs may be the best solution for a roadway segment between two bike lane or WOL segments, or as a temporary facility until bike lanes or WOLs can be incorporated.

Design Guidelines

It is recommended that the outside lanes on SSRs are striped to be as wide as possible, reallocating width from other lanes where possible, and when reallocating width will not negatively impact traffic flow.

Traffic signals are recommended to comply with the guidelines outlined in the Signal Timing and Detection section.

Cyclists on SSRs will be traveling on roads with less than desirable lane widths, while sharing the road with motor vehicles. To maximize safety on SSRs, other roadway features need to be as bike friendly as possible. Storm grates, railroad crossings, pavement surface quality, bridges, and other features are recommended to comply with the guidelines outlined in Section D, Special Conditions & Other Considerations.

The posted travel speed is not recommended to be greater than 35 MPH.

Unless the SSR is a short segment on an otherwise continuous bike lane or WOL facility, signage on SSRs is generally recommended to be limited to “Share the Road” signs.

Greenways are primarily recreational facilities designed to accommodate bicycling, walking, running or in-line skating.

MULTI-USE TRAILS (GREENWAYS)

DEFINITION & APPLICATION

Off-street trails are more popularly known as greenways. Greenways do not allow motor vehicle traffic but do permit a range of non-motorized travel, including bicycling, walking, running and in-line skating. Although typically built in an independent right-of-way, park or easement, greenways are sometimes also located within road right-of-ways, separated from motor vehicle traffic by open space or a structural barrier.

Greenways primarily attract recreational users, but because they typically wind through a community and connect destinations, they also offer an excellent opportunity to function as non-motorized transportation routes. In fact, they can sometimes offer a more direct route to destinations than the roadway network. For children, or any cyclist uncomfortable with sharing the roads with cars, trails may be the preferred facility. Greenways are also an excellent training ground for building the skills to ride on the road.

Greenways should not be provided in lieu of a street-based bikeway network. Transportation cyclists desire the same directness of route and access that drivers do, which requires the use of streets. Therefore, a community-wide bicycle infrastructure needs to provide both on and off-street facilities.

One of the factors in prioritizing greenway development projects should be whether or not the project has the potential to perform a transportation function, in addition to recreation and other objectives. Greenways intended to perform a transportation function should be designed to maximize connectivity and access to destinations.

Another appropriate application of the design guidelines for paths is for an overland bicycle connector, as shown in Figure 5. A bicycle connector is short distance, off-street, and provides direct access to a destination, or linkage between on-street bikeways, which would otherwise require an out-of-direction street-based route.

GENERAL DESIGN PRINCIPLES

Design practices that encourage the use of trails for bicycle transportation include:

- Providing frequent access points from the street network. This practice minimizes out-of-direction travel to enter or exit the trail.
- Directional signs that direct users to and from the trail.
- Minimal at-grade roadway crossings.
- Terminating the trail at points with safe access from the street system, such as at a controlled intersection or at the end of a dead-end street.
- Terminating the trail at streets that include on-street bicycle facilities.

Because trails accommodate pedestrians as well as bicyclists, they must meet all ADA design standards.

One-way trails tend to be used as two-way facilities, particularly by pedestrians, and are not recommended.

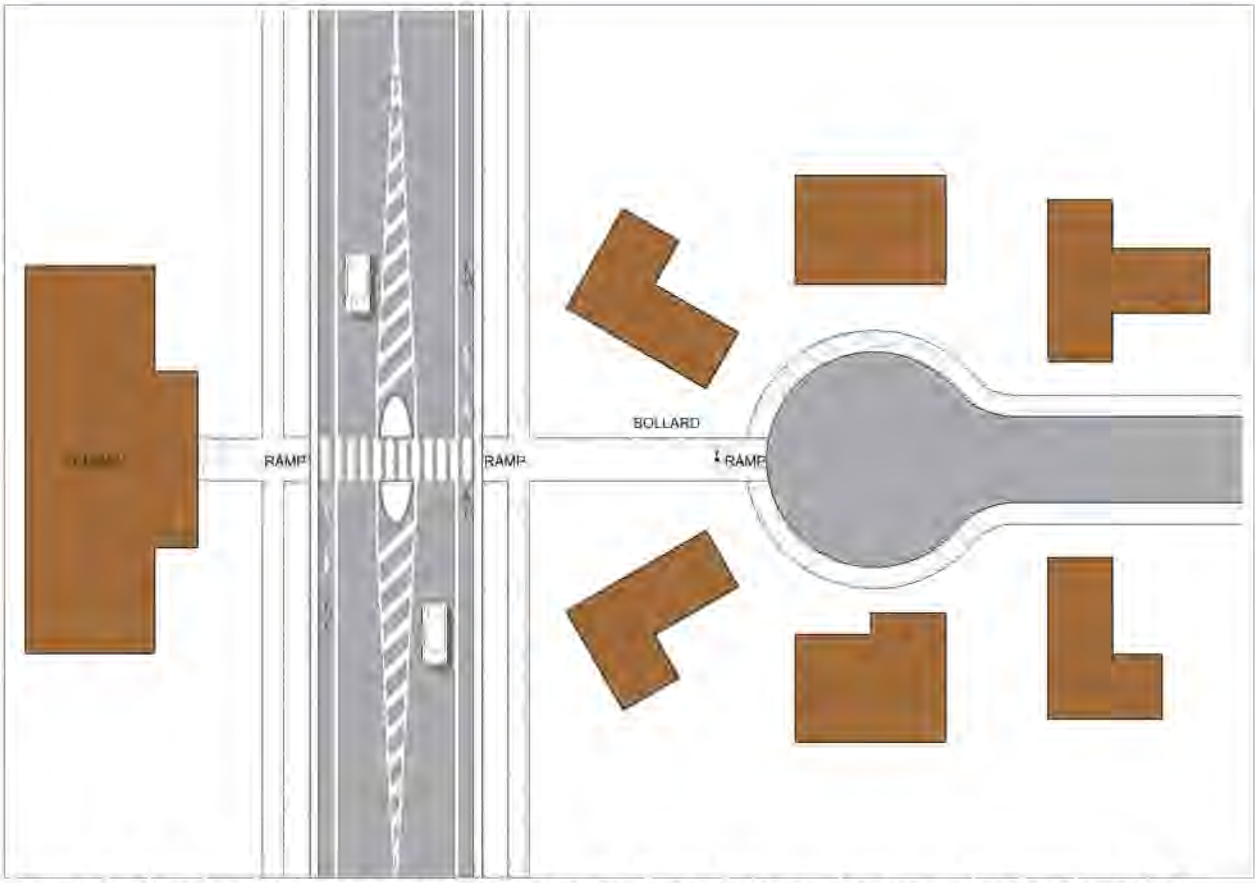


Figure 5: Overland connector trails can create direct linkages between destinations that would otherwise require out-of-direction travel on streets.

Trails Parallel to Roadways

Trails immediately adjacent to roadways have the potential to create numerous conflicts. They can create a situation in which bicyclists are traveling against the flow of nearby traffic, which is contrary to the rules of the road. This problem is exacerbated at driveways, where exiting drivers are often only looking in one direction for on-coming traffic. Furthermore, the presence of a parallel trail tends to create an expectation among drivers that all bicyclists should use the trail instead of the street. This can create problems for transportation cyclists, who often prefer the connectivity and access the street provides and will continue to use a street even where a parallel trail exists.

However, a greenway parallel to a roadway can be an appropriate design approach under the following conditions:

- The adjacent road has traffic speeds and volumes that are incompatible with bicycle use.
- The trail connects at one or both ends to other trails outside the road right-of-way, or to high quality on-street bike/pedestrian facilities.
- The trail will be at least five feet from the edge of roadway pavement or include a structural barrier between the trail and road.
- Cross-streets and driveways are few, and grade separated crossings are maximized.

The presence of a trail should not be used to justify the exclusion of bicycle facilities on, or to restrict bicycle use of, the adjacent roadway.

DESIGN GUIDELINES (See Figure 6)

Width & Clearance

Width
Ten feet is the standard pavement width for a two-way multi-use trail. Increasing the trail width to twelve feet where high use is anticipated, such as dense urban areas, is recommended. Eight-foot wide trails are not recommended except in circumstances with severe physical constraints and where existing and long-term use are expected to be low.

Lateral Clearance
Stable, two-foot shoulders with a cross-slope of no greater than 1:6 are recommended for all trails. Physical barriers and trees should not encroach into the shoulder area.

Overhead Clearance
Although eight feet is adequate clearance from overhead obstructions for bicyclists, ten-foot clearance is usually necessary in order to accommodate maintenance and emergency vehicles.

Design Speed, Slopes, & Radii

Design Speed
AASHTO recommends a design speed of 20 MPH for trails, which is the speed at which some faster cyclists may be riding. However, it is important to remember that trails are used by bicyclists with very different skill levels, as well as by pedestrians and other slower users. In addition, most greenway projects include objectives such as preserving the natural terrain and landscape features. Accordingly, it is not recommended to design trails with the intent of maximizing speed.

Running & Cross Slopes
The federal Architectural & Transportation Barriers Compliance Board's 1999 *Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas* includes recommended ADA standards for trails.

The document recommends the following:

- The maximum running slope of trails should be 1:20
- Slopes of up to 1:12 should be permitted for distances up to 200 feet, 1:10 for up to thirty feet, and 1:8 for up to ten feet.
- The cross slope of a trail should not exceed 1:20.

To help bicyclists maintain balance, trails are recommended to be banked low, up to 1:20, on the inside of a curve.

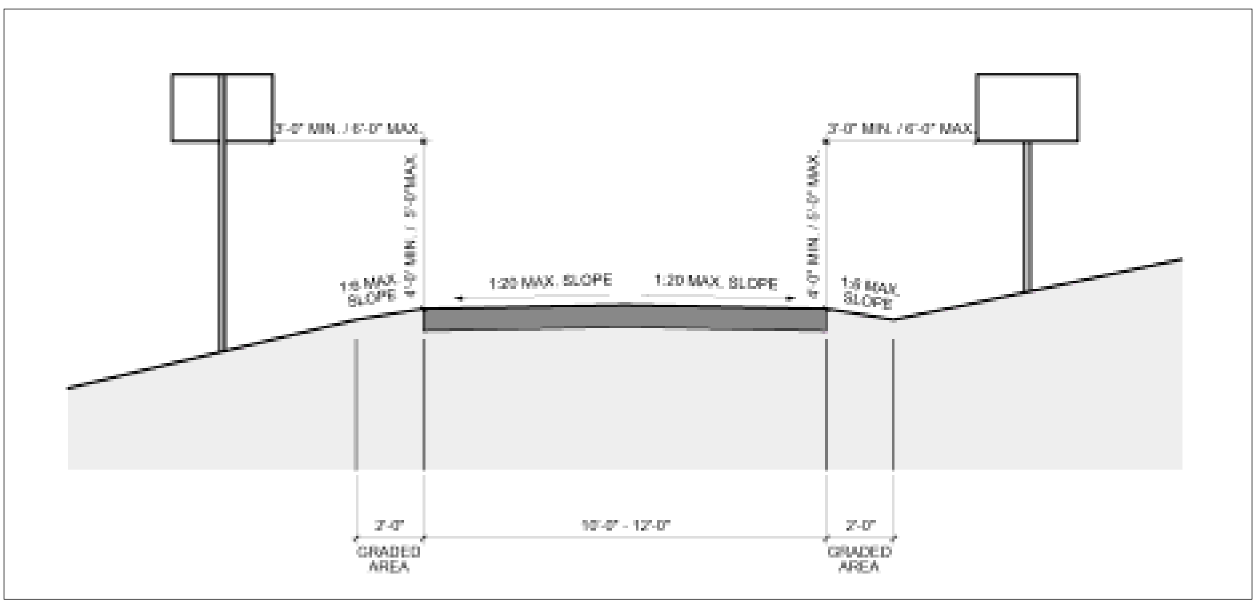


Figure 6: The recommended clearance and slope standards for trails are illustrated above.

Curve Radii
At 20 MPH, the minimum recommended radius on curves is one hundred feet, along with adequate stopping sight distances. The protection of the natural terrain or critical trees may warrant a tighter radius. When this occurs, warning signs or supplemental pavement markings can alert trail users to approaching conditions. Trail widening at a sharp curve can also improve safety.

Trail/Roadway Intersections

Grade Separated Crossings
Grade separated trail/street crossings are recommended wherever possible on a greenway, since most users expect continuous separation from motor vehicle traffic. At-grade crossings introduce conflicts between cars and bicycles, especially at high-speed, high volume points such as freeway interchanges. Grade separated crossings should not require bicyclists to travel significant distances out-of-direction, and should not require a steep or winding climb.

At-Grade Crossings
When a grade separated crossing cannot be provided, the best at-grade crossing has either light traffic, or is at a controlled intersection. It is recommended that all crossings include appropriate pavement markings and signage. For intersections with signal controls and signal loop detectors for motor vehicles, bicycle detectors are also recommended to be placed in the trail.

At intersections or at mid-block crossings on wide streets, a curbed center median is recommended, as shown in Figure 7. The median will allow trail users to cross half of the lanes and wait safely in the median refuge before crossing the second half of the roadway. A median that is at least six feet wide is recommended to provide clearance for the length of a bicycle; a ten-foot wide median will accommodate a bicycle with a trailer, or groups of bicyclists.

Railings, Fences, & Barriers
Barrier treatments such as fences or railings are sometimes needed to provide separation between a trail and a hazard - such as a steep slope, or to restrict trail user access - such as to a high-speed freeway. As shown in Figure 8, barriers can be as low as 42 inches in height. Where a cyclist's handlebars may come into contact with a nearby barrier, such as a bridge railing, a smooth rub rail is recommended at a height of 36 inches. Openings in a barrier are not recommended to exceed six inches.

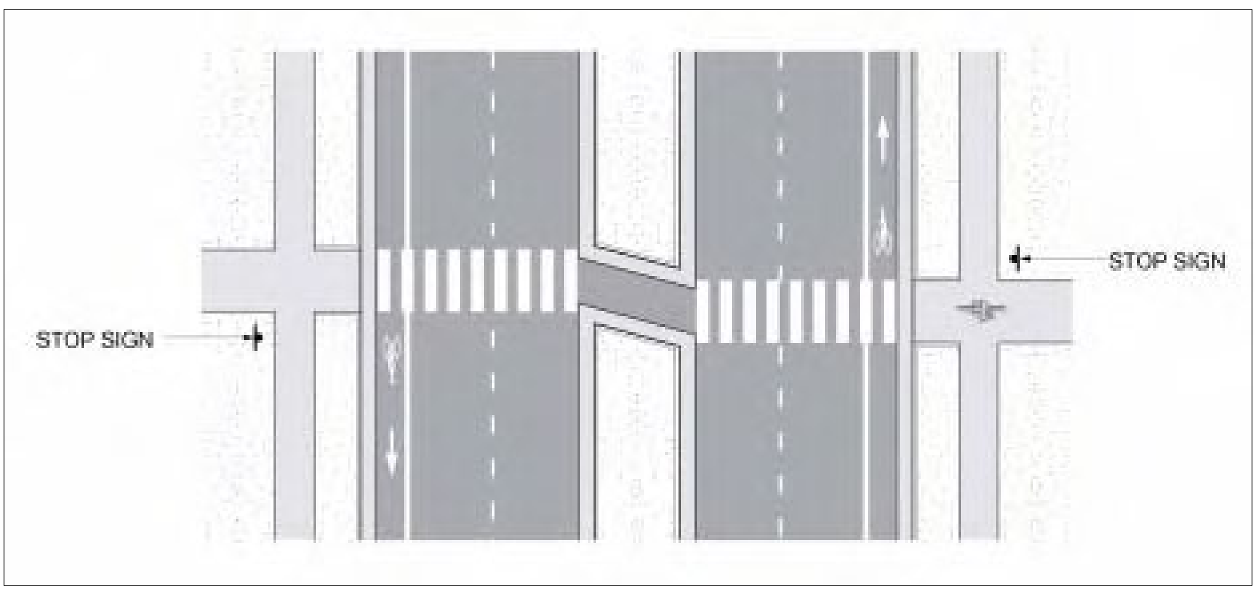


Figure 7: An at-grade trail crossing where the median island is angled toward on-coming traffic can provide better visibility for trail users.

It is recommended that barriers be placed as far from the trail as possible. When barriers encroach into two-foot trail shoulders, they reduce the usable width of the trail. When such instances cannot be avoided, it is desirable to increase the overall pavement width of the trail.

Motor Vehicle Barriers

Bollards are commonly used to restrict motor vehicle access to trails. Use of bollards should be carefully considered because they can create a significant hazard for bicyclists. The minimum recommended width between bollards is four feet, which is the narrowest width that can accommodate a bike trailer. Five feet is the preferred width.

Since most trails are two-way facilities, it is recommended that a single, removable bollard is placed in the center of the path. It is never recommended to place bollards in the path of travel of greenway users, such as in the middle of a travel lane, because users will be channelized to the center of the trail, where head-on collisions may occur.

Bollards are recommended to be placed several feet back from an intersection. This allows the cyclist to negotiate the bollard before exiting, or after entering the trail, rather than when attention should be focused on roadway traffic.

An alternative to bollards is to split the entryway into two six-foot, one-way trails, separated by low landscaping, as shown in Figure 9. This design is safer for cyclists and more attractive than bollards. It also improves access for maintenance and emergency vehicles. Such vehicles can straddle and clear the landscaping without having to remove a bollard.

In most cases, centerlines are not required on multi-use paths. Where it is desirable to separate two directions of travel on a multi-use path, a solid yellow line is recommended to designate segments with no passing and a broken yellow line is recommended where passing is permissible.

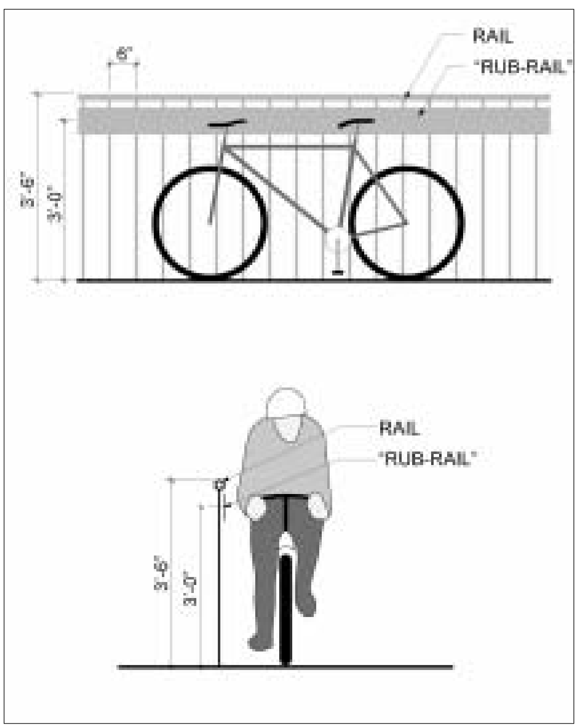


Figure 8: This figure shows recommended railing heights for trails.

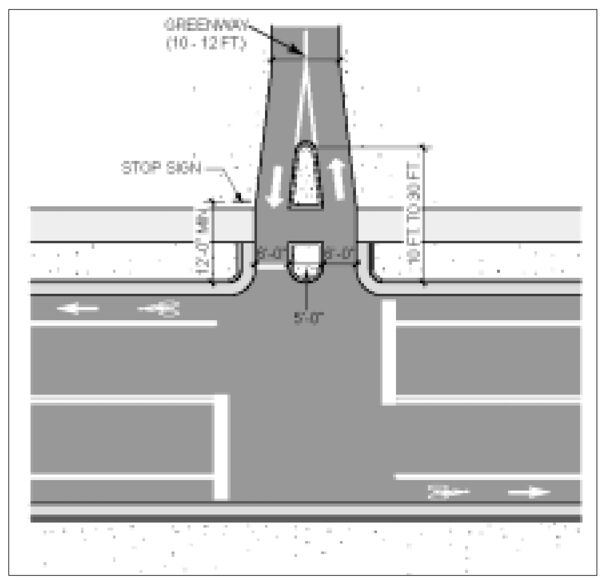


Figure 9: An alternative to bollards, such as the one illustrated here, may be used at trail entrances.

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

C. INTERSECTIONS

Good intersection design clearly indicates the path of travel to all roadway users.

INTRODUCTION

Intersections are where most conflicts between roadway users occur. By nature, intersections put one group of travelers in the path of others. Therefore, it is at intersections where guidance and well-designed accommodations for bicycles are needed most.

Good intersection design gives those approaching an intersection a clear indication of the path that they are to follow, and who has the right-of-way. Such designs allow all users to behave predictably.

Like motorists, bicyclists must place themselves in the appropriate position at an intersection for whatever movement they wish to make. When bike lanes are not present, bicyclists must merge into the outermost conventional travel lane dedicated to their desired movement. When present, bike lanes are most often located for through-moving cyclists; turning cyclists may still need to merge into the appropriate conventional travel lane.

GENERAL DESIGN PRINCIPLES

As with all other roadway design features, bicycles should be treated like vehicles. Instances where cyclists are required to cross intersections like a pedestrian should be avoided.

Intersection design that creates a path of cyclist travel that is direct, as similar to the path of motor vehicle travel as possible, and logical to both cyclists and drivers, is desirable.

Free flowing intersection features, such as slip lanes, should be minimized. Slip lanes allow right-turning vehicles to bypass traffic signals, and encourage motorists to make higher-speed turns at a location where through-bicyclists are merging from the edge of the roadway to the through lane.

Except where severe physical constraints exist, bike lanes are recommended to continue to the stop line/crosswalk. Bike lanes should not be marked through pedestrian crossings.

INTERSECTIONS WITHOUT RIGHT-TURN LANES

At signalized or stop-controlled intersections on streets that have bike lanes, but do not have exclusive right-turn lanes, it is recommended that the solid bike lane stripe be replaced with a dashed line at least 50 feet prior to the stop bar/crosswalk. The dashed line allows cyclists to merge into the conventional travel lane for a left turn movement. The dashed line encourages right-turning motor vehicles to merge into the bike lane, rather than cut off through-traveling bicyclists with a quick right-turn movement.

If there is a near-side bus stop on an intersection approach, the solid bike lane is recommended to be replaced with a dashed line for the length of the bus stop.

INTERSECTIONS WITH EXCLUSIVE RIGHT-TURN LANES

Exclusive right-turn lanes present an additional conflict between through-cyclists and right-turning motorists, and are only recommended when warranted by right turning volumes.

Where right turn lanes exist, the paths of cyclists and motorists should cross in advance of the intersection, and the intersection design should direct bicyclists to the left of the right-turn lane, as shown in Figure 10.

This strategy allows the conflict to occur in advance of the multiple conflicts that typically occur at the intersection itself. In addition, this approach maintains the rules of the road, since through-cyclists proceed to the left of right-turning motorists.

The bike lane stripe is recommended to be dashed across the area where motorists should cross the bike lane into the right-turn lane – generally at least 50 feet before the intersection. It is recommended that solid bike lane markings resume when the full width of the right-turn lane is achieved, and continue to the stop bar/ crosswalk.

Where severe physical constraints are present, the bike lane can be dropped and the outermost through-lane can be widened to 14 feet for shared use.

If the major traffic movement including bike traffic at an intersection is to the right, it may be appropriate to include a right-turn bike lane to the right of the right-turn conventional lane.

INTERSECTIONS WITH DUAL RIGHT-TURN LANES

Intersections with a right-turn lane and a shared right/through lane present particular difficulties

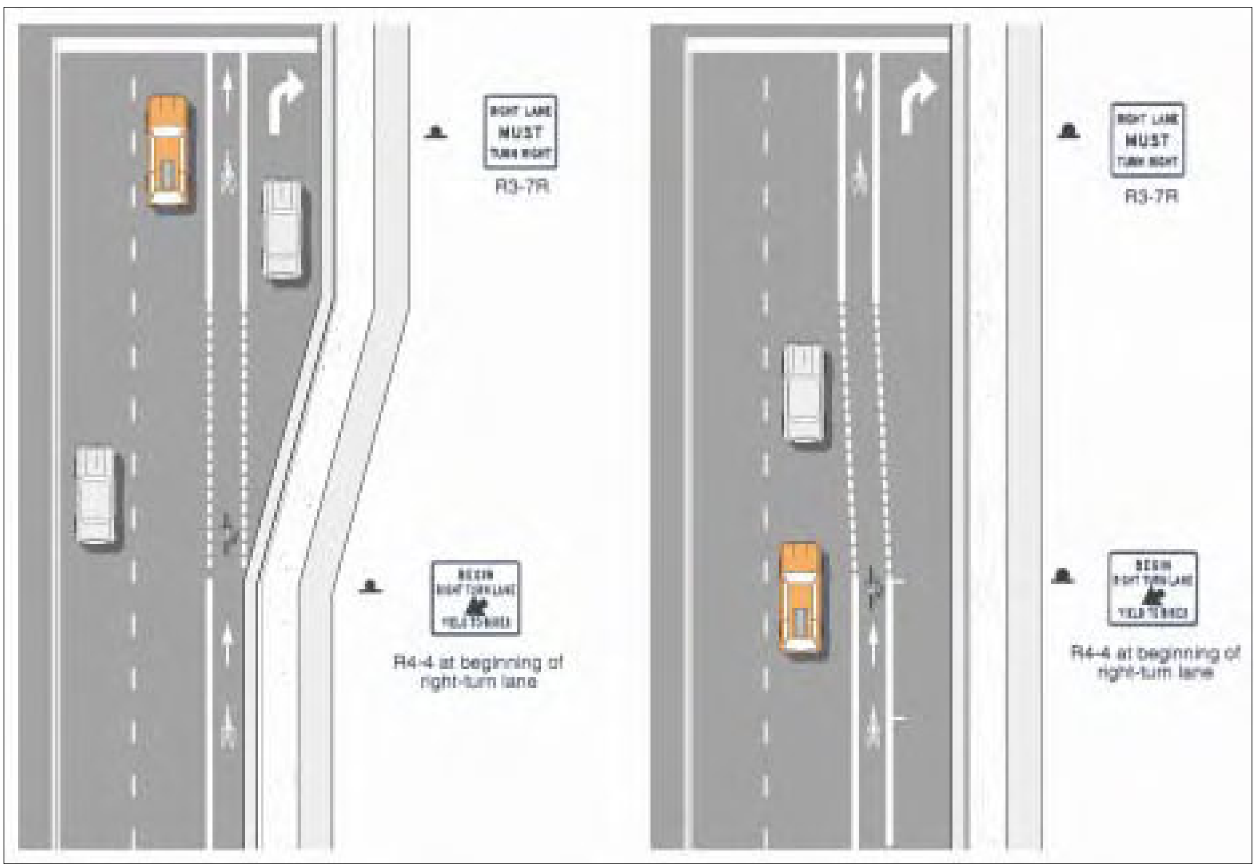


Figure 10: This figure shows bike lane markings at exclusive right turn lanes. The illustration at left shows the configuration when parking is not present; the illustration at right shows the configuration when parking is present.

for bicyclists. There is no ideal place to locate a through-bike lane, and bicyclists must merge across one lane into the next, where drivers could be turning right or going straight. The use of dual right-turn lanes is not recommended where bike traffic is expected, unless the dual turn lanes are needed to accommodate heavy right turning movements.

When such intersections are unavoidable, bicyclists can be aided by dropping the bike lane, and by striping a dashed line between the edge of pavement where the bike lane ends, to the lane stripe between the two right-turn lanes. The recommended width of the right/through lane is 14 feet. Signage alerting bicyclists to the approaching lane configuration is warranted. See Figure 11.

T-INTERSECTIONS

At T-intersections with bike lanes, left and right-turn bike lanes are recommended as shown in Figure 12. If physical constraints are present, bike lanes can be dropped, maintaining a 14-foot wide left-turn lane.

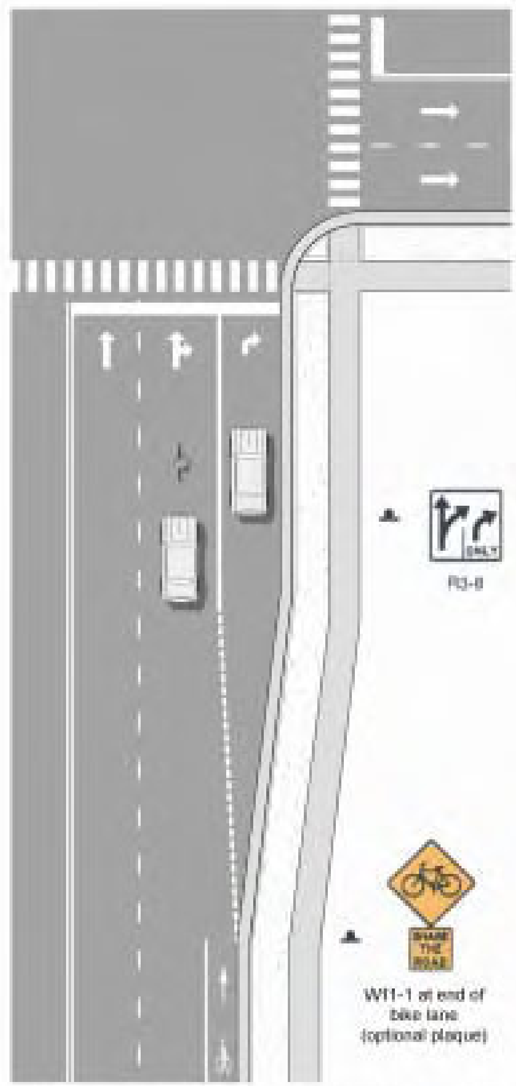
Bike lanes on the side across from the intersection are recommended to be striped through the intersection, except at crosswalks.

COMPLEX INTERSECTIONS

Intersections with offset lanes, skewed streets, or multiple streets entering from different angles can increase unpredictability and create visibility problems and confusion for all users.

Where possible, realignment with simple right-angle intersections is recommended at such intersections. It may be possible to redesign the intersection so that only two roads cross at a given point. Such intersections may also be good candidates for a roundabout, although rounbabouts can be problematic for cyclists.

Where complex intersections cannot be avoided, bike lanes can be defined with dashed lines through long undefined areas. This helps to ensure that motorists do not inadvertently encroach into the flow of bicycle travel.



BIKE LANE THROUGH DUAL RIGHT-TURN LANES

Figure 11: This figure illustrates bike lanes at dual right turn lanes and signage.

INTERCHANGES

High-speed, free-flowing freeway or interstate-style interchanges can present a major barrier to bicycle travel. Cyclists must perform weaving, merging, or crossing maneuvers with motor vehicles, while traveling at a much slower speed. Specific problems at entrance and exit ramps include the following:

- The acute angle of motor vehicles approaching from behind creates visibility problems.
- Motorists are usually accelerating, which increases the speed differential with bicyclists.

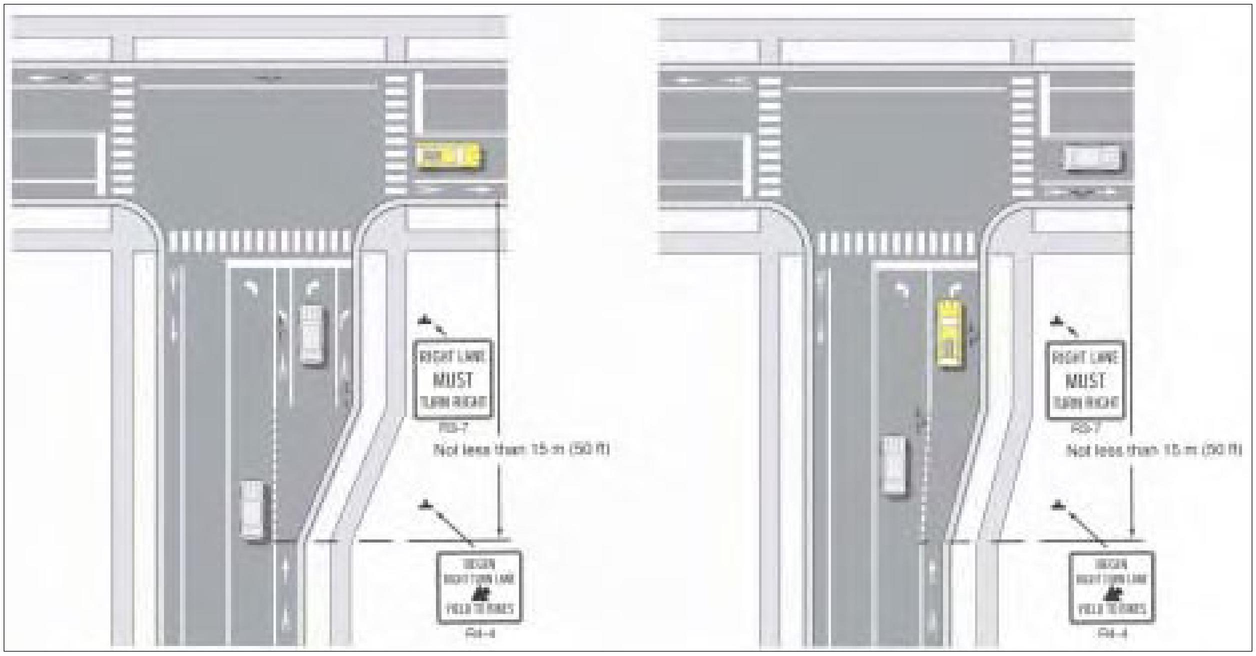


Figure 12: The illustration at left shows the preferred lane marking configuration at a T-intersection, which includes right and left-turn bike lanes. The illustration at right shows a fourteen-foot wide shared left turn lane for locations where physical constraints are present.

- Motorists are usually focused on merging movements.
- Motorists may be exiting from a high-speed, bicycle-restricted roadway and may not be expecting to encounter bicyclists.

To increase safety and comfort, the designs illustrated in Figures 13 and 14 result in nearly-right-angle crossings that minimize the distance across ramps that a bicyclist must traverse, improve sight distances, and are located where a driver's attention isn't yet entirely focused on merging with traffic.

Some urban arterials are also designed with interchange-style intersections. These facilities may be appropriate for bicycle facilities, so in addition to designing safe routes to cross such roadways, bike facilities must be provided in order to safely enter and exit the roadway.

SIGNAL TIMING & DETECTION

Bicyclists are required to follow all of the rules of the road, including those related to traffic signals. Traffic signals that do not take into consideration the needs of cyclists become barriers to bicycle travel. Particularly during off-peak periods, a law-abiding bicyclist may wait indefinitely at a traffic light before a motor vehicle appears to trip the signal detector.

In addition to detection, timing of the traffic signal to accommodate bicyclists is recommended.

SIGNAL TIMING

Traffic signal clearance intervals are recommended to be timed to provide bicyclists with sufficient time to react, accelerate, and proceed through an intersection on the clearance interval. Normally, a bicyclist can travel through an intersection under the same signal phasing arrangement as motor vehicles. However, special consideration of bicyclist needs may be necessary at multi-lane crossings and acute angle intersections, which take longer to cross. The clearance interval should take into consideration a bicyclist's speed of 6-8 MPH, and a perception/reaction/braking time of 1.0 seconds.

SIGNAL DETECTION

Traffic detectors for traffic-actuated signals are recommended to be set to detect bicycles.

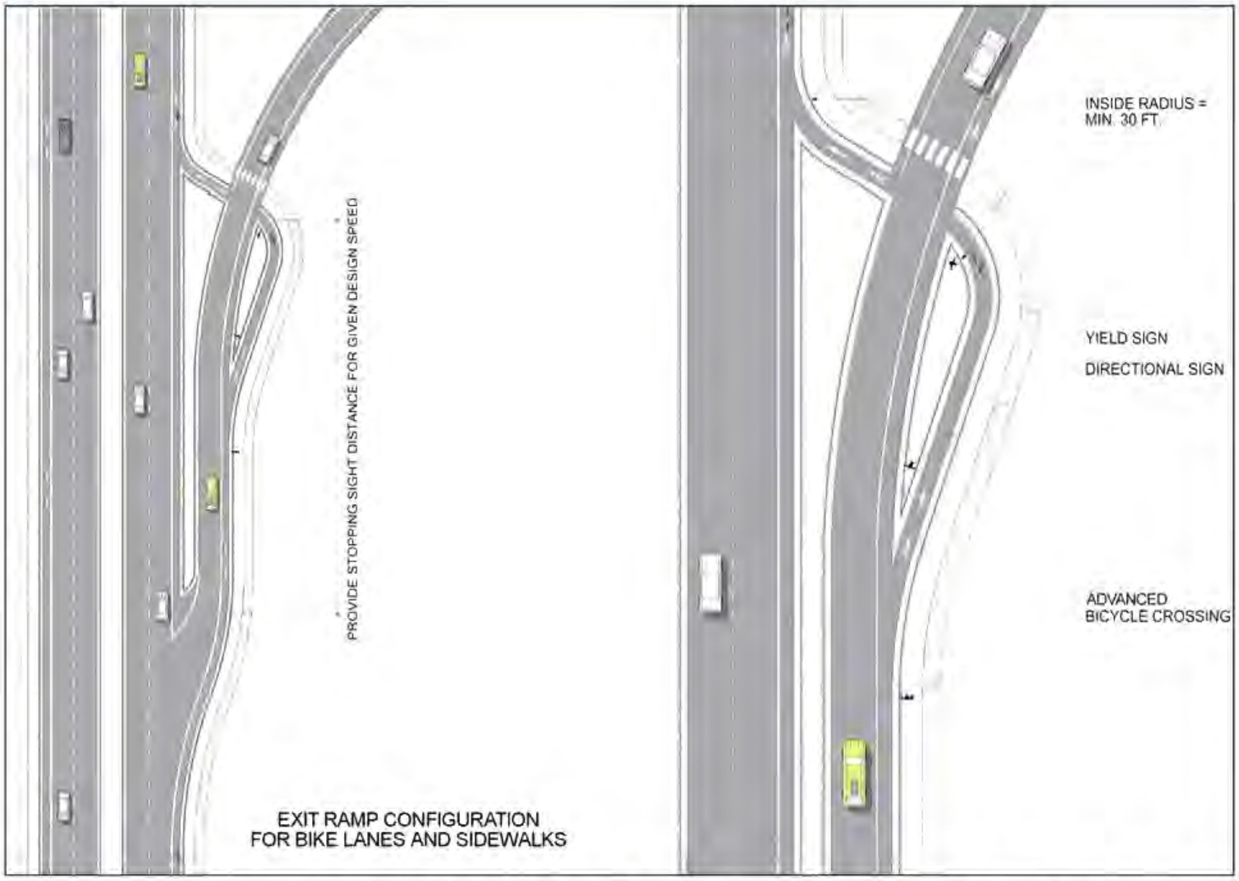


Figure 13: This figure shows bike lanes through an interchange exit ramp. The illustration to the right shows signage details.

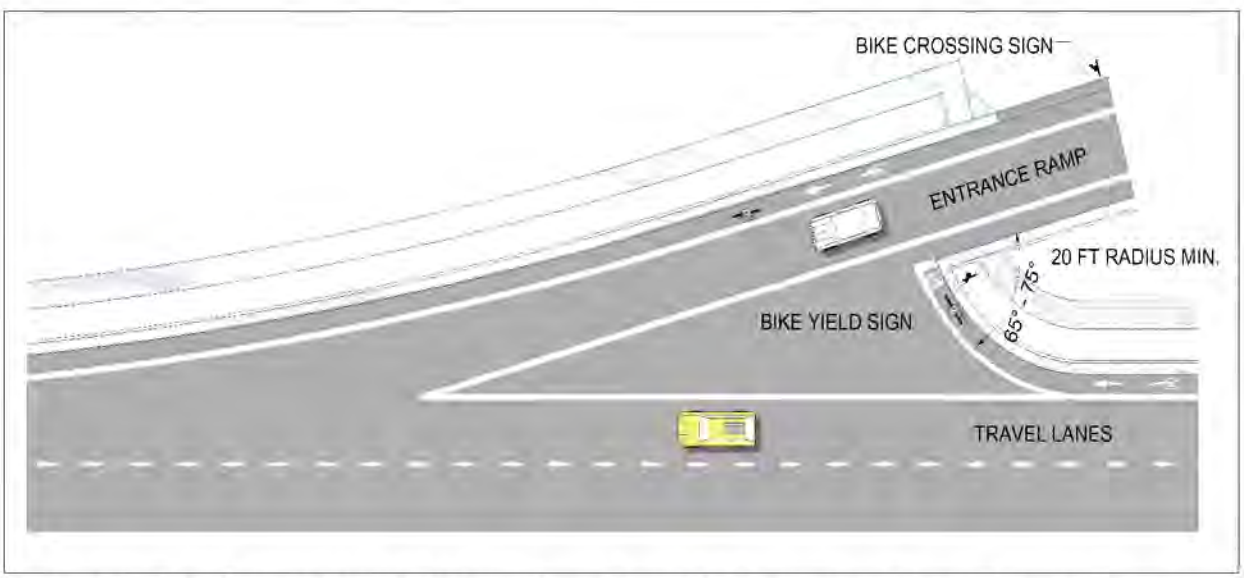


Figure 14: This figure shows bike lane through a right lane merge lane. Source: Oregon Bicycle & Pedestrian Plan

Quadrupole and diagonal quadrupole loop detectors generally provide for bicycle detection. Standard loops are difficult to adjust to detect bicycles. The different types of detector loops are illustrated in Figure 15. Location of detectors is recommended in the bicyclist's expected path. This includes bike lanes and shoulder bikeways, as well as left-turn and outside-through conventional travel lanes.

When bike lanes are not present, a bicyclist is usually positioned on the right side of the conventional travel lane. This can place the cyclist outside the area of detection. It is recommended that such intersections include a pavement marking to indicate to bicyclists where they should position themselves in order to activate the signal detector.

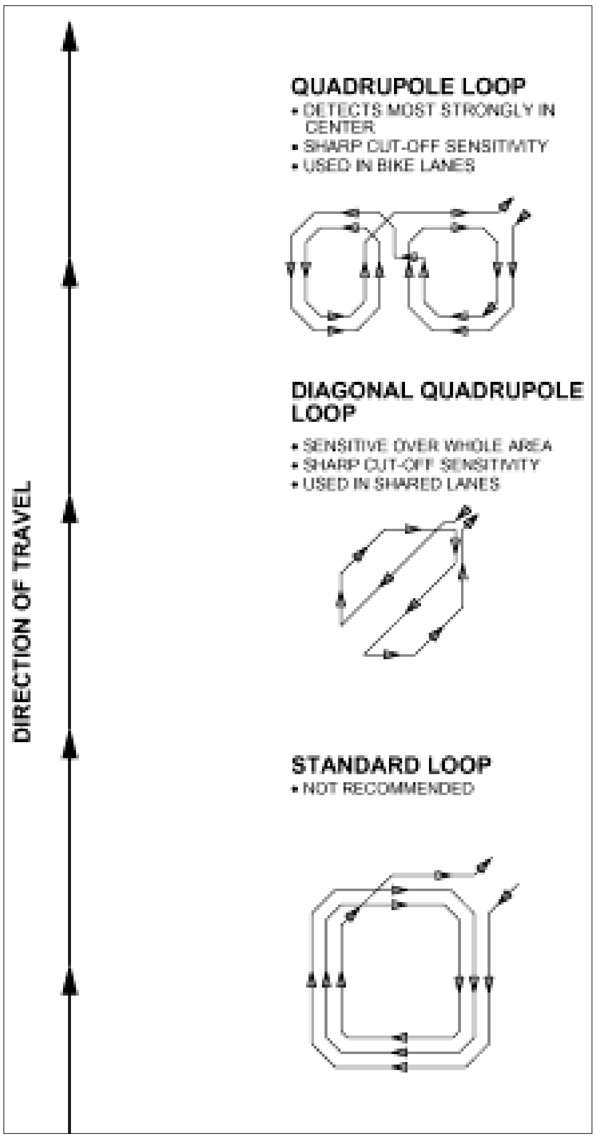


Figure 15: This figure illustrates the various types of detector loops for bicycle facilities.

Pedestrian-actuated pushbuttons are generally not recommended for bicycle facilities. When a detector cannot be provided, a pushbutton may be appropriate if:

- the cyclist can access the pushbutton without dismounting or having to make unsafe leaning movements; and
- the cyclist can access the pushbutton while remaining in the appropriate position for the desired path of travel through the intersection, including left turns and through movements.

Pavement markings indicate to bicyclists where they should position themselves to activate the signal detector.

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

D. SPECIAL CONDITIONS & OTHER DESIGN CONSIDERATIONS

Storm grates that have not been raised to the same height as the roadway and have gaps parallel to the roadway, can pose dangers for bicyclists.

STORM GRATES

Storm grates can be among bicyclists' most serious hazards. Grates with slots parallel to the flow of traffic, or with a gap between the frame and the grate, can trap the front wheel of a bicycle, and result in serious injury to a cyclist. Equally problematic are grates that are not raised when a roadway is resurfaced, leaving them significantly lower than the surrounding pavement. Exacerbating the problem is that grates are hard to see at night and, because they extend into the normal path of bicycle travel, they are often unavoidable.

Regardless of whether or not the roadway has been identified for bicycle facilities, storm grates on all streets are recommended to be bicycle-safe and hydraulically efficient, as shown in Figure 16. Where hazardous grates exist, it is recommended that replacing all of them is made a priority, especially on those streets that have been identified for bicycle facilities. When replacement is not immediately possible, steel cross straps or bars can be welded to an existing grate, spaced not less than six inches on center.

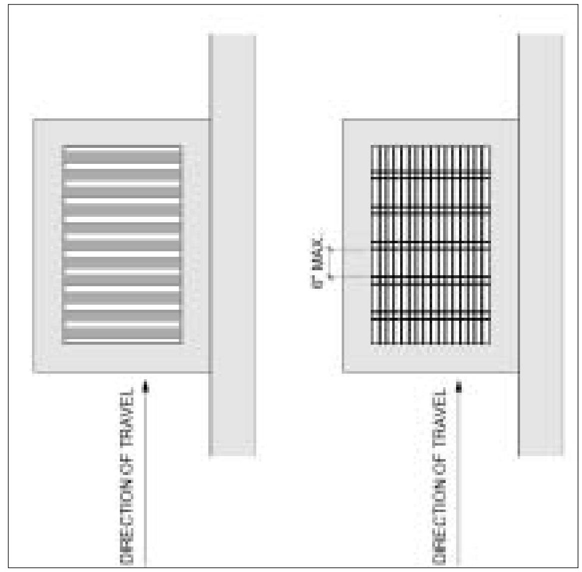


Figure 16: Bicycle-compatible storm grates, such as these are recommended to be bicycle-safe and hydraulically efficient.

When resurfacing any street, regardless of whether or not it has been identified for bicycle facilities, it is recommended that the grate height is not offset from the new pavement surface by more than one-quarter inch. If this is not possible, it is recommended to taper the pavement into the grate so that an abrupt edge is not present.

PAVEMENT SURFACE QUALITY

The smoothness of pavement surfaces affects the safety, comfort, and speed of cyclists. Wide cracks, joints, or drop-offs parallel to the flow of travel can trap a bicycle wheel and cause loss of control. Holes and bumps can force a bicyclist to weave into the path of motor vehicle travel. It is recommended that pavement is laid and maintained in a manner than ensures a smooth pavement surface.

RAILROAD CROSSINGS

Railroad crossings can present a significant problem to bicyclists if not properly designed. The channel between the flange and pavement can catch a bicycle tire and throw the cyclist. Providing safe crossings involves consideration of three design issues: angle of crossings, flangeway width, and surface smoothness.

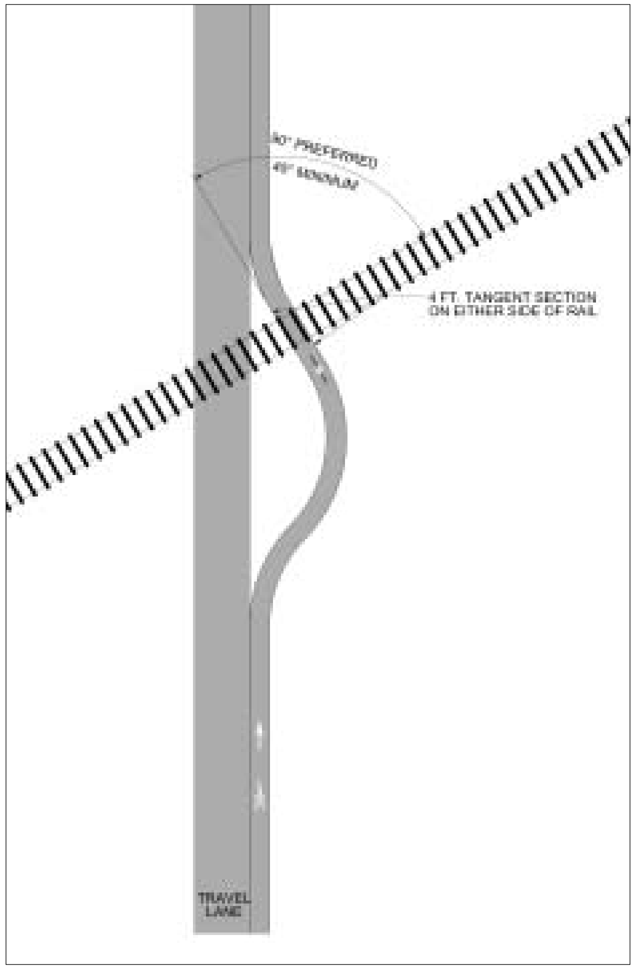


Figure 17: Bicycle facilities can be realigned to provide a safe railroad crossing of 90 to 45 degrees.

<u>ANGLE OF CROSSING</u>

Bikeways are recommended to cross railroad tracks as close to a right angle as possible. If the crossing angle is less than forty-five degrees, additional shoulder width should be provided so that the cyclist can cross the tracks at a safer angle, preferably, at a ninety degree angle. As an alternative, if right-of-way width permits, the crossing angle can be improved by realigning the bicycle facility as it approaches the tracks. See Figure 17. The use of pavement striping and markings is recommended to orient the cyclist to the safest crossing angle.

<u>FLANGEWAY WIDTH</u>

The open area between the rail itself and the adjoining pavement is recommended to be as narrow as possible. Rubberized or concrete flangeway fillers can be installed to minimize the gap, as shown in Figure 18.

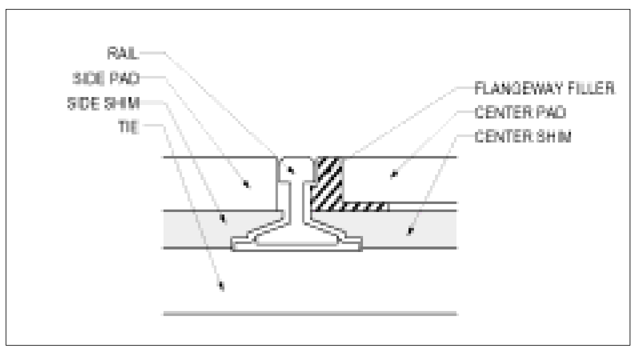


Figure 18: Bicycle-compatible railroad crossing detail, including flangeway fillers, are shown above.

<u>SMOOTHNESS OF SURFACE</u>

It is recommended that the roadway surface and the top of the rails are at the same height. Broad, steel-reinforced concrete panels are the most stable material to use at crossings. Rubberized railroad crossing mats may also be appropriate, although not on roads with heavy truck traffic. Asphalt is likely to migrate upward and develop a ridge next to the rails over time, and is not recommended. Heavy timbers are not long-lived, can be slippery when wet, and are not recommended.

<u>SIGNAGE</u>

Installation of advance warning signs and pavement markings is recommended in advance of a railroad crossing, in accordance with the MUTCD.

RUMBLE STRIPS

Rumble strips have been shown to be effective in alerting sleepy motorists and preventing run-off-the-road crashes. However, due to bicycle tire size and suspension (usually the lack thereof), rumble strips can create problems for cyclists. Furthermore, rumble strips force bicyclists further from the edge of travel lanes, where debris is more likely to collect.

Rumble strips are not recommended to be used on roadway shoulders unless there is a five-foot clear area between the rumble strip and the outside edge of the pavement. On bikeways with wide outside lanes, it is recommended that rumble strips be located beyond the edge stripe. Rumble strips are not recommended for streets with bicycle lanes, unless they are placed outside the striped width of the bicycle lane.

ROADWAY BRIDGES

Roadway bridges often present major obstacles to bicycle travel, due to high traffic volumes and speed, narrow lanes, open grate decking, wide expansion joints, or other hazards. Like motorists, bicyclists are dependant on bridges as the key connectors across barriers such as waterways or interstate highways. Safe accommodation of bicyclists on bridges is important in maintaining the continuity of a bikeway network.

As bridge work occurs or as regular maintenance occurs, bicycle-safe decking and expansion joints are recommended for all bridge decks. It is also recommended that the width of new bridges equals the width of the approaching roadways, including bike lanes, shoulders, gutter pans, and sidewalks. Because traffic speeds sometimes increase on long bridges, it may be appropriate to widen bike lanes to six feet on bridges in order to increase cyclist comfort.

Even in cases where approaching roadways do not have bicycle facilities, it is recommended that the design of new bridges assumes that bicycles will be present, and include enough width to stripe for bike lanes immediately or in the future. As work is done on roadway bridges, it is important to consider these bicycle facilities in order to safely accommodate cyclists.

CONSTRUCTION ZONES

Like motor vehicles, bicycle movement should be maintained through construction zones. The design of temporary lane restrictions, detours, and other traffic control measures instituted during construction is recommended to accommodate non-motorized travelers whenever possible, especially on routes where these modes are normally encountered.

<u>GENERAL PRINCIPLES</u>

Bike lanes should be maintained through construction zones if possible. If physical constraints preclude bike lanes and the disruption occurs over a short distance, or on low-volume rural roads, it is recommended that bicyclists are routed to share a conventional travel lane. On longer projects, a temporary bicycle lane or wide outside lane is recommended.

In urban areas, bicyclists are not recommended to be directed onto sidewalks, unless no reasonable alternative exists.

If the construction work is on a designated bikeway where no temporary accommodation can be provided, it is recommended that a reasonable detour be identified and signed.

<u>DESIGN CONSIDERATIONS</u>

- Metal plates have a surface that is very slick for bicycle wheels, and not easily seen at night or in the rain. If metal plates are used in construction zones, they are recommended to have a vertical edge no thicker than one inch. For plates thicker than one inch, an asphalt lip to minimize hazards to bicycles is recommended.
- The placement of advance construction signs should obstruct neither the bicyclist's nor the pedestrian's path of travel.
- Communication of information regarding construction and route changes to the public through the local media and official websites is recommended. Project managers are also recommended to notify and consult affected groups, such as university officials, neighborhood groups, or bike clubs.

DESIGN PRACTICES TO BE AVOIDED

SIDEWALK BIKEWAYS

Sidewalks are generally poorly suited to bicycle travel for the following reasons:

- Sidewalks put bicyclists in conflict with pedestrians. Bicyclists are typically traveling much faster than pedestrians, and the speed differential creates potential for crashes.
- There are vertical and horizontal conflicts with utility poles, signposts, driveway ramps, benches, and other street furniture and obstructions.
- Sidewalk bicyclists are unexpected. At best, motorists are looking for slow-moving pedestrians when they cross a sidewalk or crosswalk, not fast-moving cyclists.
- Sidewalk bicyclists are unpredictable. Because sidewalks are not designed for bicycle travel, it can be difficult to anticipate what movement a cyclist might make, and for a motorist to react with adequate time.
- Sidewalk bicyclists place themselves in an awkward position at intersections, where they cannot safely follow the vehicular rules of the road, but often do not follow the rules of pedestrian travel either. This circumstance creates confusion for other roadway users.

Roadway users are safer when bicycles are considered vehicles, and when bicycle facilities are designed accordingly.

TWO-WAY BIKE LANES ON ONE SIDE OF THE STREET

Occasionally practiced in the past because it used less right-of-way, two-way bike lanes on one side of the street can create dangerous conditions for cyclists. The bicyclist closest to the conventional travel lane has opposing motor vehicles on one side and opposing bicycles on the other. This arrangement places bicyclists in an unexpected location, creates confusion at intersections, and can result in awkward and dangerous movements when transitioning back to standard bike lanes.

PAVEMENT REFLECTORS

Pavement reflectors or other raised markings located at the edge of outside lanes can deflect a bicycle wheel, causing a cyclist to lose control. If reflectors are necessary on roadways with bike lanes or shoulders, it is recommended that they be installed on the motorist's side of the stripe, and have a beveled front edge. The use of pavement reflectors between travel lanes is recommended to end fifty feet in advance of intersections, where bicyclists may be merging left into the appropriate lane for their movement.

CONTINUOUS RIGHT TURN LANES

Continuous right turn lanes are very difficult for through-cyclists to navigate. Riding against the curb places them in conflict with right-turning motor vehicles, and riding in the outmost through lane puts them in conflict with cars merging in and out of the right-turn lane.

The best solution is to eliminate the continuous right-turn lane, consolidate access and create well-defined intersections, with the bike lane to the left of right turning cars, as shown in Figure 19.

GRAVEL DRIVEWAYS & ALLEYS

Gravel driveways or alleys can create a serious surface hazard for bicyclists, causing them to lose control of their bikes. To keep loose gravel from spilling onto connecting roadways, gravel entranceways are recommended to be paved back fifteen feet, as shown in Figure 20.

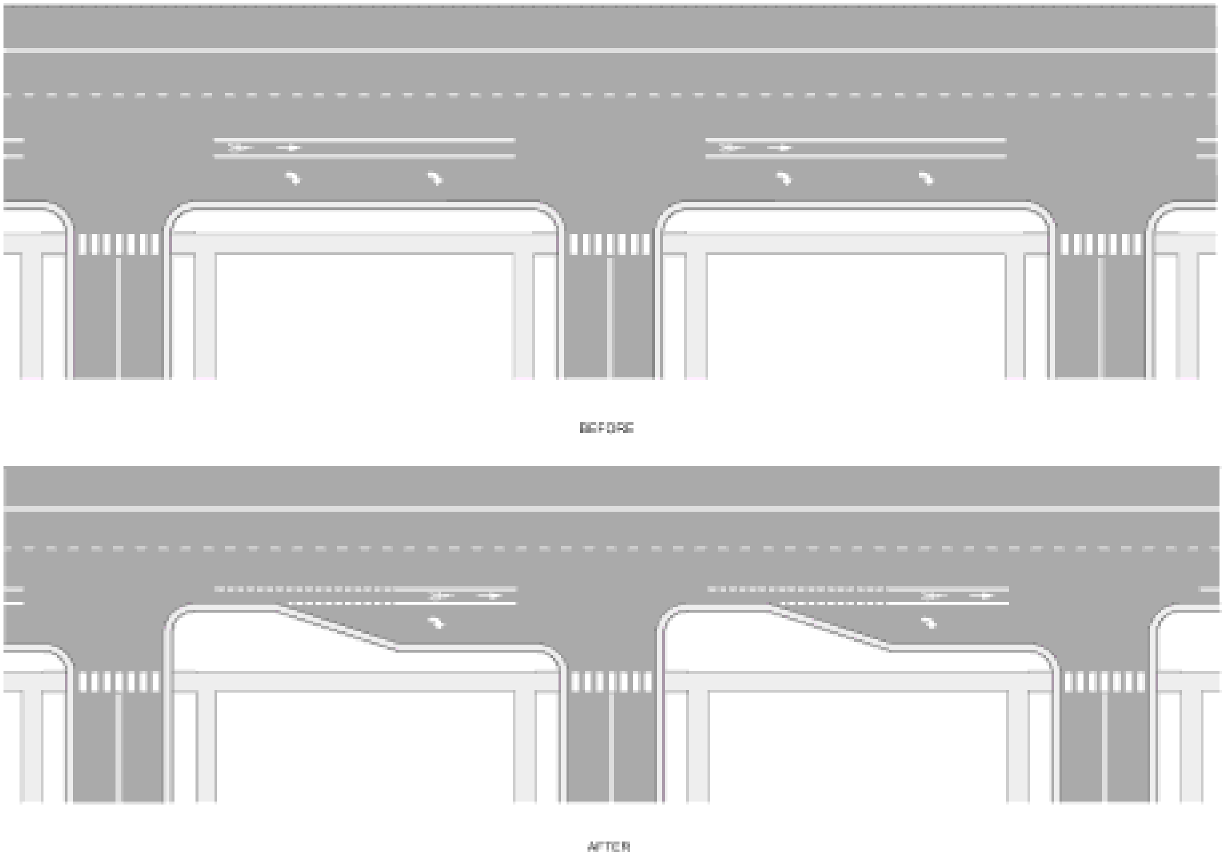


Figure 19: The configuration shown at top results in continuous merging conflicts. The configuration shown below manages access to intersections and increases safety.

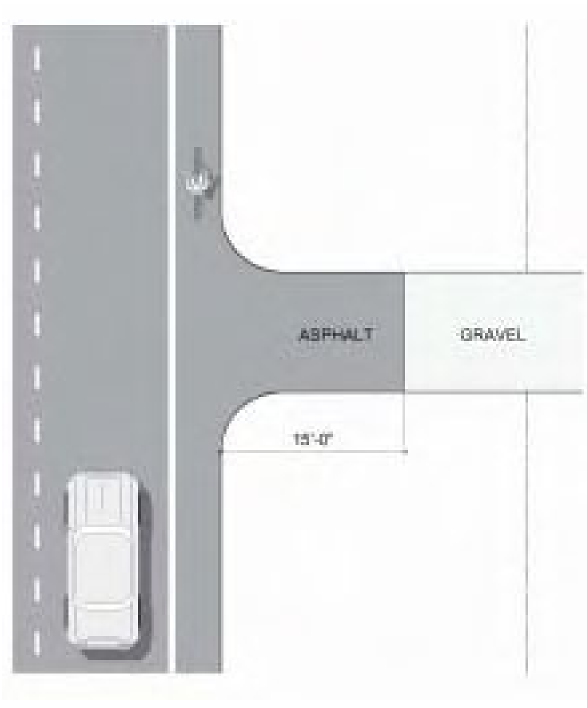


Figure 20: A paved apron at driveways and alleys keeps gravel from migrating onto bikeways.

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

E. SIGNS & MARKINGS

Signs should be used in moderation to avoid distracting roadway users. However, those signs posted should be highly visible and easily understood by all roadway users.

GENERAL PRINCIPLES

Well-designed roadways usually require little signage, because other design elements make it easy for users to understand where they should be and how they should operate. In fact, an overabundance of warning and regulatory signs may indicate a need to address more fundamental design problems. The attention of cyclists, pedestrians, and drivers should be on the road and other users, not on signs along the road. Oversigning is ineffective and can degrade the signs' usefulness to users. Too many signs are distracting, a visual blight, and a maintenance burden.

The MUTCD, published in June 2001, provides guidance on bikeway signage, sign placement, and pavement markings. Signs are illustrated in Figure 21. Signs and markings need to be consistent with the latest edition of the MUTCD. The guidelines detailed in this section are intended to refine some of the standards in the MUTCD manual.

Signs directed at bicyclists are smaller versions of standard roadway signs. This is because bicyclists are usually traveling at speeds slower than motor vehicles, and are typically in closer physical proximity to the signs themselves.

In addition to bike-specific signage, standard roadway signs directed toward motorists also generally apply to bicyclists.

In some instances, the presence of bicycle facilities may warrant additional standard signage directed toward motorists, such as at complex intersections, or on a street with both high bicycle traffic and substandard bicycle facilities.

The message conveyed on a sign should be easy to understand by all roadway users. The use of symbols is preferred over the use of text.

SIGNAGE GUIDELINES

<u>OFF-STREET TRAILS (GREENWAYS)</u>
When trails are adjacent to, or cross, roadways, signs for bicyclists are recommended to be placed at locations that are visible only to trail users, not to motorists.

Sign W11-1 is recommended to be placed on roadways in advance of where an off-street trail crosses a roadway. Generally, it is not necessary to use this sign where on-street bike facilities cross other roadways.

<u>BICYCLE LANES</u>

<u>Signage</u>
Bicycle lane (R3-16 and R3-17) signs are to be used only when bike lanes are marked by the Bicycle Lane Symbol pavement marking.

"Bicycle Lane Ahead" (R3-16) and "Bicycle Lane Ends" (R3-16a) signs are to be used in advance of the beginning of a marked bike lane and when a bike lane ends. A "Share the Road" (W11-1/W16-1) sign should be used in conjunction with the "Bicycle Lane Ends" sign.

Figure 21: Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage

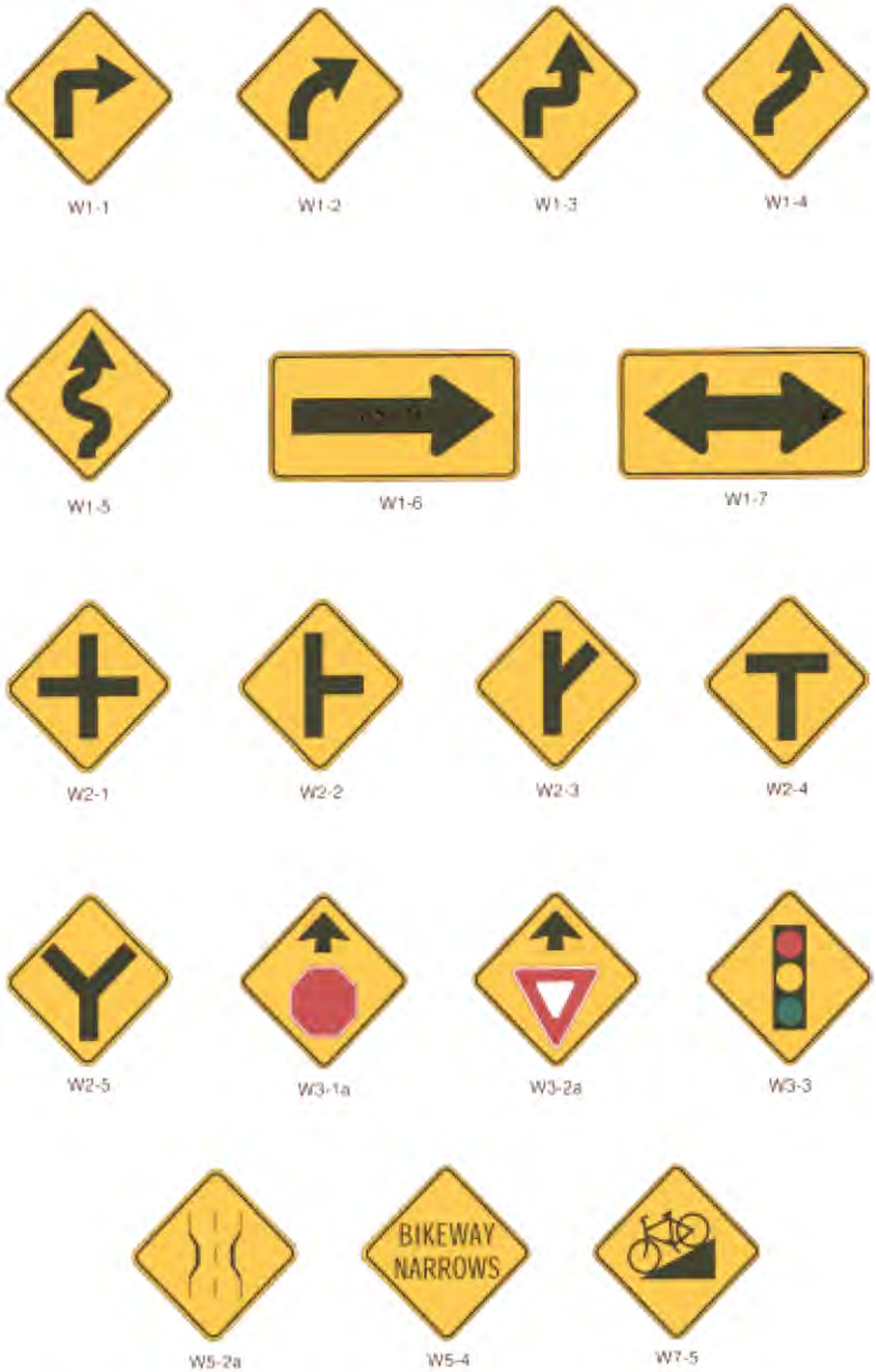


Figure 21 (cont.): Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage

Figure 21 (cont.): Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage

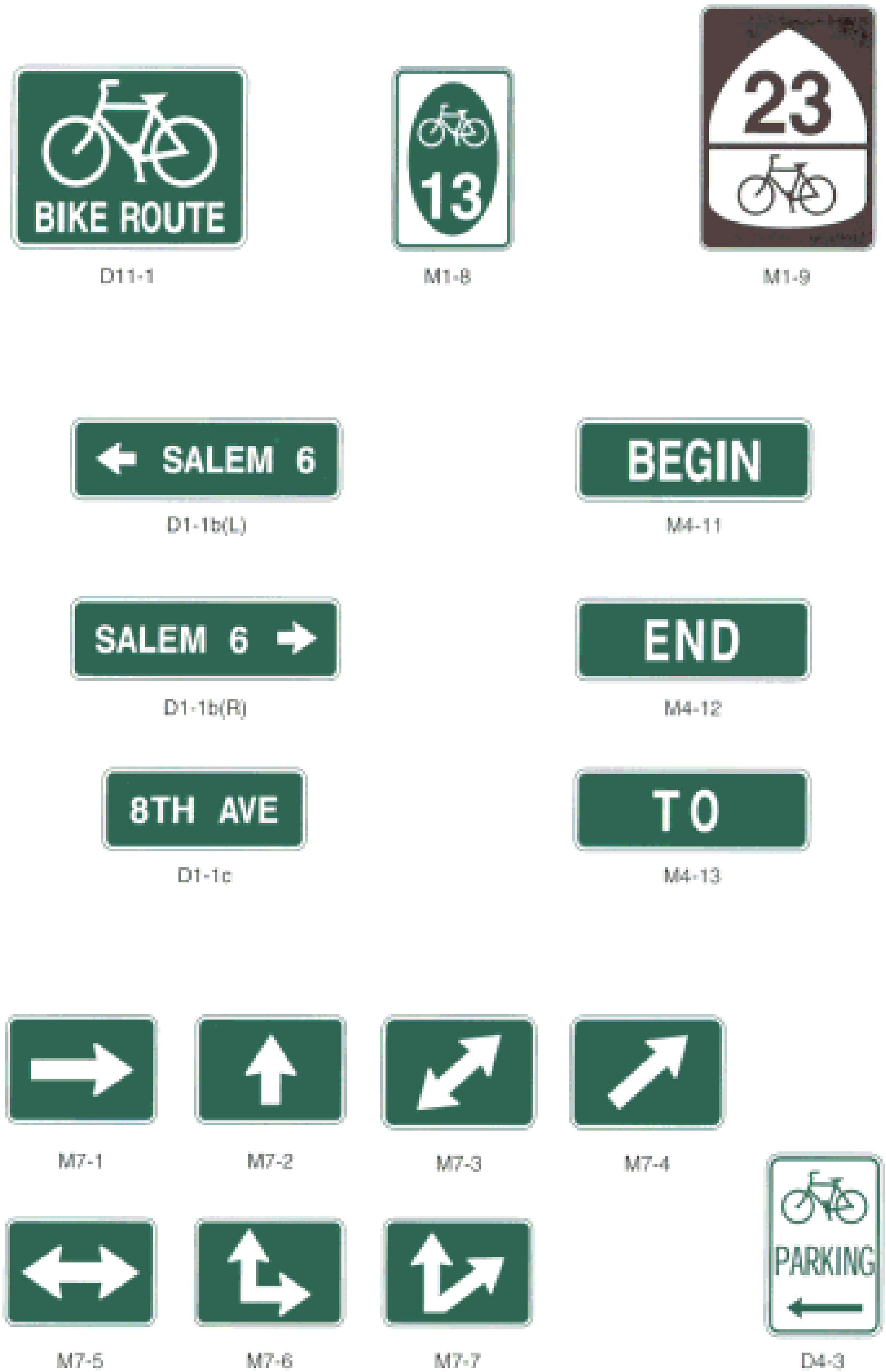


Figure 21 (cont.): Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage

Installation of the "Right Lane/Bike Only" (R3-17) sign is recommended at periodic intervals along the bike lane.

Bicycle route signs (D11-1, M1-8, M1-9, and all supplemental plaques), are recommended to always include accompanying directional or bikeway identification information. Where bike lanes are present, such signs are only needed at major intersections and where the route changes streets.

Where bike lane segments are discontinuous, it is recommended that bike route signs include information that directs bicyclists from one bike lane segment to another. For example, "Bike Route: XX Street Bikeway." Bike route signs are also recommended to direct cyclists to a destination, i.e. "Bike Route: Aquarium."

In general, bike lane pavement markings should preclude the need for "No Parking" (R7-9 and R7-9a) signs. In areas where parking in bike lanes is a chronic problem, such signs may be appropriate.

Where right turn lanes are present, and where motorists must weave across bicycle traffic in bike lanes, a "Begin Right Turn Lane/Yield to Bikes" (R4-4) sign is recommended. It is recommended that this sign be placed at the beginning of the taper, or if none, at the point of the beginning of the weave.

<u>Striping & Markings</u>

For bike lanes at bus stops, the use of dashed lines through the area that a bus is expected to cross into the bike lane to reach the curb is recommended.

Placement of a bicycle stencil and directional arrow is recommended after every major intersection, but not closer than 65 feet from the crossroad. Intervals no greater than 1,000 feet are recommended. (AASHTO has determined that the diamond marking used for special use lanes, and recommended in the past for bike lanes, should no longer be used. General perception now associates diamonds with HOV lanes and other motor vehicle facilities; not bike lanes.)

Markings are recommended for every intersection where on-street parking is present.

Care should be taken to avoid placing markings in areas where frequent motor vehicle crossings will prematurely wear down the marking.

If on-street parking is present, it is recommended that the parking area is defined with pavement markings, or a solid 4-inch white stripe, which encourages motorists to park near the curb.

<u>SHARED ROADWAYS</u>

On shared roadways, bicycle route signs (D11-1, M1-8, M1-9, and all supplemental directional plaques), are recommended to always include accompanying directional or bikeway identification information. Route signs are recommended at major intersections, where the route changes streets, and at intervals not greater than 1,000 feet.

Bike route signs are also recommended to direct cyclists to a destination, i.e. "Bike Route: Aquarium."

Shared roadways that include an outside lane of 14 feet are considered wide outside lanes (WOLs). The shared lane pavement marking may be used to identify WOLs.

If on-street parking is present, the use of pavement markings, or a solid 4-inch white stripe, is recommended to encourage motorists to park near the curb and to define the parking area.

The shared lane pavement marking may be used for wide outside lanes (WOLs).

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

F. ADDING BICYCLE FACILITIES TO EXISTING ROADS

INTRODUCTION

One of the more challenging tasks of building a bicycle infrastructure is finding space for bikes on physically constrained existing roads. Such roadways are not typically candidates for widening, and bicycles, pedestrians, and motorists must compete for limited right-of-way.

There are a variety of strategies for incorporating bicycle facilities onto roadways when such constraints are present. Most of the improvements discussed in this section can be accomplished by re-striping or adding pavement within existing right-of-way widths.

See the maintenance section (Section H) for additional information regarding repaving and construction.

PAVE THE SHOULDERS

On rural-style roadways without curbs and gutters, the width of the graded shoulders is often adequate to provide for bicycles. Such shoulders are unusable, however, if they are unpaved or paved with a bituminous surface that is too rough for bicycling.

By paving existing shoulders using the same pavement structural section as the travelway, shouldered bike lanes or wide outside lanes can be provided. In some cases, minor shoulder grading can provide still more new width for paving, further increasing safety and comfort for bicyclists.

REDUCE THE CONVENTIONAL TRAVEL LANE WIDTHS

By narrowing the width of existing conventional travel lanes, space can be reallocated for bike lanes or WOLs. In some instances, this can be accomplished without compromising typical 11 foot or 12 foot lane widths. In some instances, particularly on lower speed streets, it may be appropriate to consider reducing lane widths to less than 11 feet without significantly compromising safety or operation, and within the flexibility range of AASHTO guidelines.

Even when to-standard 14 foot WOLs cannot be provided within existing widths, it benefits cyclists for any “extra” width on a roadway to be allocated to the outside lanes. This ensures that bicyclists are provided with maximum available space, and minimizes the degree to which motorists must weave into the adjacent lane to pass a cyclist.

REDUCE THE NUMBER OF CONVENTIONAL LANES

On some roadways, transportation objectives may warrant the removal of a conventional travel lane, and reallocation of that width for bike lanes. A traffic study can determine whether lane reductions will result in an acceptable level of service for motor vehicles. Providing high quality bicycle facilities on some corridors may be worth a reduction in motor vehicle capacity.

On other streets, such as low volume four-lane roads, restriping with a center turn lane, two conventional travel lanes, and bike lanes can, in fact, improve traffic flow. “Road diet” is a term increasingly applied to this strategy, which has been used in numerous other cities.

REDUCE ON-STREET PARKING

Reducing the parking lane width to seven feet can provide additional space for bicycles. When seven-foot parking lanes are used in conjunction with bike lanes, it is recommended that bike lanes are not less than five feet wide.

In some instances, it may be appropriate to remove on-street parking from one side of a roadway. The width of one typical eight-foot parking lane can be reallocated to provide two bike lanes.

When some parking demand exists, it may be appropriate to permit parking in bike lanes during off-peak periods, at night, or only when demand is high, such as during services near a house of worship.

It is important to consider the impacts that parking removal may have on pedestrians and on traditional commercial streets. On-street parking provides a physical barrier between pedestrians and moving vehicles, and increases pedestrian comfort. Bike lanes provide a buffer too, but to a lesser degree. Most store-front businesses rely on street parking for their customers. Overall community goals should be taken into consideration when evaluating the appropriateness of removing parking lanes.

WIDEN THE ROADWAY

Most roadway widening projects are undertaken to increase motor vehicle capacity or as a streetscape improvement project. Such endeavors can present excellent opportunities to incorporate bicycle facilities.

Widening a roadway for the specific purpose of providing bicycle facilities may be feasible and warranted when the following conditions are present:

- It is a short segment between otherwise-to-standard bikeway facilities
- It is a corridor with high bicycle demand
- Widening the roadway is compatible with broader neighborhood goals and objectives
- It is necessary to correct a significant barrier to bicycle travel, or to correct a safety problem

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

G. BICYCLE PARKING GUIDELINES

INTRODUCTION

Like motorists, bicyclists need secure, convenient facilities to store their vehicles when they reach any destination. The lack of adequate bicycle parking facilities and fear of theft are significant deterrents to bicycle riding.

Well-designed racks and lockers located close to building entrances increase overall parking capacity and encourage bicycle use. About ten bicycles can be accommodated in the space required to store a single motor vehicle. Because it is less land-intensive, providing parking for bicycles is a good way to ease parking lot congestion and meet parking demand.

The guidelines in this section may be used as a foundation for the development of a bicycle parking ordinance.

The two categories of bicycle parking facilities are Short Term (bike racks), and Long Term (lockers, shelters, and rooms).

SHORT TERM PARKING FACILITIES

Bike racks serve short term parking needs. Racks must provide a means of securely locking a bicycle, and may be covered for protection from the weather. Racks do not provide a

Well-designed bicycle parking facilities, like these bike racks, encourage bicycle use.

The practice of using trees or other fixed objects for short term bicycle parking instead of bike racks, can result in damaged trees and bicycles that may block the flow of pedestrian traffic.

means to secure accessory bike components like lights, tools, or bags.

Substandard bike racks, located far from entrances and in isolated areas, do not get used. Bicyclists will pass them by for a signpost or other fixed object in a safer or more convenient location. In many cases, this practice can result in damaged street trees and parked bikes that block the flow of pedestrian traffic.

GENERAL DESIGN PRINCIPLES
Bicycle racks are recommended to:

- accommodate high security U-type locks,
- permit the frame and at least one wheel to be locked,
- be covered in areas where bikes may be left for longer periods of time,
- be securely anchored, and
- have adequate clearance around them to maneuver bikes.

"Comb", "toaster" or other wheel-bending rack styles only allow a wheel to be secured. These racks are substandard and tend not to get used.

Because the design and dimensions of racks vary, it is preferable to determine needed clearances based on the dimensions of bicycles. Conventional bicycles are about six feet long by two feet wide. It is recommended that racks are located to ensure that a wall or barrier parallel to secured bicycles allows two feet of clearance. Five feet of clearance on one side of walls perpendicular to bicycles is recommended.

This bike rack is an example of a wheel-bending rack, which secures only a wheel of the bicycle and tends not to get used. The placement of this rack also does not provide much clearance between the rack and the wall.

LOCATION

Installation of racks in a well-lit location within about fifty feet of the main entrance to a building is recommended, but not further from the entrance than the closest motor vehicle parking. The racks should be clearly visible from the entrance it serves.

When there are many building entrances, it is recommended that multiple lower capacity racks are distributed to serve all entrances. When installed in public rights-of-way, such as sidewalks, a full bike rack should not obstruct the flow of pedestrian traffic.

Bike racks are recommended to be located in well-lit areas, near an entrance, and clearly visible from the entrance it serves.

LONG TERM PARKING FACILITIES

A locker, caged shelter, or a room within a building can serve long term parking needs. These facilities are used at destinations where bicycles may be left unattended for several hours at a time, such as at park-n-ride lots, parking garages used by commuters, or universities. Long term parking provides complete security for bicycles and accessories, as well as protection from the weather.

GENERAL DESIGN PRINCIPLES

Commonly available bike lockers allow cyclists to secure a bicycle and accessories. It is recommended that lockers be constructed of metal rather than plastic, since plastic is more vulnerable to vandalism. Most public long-term bike parking is of this type.

Long term bike parking on campuses, at major employers, or in multi-family developments, may also be accommodated in a roofed area enclosed by a fence with a lockable gate, or in a lockable room.

LOCATION

Bicyclists will be more confident of the security of their bicycles if long-term parking is located in a well-lit, active area, or in an area monitored by a security camera or guard.

Lockers in parking garages and in public right-of-ways are recommended to be located within proximity to major commuter destinations. In urban areas, bicycle commuters are generally willing to walk a few blocks to their final destination when they know that their vehicle is secure.

Lockers can provide storage and protection for bicycles for extended periods of time.

APPENDIX C: BICYCLE FACILITIES DESIGN GUIDELINES

H. MAINTENANCE

INTRODUCTION

Like facilities for motor vehicles, bicycle facilities require routine maintenance. Automobiles have suspension systems and four wide, low-pressure tires. In contrast, bicyclists ride on two narrow, high-pressure tires, usually without the benefit of a suspension system. These factors make bicycles more vulnerable than most motor vehicles to poorly maintained roads.

Gravel, sticks, and other debris can easily deflect a bike tire, and potholes can bend a rim. Each of these situations presents a significant safety risk to cyclists. Other hazards, such as broken glass, can easily puncture a bike tire.

SWEEPING

A regularly scheduled inspection and maintenance program helps to ensure that litter and other debris is regularly removed from bicycle facilities. It may be appropriate to increase the frequency of the existing street sweeping schedule for roadways that also have bicycle facilities.

It may also be necessary to increase the frequency of sweeping in the fall, when leaves are likely to accumulate more quickly. This is especially important on greenway paths in forested areas.

Private landscaping and maintenance companies should not be permitted to blow grass clippings, trash or other debris in public rights of way. In addition to creating hazards for cyclists, this practice increases the overall maintenance burden on government agencies.

SURFACE REPAIRS

Routine inspections on bikeways for surface irregularities, potholes, ridges, cracks, and other surface problems are recommended. It is also recommended that government agencies be able to respond in a timely manner to reports from the public on specific hazards.

REPAVING

Repaving is a good opportunity to improve conditions for bicycling. In some cases, bike lanes can be added, shoulders can be widened, conventional lane widths can be adjusted, and surface hazards can be addressed.

Pavement overlays are recommended to extend across the entire roadway pavement width. It is recommended that abrupt edges or vertical ridges within the path of travel for cyclists are avoided.

Storm grates, manhole covers, and other such roadway features are recommended to be raised after repaving. It is recommended that the surface of such features is not offset from the pavement surface by more than one-quarter inch.

Repaving also presents a good opportunity to pave gravel driveways that connect to the roadway. It is recommended that driveways be paved back about fifteen feet from the edge of the roadway pavement to prevent gravel from spilling onto the roadway and shoulder. See Figure 20.

UTILITY CUTS

When utility cuts occur within a roadway, care should be taken to ensure that cut lines that are parallel to the flow of travel are located outside of the bikeway. This approach avoids an asphalt joint that can deflect a bicycle tire.

SPOT IMPROVEMENTS PROGRAM

While routine maintenance and regular inspections are essential to well-maintained bicycle facilities, bicyclists are often the first to be aware of any new hazard or other deficiency. A spot improvements program enables cyclists to quickly bring a problem to the attention of government representatives, and gives government the benefit of knowing about problems that arise between routine inspections.

It is important to the success of such a program that the government agency has the staff and funding available to respond to most routine maintenance problems.

Although paper forms should be available to those without internet access, a form on the government website can be the most efficient way to manage the program. Not only can an on-line maintenance request be immediately forwarded to the responsible agency, it also makes it easier to follow-up with the citizen who made the request.

APPENDIX D:
CALCULATION SHEET & SPI MAPS

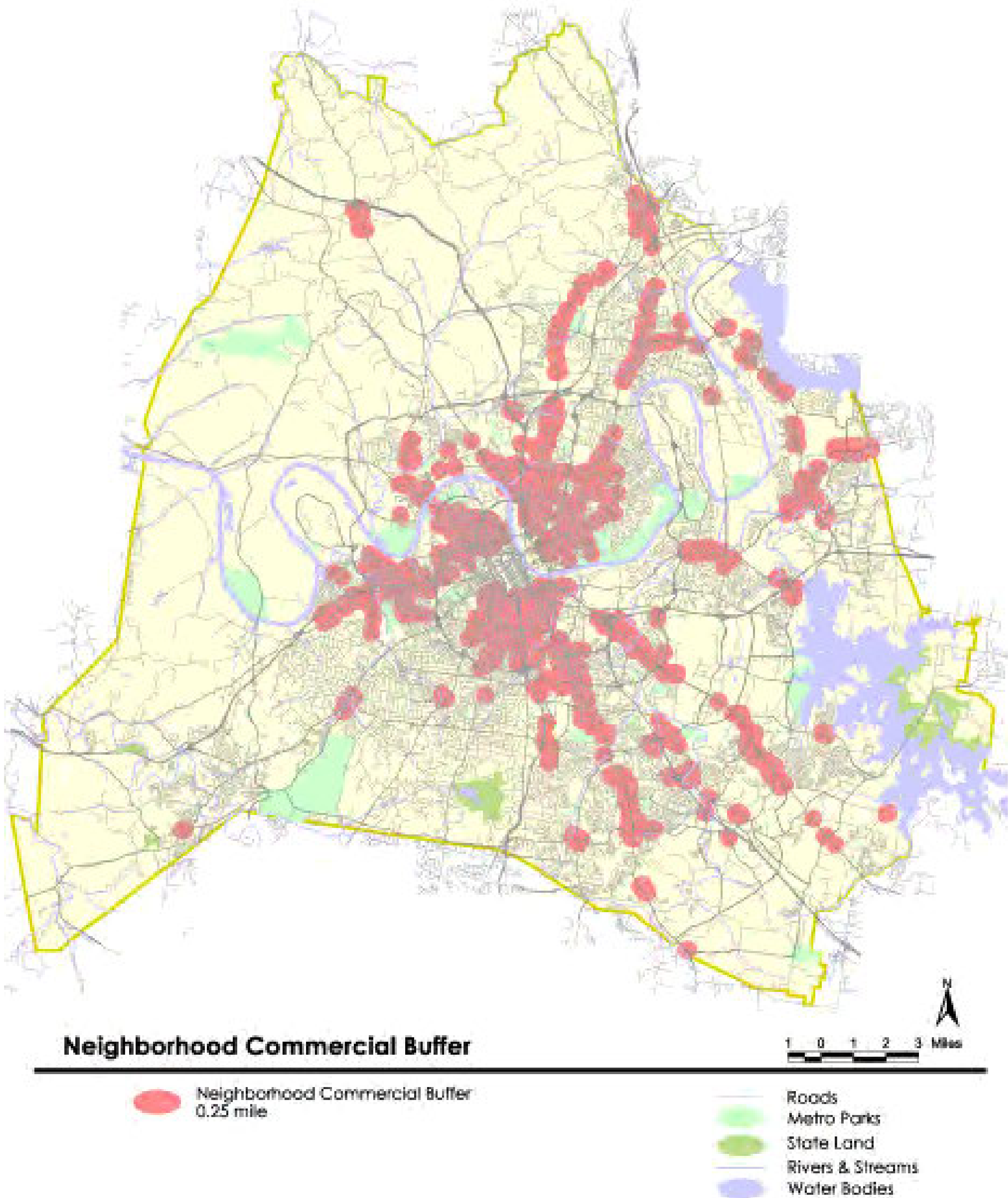
TABLE OF CONTENTS

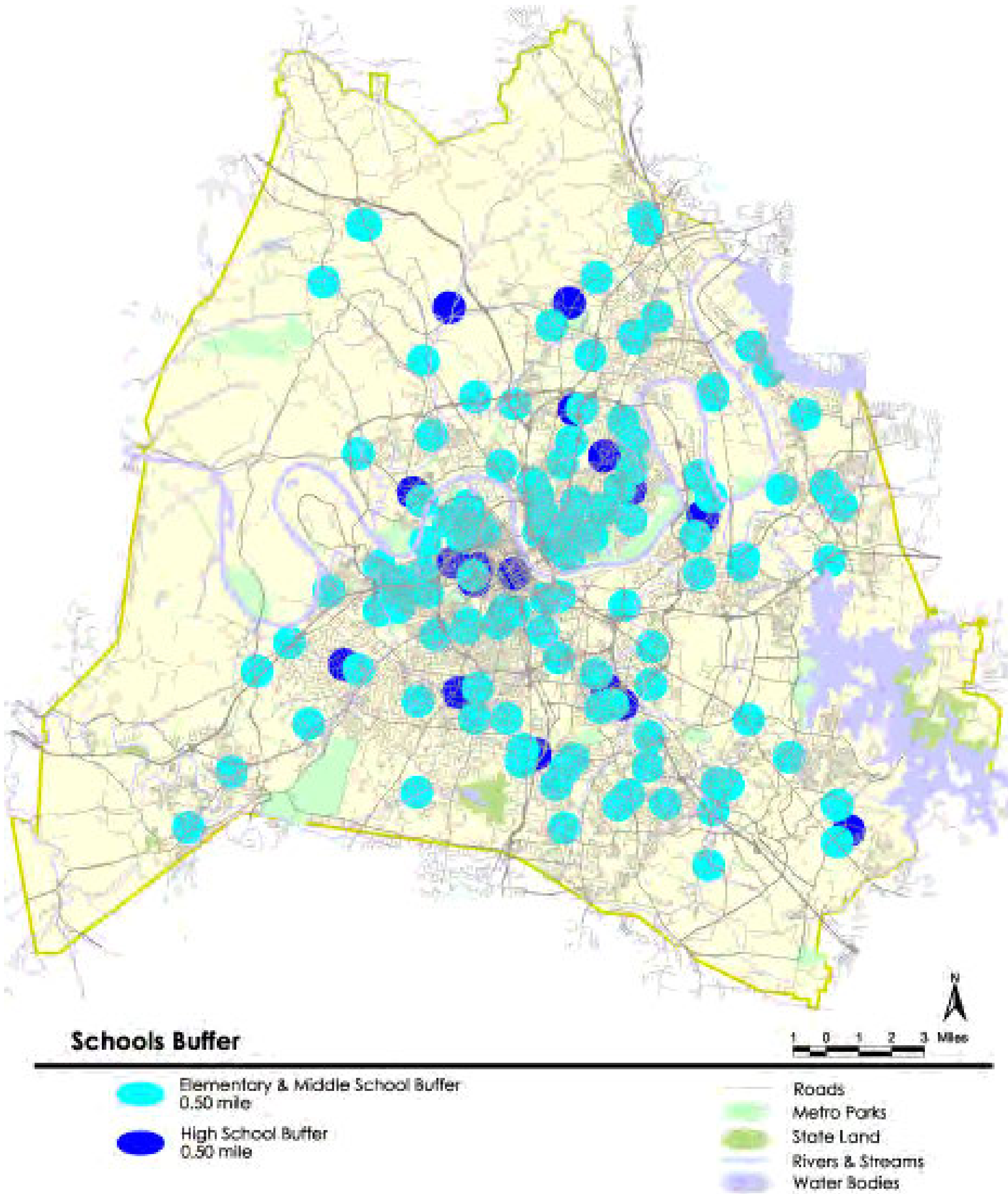
PAGE

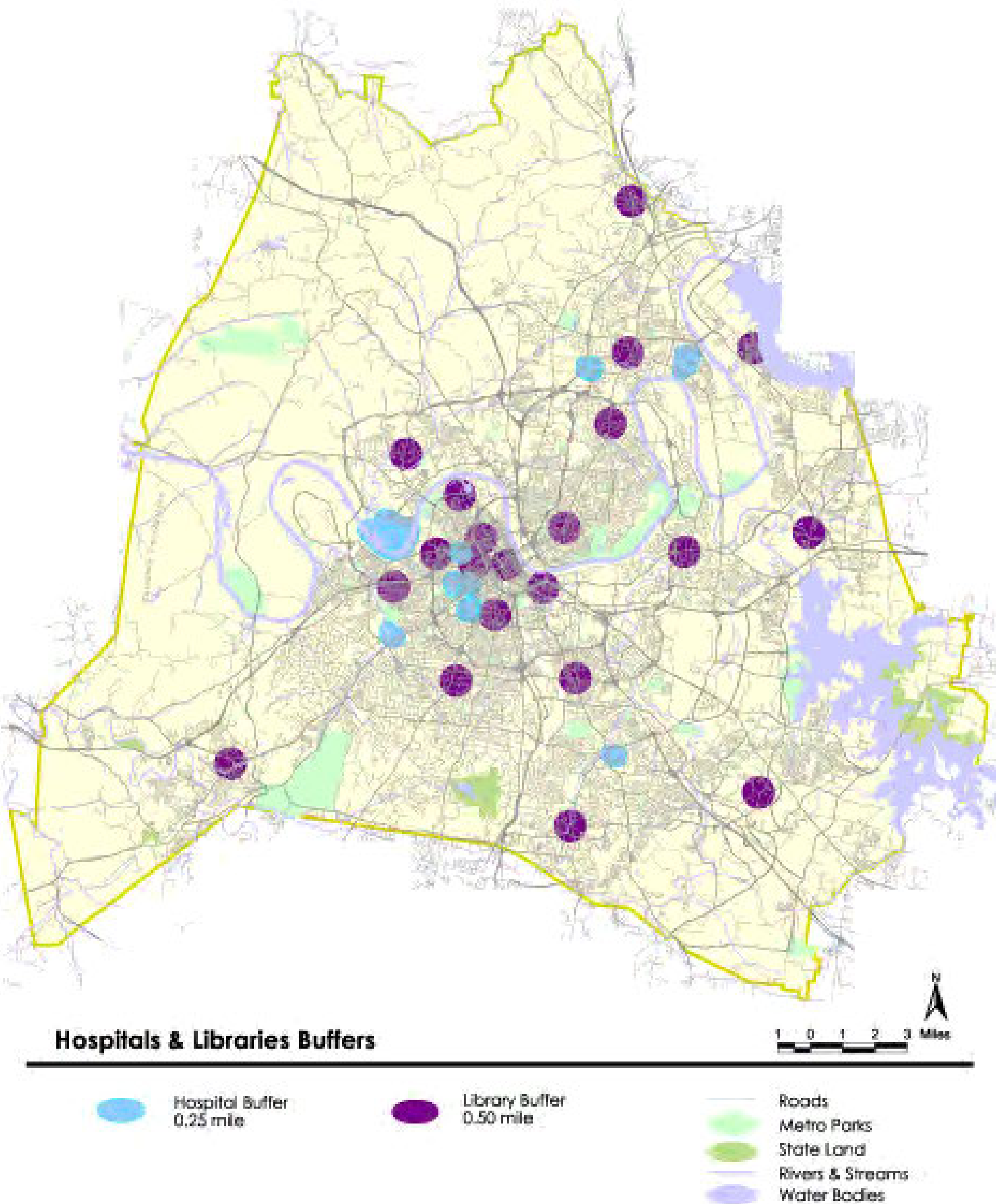
2008 Update note: As a result of the replacement of the SPI model with the new PGI and Matrix Model, Appendix D is superseded entirely by Amendment 1, Section 4.

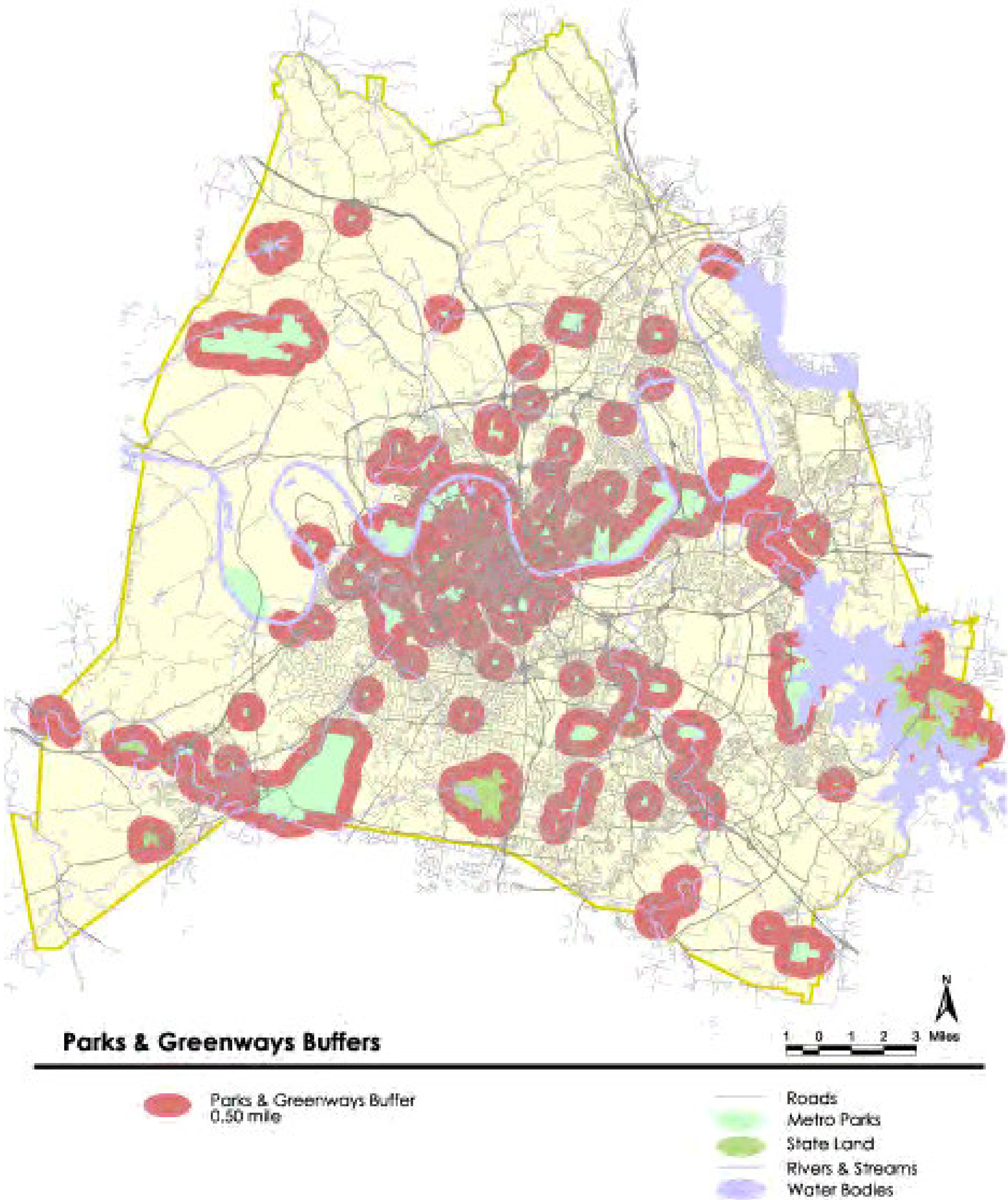
CALCULATION SHEET

STREET NAME				
FROM				
TO				
FACTORS			**SUBTOTAL**	**SCORE**
TRANSECT FACTORS				
Core		add 8		
Center		add 8		
Neighborhood		add 6		
	0.25 mi radius of "neighborhood center" or "commercial corridor"	add 2		
District	Medical center	add 2		
	Industrial	add 2		
Suburban		add 2		
	0.25 mi radius of "neighborhood center" or "commercial corridor" in Neighborhood Transect	add 2		
Rural Reserve		subtract 2		
Preserve		subtract 2		
TRIP GENERATOR - 1/2 MILE RADIUS				
Public Schools	Elementary/Middle	add 8		
	High	add 4		
Libraries and Civic Buildings		add 5		
Parks and Greenways		add 5		
Colleges and Universities		add 6		
Senior and Assisted Living Facilities		add 4		
Public Housing		add 6		
TRIP GENERATOR - 1/4 MILE RADIUS				
Hospitals		add 4		
Transit Route		add 6		
OTHER				
Arterial Roads		add 4		
Collector Roads		add 2		
Urban Services District		add 2		
Missing segment (within 0.25 mi of existing		add 4		
GRAND TOTAL				


Neighborhood Commercial Buffer
1 0 1 2 3 Miles
N
Neighborhood Commercial Buffer 0.25 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


Schools Buffer
1 0 1 2 3 Miles
N
Elementary & Middle School Buffer
0.50 mile
High School Buffer
0.50 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


Hospitals & Libraries Buffers
1 0 1 2 3 Miles
N
Hospital Buffer 0.25 mile
Library Buffer 0.50 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


Parks & Greenways Buffers
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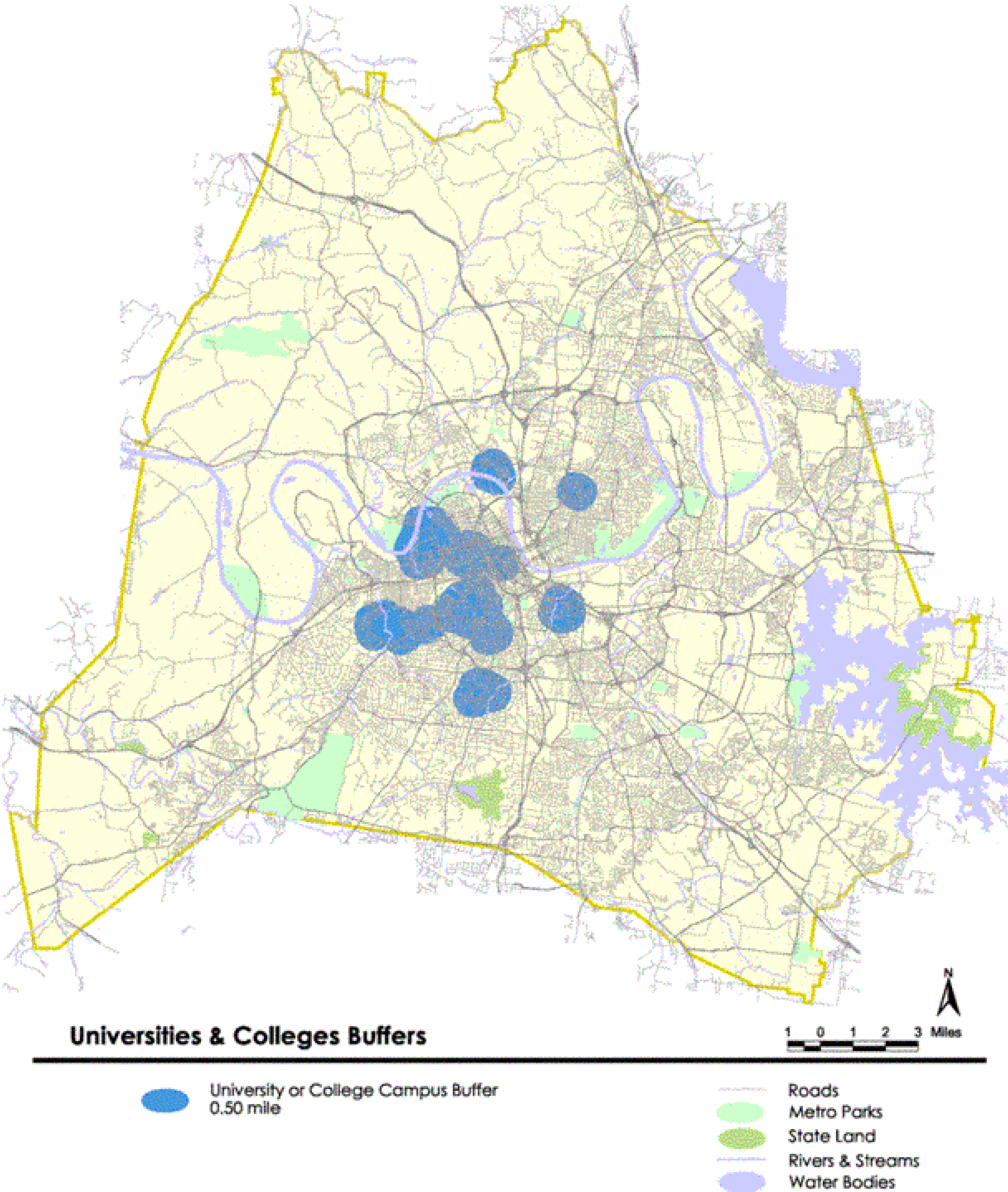
N
Parks & Greenways Buffer
0.50 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


N
Universities & Colleges Buffers
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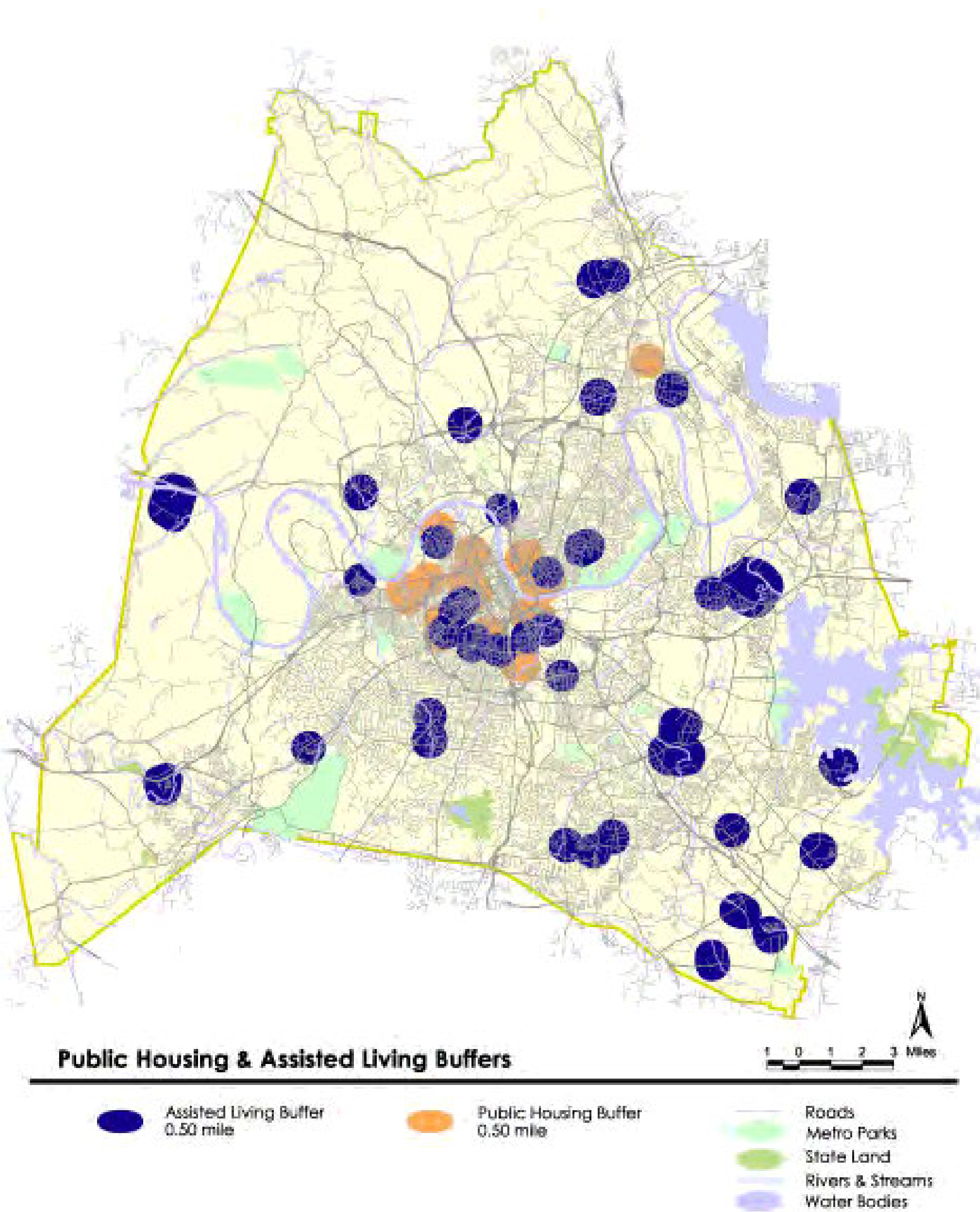
University or College Campus Buffer
0.50 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


Public Housing & Assisted Living Buffers
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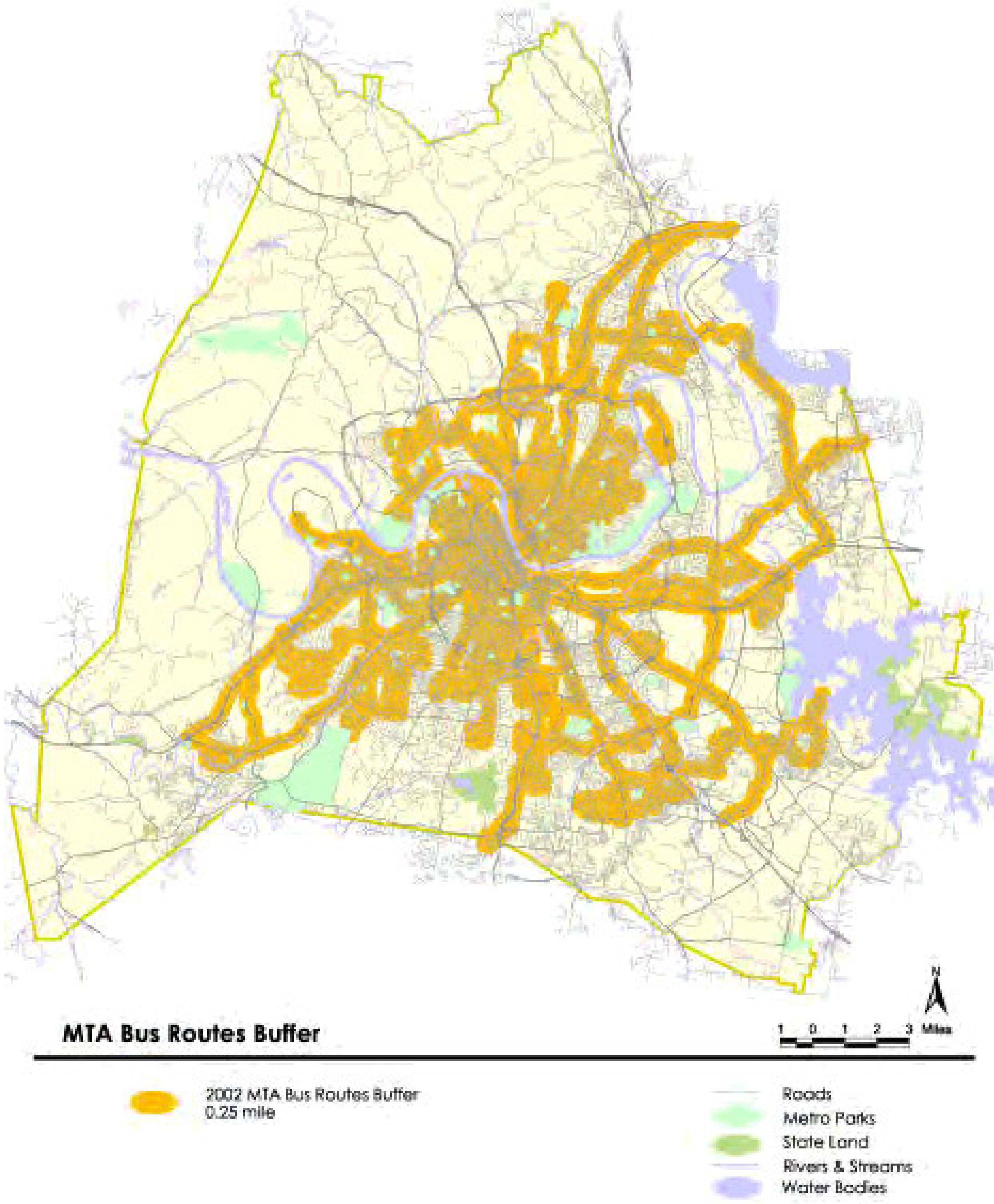
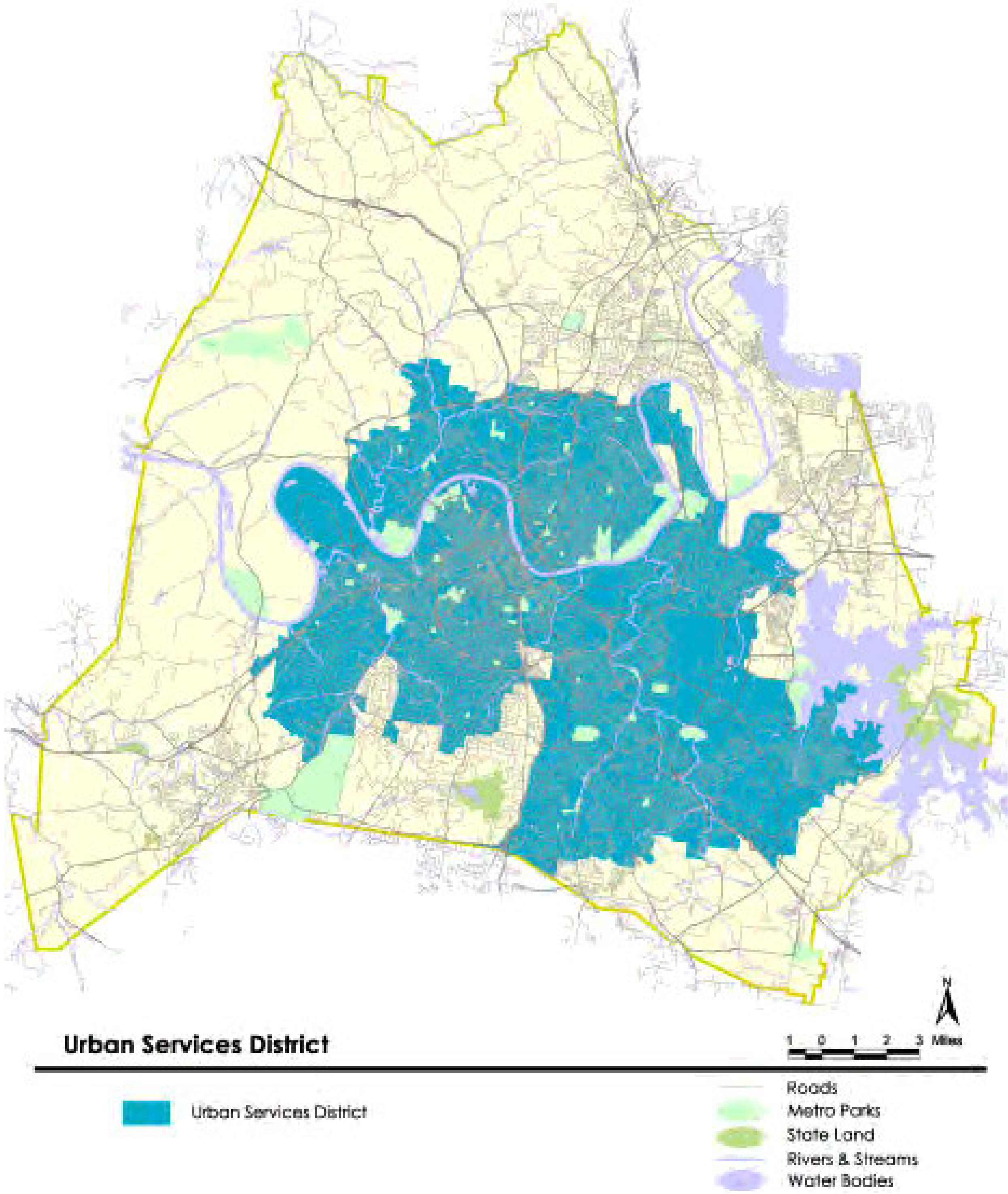
N
Assisted Living Buffer 0.50 mile
Public Housing Buffer 0.50 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


MTA Bus Routes Buffer
N
1 0 1 2 3 Miles
2002 MTA Bus Routes Buffer
0.25 mile
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies

Arterials & Collectors

Existing Arterial Roads (2002)
Existing Collector Roads (2002)
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies


Urban Services District
1 0 1 2 3 Miles
Urban Services District
Roads
Metro Parks
State Land
Rivers & Streams
Water Bodies

APPENDIX E:
BICYCLE COMPATIBILITY INDEX RESULTS

2008 Update note: The 2008 Updates for the roadway segments inventoried for the Bicycle Compatibility Index can be found in Amendment 1, Section 5

The Bicycle Compatibility Index (BCI), which was developed by the FHWA, is a quantitative process by which the compatibility of a street with bicycle travel can be objectively evaluated. As shown in the table below, the BCI predicts the overall comfort level rating of a bicyclist for a given roadway segment. This compatibility level is based on certain characteristics that are discussed in Chapter 4 of the report. The compatibility levels correspond to the suitability map, Figure 4.1 of report, as follows:

Bicycle Compatibility Index	Bicycle Suitablity
Extremely High	Most Suitable
Very High	More Suitable
Moderately High	Suitable
Moderately Low	Less Suitable
Very Low	Least Suitable
Extremely Low	

The compatibility levels for the roadway segments inventoried are listed in this table:

Road name	From	To	Compatibility Level
1st Ave	Union St	Broadway	Very Low
1st Ave	Broadway	Demonbreun St	Moderately Low
1st Ave	Demonbreun St	Peabody St	Moderately Low
2nd Ave	Ensley Blvd	Chestnut St	Moderately Low
2nd Ave	Chestnut St	Lafayette St	Very Low
2nd Ave	Lafayette St	Demonbreun St	Very Low
2nd Ave	Demonbreun St	Broadway	Moderately Low
3rd Ave	Clay St	Garfield St	Moderately High
3rd Ave	Garfield St	Van Buren St	Moderately High
3rd Ave	Van Buren St	Madison St	Moderately High
3rd Ave	Madison St	Railroad	Moderately High
3rd Ave	Railroad	Charlotte Ave	Moderately Low
4th Ave	Broadway	Peabody St	Very Low
4th Ave	Peabody St	Nolensville Rd	Moderately Low
6th Ave	Bass St	Mulberry St	Moderately High
6th Ave	Mulberry St	Lafayette St	Moderately High

Road name	From	To	Compatibility Level
6th Ave	Lafayette St	Franklin St	Moderately High
6th Ave	Franklin St	Demonbreun St	Moderately High
6th Ave	Demonbreun St	Broadway	Moderately High
6th Ave	Broadway	Charlotte Ave	Moderately Low
8th Ave	I-40 / I-65	Jefferson St	Moderately Low
8th Ave	Jefferson St	James Robertson Pkwy	Moderately Low
8th Ave	Church St	Lafayette St	Extremely Low
8th Ave	Lafayette St	I-40 / I-65	Moderately Low
8th Ave / Franklin Pk	I-40 / I-65	Douglas Ave	Very Low
10th St	Woodland St	Shelby Ave	Moderately Low
10th Ave	I-440	Halcyon Ave	Moderately High
10th Ave	Halcyon Ave	Lawrence Ave	Moderately High
10th Ave	Lawrence Ave	Acklen Ave	Moderately High
11th St	Shelby Ave	Woodland St	Moderately Low
11th Ave	12th Ave	Charlotte Ave	Moderately Low
12th Ave	Charlotte Ave	Demonbreun St	Very Low
12th Ave	Demonbreun St	Division St	Very Low
12th Ave	Division St	Wedgewood Ave	Moderately Low
12th Ave	Wedgewood Ave	Ashwood Ave	Very Low
12th Ave	Ashwood Ave	Halcyon Ave	Moderately High
12th Ave	Halcyon Ave	Gale Ln	Moderately Low
18th Ave	Clarksville Pk	Cass St	Very Low
18th Ave	Charlotte Ave	Broadway	Very Low
18th Ave	Magnolia Blvd	Portland Ave	Moderately High
21st Ave	I-440	Fairfax Ave	Extremely Low
24th Ave	Blair Blvd	Bernard Ave	Moderately High
24th Ave	Bernard Ave	Fairfax Ave	Moderately High
24th Ave	Fairfax Ave	Blakemore Ave	Moderately Low
24th Ave	Blakemore Ave	Garland Ave	Moderately Low
25th Ave	Garland Ave	West End Ave	Moderately Low
25th Ave	West End Ave	Brandau Pl	Moderately Low
25th Ave	Brandau Pl	Patterson St	Moderately High
25th Ave	Patterson St	Charlotte Ave	Moderately High
28th Ave	Charlotte Ave	I-40	Moderately High
28th Ave	I-40	Jefferson St	Moderately Low
31st Ave	Natchez Trace	West End Ave	Very Low
31st Ave	West End Ave	Park Plz	Moderately High
31st Ave	Park Plz	Parthenon Ave	Moderately Low
46th Ave	Murphy Rd	Charlotte Ave	Moderately Low
46th Ave	Charlotte Pk	Michigan Ave	Moderately High
49th Ave	Delaware Ave	Michigan Ave	Moderately High
49th Ave	Michigan Ave	Kentucky Ave	Moderately High

Road name	From	To	Compatibility Level
49th Ave	Kentucky Ave	Dr. Walter S. Davis Blvd	Moderately High
Acklen Ave	Wedgewood Ave	12th Ave	Moderately Low
Alta Loma (Dry Creek)	Dickerson Pk	I-65	Moderately High
Alta Loma (Dry Creek)	I-65	Gallatin Pk	Moderately High
Andrew Jackson Pkwy	Chandler Rd	Highland View Dr	Moderately Low
Andrew Jackson Pkwy	Highland View Dr	Lebanon Pk	Moderately Low
Andrew Jackson Pkwy	Lebanon Pk	Saundersville Rd	Moderately Low
Antioch Pk	Blue Hole Rd	Haywood Ln	Very Low
Antioch Pk	Haywood Ln	Harding Pl	Very Low
Antioch Pk	Harding Pl	Nolensville Pk (McCall St)	Moderately Low
Apple Valley Rd	Campbell Rd	I-65	Moderately High
Ashland Dr	Otter Creek Rd	Kingsbury Dr	Moderately Low
Ashland City Hwy	Clarksville Pk	Briley Pkwy	Moderately High
Ashland City Hwy	Briley Pkwy	County Line	Very High
Baptist World Center Dr	W Trinity Ln	Weakley Ave	Moderately Low
Bass St	6th Ave	Fort Negley Blvd	Moderately High
Battery Ln / Harding Pl	General Lowrey Dr	Franklin Pk	Moderately Low
Beechwood Ave	21st Ave	12th Ave	Moderately Low
Bell Rd	New Hope Rd	Stewarts Ferry Pk	Very Low
Bell Rd	Stewarts Ferry Pk	Elm Hill Pike	Moderately Low
Bell Rd	Elm Hill Pike	Smith Springs Rd	Extremely Low
Bell Rd	Smith Springs Rd	Murfreesboro Pk	Moderately Low
Bell Rd	Murfreesboro Pike	Bell Forge Ln	Very Low
Bell Rd	Bell Forge Ln	I-24	Moderately High
Bell Rd	I-24	Blue Hole Rd	Very Low
Bellevue Rd	Old Hickory Blvd	Baugh Road	Moderately High
Belmont Blvd	Portland Ave	I-440	Very Low
Belmont Blvd	I-440	Woodmont Blvd	Moderately Low
Belmont Blvd	Woodmont Blvd	Shackleford Rd	Moderately Low
Ben Allen Rd	Dickerson Pk	Hart Ln	Moderately Low
Blair Blvd	Natchez Trace	21st Ave	Moderately Low
Blair Blvd	21st Ave	Belmont Blvd	Moderately Low
Blakemore Ave	Natchez Trace	21st Ave	Very Low
Blue Hole Rd	Bell Rd	Antioch Pk	Moderately Low
Brick Church Pk	West Trinity Ln	Ewing Dr	Moderately Low
Brick Church Pk	Ewing Dr	Old Hickory Blvd	Moderately Low
Brick Church Pk	Old Hickory Blvd	Hunter's Ln	Moderately Low
Briley Pkwy	I-40	Hydes Ferry Pk	Very Low
Broadmoor Rd	Dickerson Pk	Grinstead Pl (RR)	Moderately Low
Broadmoor Rd	Grinstead Pl (RR)	Gallatin Pk	Moderately Low
Broadway Ave	1st Ave	5th Ave	Very Low
Broadway Ave	5th Ave	7th Ave	Moderately Low
Broadway Ave	7th Ave	12th Ave	Very Low

Road name	From	To	Compatibility Level
Broadway Ave	12th Ave	West End Ave	Extremely Low
Brook Hollow Rd	Highway 70 S	Charlotte Pk	Moderately Low
Burkitt Rd	Old Hickory Blvd	Nolensville Pk	Moderately Low
Bush Rd	Ezell Rd	Quarry Site	Moderately High
Cane Ridge Rd	Bell Rd	Chimney Top Dr	Moderately Low
Cane Ridge Rd	Chimney Top Dr	502 Cane Ridge Rd	Moderately High
Cane Ridge Rd	502 Cane Ridge Rd	Old Hickory Blvd	Moderately Low
Cass St / Dominican Way	Metro Center Blvd	9th Ave	Moderately Low
Cass St	9th Ave	15th Ave	Moderately High
Cass St	15th Ave	18th Ave	Moderately Low
Centennial Blvd / Dr. Walter S. Davis Blvd	Ed Temple Blvd	44th Ave	Moderately Low
Centennial Blvd / Dr. Walter S. Davis Blvd	44th Ave	51st Ave	Extremely High
Centennial Blvd	51st Ave	63rd Ave	Moderately Low
Central Pk	Lebanon Pk	I-40 Ramp	Moderately Low
Central Pk	I-40 Ramp	Old Hickory Blvd	Very Low
Central Pk	Old Hickory Blvd	County Line	Moderately Low
Chandler Rd	Old Lebanon Dirt Rd	4417 Chandler Rd	Moderately Low
Chandler Rd	4417 Chandler Rd	Oakcrest Ln	Moderately Low
Chandler Rd	Oakcrest Ln	County Line	Moderately Low
Charlotte Ave	Courthouse	8th Ave	Moderately Low
Charlotte Ave	8th Ave	12th Ave	Very Low
Charlotte Ave	12th Ave	I-40 / I-65	Extremely Low
Charlotte Ave	I-40 / I-65	33rd Ave	Moderately Low
Charlotte Ave	33rd Ave	40th Ave	Very Low
Charlotte Ave	40th Ave	54th Ave	Extremely Low
Charlotte Ave	54th Ave	White Bridge Pk	Moderately High
Charlotte Pk	White Bridge Pk	Westboro Dr	Moderately High
Charlotte Pk	Westboro Dr	Hillwood Blvd	Moderately Low
Charlotte Pk	Hillwood Blvd	I-40	Moderately Low
Charlotte Pk	I-40	River Rd	Moderately Low
Charlotte Pk	River Rd	County Line	Moderately Low
Cherokee Rd	Aberdeen Rd	West End Ave	Moderately High
Chestnut St / Edgehill Ave	Lafayette St	16th Ave	Moderately High
Chestnut St / Edgehill Ave	16th Ave	21st Ave	Moderately Low
Church St	8th Ave	9th Ave	Moderately Low
Church St	9th Ave	George L. Davis Blvd	Moderately Low
Church St	George L. Davis Blvd	15th Ave	Extremely Low
Church St	15th Ave	21st Ave	Very Low
Clarksville Pk	Clay St	Metrocenter Blvd	Very Low
Clarksville Pk	Metrocenter Blvd	Trinity Ln	Extremely Low
Clarksville Pk	Trinity Ln	Ashland City Hwy	Extremely Low
Clarksville Pk	Ashland City Hwy	Abernathy Rd	Very Low
Clarksville Pk	Abernathy Rd	Briley Pkwy	Moderately Low

Road name	From	To	Compatibility Level
Clarksville Pk	Briley Pkwy	County Line	Moderately High
Cloverland Dr	Copperfield Ct	Edmonson Pk	Moderately Low
Conference Dr	Gallatin Pk	Long Hollow Pk	Moderately Low
Copperfield Ct	Copperfield Way	Cloverland Dr	Moderately High
Copperfield Way	Old Hickory Blvd	Copperfield Ct	Moderately High
County Hospital Rd	John Mallette Dr	Camilia Caldwell Ln	Moderately Low
County Hospital Rd	Camilia Caldwell Ln	Briley Pkwy	Moderately High
Craighead St	Franklin Pk	Bransford Ave	Moderately Low
Craighead St	Bransford Ave	Nolensville Pk	Moderately Low
Cunniff Pkwy	I-65	Dickerson Pk	Moderately Low
Davidson Dr	Davidson Rd	Windrowe Dr	Moderately Low
Davidson Dr	Windrowe Dr	Charlotte Pk	Moderately High
Davidson Rd	Davidson Dr	Post Rd	Moderately High
Davidson St	Gateway Bridge	5th St	Extremely High
Davidson St	5th St	12th St	Very High
Davidson St	in Shelby Park	------	Moderately High
Delaware Ave	46th Ave	51st Ave	Moderately Low
Demonbreun St	1st Ave	3rd Ave	Moderately High
Demonbreun St	3rd Ave	4th Ave	Moderately Low
Demonbreun St	4th Ave	6th Ave	Moderately Low
Demonbreun St	6th Ave	7th Ave	Moderately Low
Demonbreun St	7th Ave	8th Ave	Moderately Low
Demonbreun St	8th Ave	9th Ave	Moderately Low
Demonbreun St	9th Ave	10th Ave	Moderately Low
Demonbreun St	10th Ave	12th Ave	Moderately Low
Demonbreun St	12th Ave	Roundabout	Moderately Low
Dickerson Pk / 1st St	Spring St Interchange	Douglas Ave	Very Low
Dickerson Pk	Douglas Ave	Hunters Ln	Extremely Low
Dickerson Pk	Hunters Ln	County Line	Very Low
Dodson Chapel Rd	Bell Rd	Old Hickory Blvd	Moderately Low
Donelson Pk	Harding Place	Murfreesboro Pk	Very Low
Donelson Pk	Murfreesboro Pk	Elm Hill Pk	Extremely Low
Donelson Pk	Elm Hill Pk	Lebanon Pk	Extremely Low
Douglas Ave	Gallatin Pk	Ellington Pkwy	Moderately Low
Douglas Ave	Ellington Pkwy	Dickerson Pk	Moderately High
Dr. D.B. Todd Jr. Blvd	Charlotte Ave	Jo Johnston Ave	Moderately Low
Dr. D.B. Todd Jr. Blvd	Jo Johnston Ave	Herman St	Moderately Low
Dr. D.B. Todd Jr. Blvd	Herman St	Jackson St	Moderately Low
Dr. D.B. Todd Jr. Blvd	Jackson St	Jefferson St	Moderately High
Dr. D.B. Todd Jr. Blvd	Jefferson St	Clay St	Moderately High
Due West Ave	Dickerson Pk	I-65	Moderately Low
Due West Ave	I-65	Gallatin Pk	Moderately Low

Road name	From	To	Compatibility Level
Earhart Rd	Central Pk	S. John Hager Rd	Moderately Low
Eastland Ave	Riverside Dr	Porter Rd	Moderately Low
Eastland Ave	Porter Rd	Gallatin Pk	Moderately High
East Trinity Ln	Dickerson Pk	Overby Rd	Moderately Low
East Trinity Ln	Overby Rd	Ellington Pkwy	Moderately High
East Trinity Ln	Ellington Pkwy	Gallatin Pk	Very Low
Eatons Creek Rd	Kings Ln	Ashland City Hwy	Very High
Edmondson Pk	Nolensville Pk	McMurray Dr	Moderately Low
Edmondson Pk	McMurray Dr	Old Hickory Blvd	Moderately Low
Edmondson Pk	Old Hickory Blvd	County Line	Very Low
Ed Temple Blvd	Clarksville Hwy	Jefferson St	Very Low
Elliston Pl	21st Ave	25th Ave	Very Low
Elm Hill Pk	Bell Rd	Patio Dr	Moderately Low
Elm Hill Pk	Patio Dr	McCrory Creek Rd	Very Low
Elm Hill Pk	McCrory Creek Rd	Donelson Pk	Moderately Low
Elm Hill Pk	Donelson Pk	Massman Dr	Very Low
Elm Hill Pk	Massman Dr	Fesslers Ln	Very Low
Elm Hill Pk	Fesslers Ln	Murfreesboro Pk	Very Low
Elmington Ave	Richardson Ave	West End Ave	Moderately High
Elysian Fields Rd	Trousdale Dr	Nolensville Pk	Moderately Low
Ensley Blvd	2nd Ave	Moore Ave	Moderately Low
Ewing Dr	Knight Dr	Dickerson Pk	Very Low
Fairfax Ave	21st Ave	Natchez Trace	Moderately Low
Fairfax Ave	Natchez Trace	Chesterfield Ave	Very High
Fairfield Ave	Murfreesboro Pk	Hermitage Ave	Moderately High
Fern Ave	Dickerson Pk	Brick Church Pk	Moderately Low
Fern Ave	Brick Church Pk	Weakley Ave	Moderately Low
Fesslers Ln	Hermitage Ave	Murfreesboro Pk	Very Low
Fort Negley Blvd	Bass St	Hamilton Ave	Moderately Low
Franklin Limestone Rd	Murfreesboro Pk	Quarry Entrance	Moderately Low
Franklin Limestone Rd	Quarry Entrance	Antioch Pk	Moderately Low
Franklin Pike Circle	Old Hickory Blvd	Regent Dr	Moderately Low
Franklin Pk	Douglas Ave	Kirkwood Ave	Moderately High
Franklin Pk	Kirkwood Ave	Woodmont Blvd	Moderately High
Franklin Pk	Woodmont Blvd	Otter Creek Road	Very Low
Franklin Pk	Otter Creek Road	Old Hickory Blvd	Moderately High
Gale Ln	Franklin Pk	Belmont Blvd	Moderately High
Gallatin Ave	Main Street	Eastland Ave	Moderately Low
Gallatin Ave	Eastland Ave	Cahal Ave	Very Low
Gallatin Pk	Cahal Ave	Iverson Ave	Very Low
Gallatin Pk	Iverson Ave	Briley Pkwy	Moderately Low
Gallatin Pk	Briley Pkwy	Lakewood Dr	Extremely Low

Road name	From	To	Compatibility Level
Gallatin Pk	Lakewood Dr	Madison St	Moderately Low
Gallatin Pk	Madison St	County Line	Moderately Low
Garland Ave	24th Ave	25th Ave	Moderately Low
Granny White Pk	Maryland Way	Tyne Blvd	Moderately Low
Granny White Pk	Tyne Blvd	Shackleford Rd	Moderately Low
Granny White Pk	Shackleford Rd	Grandview Dr	Moderately Low
Granny White Pk	Grandview Dr	Gale Ln	Very Low
Great Circle Rd	Metrocenter Blvd	Vantage Way	Moderately Low
Greenfield Ave	Golf St	Gallatin Pk	Moderately Low
Harding Pl	Harding Rd	Windsor Dr	Moderately Low
Harding Pl	Windsor Dr	Belle Meade Blvd	Moderately Low
Harding Pl	Belle Meade Blvd	Hillsboro Pk	Moderately Low
Harding Pl	Hillsboro Pk	General Lowrey Dr	Moderately Low
Harding Pl	Franklin Pk	I-65	Moderately High
Harding Pl	I-65	Timberhill Dr	Very Low
Harding Pl	Timberhill Dr	Nolensville Rd	Moderately Low
Harding Pl	Nolensville Pk	I-24	Extremely Low
Harding Pl	I-24	Ezell Rd	Moderately Low
Harding Pl	Ezell Rd	Donelson Pk	Moderately Low
Harding Pk	Bosley Springs Rd	Hillwood Blvd	Extremely Low
Harding Pk	Hillwood Blvd	Leake Ave	Moderately Low
Harding Pk	Leake Ave	Highway 70 S	Moderately Low
Harpeth Bend Dr	Highway 100	Beech Bend Dr	Extremely High
Hart Ln / Ben Allen Rd	Saunders Ave	Ellington Pkwy	Very Low
Hart Ln	Ellington Pkwy	Dickerson Pk	Moderately Low
Trousdale Dr	Hill Rd	Hearthstone Ln	Moderately High
Herman St	8th Ave	12th Ave	Moderately High
Herman St	12th Ave	19th Ave	Moderately Low
Herman St	19th Ave	21st Ave	Moderately High
Herman St	21st Ave	28th Ave	Moderately High
Hermitage Ave	Peabody St	RR Crossing	Very Low
Hermitage Ave	RR Crossing	Spence Ln	Very Low
Hicks Rd	Sawyer Brown Rd	Highway 70 S	Moderately Low
Highway 70 S	Harding Rd / Hwy 70 Split	Old Harding Pk	Very Low
Highway 70 S	Old Harding Pk	Old Hickory Blvd	Moderately Low
Highway 70 S	Old Hickory Blvd	Sawyer Brown Rd	Very Low
Highway 70 S	Sawyer Brown Rd	I-40	Very Low
Highway 70 S	I-40	Charlotte Pk	Moderately Low
Highway 96	Highway 100	County Line	Very High
Highway 100	W. Tyne Blvd	Old Hickory Blvd	Moderately High
Highway 100	Old Hickory Blvd	County Line	Moderately Low
Hill Rd	Franklin Pike Cr	Hill Rd 657	Moderately Low
Hill Rd	657 Hill Rd	Hill Rd Cir	Moderately Low

Road name	From	To	Compatibility Level
Hill Rd	Woodridge Ct	Old Hickory Blvd	Moderately Low
Hill Rd Cr	Hill Rd	Woodridge Ct	Moderately Low
Hillsboro Pk	Old Hickory Blvd	Harding Pl	Very Low
Hillsboro Pk	Harding Pl	Graybar Ln	Moderately Low
Hillsboro Pk	Graybar Ln	I-440	Very Low
Hillwood Blvd	Charlotte Pk	Harding Pk	Moderately Low
Hobson Pk	Murfreesboro Pk	County Line	Moderately High
Hogan Rd	Franklin Pk	Overton Rd	Moderately Low
Hunter's Lane	Dickerson Pk	Brick Church Pk	Moderately Low
James Robertson Pkwy	Charlotte Ave	8th Ave	Moderately Low
James Robertson Pkwy	8th Ave	Church St	Extremely Low
Jefferson St	5th Ave	8th Ave	Very Low
Jefferson St	8th Ave	I-40	Very Low
Jefferson St	I-40	Ed Temple Blvd	Very Low
John Hager Rd	New Hope Rd	Earhart Rd	Moderately Low
John Merritt Blvd	Ed Temple Blvd	39th Ave	Moderately Low
Karen Dr	Knights of Columbus Blvd	Patricia Dr	Moderately Low
Kings Ln	Tucker Rd	Clarksville Pk	Moderately Low
Kings Ln	Clarksville Pk	Eatons Creek Rd	Moderately Low
Kingsbury Dr	Ashland Dr	Harpeth River Dr	Moderately High
Knight Dr	Whites Creek Pk	Brick Church Ln	Moderately Low
Knight Dr	Brick Church Ln	Ewing Dr	Moderately Low
Knight Dr	Ewing Dr	Whites Creek Pk	Very High
Knights of Columbus Blvd	McGavock Pk	Karen Dr	Moderately Low
Lafayette St	8th Ave	I-40	Very Low
Lakeview Dr	Overton Lea Rd	End	Moderately High
Lealand Ln	I-440	Maplehurst Ave	Moderately Low
Lealand Ln	Maplehurst Ave	Tyne Blvd	Moderately Low
Lealand Ln	Tyne Blvd	Overton Lea Rd	Moderately Low
Lebanon Pk	Omahundro Pl	Spence Ln	Moderately High
Lebanon Pk	Spence Ln	Briley Pkwy	Moderately High
Lebanon Pk	Briley Pkwy	Donelson Pk	Moderately Low
Lebanon Pk	Donelson Pk	Disspayne Dr	Very Low
Lebanon Pk	Disspayne Dr	Stones River	Moderately Low
Lebanon Pk	Stones River	County Line	Moderately High
Long Hollow Pk	Dickerson Pk	County Line	Moderately Low
Main St	Spring St	Cumberland River	Very Low
Mainstream Dr	Metrocenter Blvd	Great Circle Rd	Moderately High
McCroy Ln	Highway 100	Highway 70 S	Moderately High
McGavock Pk	Gallatin Pk	Riverside Dr	Moderately Low
McGavock Pk	Pennington Bend Rd	Meadowood Dr	Moderately Low
McGavock Pk	Meadowood Dr	Lebanon Pk	Moderately Low

Road name	From	To	Compatibility Level
McGavock Pk	Lebanon Pk	Elm Hill Pk	Very Low
McGavock Pk	Elm Hill Pk	Knights of Columbus Blvd	Moderately Low
McMurray Dr	Tusculum Rd	Brewer Dr	Moderately Low
McMurray Dr	Brewer Dr	Edmonson Pk	Moderately Low
Metrocenter Blvd	I-65	Clarksville Pk	Moderately Low
Morton Mill Rd	Old Harding Rd	Northridge Dr	Moderately High
Morton Mill Rd	Northridge Dr	Riverbend Ln	Moderately High
Murfreesboro Pk	I-65 / I-40	(RR) Menzler Rd	Extremely Low
Murfreesboro Pk	(RR) Menzler Rd	Briley Pkwy	Moderately Low
Murfreesboro Pk	Briley Pkwy	Donelson Pk	Moderately Low
Murfreesboro Pk	Donelson Pk	County Line	Extremely Low
Murphy Rd	West End Ave	Bowling Ave	Moderately Low
Murphy Rd	Bowling Ave	46th Ave	Moderately High
Myatt Dr	Spring Branch Rd	Anderson Ln	Extremely Low
Myatt Dr	Anderson Ln	Old Hickory Blvd	Very Low
Randy Rd	Old Hickory Blvd	Neely's Bend	Moderately Low
Nashboro Blvd	Bell Rd	Murfreesboro Pk	Moderately High
Natchez Trace	West End Ave	Blakemore Ave	Moderately Low
Natchez Trace	Blakemore Ave	Fairfax Ave	Moderately High
Natchez Trace	Fairfax Ave	Blair Blvd	Moderately Low
Natchez Trace	Blair Blvd	Woodlawn Dr	Moderately High
Natchez Trace Pkwy	Highway 100	County Line	Moderately Low
Neely's Bend	Gallatin Pk	Cumberland River	Very Low
Nesbitt Ln	Gallatin Pk	Heritage Dr	Moderately High
Nesbitt Ln	Heritage Dr	Ronnie Rd	Moderately High
Nesbitt Ln	Ronnie Rd	I-65	Moderately High
Nesbitt Ln	Old Hickory Blvd	End	Very High
New Hope Rd	Central Pike	John Hager Rd	Moderately High
Nolensville Pk	Wingrove St	I-440	Moderately High
Nolensville Pk	I-440	Thompson Ln	Moderately High
Nolensville Pk	Thompson Ln	Haywood Ln	Moderately Low
Nolensville Pk	Haywood Ln	Old Hickory Blvd	Moderately Low
Nolensville Pk	Old Hickory Blvd	County Line	Moderately Low
North Graycroft Ave	Nesbitt Ln	Slayton Dr	Moderately Low
North Graycroft Ave	Slayton Dr	Monticello Ave	Moderately High
Oakley Dr	Overton Rd	Cochran Dr	Moderately High
Old Charlotte Pk	Highway 70 S	County Line	Moderately Low
Old Harding Pk	Highway 100	Highway 70 S	Moderately Low
Old Hickory Blvd	River Rd	Old Charlotte Pk	Moderately Low
Old Hickory Blvd	Old Charlotte Pk	Charlotte Pk	Moderately High
Old Hickory Blvd	Charlotte Pk	Highway 70 S	Very Low
Old Hickory Blvd	Highway 70 S	Highway 100	Moderately Low

Road name	From	To	Compatibility Level
Old Hickory Blvd	Highway 100	Hillsboro Rd	Very Low
Old Hickory Blvd	Hillsboro Rd	Granny White Pk	Very Low
Old Hickory Blvd	Granny White Pk	Franklin Pk	Extremely Low
Old Hickory Blvd	Franklin Pk	Valley View Rd	Extremely Low
Old Hickory Blvd	Valley View Rd	Blue Hole Rd	Moderately Low
Old Hickory Blvd	Blue Hole Rd	Bell Rd	Moderately Low
Old Hickory Blvd	Bell Rd	I-40	Moderately Low
Old Hickory Blvd	I-40	Central Pk	Very Low
Old Hickory Blvd	Central Pk	Lebanon Pk	Moderately Low
Old Hickory Blvd	Lebanon Pk	Bennnet Dr	Very Low
Old Hickory Blvd	Bennnet Dr	Myatt Dr	Moderately Low
Old Hickory Blvd	Myatt Dr	Gallatin Pk	Moderately High
Old Hickory Blvd	Gallatin Pk	I-65	Moderately Low
Old Hickory Blvd	I-65	Dickerson Pk	Moderately High
Old Hickory Blvd	Dickerson Pk	Whites Creek Pk	Very Low
Old Hickory Blvd	Whites Creek Pk	Ashland City Hwy	Moderately Low
Old Hickory Blvd	Ashland City Hwy	Cumberland River	Moderately Low
Old Hickory Blvd	Burkitt Rd	Owen Dr	Moderately Low
Old Hickory Blvd	Owen Dr	Murfreesboro Rd	Moderately Low
Otter Creek Rd	Hillsboro Pk	Ashland Dr	Moderately High
Otter Creek Rd	Ashland Dr	Granny White Pk	Moderately Low
Otter Creek Rd	Granny White Pk	West of Radnor Lake Park	Moderately High
Otter Creek Rd	Inside Radnor Lake Park	------	Moderately High
Otter Creek Rd	East of Radnor Lake Park	Franklin Pk	Moderately Low
Overton Rd	Hogan Rd	Oakley Dr	Moderately Low
Overton Lea Rd	Lakeview Dr	Lealand Ln	Moderately Low
Park Pl	31st Ave	Parthenon Ave	Moderately Low
Patricia Dr	Karen Dr	Thompson Pl	Moderately High
Pennington Bend	McGavock Pk (W)	Music Valley Dr	Moderately Low
Pennington Bend	Music Valley Dr	McGavock Pk (E)	Moderately Low
Poplar Creek Rd	Old Harding Rd	Willow Oak Dr	Moderately Low
Poplar Creek Rd	Willow Oak Dr	Rolling River Pkwy	Moderately Low
Poplar Creek Rd	Rolling River Pkwy	River Fork Dr	Moderately Low
Poplar Creek Rd	River Fork Dr	McCrory Ln	Moderately Low
Portland Ave	18th Ave	Belmont Blvd	Moderately High
Post Rd	Hillwood Blvd	Highway 70 S	Moderately Low
Regent Dr	Franklin Pike Cr	Hogan Rd	Moderately High
River Rd	Charlotte Pk	Old Hickory Blvd	Moderately Low
Riverside Dr	Huntleigh Dr	Golf St	Very High
Rolling River Pkwy	Poplar Creek Rd	End	Extremely High
Ronnie Rd	Old Hickory Blvd	Nesbitt Ln	Moderately High
Rosedale Ave	Nolensville Pk	Craighead St	Moderately High

Road name	From	To	Compatibility Level
Saunders Ave / E. Marthona Rd	Hart Ln	Old Hickory Blvd	Moderately Low
Saundersville Rd	Andrew Jackson Pkwy	Shute Ln	Moderately Low
Sawyer Brown Rd	Old Harding Pk	Highway 70 S	Extremely High
Sawyer Brown Rd	Highway 70 S	Charlotte Pk	Moderately Low
Shelby Ave	Cumberland River	4th St	Moderately Low
Shelby Ave	4th St	5th St	Moderately Low
Shelby Ave	5th St	10th St	Moderately Low
Shelby Ave	10th St	14th St	Moderately Low
Shelby Ave	14th St	20th St	Very Low
Shephard Hills	Gallatin Pk	Spring Branch Rd	Moderately High
Shute Ln	Saundersville Rd	Old Hickory Blvd	Moderately Low
Smith Springs Rd	Bell Road	End	Moderately Low
Spence Ln	Murfreesboro Pk	Elm Hill Pk	Moderately Low
Spence Ln	Elm Hill Pk	Hermitage Ave / Lebanon Pk	Moderately Low
Spring Branch Rd	Shephard Hills Dr	Myatt Dr	Moderately High
Stewart's Ferry Pk	Lebanon Pk	Bell Rd	Very Low
Sweetbriar Ave	Granny White Pk	21st Ave	Moderately High
Temple Rd	Highway 100	Sneed Rd	Moderately Low
Thompson Ln	Bridge Dr (Crestridge)	Powell Ave	Very Low
Thompson Ln	Powell Ave	Thompson Ln / Briley Pkwy	Moderately Low
Thompson Ln	Thompson Ln / Briley Pkwy	Murfreesboro Pk	Moderately High
Thompson Pl	Patricia Dr	Murfreesboro Pk	Moderately High
Trinity Ln	Dickerson Pk	Brick Church Pk	Very Low
Trinity Ln	I-65	Baptist World Center Dr	Moderately Low
Trinity Ln	Baptist World Center Dr	Tucker Rd	Moderately Low
Buena Vista Pk	Tucker Rd	Clarksville Pk	Moderately Low
Tucker Rd	I-65	West Hamilton Rd	Very High
Tucker Rd	West Hamilton Rd	Trinity Ln	Moderately Low
Tulip Grove Rd	Central Pk	Lebanon Pk	Moderately Low
Tusculum Rd	Blue Hole Rd	Nolensville Pk	Moderately Low
Tusculum Rd	Nolensville Pk	McMurray Dr	Moderately Low
Tyne Blvd	Highway 100	Belle Meade Blvd	Moderately High
Tyne Blvd	Belle Meade Blvd	Hillsboro Pk	Moderately Low
Tyne Blvd	Hillsboro Pk	Franklin Pk	Moderately High
Una Antioch Pk	Antioch Pk	Piccadilly Row	Moderately Low
Una Antioch Pk	Piccadilly Row	Murfreesboro Rd	Moderately Low
Vantage Way	Metrocenter Blvd	Great Circle Rd	Moderately Low
Weakley Ave	Fern Ave	Baptist World Center Dr	Moderately High
Wedgewood Ave	21st Ave	Franklin Ave	Very Low
Wedgewood Ave	Franklin Ave	I-65	Very Low
Wedgewood Ave	I-65	Fairgrounds	Moderately Low
Wedgewood Ave	Fairgrounds	Nolensville Pk	Very High

Road name	From	To	Compatibility Level
West End Ave	Natchez Trace	Blakemore	Very Low
West End Ave	Blakemore Ave	Murphy Rd	Extremely Low
West End Ave	Murphy Rd	I-440	Moderately Low
West End Ave	I-440	Bosley Springs Rd	Very Low
West End Ave	Broadway split	25th Ave	Extremely Low
Westlawn Dr	Murphy Rd	Aberdeen Rd	Moderately High
White Bridge Pk	Harding Pk	Charlotte Pk	Very Low
Whites Creek Pk	Trinity Ln	Briley Pkwy	Moderately Low
Whites Creek Pk	Briley Pkwy	Buena Vista Pk	Moderately High
Whites Creek Pk	Buena Vista Pk	Old Hickory Blvd	Very High
Whites Creek Pk	Old Hickory Blvd	Old Clarksville Pk	Moderately Low
Whites Creek Pk	Old Clarksville Pk	I-24	Moderately Low
Whites Creek Pk	I-24	County Line	Moderately Low
Whitland Ave	West End Ave	Bowling Ave	Moderately High
Woodland St	5th Ave	10th Ave	Moderately Low
Woodland St	10th Ave	17th Ave	Moderately Low
Woodland St Bridge	-----	1st Ave	Very Low
Woodlawn Dr	Natchez Trace	21st Ave	Moderately Low
Woodmont Blvd	Harding Pk	Hillsboro Pk	Moderately High
Woodmont Blvd	Hillsboro Pk	Franklin Pk	Very Low

APPENDIX F: FEDERAL FUNDING SOURCES

The following is a list of funding sources available through TEA-21, the primary funding mechanism for bicycle and pedestrian projects that receive federal funds. Following the TEA-21 breakdown are more detailed, page-long summaries of a wide range of grant sources, including federal, state, and other local programs. Federal grant sources are listed first, followed by state, and regional or local programs. The TEA-21 funding sources are:

- *National Highway System* funds are for bicycle projects adjacent to any highway on the National Highway System, including Interstate Highways;
- *Surface Transportation Program (STP)* funds may be used for construction or non-construction projects that benefit bicycles and pedestrians. “Non-construction” projects are items such as maps, brochures, and public service announcements. These funds may be programmed to bring sidewalks and intersections into compliance with ADA regulations;
- Ten percent of STP funds are earmarked for *Transportation Enhancement Activities (TEAs).* There is a list of activities that are eligible under the TEA program, including bikeways, pedestrian walkways, and preservation of abandoned railway corridors;
- *Hazard Elimination and Railway-Highway Crossing Programs* account for another 10 percent of a state’s STP funds (see 2nd bullet). These funds should be used for inventory and/or to address safety concerns of motorists, pedestrians, and bicyclists;
- *Congestion Mitigation and Air Quality (CMAQ) Improvement Program* funds are similar to STP funds in that they may be used for construction or non-construction projects that benefit bicyclists and pedestrians;
- *Recreational Trails Program (RTP)* funds are different from other Federal Aid programs for bicycles and pedestrians in that they are set aside specifically for motorized and non-motorized trails. The RTP funds explicitly prioritize recreational facilities;
- The *Federal Lands Highway Program* will fund bicycle and pedestrian facilities as a provision of roads, highways, and parkways. This program is under the discretion of the appropriate Federal Land Agency or Tribal government;
- The *National Scenic Byways Program* funds bikeways and walkways along scenic routes;
- *Job Access and Reverse Commute Grants* may fund bicycle-related services intended to transport welfare recipients and eligible low-income individuals to and from employment;
- *High Priority Projects and Designated Transportation Enhancement Activities* are those projects specifically identified by TEA-21. These projects include bicycle, pedestrian, trail, and traffic calming projects throughout the nation;
- The TEA-21 legislation amended the *Urbanized Area Formula Grants, Capital Investment*

Grants and Loans, and *Formula Program for Other than Urbanized Area* transit funds, part of the Federal Transit Program, to include projects that improve bicycle and pedestrian access to transit facilities and vehicles. It includes a one percent set-aside for bicycle access, including bicycle storage facilities and pedestrian walkways and access.

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

Name of Funding Program:	**Transportation Equity Act for the 21st Century (TEA- 21)**
Funding Source:	Federal
Summary Description:	TEA-21 authorizes the Federal surface transportation programs for highways, highway safety and transit for the six year period from 1998-2003. There are general state and local improvements for highways and bridges that accommodate additional modes of transit. These improvements include capital costs, publicly owned intercity facilities, and bicycle and pedestrian facilities. TEA-21 will expire on September 30, 2003.
Eligible Applicants:	Cities, counties, transit operators. Special districts may apply with sponsorship from an eligible applicant.
Typical Funding Amounts:	Estimated at approximately $215 billion over the 6-year period, an increase of approximately $60 billion over ISTEA legislation.
Required Matching Funds:	A 20% match is required.
Procedure for Project Review and Selection:	Initiated projects must gain support of local government. Local government submits projects to the Metropolitan Planning Organization (MPO) for review and prioritization for inclusion in the Regional Transportation Improvement Plan (RTIP). Allocations are then made on the basis of priorities developed by the Long Range Transportation Plan (LRTP) and local MPO funding policies.
Schedule for Application Availability, Due Date, and Selection Date:	Requests for grants must be in by the middle of July. Proposals for grants must be in by the middle of September.
Key Changes from ISTEA To Tea-21:	TEA-21 makes 25% of new money above 1997 state TE funding levels transferable to other ISTEA programs, at the State's discretion.

Name of Funding Program:	**Surface Transportation Program Fund (STP) (Section 1108)**
Funding Source:	Federal
Summary Description:	The Surface Transportation Program is a block grant fund. Funds are used for roads, bridges, transit capital and pedestrian and bicycle projects. These projects include bicycle transportation facilities, bike-parking facilities, equipment for transporting bicycles on mass transit facilities, bike activated traffic control devices, preservation of abandoned railway corridors for bicycle and pedestrian trails, and improvements for highways and bridges. TEA-21 allows the transfer of funds from other TEA-21 programs to the STP Fund.
Eligible Applicants:	Cities, counties, transit operators, and Metropolitan Planning Organizations. Non-profit organizations and special districts may also apply with sponsorship from an eligible agency.
Typical Funding Amounts:	Approximately $154 million for FY 2002 in the State of Tennessee. The Nashville Area MPO receives about $9 million annually, which is shared by nine different jurisdictions.
Required Matching Funds:	A local match of 20% is required for bicycle and pedestrian projects, 11.5% is required for all other types of projects.
Procedure for Project: Review and Selection:	Allocations are made based on priorities developed by the LRTP in cooperation with local jurisdictions.
Schedule for Application Availability, Due Date, and Selection Date:	Based on a multi-year project selection process.
Key Changes from ISTEA To TEA-21:	Sidewalk improvements must comply with the Americans with Disabilities Act and are specifically eligible.

Name of Funding Program:	**Transportation Enhancements Program (Section 1201, paragraph 35)**
Funding Source:	Federal
Summary Description:	The TE Program is a 10% set aside fund from the Surface Transportation Program. Projects must have a direct relationship to the intermodal transportation system through function, proximity, or impact. This program has 12 activities that are eligible for funding. Two Enhancement Activities are specifically bicycle related: (1) provision of facilities for bicyclists and pedestrians, (2) preservation of abandoned railway corridors (including the conversion and use thereof for bicycle or pedestrian trails).
Eligible Applicants:	Local, regional and state public agencies, special districts, non-profit and private organizations. Cities, counties and transit operators must sponsor and administer the proposed projects.
Typical Funding Amounts:	Varies
Required Matching Funds:	A 12% local match is required.
Procedure for Project Review and Selection:	Each MPO programs TE projects into the Regional Transportation Improvement Program (RTIP). RTIP projects are then approved by the Federal Highway Administration and Federal Transit Administration in the Federal Street Transportation Improvement Program.
Schedule for Application Availability, Due Date, and Selection Date:	Check the RTIP.
Key Changes from ISTEA To TEA-21:	Eligible projects now include safety and educational activities for pedestrians and bicyclists, funds for tourist and welcome centers, environmental mitigation to reduce vehicle-caused wildlife mortality while maintaining habitat connectivity, and the establishment of transportation museums.

Name of Funding Program:	**Congestion Mitigation and Air Quality Improvement Program (CMAQ) (Section 1110)**
Funding Source:	Federal
Summary Description:	Funds are available for projects that will help attain National Ambient Air Quality Standards (NAAQS) identified in the 1990 federal Clean Air Act Amendments. Projects must come from jurisdictions in non-attainment areas. Eligible projects include bicycle and pedestrian transportation facilities intended for transportation purposes, bicycle route maps, bike activated traffic control devices, bicycle safety and education programs, and bicycle promotional programs.
Eligible Applicants:	Cities, counties, transit operators, and MPOs. Non-profit organizations and Special districts may also apply with sponsorship from an eligible agency.
Typical Funding Amounts:	Approximately $2 million for FY 2002 in the State of Tennessee.
Required Matching Funds:	A 20% local or state match is required.
Procedure for Project Review and Selection:	Initiated projects must gain support of local government. Local government submits projects to the MPO for review and prioritization for inclusion in the RTIP. Allocations are made on the basis of priorities developed in the RTP by the MPO in cooperation with local jurisdictions.
Schedule for Application Availability, Due Date, and Selection Date:	Based on a multi-year project selection process.
Key Changes from ISTEA to To TEA-21:	A small percentage of this increased funding can be transferred. (Section 1310)

Name of Funding Program:	**National Highway System Fund (NHS)**
Funding Source:	Federal
Summary Description:	NHS funds are to provide for an interconnected system of principal arterial routes. The programs' goal is to provide access to major population centers, international border crossings, transportation systems, meet national defense requirements, and serve interstate and interregional travel. This travel includes access for bicyclists and pedestrians. Facilities must be located and designed pursuant to an overall plan developed by each MPO and State, and incorporated into the RTIP.
Eligible Applicants:	State and local governments.
Typical Funding Amounts:	Approximately $108 million for FY 2002 in the State of Tennessee.
Required Matching Funds:	A local or state match of 20% is required.
Procedure for Project Review and Selection:	Initiated projects must gain support of local government. Local government then submits projects to the MPO for review and prioritization for inclusion in the RTIP. Allocations are then made on the basis of priorities developed by the RTP and local MPO funding policies.
Schedule for Application Availability, Due Date, and Selection Date:	Applications are accepted year round.
Key Changes from ISTEA To TEA-21:	NHS funds can now be spent on non-motorized projects within Interstate corridors. (Section 1202)

Name of Funding Program:	**Federal Lands Highway Program Fund**
Funding Source:	Federal
Summary Description:	This Discretionary Program provides funding for any kind of transportation project (including pedestrian and bicycle facilities) that are within, provide access to, or are adjacent to public lands. Facilities must be located and designed pursuant to an overall plan developed by each MPO and State, and incorporated into the RTIP.
Eligible Applicants:	Local jurisdictions, Bureau of Land Management (BLM), and the National Trail System Program.
Typical Funding Amounts:	Varies
Required Matching Funds:	No match required.
Procedure for Project Review and Selection:	This is a discretionary program. Initiated projects must gain support from an eligible agency. The eligible agency submits the project. The Forest Service, and the Federal Department of Transportation meet annually to discuss proposed projects and later approve specific projects by consensus.
Schedule for Application Availability, Due Date, and Selection Date:	Application deadline is the 1st of July.
Key Changes from ISTEA To TEA-21:	Increased funding.

Name of Funding Program:	**Scenic Byways Program Fund**
Funding Source:	Federal
Summary Description:	This program provides funding for the planning, design, and development of a State Scenic Byways Program. Priority is given to designated scenic byways, proposals with specific intent, and projects established under partnerships. Funds may be used for the construction of facilities along the highway for the use of pedestrians and bicyclists, including pedestrian/bicycle access, safety improvements, and rest areas.
Eligible Applicants:	Local government agencies.
Typical Funding Amounts:	Varies
Required Matching Funds:	A 20% local match is required.
Procedure for Project Review and Selection:	The local jurisdiction, and the MPO must formally support the byway. The local agencies must contact TDOT district office local representatives, delineate a corridor, hold public hearings and adopt a scenic highway element in their zoning ordinances. TDOT reviews the proposal. If it is approved, the FHWA allocates the funds.
Schedule for Application Availability, Due Date, and Selection Date:	A call for projects is sent out in February, deadline date for submittal is June 30th.
Key Changes from ISTEA To TEA-21:	None

Name of Funding Program:	**Bridge Repair and Replacement Program**
Funding Source:	Federal
Summary Description:	Funds are available for bridge rehabilitation and replacement. All bridges are eligible, and on-system bridges are eligible for discretionary funding. When a highway bridge deck is being replaced or rehabilitated with federal funds, the bridge-deck must provide bicycle accommodations, if access is not fully controlled. Bicycles are permitted to operate at each end of the bridge, if it is determined that bicycles can be accommodated at a reasonable cost. Bridge projects must be incorporated into the RTIP.
Eligible Applicants:	City and county agencies, park and recreation districts. All agencies must have a city, county or transit operator as a sponsor.
Typical Funding Amounts:	Approximately $96 million for FY 2002 in the State of Tennessee.
Required Matching Funds:	No local match requirements specifically for bicycle accommodations.
Procedure for Project Review and Selection:	Local agencies submit applications to develop a priority list for bridge rehabilitation or replacement. The FHWA determines eligibility of bridges based on a coding system. Bridges must have a deficiency rating of 80 or less for rehabilitation and 50 or less for replacement. Once a year the agencies select two of the worst five local bridges in the State.
Schedule for Application Availability, Due Date, and Selection Date:	Project selection is made in October.
Key Changes from ISTEA To TEA-21:	Increased funding.

Name of Funding Program:	**National Recreational Trails Fund (Section 1112)**
Funding Source:	Federal
Summary Description:	Funds are available for recreational trails for use by bicyclists, pedestrians, and other non-motorized and motorized users. Projects must be consistent with a Statewide Comprehensive Outdoor Recreation Plan (SCORP). Projects include development of urban trail links, maintenance of existing trails, restoration of trails damaged by use, trail facility development, provision of access for people with disabilities, administrative costs, environmental and safety education programs, acquisition of easements, fee simple title for property and construction of new trails.
Eligible Applicants:	Private individuals or organizations, counties, cities, and other government agencies.
Typical Funding Amounts:	Approximately $2 million for FY 2002 in the State of Tennessee.
Required Matching Funds:	The State is required to use a portion of its tax revenue from fuel for off-highway recreation purposes.
Procedure for Project Review and Selection:	Projects must gain support of eligible agencies, eligible agencies submit applications to the State Recreational Trails Advisory Board which ranks projects according to State-wide criteria.
Schedule for Application Availability, Due Date, and Selection Date:	Applications are due October 1.
Key Changes from ISTEA To TEA-21:	Significant increases in funding.

Name of Funding Program:	**National Highway Safety Act (Section 402)**
Funding Source:	Federal
Summary Description:	The Highway Safety Program is a non-capital safety project grant program under which states may apply for funds for certain approved safety programs and activities. There is a priority list of projects for which an expedited funding mechanism has been developed; bicycle and pedestrian safety programs have been included on this list. Eligible states must adopt a Highway Safety Plan (HSP) reflecting state highway problems. Eligible projects include pedestrian and bicycle safety programs, program implementation, and identification of highway hazards.
Eligible Applicants:	State departments, cities, counties, school and special districts.
Typical Funding Amounts:	Approximately $3 million for FY 2002 in the State of Tennessee.
Required Matching Funds:	A 20% match is required.
Procedure for Project Review and Selection:	The State administers the program. Eligible applicants are asked to submit a proposal for approval. The program is approved by the NHTSA/FHWA. Projects related to bicycle safety education and law enforcement would be eligible for NHTSA funds.
Schedule for Application Availability, Due Date, and Selection Date:	The proposal deadline is April 15th. Applications are accepted year round.
Key Changes in TEA-21:	Increased funding.

Name of Funding Program:	**Transit Enhancement Activity (Section 3003)**
Funding Source:	Federal
Summary Description:	This is a new program created by TEA-21. This program has a one percent set-aside of Urban Area Formula transit grants (3007). The funding can be used for, among other things, bicycle and pedestrian access to mass transportation, including bicycle storage facilities and installing equipment for transporting bicycles on mass transportation vehicles.
Eligible Applicants:	Regional Transportation Planning Agency, Federal, State, and Local Public Agencies
Typical Funding Amounts:	Varies
Required Matching Funds:	A 5% match required.
Procedure for Project Review and Selection:	Public transit operators decide who and where the funds are appropriated.
Schedule for Application Availability, Due Date, and Selection Date:	Transit projects that use Urban Area Formula transit grants are analyzed. Those projects meeting the requirements of a Transit Enhancement Activity are then designated and Transit Enhancement funds are awarded to those projects.
Key Changes from ISTEA To TEA-21:	This is a new program.

Name of Funding Program:	**Highway Safety, Research, and Development Fund (Section 2003)**
Funding Source:	Federal
Summary Description:	Provides funding for research on all phases of highway safety and traffic conditions. Uses training and education of highway safety personnel, research fellowships in highway safety, development of improved accident investigation procedures, emergency service plan, and demonstration projects. Projects include improving pedestrian safety through education, police enforcement, and traffic engineering. Projects must be incorporated into the RTIP.
Eligible Applicants:	Cities, counties, and state agencies. Programs are often run by local community traffic safety programs.
Typical Funding Amounts:	Varies
Required Matching Funds:	A local match of 25% is required.
Procedure for Project Review and Selection:	Eligible agencies submit applications to the FHWA/NHTSA. Those related to bicycle safety education and law enforcement would be eligible for NHTSA funds.
Schedule for Application Availability, Due Date, and Selection Date:	September 1st
Key Changes from ISTEA To TEA-21:	None

Name of Funding Program:	**Schools and Roads Grants to States**
Funding Source:	Federal
Summary Description:	Funds are used for public roads and schools that are located in the same county as a National Forest. The program's intention is to maintain county roads that lead to Forest Service roads.
Eligible Applicants:	Cities and counties containing National Forest Land.
Typical Funding Amounts:	Varies
Required Matching Funds:	No match required.
Procedure for Project Review and Selection:	Applicants must contact local governments. Local governments disburse the funds for projects.
Schedule for Application Availability, Due Date, and Selection Date:	Application deadline is annually in spring.

Name of Funding Program:	**Section 3 Mass Transit Capital Grants**
Funding Source:	Federal
Summary Description:	This discretionary funding program is used to finance mass transit systems, especially rail systems in urbanized areas with populations over 50,000 or more. Projects include station access, including bicycle and pedestrian access, and American with Disabilities Act projects, implementation of shelters, bicycle parking facilities, racks, and other equipment for transporting bicycles on transit vehicles.
Eligible Applicants:	States, regional and local governments, appropriate boards and commissions, and transit operators.
Typical Funding Amounts:	
Required Matching Funds:	A local match of 10% is required for bicycle projects, 5% for ADA projects.
Procedure for Project Review and Selection:	Projects must be included in the RTIP. Congress allocates funds in a political process. No applications are necessary, since no formula exists.
Schedule for Application Availability, Due Date, and Selection Date:	On-going.

Name of Funding Program:	**Section 9 Mass Transit Formula Grants**
Funding Source:	Federal
Summary Description:	Formula grants to cover mass transportation capital and operating expenses. Eligible projects include construction, maintenance, improvement, and acquisition of transit facilities and access projects for bicycles.
Eligible Applicants:	Urban areas with a population of 50,000 or more are eligible if a comprehensive mass transportation planning process exists. State, and local governments, and transit operators are eligible. Public and private non-profit organizations are eligible for subgrants. Projects must be consistent with the LRTP and must be incorporated into the RTIP.
Typical Funding Amounts:	Varies
Required Matching Funds:	A local match of 10% is required for bicycle projects.
Procedure for Project Review and Selection:	Applicants submit proposals to the local MPOs office.
Schedule for Application Availability, Due Date, and Selection Date:	The application deadline is September.

APPENDIX G:
PUBLIC OPINION SURVEY RESULTS

Attitudes Towards Sidewalks & Bike Paths in the Nashville Area

Summary

Overall, forty-three percent (43%) of the respondents said that they have sidewalks in their area. Area 1 (See map, Page G.3) had the lowest percentage of respondents saying they had sidewalks in their area at 12%; Area 8 had the highest percentage of respondents saying they had sidewalks in their area at 71%.

Forty-five percent (45%) of the respondents said that they agree with the statement "In Nashville, walking is a safe, convenient, and practical way to get from one place to another." Respondents who use the sidewalks usually use them for walking or running, and use them in their neighborhood or apartment complex. Seventy-one percent (71%) of the respondents that did not use sidewalks said it was because there were no sidewalks in their area.

Thirty-one percent (31%) of the respondents said that they agree with the statement "In Nashville, bicycling is a safe, convenient, and practical way to get from one place to another." Nearly three quarters of the respondents said that they do not ride bikes. Those who do ride bikes do so for recreation or exercise, and ride them around their neighborhood or apartment complex. Over half of the respondents who do not ride bikes said that it was because they do not own a bike.

Response to adding more sidewalks and bike lanes was positive with eighty-one percent (81%) of the respondents saying that they would like to have more sidewalks and bike lanes in Davidson County. Area 4 had the lowest percentage of respondents saying they wanted more sidewalks and bike lanes at 62%; Area 8 had the highest percentage of respondents saying they wanted more sidewalks and bike lanes at 93%.

Purpose

RPM & Associates, as part of a larger project to develop a strategic plan for Nashville sidewalks and bike paths, wants to determine how people perceive, use, and support them. They want to know:

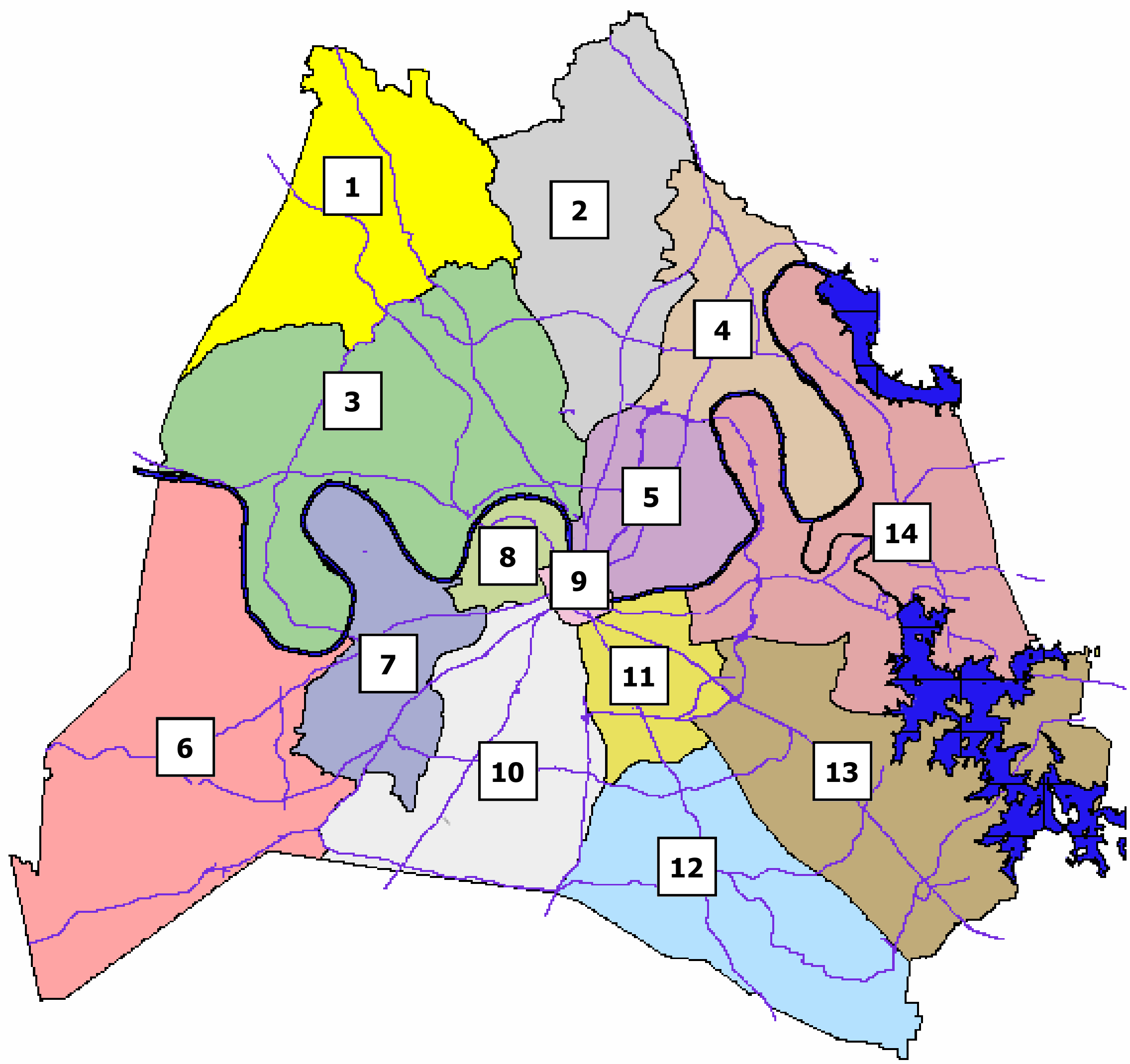
1. Do the people of Nashville use sidewalks and bike facilities now?
    - If so, which ones?
    - For what purposes?
    - How frequently?
    - If not, why not?

2. If sidewalks and bike paths were built to meet the wants of the respondents, would they use and support them?
    - What would they like?
    - How could they better meet their needs and wants
    - What concerns, problems do they see?

3. How do use, support, and demand for sidewalks and bike paths vary by demographics?
    - Age, income, ethnic groups, etc.
    - Geographic areas of the city
    - Disabilities, other special needs

Methodology

Perdue Research Group conducted a total of 1547 telephone interviews with respondents in and around the Metro Nashville area. The area was split up into fourteen different areas according to Census Track Sub Area Planning.



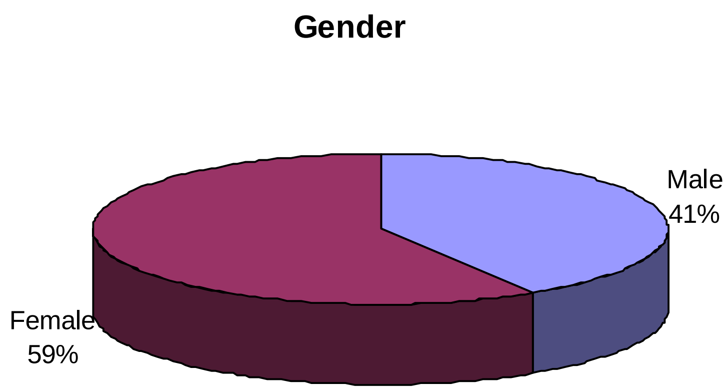
Each area was split evenly so that there would be at least 108 interviews in each area. The breakout of each area is as follows:

Area	Number of Interviews Completed
1	110
2	112
3	109
4	113
5	108
6	113
7	119
8	108
9	111
10	113
11	108
12	108
13	107
14	108
Total	**1547**

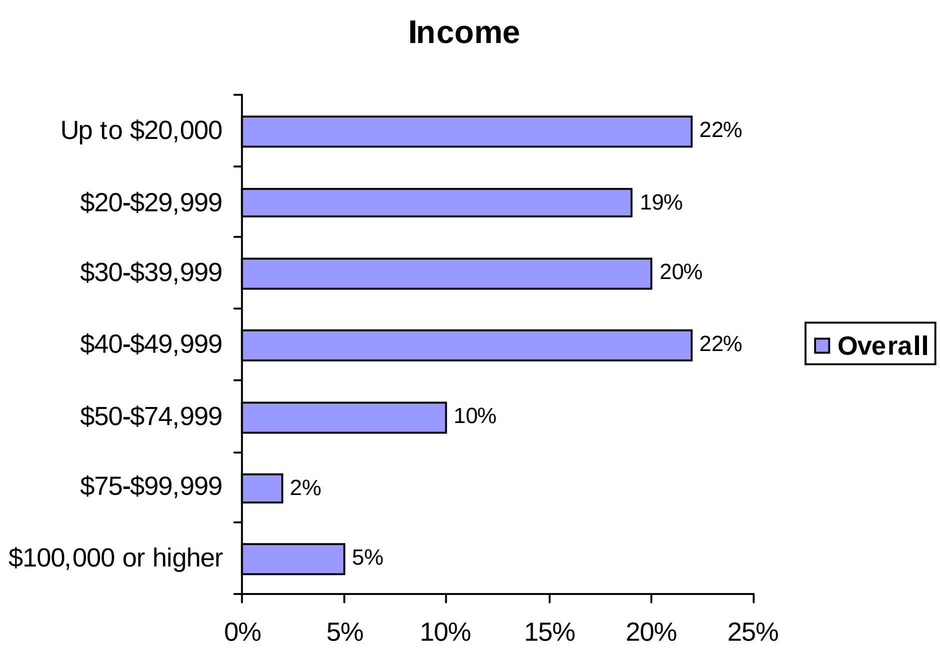
Results

Respondents

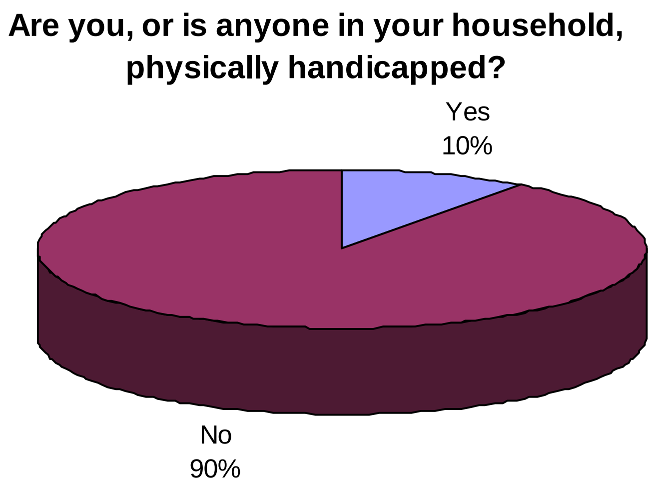
Fifty-nine percent (59%) of the respondents are female; forty-one percent (41%) are male.



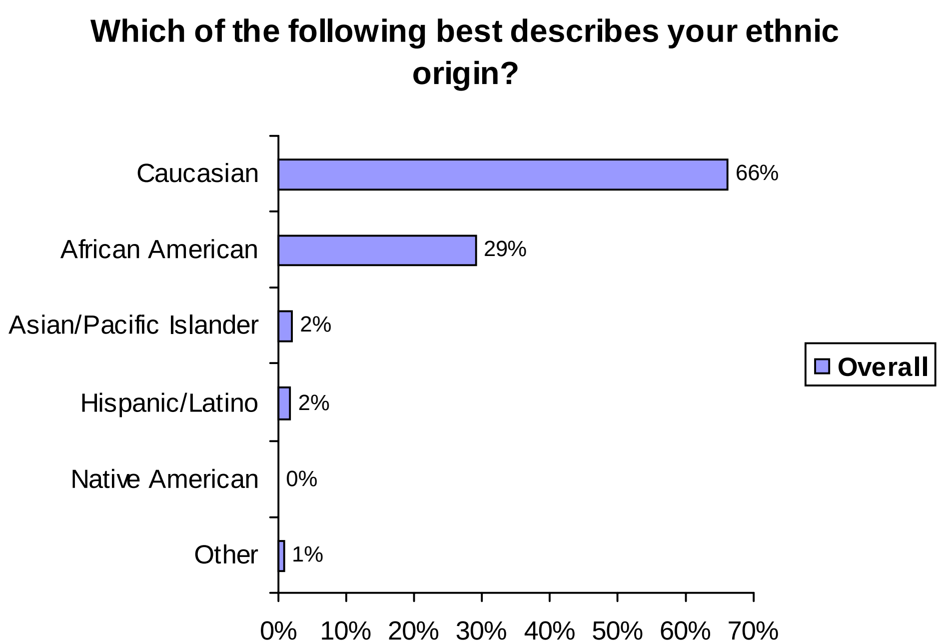
Forty-two percent (42%) of the respondents have an annual income of between $30,000 and $49,999.



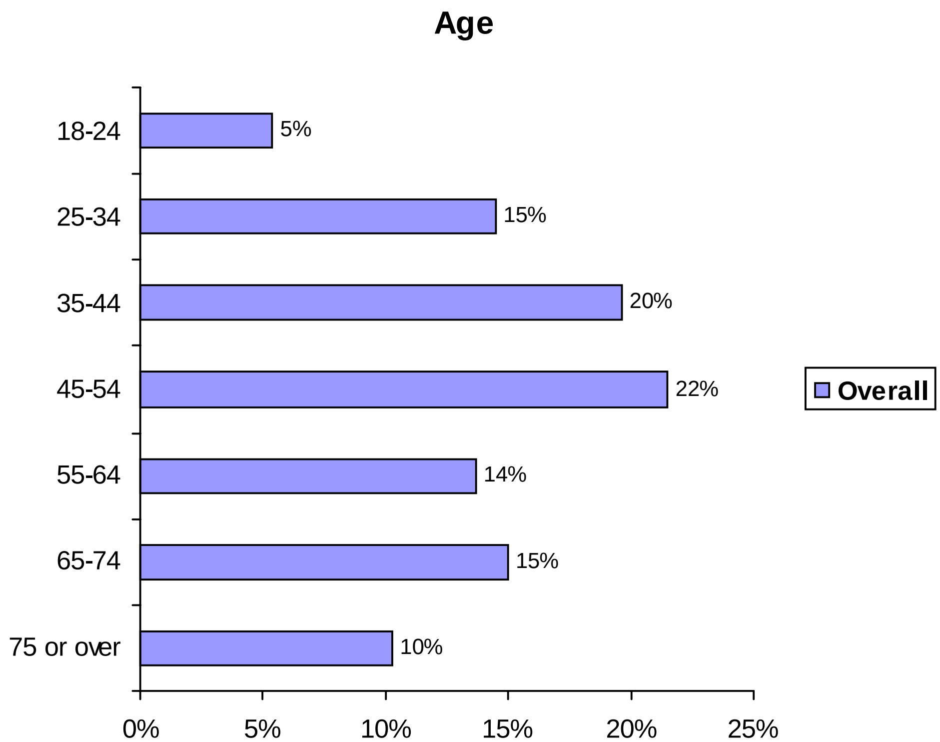
Ten percent (10%) of the respondents are themselves, or have someone in their household that is physically handicapped.



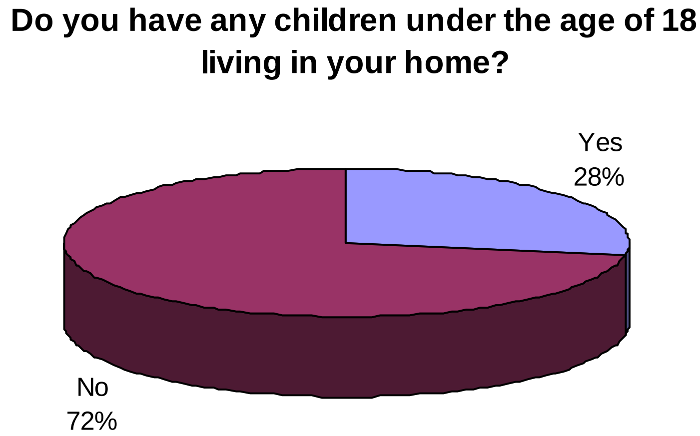
Sixty-six percent (66%) of the respondents are Caucasian. Twenty-nine percent (29%) are African American.



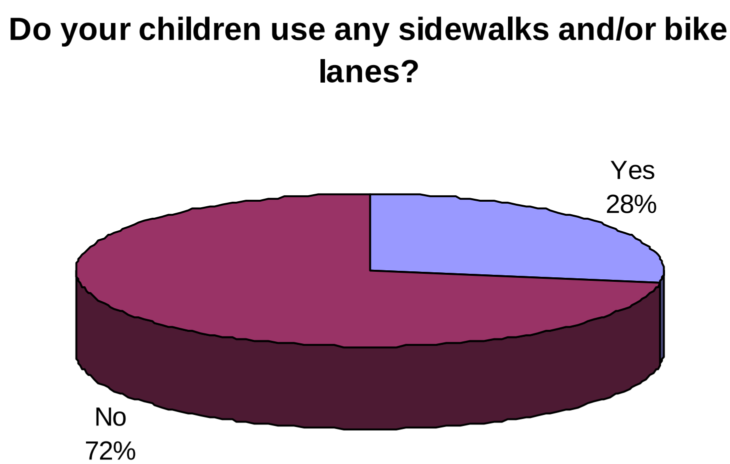
Forty-two percent (42%) of the respondents are between the ages of 35 and 54.



Twenty-eight percent (28%) of the respondents have children under the age of 18 living in their home.



Twenty-eight percent (28%) of the respondents that have children under the age of 18 living in their home say that their children use sidewalks and/or bike lanes.

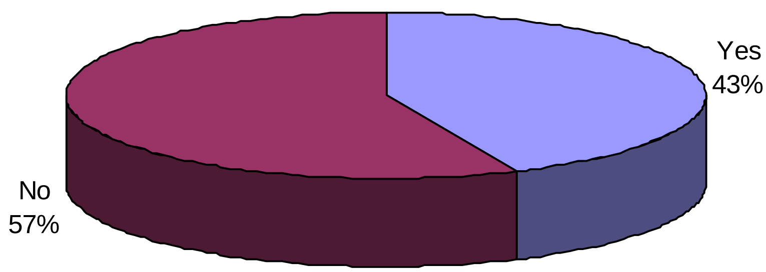


Findings

Sidewalks

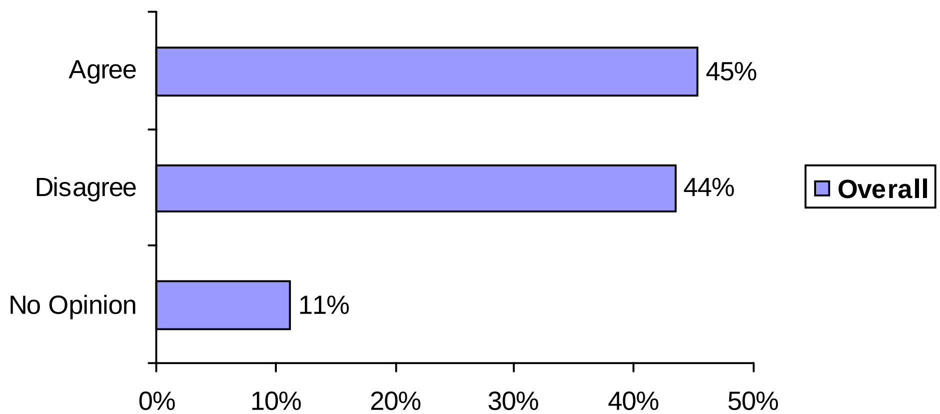
Forty-three percent (43%) of the respondents said that they have sidewalks in their area.

Are there sidewalks in your area?

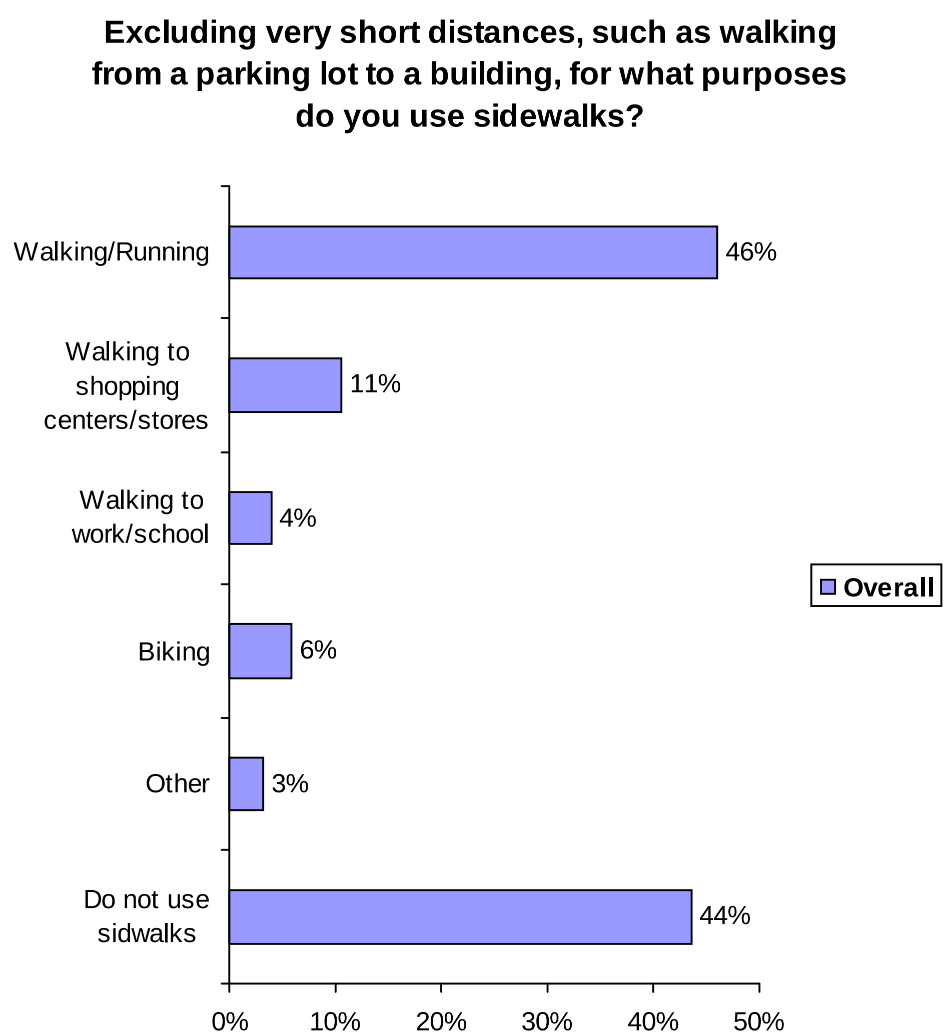


Forty-five percent (45%) of the respondents said that they agree with the statement "In Nashville, walking is a safe, convenient, and practical way to get from one place to another."

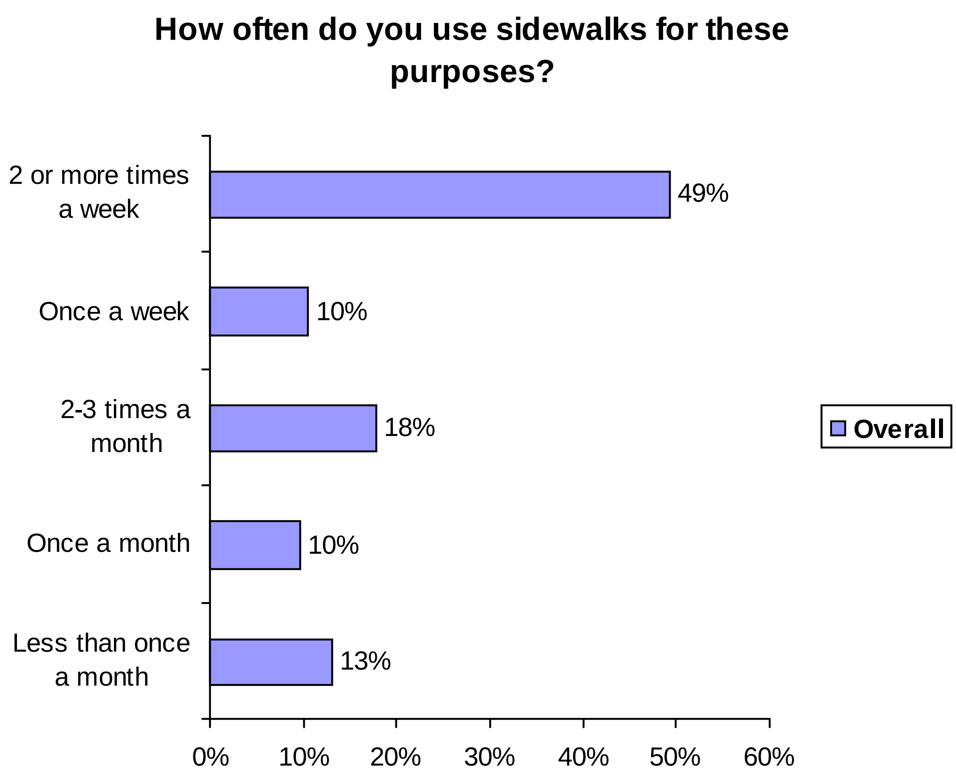
What is your opinion of the following statement: "In Nashville, walking is a safe, convenient, and practical way to get from one place to another



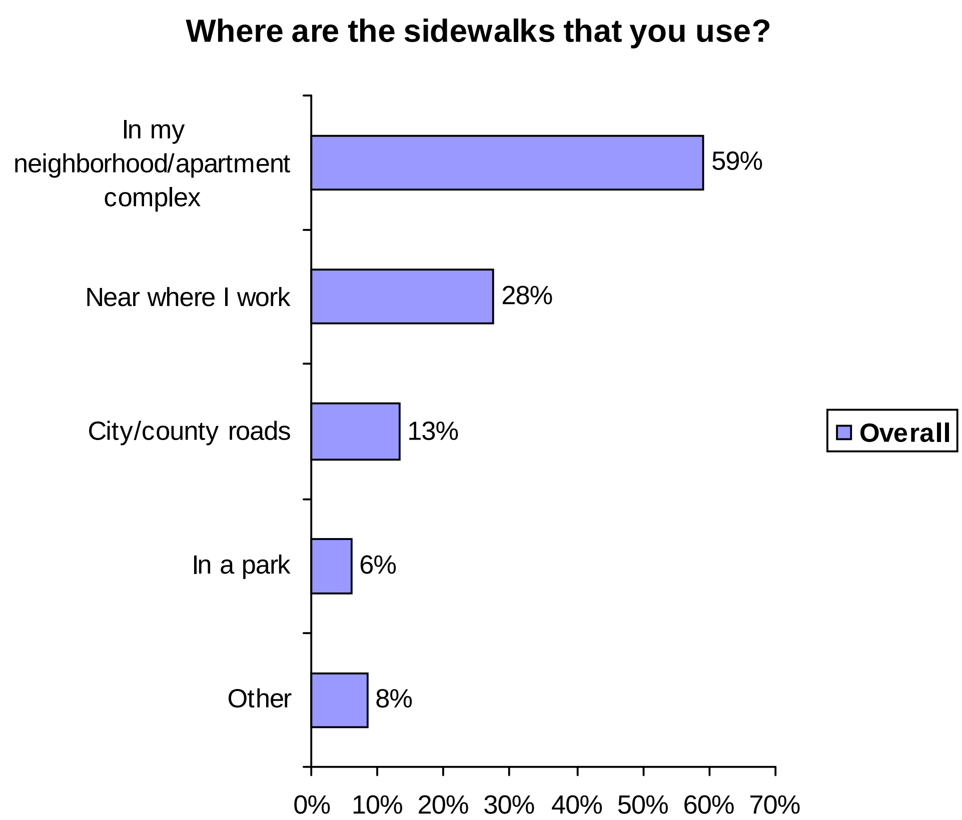
Forty-four percent (44%) of the respondents said that they do not use sidewalks. Those who do use sidewalks cited walking/running as a reason they use sidewalks. (Percentages are over 100% because respondents could have answered more than once).



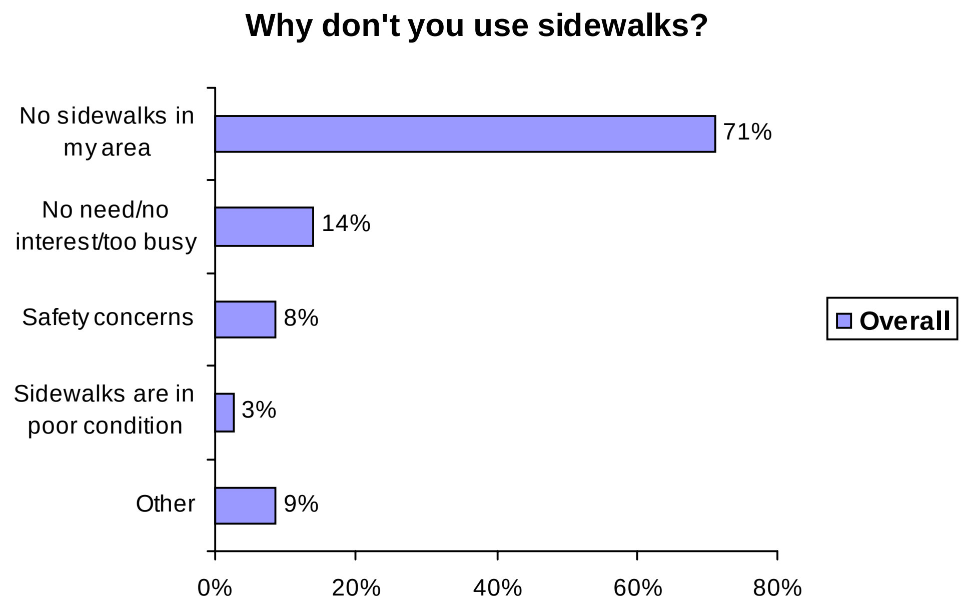
Nearly half of the respondents who use sidewalks (49%) said that they use sidewalks for the purposes mentioned previously two or more times a week.



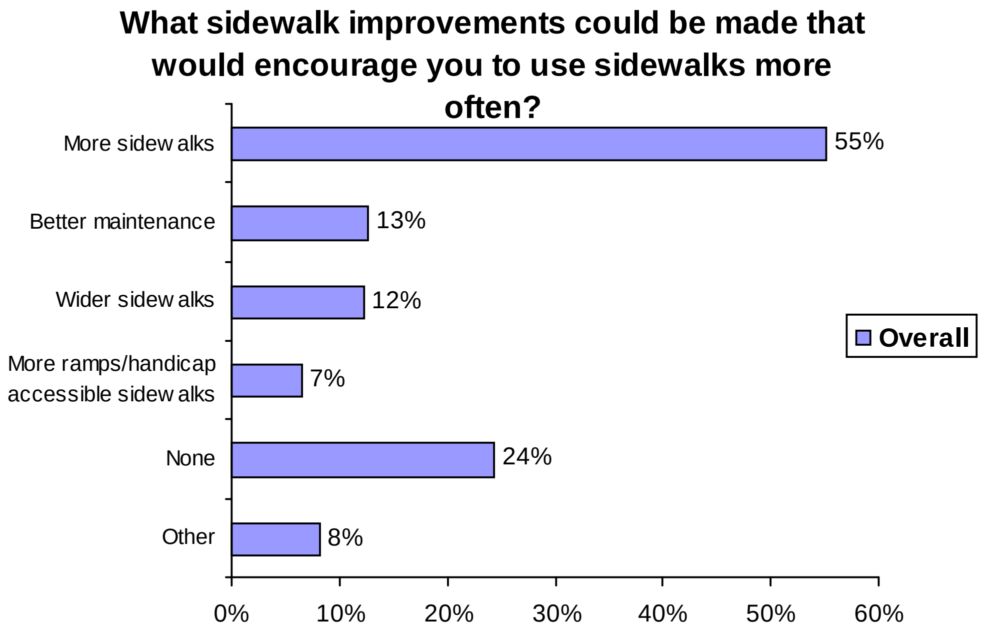
Fifty-nine percent (59%) of the respondents who use sidewalks said that the sidewalks that they use are in their neighborhood/apartment complex.



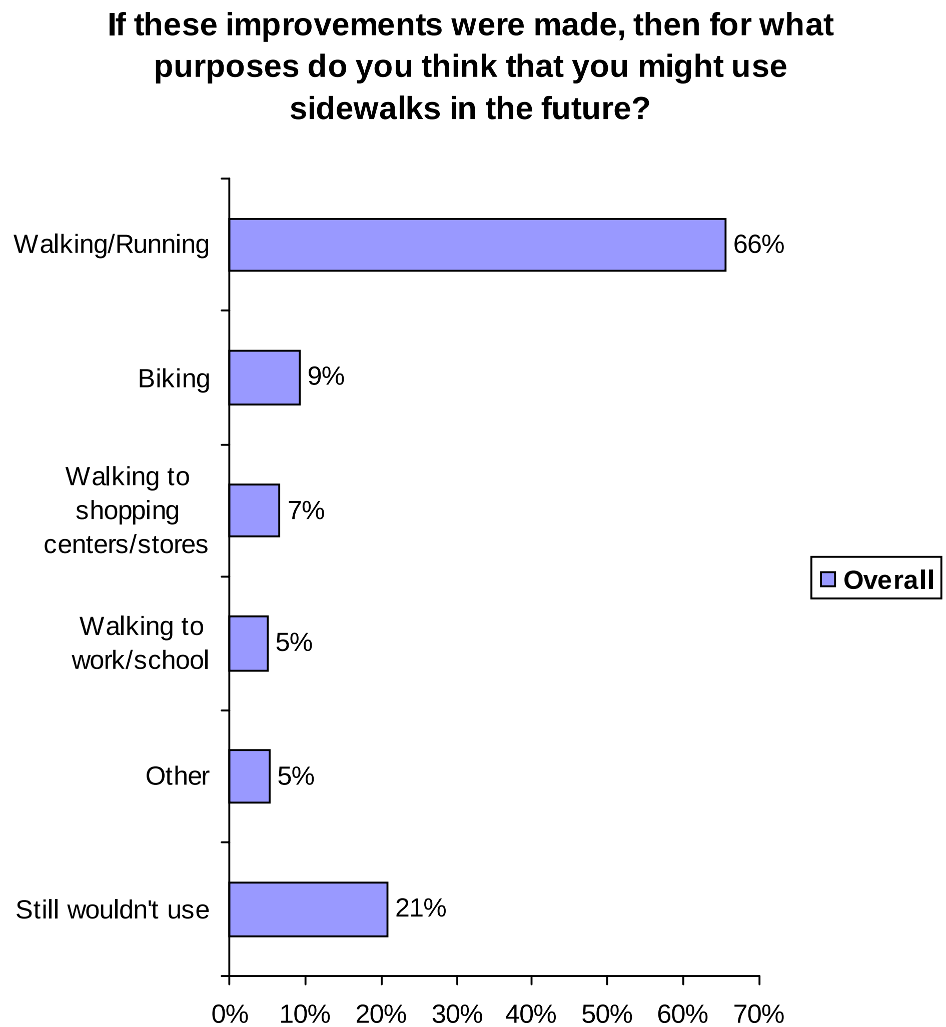
Seventy-one percent (71%) of the respondents who said that they do not use sidewalks said that there are no sidewalks in their area.



Fifty-five percent (55%) of the respondents cited adding more sidewalks as one of the improvements that could be made in their area.

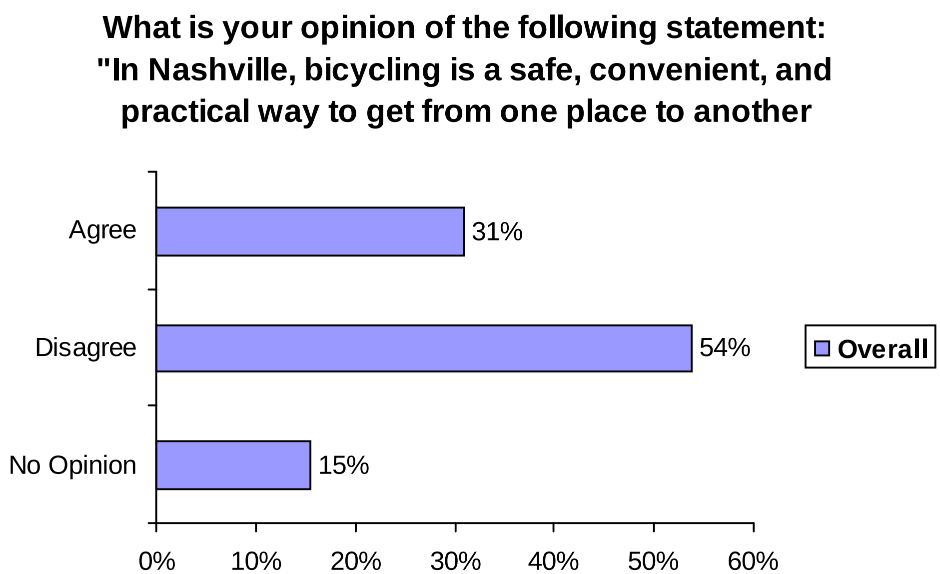


Twenty-one percent (21%) of the respondents said that they would still not use the sidewalks if improvements were made. Of the respondents that would use the sidewalks after the improvements, sixty-six percent (66%) would use the sidewalks for walking/running.

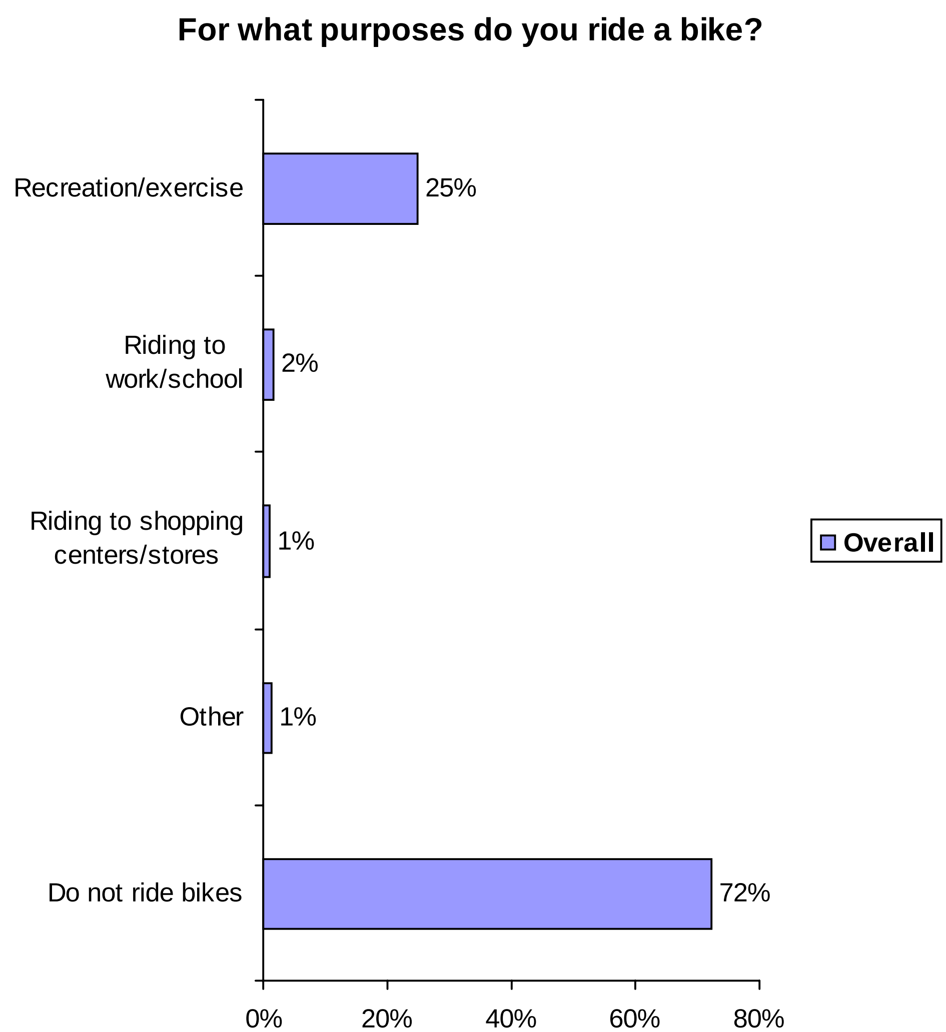


Bike Lanes

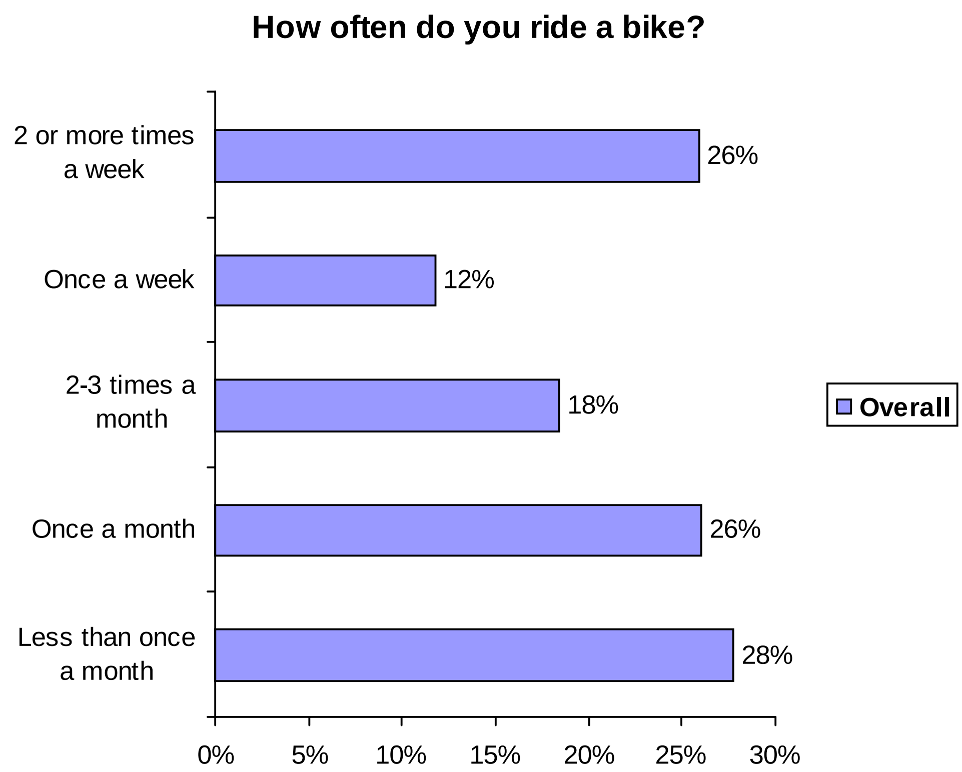
Fifty-four percent (54%) of the respondents disagree with the statement "In Nashville, bicycling is a safe, convenient, and practical way to get from one place to another."



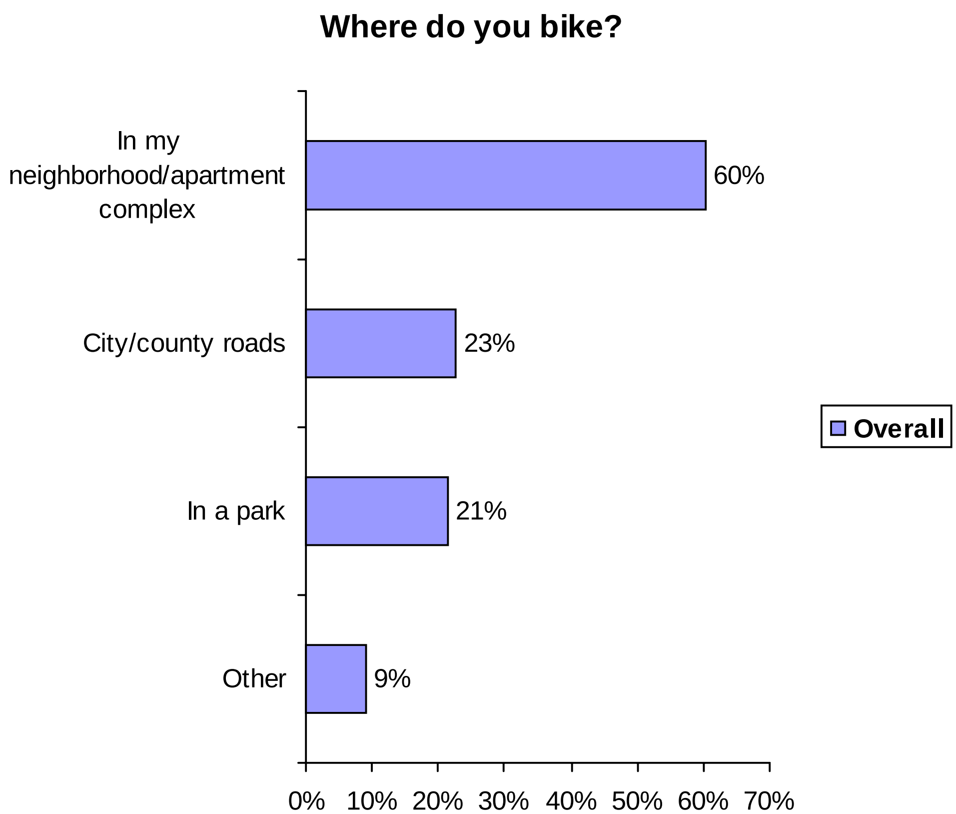
Seventy-two percent (72%) of the respondents said that they do not ride a bike. Those who do ride bikes cited recreation/exercise as a reason they ride bikes. (Percentages are over 100% because respondents could have answered more than once).



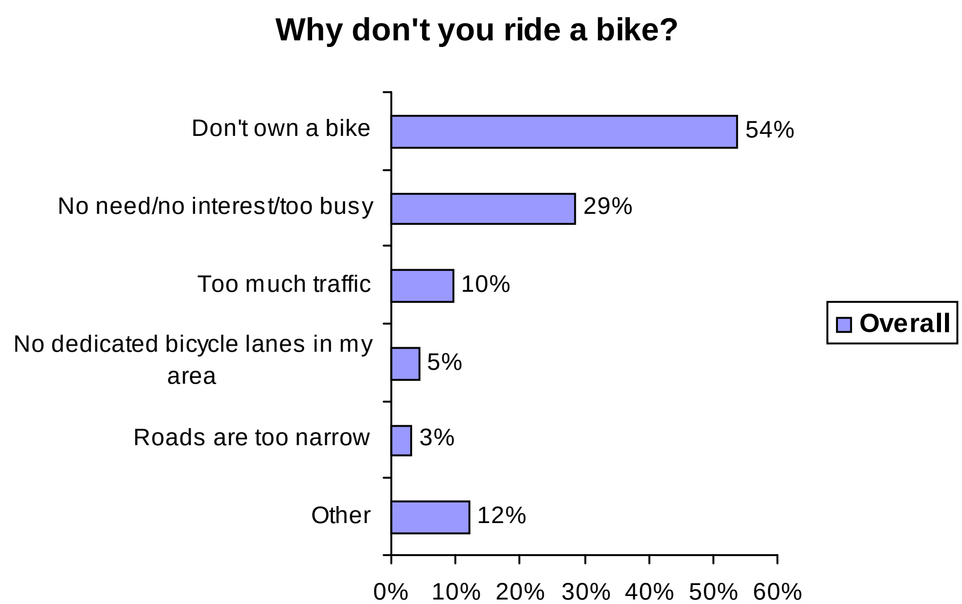
Fifty-four percent (54%) of the respondents who ride bikes said that they ride bikes for the purposes mentioned previously once a month or less.



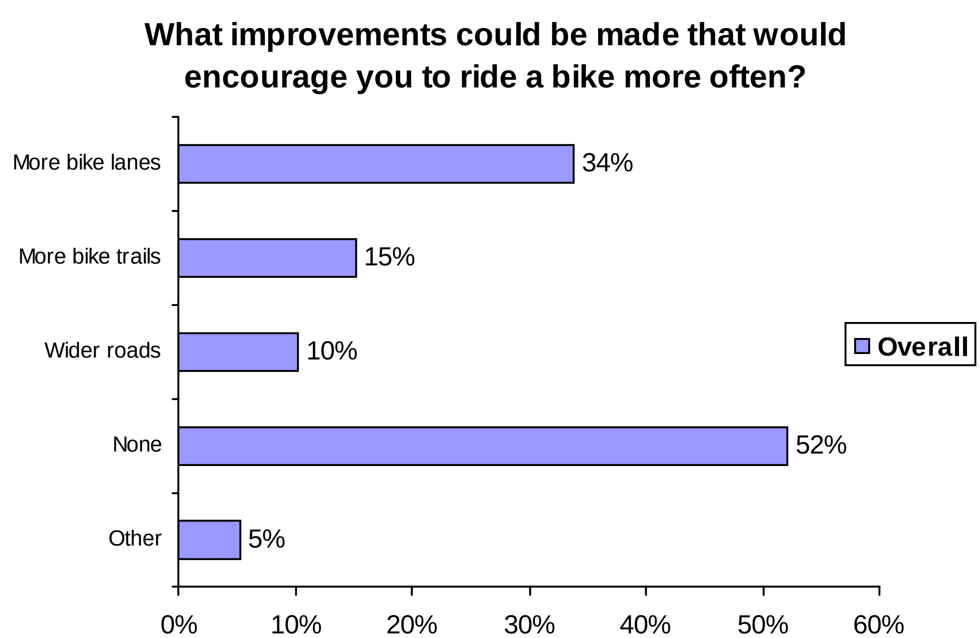
Sixty percent (60%) of the respondents who ride bikes said that they ride bikes in their neighbor-hood.



Fifty-four percent (54%) of the respondents who said that they do not ride a bike said that they do not own a bike.



Over half of the respondents said that there were no improvements that could be made to encourage them to ride a bike more often.



APPENDIX H:
PUBLIC COMMENTS

SIDEWALK QUESTIONS AND RESPONSES
for the
NASHVILLE AND DAVIDSON COUNTY STRATEGIC PLAN
FOR SIDEWALKS AND BIKEWAYS
JANUARY, 2002 PUBLIC MEETINGS

SIDEWALK QUESTIONS:

1. What do you see as obstacles to pedestrian travel within Metro?

- Lack of motorist education
- Sidewalks that do not connect
- Obstructions in sidewalks
- Sidewalks that are not accessible
- Sidewalks that are not maintained and that are in poor condition
- Lack of regulations and lack of enforcement of existing regulations
- Lack of animal control
- Lack of street crossing facilities
- Motorists who turn right on red
- Parking lots that are too close to the roadway and block the sidewalk
- Unsafe sidewalk facilities (crime)
- Lack of a buffer between sidewalks and roadways
- Stormwater drainage
- Ditches
- Traffic
- Incomplete / missing sidewalks
- Lack of design standards for mailboxes

2. What would encourage more people to use sidewalks as a means of transportation? For example, are there design features such as wider sidewalks, planter strips, or safer pedestrian crossings that would encourage more people to use sidewalks?

- Connect people to daily destinations
- Use education to motivate the public to walk
- Use education to make motorists aware of pedestrians
- Form neighborhood walking clubs
- Construct more sidewalks
- Make the sidewalks interesting and beautiful
- Enforce “no parking” areas
- Install benches and shade trees along sidewalks
- Install lights along sidewalks for nighttime use
- Safe roadway crossings
- Remove obstructions from sidewalks

- Cluster developments to promote walking
- Develop appropriate design standards
- Properly install crosswalk buttons (make easily accessible)
- Require parallel parking instead of angle parking
- Improve public transportation
- Maintain sidewalks (keep in good condition)
- Connect sidewalks to the street at bus stops (in locations where there is a green space between the roadway and the sidewalk)
- Animal control
- No right turns on red

Questions #3 and #4 are similar, and many of the responses are similar.

3. What types of areas in our community do you think need to be connected by sidewalks (such as urban areas, neighborhoods, suburban areas, or rural areas)?

4. In general, what types of places do you think need to be connected by sidewalks the most (such as office parks, shopping centers, bus stops, schools, subdivisions, etc.)?

- Schools and surrounding residential areas
- Densely populated areas
- Dense commercial areas
- Areas where people have no other means of transportation
- Inner city urban areas
- Link all of Davidson County with "interstate" sidewalks
- Connect sidewalks to other modes of travel (ex. bus stops)
- All areas should be connected at some point in the future
- Parks and greenways
- Libraries
- Uses for the younger generation in order to promote walking
- Churches
- Grocery stores
- Malls
- Older subdivisions that do not have sidewalks
- Create a grid system of sidewalks
- Areas with multiple uses
- Adjacent commercial uses
- Connect commuter parking to multiple uses
- Suburban areas
- Areas with high volumes of traffic and a large number of pedestrians
- Shopping areas
- Subdivisions
- Multi-use paths

BIKEWAY QUESTIONS AND RESPONSES
for the
NASHVILLE AND DAVIDSON COUNTY STRATEGIC PLAN
FOR SIDEWALKS AND BIKEWAYS
JANUARY, 2002 PUBLIC MEETINGS

BIKEWAY QUESTIONS:

1. What do you see as obstacles to bicycle travel within Davidson County?

- Lack of education for motorist, bicyclist, and law enforcement
- Lack of bicycle facilities
- The 4 quadrants of the City are not connected by roads that are safe to bike on
- Lack of design standards (ex. “lips” on driveways)
- Lack of end of trip facilities (ex. bicycle parking, showers)
- Major intersections are difficult to bicycle through
- Debris on shoulders / roadside maintenance
- Traffic and traffic control
- Narrow roads
- High speed traffic
- Lack of connectivity between neighborhoods
- Lack of animal control
- Grates placed parallel to travel
- Parked cars
- Stormwater drainage
- Lack of signage
- Lack of funding
- Traffic calming devices
- Mix of traffic on multi-use paths
- Barriers – cloverleaf intersections
- Ditches
- Rumble strips
- Lack of access across river and interstates
- Delivery trucks

2. What would encourage more people to use bicycles as a means of transportation, such as riding to work, school, shopping centers, etc.?

- Education for motorists and bicyclists
- Bike lanes on roads with fast moving traffic
- Designated safe routes
- Bicycle facilities that link desired destinations
- “Shared roadway” signs
- Promote bicycling and publicize rules (ex. bus billboards)
- Improve intersection design standards
- Incorporate bicycle facilities development with land use planning
- Better maintenance of shoulders (condition of road and street cleaning)
- Adopt bicycle friendly policies
- Make bicycling easier
- Bike racks at destinations

- Bike racks on busses
- Connect destinations
- Provide information on bicycle facilities (ex. publicize routes, provide maps)
- Reduce speed limits on roads with bicycle facilities
- Provide more signage for bicycles
- Provide incentives for companies who provide bicycle racks and showers for developments / employees
- Wider roadways
- Designated bicycle lanes
- Cross town routes
- Bicycle facilities at and near schools
- Bicycle lockers
- More greenways
- Wider bike lanes
- Promote “Bike to Work”
- Provide a way to report problem drivers
- Improve Metro’s bicycle ordinance
- Include bicycle questions on drivers tests for motorists (and include in drivers handbook)
- Multi-lingual signs
- Prevent roadway drop-offs (ex. roads without a shoulder are sometimes not level with the ground)
- Police on bicycles
- Provide a “bike to school” program
- Connect residential areas to parks and greenways
- Provide better railroad crossings

3. Do you prefer wider outside lanes, bike lanes, or multi-use trails for bike travel?
    - Bike routes
    - Bike lanes
    - Multi-use trails
    - A separate facility is better for safety

4. Where would you like to see bikeways and end of trip facilities?

    - Tucker Road for Fairway – bike lane
    - Shelby Street
    - Hickory Hollow, Bell Road, Stewarts Ferry – curb cuts are a problem
    - West End / Highway 70 corridor
    - Elm Hill Pike or Lebanon Road
    - Major arterials – radial routes
    - Highway 100 to Natchez Trace
    - Old Hickory Boulevard
    - Rail line that parallels Franklin Road
    - Metro Center Boulevard
    - Areas within 2 miles of popular destinations
    - Bicycle loop detectors for left hand turns
    - Bike racks on buses
    - River crossings
    - Balance the construction of bicycle facilities (do not concentrate on select areas only)

- Consider bike lanes for other users (ex. rollerbladers)
- Connect residential and office / commercial areas
- Along Hamilton Church to Hickory Hollow
- Edmondson Pike
- Cloverland
- All major roads
- Highway 70
- Connect bicycle facilities to parks
- Old Harding from Old Hickory Boulevard to Highway 100
- 12th Avenue
- Highway 100 from Old Hickory Boulevard to Vaughn Road
- 8th Avenue and Franklin Road
- Davidson Road and Davidson Drive
- Nolensville Pike from Harding Place to downtown
- Commuter corridors to Central Business District
- Vanderbilt area
- Granny White
- Thompson Lane and Woodmont
- Main Street
- Charlotte Avenue
- Riverside Drive
- Clarksville Highway
- Ashland City Highway
- Water fountains on multi-use trails
- County Hospital Road
- Bells Bend
- East Nashville to downtown
- Inglewood
- Universities to the Green Hills area
- Coordinate bicycle facilities with adjacent counties
- Link greenways

Suggestions for Sidewalk Placement & Improvement (Received through mail, e-mail, fax, or at public meetings)

- Add sidewalks on Richland Ave. Off West End
- Add sidewalks at Ensworth School on Woodlawn & approximately 3 other schools
- Add sidewalks at MBA School & West End Middle School (on Bowling Ave.)
- Continue sidewalk down Bowling Ave.
- Continue sidewalk down Woodlawn
- Add sidewalk on Davidson Road between Post Road, Hickory Valley, and HG Hill Middle School/ Hillwood High School (should be restored and extended along the full length of Davidson Road)
- Add sidewalks from Burton Hills Condos to Green Hills Mall
- Add sidewalk on Graybar Lane, between Belmont Blvd. & Hillsboro Road
- Add sidewalk on Brush Hill Road
- Add sidewalks on Blair Blvd. West of Natchez Trace
- Improve Crosswalk at Blair Blvd and 21st Avenue, it is not marked properly and walk time is too short
- Improve/Add sidewalks to Dickerson Road
- Sidewalks on Hillsboro Road
- Add sidewalks on Woodmont Blvd., Harding Road, Bowling Avenue, Estes Road, Woodlawn Drive
- Add sidewalk on Granny White to Radnor Lake
- Crosswalks and sidewalks along Murfreesboro Road around shopping areas, apartments, & restaurants
- Repair bridge near intersection of Murfreesboro Road & Thompson Lane
- Crosswalk between restaurants on Murfreesboro Road
- Complete sidewalk on Neely's Bend
- Add sidewalks to Sanitarium Road
- Add sidewalk on Hill Road (Granberry School)
- Have demonstration area in Green Hills/Hillsboro/Belmont area for sidewalks
- Construct overhead bridge to cross Hillsboro Road in Green Hills
- Complete sidewalks on Belmont Blvd. around Stokes & David Lipscomb (make safer)
- Add sidewalks on Glen Echo - street has P.O., library and stores
- Add sidewalk/bikeway on Granny White from Brentwood to downtown
- Add sidewalk on Caldwell between Granny White Pk. and Franklin Rd.
- More sidewalks in Hillsboro/Belmont Area
- District 4 needs sidewalks & wants children to be able to ride bicycles on sidewalks
- Repair/Complete sidewalks on Sweetbriar Avenue
- Green Hills/ Vanderbilt area should be pedestrian friendly
- Complete sidewalk on Blair Ave. near Chesterfield
- Abbott Martin Rd. from Cross Creek to Lynwood needs sidewalks
- Add sidewalks on Lealand, Valley Brook and Harding Place
- Add sidewalk on Hobbs
- More sidewalks in West Meade
- Add sidewalk on McFennin between Petway and Cleveland St.
- Add sidewalks in East Hill neighborhood on Dozier PL., Burchwood Ave., Gear St., Delmas Ave., Fairwin Ave., & Spain Ave.
- Add sidewalks on Cooper Lane
- Add sidewalks in Bordeaux/ Hydes Ferry area
- Add sidewalks on Curtis St. from Buena Vista to Courtney to Clarksville Hwy.
- Add sidewalks on Belmont Blvd./Granny White around J.T. Moore middle school
- Add sidewalks on Sharondale Drive from Hillsboro to Woodlawn
- Add sidewalks on Old Hickory Blvd. between Hwy 70 and Hwy 100

- Add sidewalks on 37th Ave. N. from Murphy to Centennial
- Add sidewalks in Oakland Acres neighborhood
- Add sidewalks on Cherokee Road and Sloan Road
- Improve Crosswalks at 46th Ave., Murphy Rd., Sloan Rd., & the entrance to McCabe Golf Course
- Add sidewalks on Kenner Ave. from Harding Road to Estes Road
- Add sidewalks on Ridgefield Lane from Kenner Ave. to Woodlawn Blvd
- Improve sidewalks on White Bridge Road from Harding Road to Knob Road
- Improve sidewalks on 31st Ave./Blakemore from West End to 21st Ave S
- Improve sidewalks on West End Ave from I-440 to 25th Ave. S.
- Improve sidewalks on 21st Ave S. from Blakemore to West End Ave.
- Improve sidewalks on Demonbreun Street from 14th Ave S. to 4th Ave S.
- Improve sidewalks on Broadway from 21st Ave. S. to 9th Ave. S.
- Improve sidewalks on Natchez Trace from Woodmont Blvd to Blakemore
- Improve sidewalks on Glen Echo Road from Hillsboro Rd to Benham Ave.
- Add pedestrian crossing at Hillsboro and Woodmont
- Add pedestrian crossing at White Bridge Road and Brookmont Terrace
- Add pedestrian crossing at Abbott Martin and Bandywood, and Abbott Martin and Hillsboro Cir.
- Add pedestrian crossing at 23rd Ave. N. at Patterson St.
- Improve pedestrian crossing on Harding at Woodmont and Kenner
- Improve pedestrian crossing on West End at 25th/Elliston Pl., 21st Ave, and 28th Ave.
- Improve pedestrian crossing on Broadway at 21st Ave S. and 17th Ave.
- Improve pedestrian crossing at Church St and 18th Ave.
- Improve pedestrian crossing at Elliston Place and 23rd Ave
- Improve pedestrian crossing at Thompson Lane and Bransford Ave.
- Complete the sidewalk on the north side of Wallace Road to Nolensville Rd.
- Add sidewalks on Dellway Dr. from Dickerson Rd. to Jones Ave.
- Add sidewalks on Jones Ave. from Joy to Douglas Ave.
- Installation of sidewalks at Belle Meade or Highway 100, Page Rd., Highland area
- Standardize pedestrian signal at Jackson Downs (Hermitage)
- Add sidewalks on Lebanon Pk.(Hermitage) at Jackson Downs: no safe way to cross the road, need sidewalks and crosswalk signs(for the blind)
- Add sidewalks on Tusculum Rd. between Blue Hole Road and Nolensville Road
- Add sidewalks on Colice Jean Road, connecting neighborhoods to Bellevue Middle to Red Caboose Park
- Add sidewalks on Grandview Drive, between Granny White and Belmont

2008 Update note: Additional Public Comments gleaned through the 2008 Update process can be found in Amendment 1, Page A-1.

General Sidewalk Comments (Received through mail, e-mail, fax, or at public meetings)

- Citizens do not have input on how sidewalk money is spent
- Prohibit Zoning Commission from granting variances to developers not wanting to build sidewalks
- Allow developers to contribute money in lieu of building sidewalks in their development where they aren't needed
- Develop a Sidewalk/Pathway system that connects from residential areas to business locations
- More contiguous sidewalks
- Keep green space between sidewalks and roadways
- Avoid sidewalk obstructions (i.e. utility poles & mail boxes)
- Provide sidewalks around schools
- Provide sidewalks between housing (especially public housing & apartments), shopping, bus stop areas, parks, libraries, & churches
- Implement a high quality P.R. program
- Enhance sidewalk appearance
- Build overpasses at busy streets
- Install adequate lighting on sidewalks
- Maintain sidewalks regularly
- Install emergency phones on sidewalks
- Connect parks (i.e. Radnor Lake, Percey Warner, Shelby, Centennial, & Bi-centennial)
- Build sidewalks in shade where possible
- Add additional sidewalks along main roads and highways
- Add sidewalks in urban areas
- Utilize sidewalks to connect neighborhoods
- Add small parks and benches along sidewalks
- Use good Urban Design (i.e. align buildings w/ streets, clustered village-style, mixed-use planning)
- Add more sidewalks in suburban areas
- Make sure to include sidewalks in planning processes
- Add more sidewalks in heavily trafficked areas
- Start police officers patrols on foot for safer sidewalks
- Widen sidewalks
- Add crosswalks
- Ensure that pedestrian travel is possible despite the increased traffic
- Connect major areas (Adelphia, Cumberland Science museum, and Zoo) using sidewalks
- Ensure that sidewalks are ADA compliant
- Consider bicycle and pedestrian travel when planning roadway improvement projects and new roadways
- Spend less money on planting strips
- Focus less on sidewalks in residential areas
- Position sidewalks around bus stops
- Add sidewalks in areas with large numbers of children, and/or young families
- Position sidewalks around post offices

2008 Update note: Additional Public Comments gleaned through the 2008 Update process can be found in Amendment 1, Page A-1.

Suggestions for Bike lane Placement & Improvement (Received through mail, e-mail, fax, or at public meetings)

- Add bike lane to Belmont Blvd.
- Add bike lanes in Hillsboro Village, Vanderbilt area, West End area, Downtown, Green Hills, Madison, Hermitage, Music row, Belmont, Donelson, & Antioch
- Add bike lanes on Old Natchez Trace, Vaughn's Gap, Hwy 100, & Hwy 70
- Add Bike Lane on Estes Road from Woodlawn to Harding Place
- Add a bikeway on McGavock Pike to Mill Creek Greenway
- Add a bikeway from Currey Road to McGavick Pike
- Add bikeways from proposed bus shelter on West End to downtown businesses, museums, arena, library, & other public facilities
- Add a bike lane on Delmas Avenue
- Use land by I-440 walls as multi-use lanes
- Add bike lane or wider lanes from Bellevue (Hwy 70, Hwy 100) to West End/Downtown area
- Add a bike lane on Old Hickory Blvd. from I-40 to Brentwood
- Add a bike lane along 31st Ave. going from Acklen Park to Nebraska Avenue
- Add a bike lane on Granny White Pike
- Add a multi-use path on Old Hickory Blvd. from Ashland city Highway to Beaman Park & on Eatons Creek to Ashland City Highway
- Add a multi-use path on Little Marrowbone Rd. from Old Hickory to Ashland city Highway
- Add a multi-use path on Old Hickory Blvd. from Ashland City Highway to Cumberland River Greenway & the park at Bell's Bend
- Add a multi-use path from Ashland City Highway to the Whites Creek Greenway
- Add a bike lane in Percy Priest School/Granny White Pike area

2008 Update note: Additional Public Comments gleaned through the 2008 Update process can be found in Amendment 1, Page A-1.

General Bike Comments (Received through mail, e-mail, fax, or at public meetings)

- Advertise the convenience of using bicycles
- Advertise the local bicycle clubs
- Create more bicycle club benefits, such as discounts and benefits for newcomers as well as constant visitors
- End of trip facilities placed appropriately based on surroundings.
- Highly defined maps with "YOU ARE HERE" location makers & distance markers from single specified base location at center of downtown
- Provide education for cyclists & motorists
- Add more Bike lanes
- Maintain current bike lanes
- Bikeway planning should complement the comprehensive plan for Subarea 6:2002
- Allow new developments to co-exist with possible future bikeways (specifically in area near terminus of Natchez Trace)Attach bike racks to Metro buses
- Consider bike and pedestrian facilities in planning process
- Establish trails based on existing roadway hierarchy (i.e. residential, collector, arterial)
- Include better bike storage/parking facilities geared towards multi-modal transportation
- Utilize an Adopt-a-Bikeway system to address maintenance issues
- Provide better access to bike lanes or paths
- Build several multi-use trails
- Widen lanes for bikes
- Add bike lanes between homes, stores, offices, parks, and libraries to connect neighborhoods
- Clearly indicate bike lanes with signs
- Provide safe storage facilities for bikes at destinations
- Encourage providing showers at work places
- Register bikes and require bike tags like car tags
- Raise the bike lanes above or below automobile traffic
- Connect suburbs to downtown with bike lanes or wider outside lanes for bike travel
- Add more bikeways in inner city
- Construct bikeways that are not exclusive to bikes (allow skaters, etc., on bikeways also)
- Provide bikeways near schools and neighborhoods
- Offer end of trip facilities near schools and shopping areas
- Add bike lanes on major commuter routes
- Develop a network of continuous bike lanes
- Integrate bike ways with busses/alternative transit
- Make sure that drainage grates are installed correctly to accommodate bicycles
- Add bike lanes on radial roads going to/from downtown
- Add either outside lane, bike lane, or multi-use lane based on the most cost effective choice
- Establish a sense of safety for bicyclists in order for bike lanes to be used
- Widen sidewalks and separate bicyclists and walkers with striping (similar to Germany)
- Use dedicated lights for bike lanes
- Arrange bike trails adjacent to greenway trails
- Include bikeways at parks
- Convert existing shoulders to bike lanes
- Stripe lanes according to AASHTO guidelines to provide wide curb lanes or bike lanes

General Safety Concerns (Received through mail, e-mail, fax, or at public meetings)

- Ensure that shoulders are wide enough
- Concern that speed humps pose safety threat to cyclist
- Stripe roadways to remind motorists to stay in lanes
- Strictly enforce speed limits in residential neighborhoods
- Keep streets clear of debris
- Promote health benefits of biking and walking
- Provide more police presence on major arteries
- Increase safety of crosswalks
- Strict enforcement of traffic laws in general
- Ensure that it is safe to walk or bike despite increasing amount of traffic on streets
- Awareness of both drivers and bicyclists at intersections and along bike paths adjacent to streets
- Consideration of drivers to pedestrians in cross walks
- Prohibit right turns on red to improve safety for bicyclists and pedestrians
- Teach about bike safety in schools
- Educate motorists on pedestrian safety
- Reduce aggressive driving
- Maintaining personal safety
- Injury from unchained dogs
- Providing adequate wheelchair ramps in sidewalks
- Consider low visibility on large and sharp road curves (ex. Granny White between Saxon and Otter Creek)
- Avoiding neighborhood roads being used as "cut-throughs"

Project Management Comments (Received through mail, e-mail, fax, or at public meetings)

- Inform public of amount of sidewalks/bikepaths that are expected to be built and the time frame for completing the project
- Contain any policies that TDOT may have regarding non-motorized facilities along US & State highways in the Strategic Plan for Sidewalk and Bikeways
- List any policies or procedures that may impede the plan's goals
- Include policies and procedures from other states that would be beneficial to developing pedestrian/bike facilities along US & State Highways in the Strategic Plan for Sidewalk and Bikeways
- Hold public meetings in all parts of county
- Notify each resident on the street where the sidewalk is planned and provide contact names and numbers
- Refer to current metrics attained by the Nashville Traffic Management Program for identifying neighborhoods in true needs

2008 Update note: Additional Public Comments gleaned through the 2008 Update process can be found in Amendment 1, Page A-1.

WALK TO SCHOOL COMMENTS

Bordeaux

- "It is trash on the sidewalk. There was glass on the street some body can get flat because I saw few nails. Mayor, please may I have your autograph?"
  Age 9

- "I feel great. I saw stings and my best friend tripping and falling. And I saw broke bottles and sidewalks that were broke also."
  Age 9

- "The sidewalk had glass on it. It had rocks in the grass. The mailbox was on the sidewalk."
  Age 10

- "I did not see any dangerous things. I was cool. I hope we is on the news with the mayor talking to us."
  Age 9

- "The metal was broke on the sidewalk. There was trash and glass everywhere. There was dents in the sidewalk."
  Age 9

- "I like walk to school day it was fun. I wasn't fun when it had holes in the street. We had to walk on the on the street. I had a nice day."
  Age 9

- "I felt uncomfortable with all the cameras around. I did feel comfortable with the policeman. I felt unsafe too because walking to school in dangerous especially if you are followed behind you can get kidnapped. But I do want to keep doing the walk to school day."
  Age 9

- "I feel unsafe walking to school because they was glass. They was a piece of metal down in the ground that went down and it is not safe for people in wheelchairs."
  Age 10

- "I saw glass on the ground. I saw the metal walkway thing not fixed. There was a lot of trash on the ground. I saw beer bottles on the ground."
  Age 9

- "Paper, glass, rocks, hole in the ground, bottles."
  Age 10

Buena Vista

- "The walk was very pleasant and rather orderly."
  Parent

- "It was a cool crisp morning. Felt togetherness with Montavious. We got needed exercise."
  Parent

- “My daughter and I walked (after parking) from the Lobby CTR Library. The walk was very enjoyable. Although we were both a bit ‘chilly’, we were able to laugh and talk and even have a little ‘race’ between the two of us.”
  Parent

- “It was an enjoyable event. Lets do it again.”
  Parent

- “I have enjoyed working with Hull Jackson for the four years. I live in this neighborhood.”
  Parent

- “Jalen was very excited to ‘walk to school’. It was wonderful to be able to walk with my child, his classmates, and other parents. Everyone had fun and of course got some morning exercise.”
  Parent

- “This was great, a time to talk and fellowship with other parents.”
  Parent

- “My son and I had fun. The distance was short. It looks like not many parents participated.”
  Parent

- “Excited about joining the walk. Enjoyed friends and family gathering to walk together.”
  Parent

- “Did not want to participate. Once the students gathered and began to walk – it was fun.”
  Parent

- “I had fun.”
  Parent

- “No problems, very organized. A feeling of doing something positive with my children and other parents. A feeling of belonging to a club for good cause. My kids were very happy.”
  Parent

- “Sidewalks.”
  Parent

- “No problem at all. I feel that this walk was a very good idea for teachers as well as the student and parents and I look forard to many more events such as this.”
  Parent

- “Sidewalks.”
  Parent

- “I had fun.”
  Parent

- “Would have been a perfect walk if sidewalks and crosswalks were present. Otherwise I really enjoyed the fresh air and exercise and quality time with my kids.”
  Parent

- "It was great. No problems."
  Parent

- "It was a great feeling of community."
  Parent

- "I had fun."
  Parent

- "Sidewalks are needed, too many stray dogs."
  Parent

- "Group didn't all walk together. There was a large amount of children walking about 12 feet in front of the rest. Other than that, it was great."
  Parent

Charlotte Park

- "1. It was very cold.
  2. Going under bridges is scary.
  Other then that it was fun even though I live a half a mile away."
  Age 8

- "We had a nice walk. We could have used a sidewalk or two."
  Adult

- "I enjoyed my walk to school this morning. I observed a lot of parents participating in the walk. Also, I learned safety rules."
  Age 9

- "I felt good about walking to school because it was nice out side and I like to walk to school. I didn't come upon any problems."
  Age 10

- "#1 No crossing guard at Annex and Roberson Rd.
  #2 No side walk from Roberson down to our house."
  Age 8

- "The walk was a great turn-out. The position from where we started was changed due to a police situation. Other than that, it was a great success."
  Adult

- "The sidewalk was not wide enough so I could not walk hand in hand with my moma. And I enjoyed it. And my moma enjoyed it too."
  Age 9 ½

- "I felt good about the walk. I observed a group parents and kids walking to school. I had a great time. Also, I learned about safety."
  Age 6

- "It was a good walk!"
  Age 6

- "The children <u>love</u> it!"
  Adult

- "I thought this was very fun for the kids! (and parents) I didn't see any problems."
  Adult

- "It was fun to walk to school and get back on time."
  Age 9

- "They need sign to look for children and speed zone sign."
  Age 11

- "My son and me, we start Oct. 2, 01 to Oct. 6, 01 walking in the apt & Richland Hill the morning about 6:30 am – 7:00 am. Very feeling good, thank you very much help my son. I don't know what's I say? Thank a lot."
  Adult

- "I truly enjoyed walking to school because I have always rode to school on a bus or in a car."
  Adult

- "I was happy when I went walking today. I saw a squirrel climb up a tree. My problem was I didn't know that it was a squirrel because it was in a bush."
  Age 7

- "It made my bones strong. I saw some cars in the street."
  Age 7

- "A lot of dogs. But they did not bite us. And the moms and us."
  Age 7

- "When I walked to school I saw a bird with it's baby birds."
  Age 7

- "Just happy that I walked all the way to school. I liked walking with my grandfather."
  Age 9

- "I enjoyed the walk and the mother patrols were very consistent. I didn't run across any problems."
  Age 9

- "Street being worked on, needed side walks."
  Adult

- **"**Dylan thought this was very exciting, however, we can't always do this because I have to hurry back home to my grandmother. No problems."
  Adult

- "I enjoyed walking Dajon to school, however, being new to the neighborhood I found the map very hard to read. I also was confused about what I was suppose to do once we arrived at the school. Everything else was fun and great."
  Adult

- "There was not group leader on Henry Ford or Basswood where we live on Futura Dr."
  Adult

- "I want (*to)* say thank you to Charlotte Park School staff."
  Adult

Gateway Elementary

- "I was so mad that I saw litter. I thought it was cool that I got to look under the bridge."
  Age 8

- "It was a great walk. I like it because we had our friends. I did not have any problems because I knew the dogs."
  Age 8

- "When I walk to school in the mornings I see two flowers and I feel like planting them they are so pretty. I see cars going by and I don't like when the stare at me. The End."
  Age 8

- "It was a good walk. I liked it because it was fun. But there was trash."
  Age 8

- "I felt safe with all my friends. We had fun walking to school."
  Age 8

- "It was ok. I liked it. It was fun."
  Age 8

- "I felt very safe and my friend did too. And I saw a dog that looks mean."
  Age 9

- "I was excited. I had lots and lots of fun. I will walk again if I have too. I saw lots of trash in the street and on the sidewalk. And it was crowded out there, But I steal had fun. And I saw lots and lots of grass too!"
  Age 8

- "There were no problems. I was happy. I saw cars, trees, trash and flowers."
  Age 8

- "I saw a lot of trash in the grass."
  Age 8

- "There was some trash on the sidewalk."
  Age 8

- “There was a lot of trash and I want some one to pick it up soon.”
  Age 8

- “I did not have no problems but It was fun I was kind of happy! I just had to sit it out it was fun but it was litter.”
  Age 8

- “It was very good I am glad I went.”
  Age 9

- “I like to walk to school”
  Age 9

- “I feet good about it. It was fun I walk with Mrs. Yon and my best friend Ashton. There was a little boy how was pushing people and skipping people.”
  Age 10

- “My legs hurting”
  Age 9

- “I felt happy to get to walk and there were no problems.”
  Age 9

- “Nice, funny, great, and that’s my feelings.”
  Age 9

Warner

- “I thought that the rope hold on was good but it is confused because people pull the rope and somebody could fall on the ground. It was really fun to walk to school. Thank you Mr. Louis, you are the best.”
  Age 10

- “I feel happy about walk to school day. It was yesterday but I feel happy about it and it was fun. It was boomloons (*balloons)* in the air and don’t come back to Warner.”
  Age 9

- “When we had walk to school day I had fun when we first started to walk. Then when we was half way down to the end of the sidewalk then there was a problem when I was tying my shoe and then I was ready to get my spot back. Someone was trying to trip me when I tried to get my spot back.”
  Age 9

- “I thought that when we had the rope, we had a lot of problems. People tugged and almost made people fall. Another problem was it was to cold. I think next time we should do it when it’s a little warmer. Other then that I had a fun time.”
  Age 9

- “It was good but the student was being fun with the rope because the student would not stop pulling the rope and my hands was red.”
  Age 10

- "I did not like when they poll the rope and what I like is when they let the balloons out the bag and everybody was wearing black and with we hold the flag."
  Age 9

- "My observation are the rope didn't go good because students keep letting go of the rope and it was hurting peoples hands. My good observation are everything else was great excellent beside the people who let go of the rope was running off and tugging on the rope."
  Age 9

- "I thought it was really neat. But people kept pulling the rope. And walking slow to slow then we stared walking fast. So nothing really. It was very fun. And I want to do it again! In I seen so teachers I never seen before. The Walk To School Day was fun in people almost got hurt."
  Age 9

- "The tree is pretty."
  Age 8

- "The teacher like the school in the job."
  Age 8

- "I saw litter on the way to the school."
  Age 7

- "I saw people waved at me and I saw people walking too."
  Age 7

- "Swimming pool. School. The tree is pretty. One more thing. Love. Broken."
  Age 8

- "I notice they got a play ground and that got pretty flowers. They got a swimming pool. I like the people waving. I like the parade. I like teachers."
  Age 7

- "I saw a bird's nest in the tree. I saw some pretty colored tree."
  Age 7

- "I got cut on the sidewalk."
  Age 7

- "I saw big big big school. I love my school in I love my mom."
  Age 2

- "I notice the broken and a colored old tree."
  Age 8

- "I saw the some tree was green and I saw a flag it was beautiful."
  Age 7

- "I saw the world and I saw a bird's nest in the tree and I waved at the people and I saw a play-ground. And the pretty colorful tree and the swimming pool at the center."
  Age 7

- "I saw a swimming pool and center and bird's nest in the tree. I saw broken glass. Colored tree flag. Wave. See the people."
  Age 8

- "I notice the bird nest."
  Age 7

- "Bird nest in the tree. I saw glass broken. I saw a colored tree. I saw pretty colored."
  Age 7

- "People. Love. Saw. See. Notice."
  Age 8

- "Happy houses. Trees. "
  Age 6

- "Tree I saw a trees. I feel happy."
  Age 6

- "I feel proud. I saw a bus."
  Age 6

- "I saw a dog in of houses. I saw a spider web. I saw a bus. I saw a water sprinkler."
  Age 9

- "Happy. treee. Proud. Bus. Water sprinkler. Dog."
  Age 6

- "Proud. Trees. Happy. Dog. Bus. Spider web houses. Proud."
  Age 7

- "I fill glad because I was that proud.
  Age 6

- "I loved walk to school day made me feel so so good! I did not really have problems but I did like Walk to School Day. And my teacher picked me to hold the flag. She is a nice teacher. I love this school."
  Age 7

- "I like to walk to school. I like to hold the rope."
  Age 7

- "The Walk to School day was fun to me. It made me happy. It was great. The world is fun. I love the world."
  Age 7

- "I had fun I felt good because I got exercise. I wish we did it again it was fun. I enjoy it. I had a lot of exercise. Can we do that again. I wish we did. I love walking."
  Age 7

- "I like to read. I like to learn. I like to run. I like the school folk. I like the exercise. I like to write. I like to draw."
  Age 9

- "I feel sad in New York. It made me cry. Good-bye. I love New York. Yae. Sad note."
  Age 6

- "It was fun walking to school day. I like exercising. It was fun."
  Age 7

- "We walked around the block. There was a lot of classes. I saw cars passing by. They waved at us. It was fun for the case. We walked to school."
  Age 7

- "I liked Walk to School Day. I got good exercise. I liked when Mr. Lois took me and Olivia's picture. I like holding the poster. I wish I could do it again."
  Age 8

- Walk to school is fun. It is a good exercise. I like walking to school. And I love to walk to school is good and funny walk to school was a surprise and fun. I like the way we hold the flag.
  (no age)

- "I like to walk to school and I like when we walk to school. I like walk a school. Because it is good. To walk to school."
  Age 7

- "I liked when we walked around the school and I felt safe and happy and I fill proud for with I did."
  Age 7

- "I have a good time. I saw a teen."
  Age 7

- "I feel happy. I see a tree."
  Age 7

- "I was so happy. I want to cry because I was. Think about the plane crash in New York City. That was my first time do that."
  Age 8

- "I had to hold the flag it was fun to hold the flag the wind was blowing the flag. The flag was in my face I could see where I was going and it was really fun."
  Age 7

- "The children walking from South 4th St. only have one crossing guard. She is on Russlle but when the children come to the second street, there is no one to cross them and it is only a two way stop. Some of the children had problems crossing that street by themselves. You have a lot of kindergartners walking that way by themselves every day. You need one more crossing guard or a 4-way stop."
  Parent

- "I seen trees and grass. I saw people Mr. Williams. I saw James. I saw Randall, I saw Hunter."
  Age 7

- "I felt happy we had one problem it was they was too slow. I saw a lot of trees."
  Age 7

- "I liked Walk To School Day because I got a lot of exercise. I wish that we can do it again next year. I liked it when we said the pledge to the flag and the Warner school pledge because we let all the balloons fly."
  Age 9

- "It felt great when I was walking. It was fun. I walk every day. To school and from school. I am proud to walk to school."
  Age 9

- "I was happy walking to school by myself. I was very happy this morning sometimes. He get very, very mad at her and I feel bad to see her crying a lot."
  Age 9

- "We see car and train. I feel happy and I was cold. It was fun."
  Age 7 or 8

- "I felt happy and glad I was not mad but they were pulling the rope. I couldn't even walk but that is OK. Goodbye."
  Age 8

- "I had fun going on the walk. We walked all the way around the field. And then, we went inside the building. And then, we did our work. Then we went to lunch."
  Age 8

- "I was feeling great. I thought it was a long walk. We walk around the block and walk back to school. I had fun walking to school. But we really don't walk to school. And we was teaching us safety."
  Age 8

- "I was have fun walk and saying pledge and talk to my friend Diamand and talk to my our friend Orde and have fun walking on end the park."
  Age 8

- "I felt safe walking and saying the pledge with my best friend Jamessae. I like Warner School. It is fun if you listen to your teachers."
  Age 8

- "I felt very good because I was safe and I had a good exercise and we saw other people waving at."
  Age 8

- "I felt happy because it wasn't hot it wasn't cold, it was warm. I saw houses, cars, and birds."
  Age 9

- "I saw houses and church building flags. I felt happy are no problem. Came upon it was a greatest sunny day when we did walk to school day and we sang song and cheers when we was walk and I had fun."
  Age 10

- "I felt good about walking to school it was great it was good. I did not have my problem. I was good. I was not bad and we was singing even Mrs. Yelverton."
  Age 9

- "I came upon no observations. My feelings were I was happy and felt good about walk to school day. It was great even when the kids let out the balloons and they went in the sky when the airplanes passed by."
  Age 9

- "My feelings was that I have a great time on walk to school in we sign some on walk to school day. Everybody in cars waves at us in we walk to South 6th Street in we walk to school on Tuesday."
  Age 9

- "When I was walking to school, I feel much better when I walking back to school and I saw lot of cars and we saw people on the road. And then we saw house's and other things when we were came back."
  Age 9

- "It was fun when we walk to school day. We were singing songs and we had to hold a rope and sing songs. People was pulling on the rope and we couldn't hold to the rope the boys was the rope and my teacher had to pull the rope back up and some people had to go to dss."
  Age 10

- "On Walk to School Day I had fun. I followed the rules, when I was having fun. Our class sung songs and cheers on our walk. I felt very exited and things. I had no problems, I just have a very fun walk and now I'll have a more safer walk."
  Age 10

- "It was a good time. It was fun. And it is good for your heart. It's exercise. It's great to walk. Any I had a good time walking."
  Age 10

- "It was a good time. I had a good day. I love walk to school day. It was very very fun walking around the school. And Mrs. Cook had help us make a flag it was a good flag."
  Age 8

- "I had fun walk out side around Warner School. And get the flag. We made a flag too. Then we walk around the to the seat area. We sing a song named lean on me and the use."
  Age 10

- "When I was walking around the block, I saw a airplane up in the air and a helicopter in the sky and I saw some people and they waved at me and my friend and my teacher then we went back to school."
  Age 9
- "A woman waved at my class. A problem I had was that other kids were pulling the rope and going slow. I had a good time. I liked the walk because I seen a lot of my friends. I had a lot of exercise. I had a lot of fun walking around the block. I hope we do it again next year."
  Age 8
- "When me and my brother was on our way to school, I saw men, homeless, drinking beer. I was scared they was going to hurt me. But my brother didn't see them. And we was OK."
  Age 9
- "I feel really good about walking to school because I learned how to walk to school. I think we should walk to school every day. I saw no problems."
  Age 8
- "I feel good. I saw people wave at us. I waved back."
  Age 8
- "I saw nice people and I saw a men riding a bike and women in a car."
  Age 9
- "I'm happy we did this to day. I saw people dogs and cars. I learned to be safe when you are walking."
  Age 8
- "It was fun. It feels good to me I like to walk to so much."
  Age 8
- "I felt good when we walked to school. I came upon a little tree on the wall. I loved how it felt good outside. When we in I just started coloring."
  Age 8
- "I saw where I was walk I saw cars and people."
  Age 8
- "When we walk to school I taught it was fun. We marched and sung too."
  Age 9
- "I saw people in the houses watching by. I saw caterpillars on trees. I saw the center. I saw the playground. I saw people driving cars. I saw airplanes. I saw birds in the nest resting up."
  Age 9
- "We had a good walk. We walk on the way around. We said the pledge of allegiance."
  Age 9

- "I had one problem on Walk to School Day. I was first in line everybody was trying to pull me back when we were holding the rope. When I was walking I saw people waving to us. We were singing a cheer."
  Age 9

- "My feelings that came upon was happy because we was sing songs. The problems that came upon was that at first it was boring but when we get the walking it was fun because we did cheers and singed songs."
  Age 9

- "My feeling are happy because we had to walk that's was happier part about we saw people when was walking but the most funniest part about is when the girls was singing."
  Age 10

- "It felt good because I was getting exercise."
  Age 9

- "We walk to school to make you strong. I like win."
  Age 7

- "We walk to school to get you strong."
  Age 7

- "We walk to school to keep our body good get you strength."
  Age 6

- "We walk to school. Keep our body good. Make you strong."
  Age 6

- "We walk to school to make you strong."
  Age 6

- "We walk to school to walk to school."
  Age 7

- "We walk to school to walk to school. Keep out."
  Age 7

- "We walk to school to make you healthy."
  Age 6

- "I thought Walk to School Day was great but there were just a few problems. People we fighting and not holding the rope like they should. I thought that the weather was too cold."
  Age 9

- "Everybody kept pulling on the rope. It turned into chaos. I think we need a bigger rope. The rest went well. I liked walking. "
  Age 9

- "On Walked to School Day there were a problem between me and Eric when we were walking someone had push me in I tripped Eric."
  Age 9

- “Many students kept pulling on the rope.”
  Age 10

- “I thought that the rope was slowing all the people down. The rope wasn’t right for the Walk to School Day people kept pulling the yellow rope.”
  Age 9

- “I thought that it was great. But people was pulling the rope. Some people were falling from the rope being pulled. But the rest of the time was great. Walked waving flag. I had fun. But my problem can be solved.”
  Age 9

Whitsett Elementary

- “Their were to many cars on the street.”
  Age 7

- “I think it was fun. The sign was broken.”
  Age 7

- “A boy told me that he was going to hurt me.”
  Age 8

- “I was feeling happy. Some guy was fighting.”
  Age 7

- “I felt happy and I enjoyed walking to school. It was fun walking to school.”
  Age 8

- “I felt cold. I felt happy. I felt like helping my friend. I felted like running.”
  Age 8 in a half

- “I felt kind of scared until I got to the sidewalk. But then I felt glad I got to walk to school.”
  Age 8

- “I was cold and freezing.”
  Age 8

- “When I walked to school I was cold. But I was happy anyway. The teachers walked us to class. Then we got to work. The End.”
  Age 9

- “I feel great. It was fun. I will walk again with my friend. I will ride my bike next time. My friend will be on her scooter. I had a great, great time.”
  Age 8

- “I feel great when I walk to school. I was skating to school. I was trying to skate as slow as I can. Because they was walking slow. But I was fast if I’m riding my skates.”
  Age 8

- “I feel good I do not like the dog But I like walked.”
  Age 9

- "I felt glad I walked with my mom. I saw a dog."
  Age 8 ½

- "I was cold. I got cold because I had shorts on. It was a long walk almost."
  Age 8

- "It feel great. And we hold hand. Any my partner is : Karen."
  Age 9

- "I was riding my bike a little dog was chasing me when I was riding my bike to school it was fun riding to school. Then I stopped and go off my bike I locked it on the bar. I went to class we worked all day."
  Age 9

APPENDIX I: RESOURCES

Bicycle and Pedestrian Related Publications and Reports Produced by USDOT Federal Highway Administration

FHWA Publications with a Report Number (e.g. FHWA-PD-92-041) can be ordered directly from the FHWA R&T Report Center by faxing the document number and mailing information to (301) 577-1421.
Documents that do not have a Report Number can be ordered by calling the Pedestrian and Bicycle Information Center.

1. National Bicycling and Walking Study Reports

FINAL REPORT
- FHWA-PD-94-023 National Bicycling and Walking Study
- National Bicycling and Walking Study Executive Summary (1994)
- National Bicycling and Walking Study Five Year Status Report (1999)

CASE STUDIES:
- FHWA-PD-92-041 #1 Reasons Why Bicycling & Walking are Not Being Used More
- FHWA-PD-92-038 #2 The Training Needs of Transportation Professionals
- FHWA-PD-93-039 #3 What Needs to be Done to Promote Bicycling and Walking
- FHWA-PD-93-031 #4 Measures to Overcome Impediments to Bicycling and Walking
- FHWA-PD-93-008 #5 An Analysis of Current Funding Mechanisms
- FHWA-PD-93-024 #6 Analysis of Successful Grass-Roots Movements
- FHWA-PD-92-040 #7 Transportation Potential and Other Benefits of Off-Road Facilities
- FHWA-PD-93-007 #8 Organizing Citizen Support and Acquiring Funding
- FHWA-PD-93-012 #9 Linking Bicycle/Pedestrian Facilities with Transit
- FHWA-PD-94-012 #10 Trading Off Among the Needs of Motor Vehicle Users, Peds, Bikes
- FHWA-PD-93-009 #11 Balancing Engineering, Education, Law Enforcement, Encouragement

- FHWA-PD-92-036 #12 Incorporating Consideration of Bicyclists & Pedestrians into Education
- FHWA-PD-93-018 #13 A Synthesis of Existing Bicyclist and Pedestrian Related Laws
- FHWA-PD-93-025 #14 Benefits of Bicycling and Walking to Health
- FHWA-PD-93-015 #15 The Environmental Benefits of Bicycling and Walking
- FHWA-PD-92-037 #16 A Study of Bicycle and Pedestrian Programs in European Countries
- FHWA-PD-93-016 #17 Bicycle/Pedestrian Policies and Programs in Asia, Australia, New Zealand
- FHWA-PD-93-010 #18 Analyses of Successful Provincial, State, and Local Programs
- FHWA-PD-93-028 #19 Traffic Calming, Auto Restricted Zones, and Traffic Management
- FHWA-PD-93-037 #20 The Effects of Environmental Design on the Amount and Type
- FHWA-PD-93-017 #21 Incorporating Bicycle and Pedestrian Considerations into Planning
- FHWA-PD-93-019 #22 The Role of State Bicycle/Pedestrian Coordinators
- FHWA-PD-93-014 #23 The Role of Local Bicycle/Pedestrian Coordinators
- FHWA-PD-93-006 #24 Current Planning Guidelines and Design Standards

2. Other FHWA Reports

- FHWA-PL-00-021 Innovative Traffic Control: Technology and Practice in Europe
- FHWA-HEP-99-006 Designing Sidewalks and Trails for Access: Part I (available fall 1999)
- FHWA-RD-98-166 Guidebook on Methods to Estimate Nonmotorized Travel: Supporting Documentation
- FHWA-RD-98-165 Guidebook on Methods to Estimate Nonmotorized Travel: Overview of Methods.
- FHWA-RD-98-105 Implementing Bicycle Improvements at the Local Level
- FHWA-RD-98-095 The Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual
- FHWA-RD-98-072 The Bicycle Compatibility Index: A Level of Service Concept, Final Report
- FHWA-PD-98-052 Recreational Trails Program (brochure)
- FHWA-PD-98-049 Bicycle and Pedestrian Provisions of the Federal-aid Program (brochure)
- FHWA-PD-97-053 Bicycle and Pedestrian Planning Under ISTEA
- FHWA-PD-97-062 Flexibility in Highway Design
- FHWA-HI-96-028 Pedestrian and Bicyclist Safety and Accommodation (NHI Participant Workbook)
- FHWA-RD-95-163 Bicycle and Pedestrian Crash Types of the Early 1990s
- FHWA-PD-95-009 A Compendium of Available Bicycle and Pedestrian Trip Generation Data
- FHWA-PL-95-006 FHWA Study Tour for Pedestrian and Bicyclists Safety in England, Germany, and the Netherlands
- FHWA-PL-95-005 Bicycling and Walking in the Nineties and Beyond: Applying Scandinavian Experience to America's Challenges
- FHWA-RD-94-062 Bicycle Safety Related Research Synthesis
- FHWA-PD-94-031 Conflicts on Multiple-Use Trails
- FHWA-HI-94-028 Bicycle and Pedestrian Planning (NHI Participant Workbook)
- FHWA-RD-92-073 Selecting Roadway Design Treatments to Accommodate Bicycles

APPENDIX J: ORDINANCES, POLICIES & PRACTICES

INTRODUCTION

The following recommendations address Metro's adopted regulatory documents and routine practices. Recommendations related to a specific regulatory document are addressed under that document's heading; other recommendations are addressed separately. All recommendations are emphasized with bold text. These recommendations reflect best practices and are proposed to help Metro achieve its objectives to create a more accessible community.

SUBDIVISION REGULATIONS

The following changes to Metro's Subdivision Regulations are recommended.

Amend *Section 2-6.1.B.1: Sidewalk Dimensions*, to reflect the minimum sidewalk corridor widths recommended in the Pedestrian Facilities Design Guidelines, based on roadway classification. The recommended widths are specified in Table J.1 (current roadway classifications are shown, however, recommended widths should be applied to whichever equivalent new classifications are contained in the new Major Street Plan).

Amend *Section 2-6.1.B.7: Existing Character*, to require that new sidewalk corridors be built to the recommended new width standards, regardless of the configuration of existing adjacent sidewalks, unless the new sidewalk will be less than 300 feet long. See the Pedestrian Facilities Design Guidelines for additional information.

Amend the *Subdivision Regulations* to ensure the routine incorporation of pedestrian design features such as curb extensions, pedestrian refuge islands and others, as discussed in the Pedestrian Facilities Design Guidelines, where appropriate. For example, curb extensions are typically recommended for use on streets with on-street parking. Pedestrian signals are recommended to be provided at all signalized intersections. Requirements for other features should be based on the intensity of desired pedestrian activity, as established by the transect zones. For example, a Center or Neighborhood transect might require a more generous application of pedestrian design features.

ZONING ORDINANCE

The following changes to Metro's Zoning Ordinance are recommended.

Amend *Chapter 17.12: District Bulk Regulations*, to require a setback of one foot from property lines shared with a public right-of-way for fences, walls, and other such structural features, per the Pedestrian Facilities Design Guidelines. Pedestrians tend to "shy" away from adjacent structures by walking down the middle of the sidewalk. This provision ensures that the actual width and the usable width of a sidewalk are the same. For sidewalks with a width greater than ten feet, this provision will usually not be necessary.

	Local streets or equivalent	Collector streets or equivalent	Arterial streets or equivalent
Pedestrian Travelway	Five feet minimum	Six feet minimum	Eight feet minimum
Furnishings Zone	Four feet minimum	Five feet minimum	Six feet minimum
Frontage Zone	NA	NA	Four feet minimum

Table J.1: Recommended minimum widths for zones within the sidewalk corridor.

Amend Section *17.16.040: Educational Uses*, to require site design that provides direct and continuous pedestrian and bicycle access to major school building entrances from public streets and overland trail connectors. Where pedestrian and bicycle facilities cross driveways, parking lots or other locations where motor vehicles are present, design features should give precedence to students on foot or bicycle. See the School-Related Issues in section C of Chapter 5 in the report.

Furthermore, ***Section 17.16.040.A.4.a)* should be amended to ensure that new elementary schools are located on neighborhood streets, and that they should be located within walking distance of a large proportion of students' homes.** As discussed in Section D, Education and Encouragement, in Chapter 5, young children are even more dependent than other pedestrians on well-designed pedestrian facilities and slow, careful motorists. Locating elementary schools on streets that are safe and comfortable for walking should maximize the number of students who walk to school and should reduce the volume of school-related motor vehicle traffic. Also, this provision will enhance the safety for those children that do walk.

Amend *Chapter 17.20: Parking, Loading & Access*, to include bicycle parking requirements per the following:

- In general, bicycle parking is recommended to be a percentage of required motor vehicle parking, as specified in Table 17.20.030. Five percent is a typical proportion for most uses, although schools, dormitories and other such uses are recommended to require a higher rate.
- Although bicycle parking may be an adjustment factor that could be added to *Section 17.20.040: Adjustments to Required Parking*, bicycle parking requirements themselves are not recommended to be reduced under similar provisions, since urbanized areas are where bicycle parking demand will be the highest.
- When bicycle parking requirements exceed a specified number of spaces, it is recommended that bike lockers or covered bike racks be required as a percentage of required bike parking spaces. This provision would be based on the presumption that developments with large volumes of required parking will also typically be major employers, with a need for long-term bike commuter parking.

Bicycle parking should be a percentage of required motor vehicle parking, with a higher proportion at schools and dormitories.

- When a development includes a parking structure, a percentage of required bicycle parking is recommended to be located within the structure to provide covered parking for long and medium-term users. It is recommended that parking structure entrances be designed for bicycle access so that cyclists can access the structure without dismounting.
- Bike rack and locker design and location is recommended to comply with the Bicycle Facilities Design Guidelines.
- It is recommended that a parking reduction or density bonus be offered for shower facilities in non-residential buildings.

Amend the sidewalk requirements in *Section 17.20.120* and elsewhere in the *Zoning Ordinance* so that there is more consistency with the sidewalk requirements in the *Subdivision Regulations*, updated per the recommendations above. Conformance will ensure that previously platted developments that do not require review under the *Subdivision Regulations* are held to the same sidewalk requirement standards.

Amend the exemptions identified in the introduction to *Section 17.20.120: Provision of Sidewalks*, to offer relief from sidewalk requirements only when the square footage or value of any expansion is not greater than 25% of the existing square footage or value, or when a cumulative increase through multiple expansions over a five-year period is not greater than 25%. Under these provisions, any expansion(s) greater than 40,000 square feet should not be exempt from sidewalk requirements.

Amend *Section 17.20.120.A: On-Site Sidewalk Installation*, per the following:

- A minimum sidewalk width of five feet is recommended to be required for all developments.
- Sidewalks are recommended to meet Metro's accessibility requirements.
- In addition to being continuous, sidewalks should offer direct access between major building entrances and any site boundary with public streets, public sidewalks, public transit stops, parking garages and parking lots, and any site boundary with off-site attractors.
- Curbs, wheel stops, or other physical barriers are recommended to ensure that the "nose" of any parked vehicle does not encroach into the sidewalk and reduce usable width.

Amend *Section 17.20.140: Traffic Impact Studies*, to require that pedestrian and bicycle considerations be incorporated into traffic study requirements. Requirements for Traffic Impact Studies should not be waived for developments within the downtown loop, since developments in this area tend to generate a higher percentage of pedestrian/bicycle trips than developments elsewhere. All studies are recommended to:

- Identify the routes of travel and the types of facilities that will be provided for pedestrians and bicyclists who are traveling to the development site.
- Identify the routes of travel and the types of facilities that will be provided for pedestrians and bicyclists who are traveling through the segment of roadway that is impacted by the development.
- Identify necessary pedestrian and bicycle improvements at intersections.
- Identify whether or not the development occurs on a street that has been identified on the Bicycle Facilities VisionMap as a bikeway corridor.
- Identify nearby pedestrian/bicyclist generators or destinations that may need to be connected with the project site.

Several sections of the *Zoning Ordinance* address pedestrian-related site design issues. Historically, requirements for such facilities, and scrutiny for compliance, have been minimal. In order to facilitate compliance with the recommended new standards and efficiently advise applicants, **it is recommended that a guidance brochure be developed by the Planning Commission that addresses pedestrian-related site design considerations.** In addition to providing guidance on design requirements, additional recommended best practices can be incorporated into the document.

Amend *Section 17.36.080A.4: Nonresidential and Mixed-Use Standards for PUDs*, to require direct, continuous, and accessible pedestrian facilities between major destinations and land-use components within the PUD, as well as between major building entrances and parking areas, public rights-of-way and public transit stops.

THE *MAJOR STREET PLAN* & ROADWAY CROSS-SECTION DESIGN STANDARDS

As recommended in the Pedestrian Facilities Design Guidelines, and like the *Subdivision Regulations*, **the roadway cross-sections in the *Major Street Plan* should incorporate the sidewalk width standards specified in Table 5.2** (current roadway classifications are used, but recommended widths should be applied to equivalent new classifications).

Roadway design cross-sections in the *Major Street Plan* are recommended to incorporate bike lanes on all Minor Collector, Major Collector, and Arterial streets, or equivalent new classifications, per the Bicycle Facilities Design Guidelines.

If a Rural Residential street classification is retained, it should be amended to

incorporate shoulders that are in compliance with the bicycle and pedestrian design guidelines, including pavement surface provisions.

TRAVEL LANE WIDTH STANDARDS

Facilities for pedestrians, bicyclists, and motorists must sometimes compete with each other for limited space on existing right-of-way. Since all of these modes are permitted on every street classification except for freeways, every street should offer safe facilities for every mode. By adopting a policy that applies some flexibility to conventional travel lane width standards, additional space can be made available for pedestrian and bicycle facilities.

> *"Metro should, as a matter of course, review all paving projects within the city from the perspective of making the project more bicycle-friendly."*

The width of a roadway should be planned as the sum of the widths of the lanes for moving traffic, parking, and bicycles, including the median width where appropriate. Streets must be planned, located and designed to be suitable for predictable traffic operations, which include vehicles, pedestrians, bicycles, emergency and service vehicles, to ensure traffic mobility and safety.

The American Association of State Highway & Transportation Officials' (AASHTO) 2001 *Policy on Geometric Design of Highways & Streets* states that "Although lane widths of 12 ft are desirable on both rural and urban facilities, there are circumstances where lanes less than 12 ft wide should be used. In urban areas where pedestrian crossings, right-of-way, or existing development become stringent controls, the use of 11 ft lanes is acceptable. Lanes 10 ft wide are acceptable on low speed facilities, and lanes 9 ft wide are appropriate on low-volume roads in rural or residential areas."[1] The Tennessee Department of Transportation's (TDOT) *Standard Roadway & Structure Drawings* defines streets with speeds of 40 MPH or less as low speed streets. Low volume roads are typically considered to be those with average daily traffic of 400 vehicles or less.[2]

Certain travel lanes can be reduced to allow enough room for bike lanes.

In regards to bicycle lanes, AASHTO further states that "in some instances, on multilane facilities in urban areas narrower lanes may be utilized to permit wider outside lanes for bicycle use. In this situation, 10 to 11 foot lanes are common on inside lanes with 12 to 13 foot lanes utilized on outside lanes."

Accordingly, **it is recommended that Metro approve the use of travel lanes that are less than 12 feet where appropriate.**

On many constrained existing streets, the ability to stripe conventional travel lanes to be less than 12 feet wide means the difference between bike lanes and no bike lanes. Also, because roadway cross-sections vary so significantly along the length of many older streets, it is critical that some flexibility be applied to conventional lane widths in order to provide continuous bikeway corridors.

Properly applied, narrow lanes can be better for drivers, too. Lanes that are less than 12 feet wide tend to slow traffic, which decreases stopping distance, increases reaction time, and decreases the severity of crashes. Also, when conventional lanes are narrowed to provide space for bike lanes, there are benefits to motorists, such as larger turning radii at intersections, breakdown space, and improved passage for emergency vehicles.

[1] AASHTO, *Policy on Geometric Design of Highways and Streets*
[2] Standard Roadway and Structure Drawings

As discussed above, under the recommended conditions, the use of lanes less than 12 feet is endorsed by AASHTO. It is also commonly practiced by engineering departments in cities throughout the United States.

ROADWAY REPAVING & RESTRIPING POLICIES

Roadway improvement projects, including those on streets that are not slated for bicycle facilities, should include the replacement of substandard storm grates with new grates that comply with Metro Public Works' adopted engineering specifications, and as reflected in the Bicycle Facilities Design Guidelines. Associated costs are recommended to be integrated into the improvement project budgets.

During roadway improvement projects, including those on streets not slated for bicycle facilities, storm grates should be raised to be flush with the new asphalt surface, or the asphalt surface should be tapered to meet the grate surface, per the Bicycle Facilities Design Guidelines.

On multi-lane streets not slated for specific bicycle facilities per the Bicycle Facilities Vision Map, pavement width in excess of minimum lane widths should be reallocated to the outside lanes during repaving projects. This maximizes the width of outside lanes, which increases safety and comfort for bicyclists, and it minimizes the degree to which passing cars must weave into an adjacent lane. AASHTO's *Policy on Geometric Design of Highways & Streets* generally recommends this approach for all streets. Although a particular street may not meet the standards that would allow it to be designated as a bikeway, any additional outside lane width will benefit bicyclists who travel on that street.

SPEED LIMIT

Currently, the default speed limit on all Metro streets is 30 miles per hour. Traffic engineering studies have shown that motorists tend to travel at a speed that is approximately nine miles per hour greater than the posted speed limit. In fact, many residents cite speeding cars as a significant problem in their neighborhoods. Reduced speed limits will help make the neighborhoods more suitable for pedestrians and bicyclists. **It is recommended that the default speed on all Local streets, Minor Collector streets in residential areas, and on other streets in dense urban areas, be lowered to 25 miles per hour.**

As traveling speeds decrease, stopping distances also decrease. Slower traveling speeds often reduce the number of crashes that occur, and the severity of those crashes that do occur. Slower traveling speeds also make it easier for drivers to yield to pedestrians at intersections and driveways.

Speed limits of 25 miles per hour or lower are recommended on urban streets as well as neighborhood streets.

AASHTO's 2001 *Policy on Geometric Design of Highways & Streets* states that "Urban arterial streets should be designed and control devices regulated, where practical, to permit running speeds of 20 to 45 MPH. Speeds in the lower portion of this range are applicable to local and collector streets through residential areas and to arterial streets through more crowded business areas. . . . For arterial streets through crowded business areas, coordinated signal control through successive intersections is generally needed to permit attainment of even lower speeds. Many cities have substantial lengths of signal controlled streets that operate at speeds of 20 to 40 MPH."[3] Clearly, a 25 MPH default speed limit conforms to the intent of this guidance from AASHTO.

Reducing the posted speed, alone, is not an especially effective way to reduce traffic speeds. However, on some narrow streets, it will allow law-abiding drivers to set the speed for those behind them. The primary rationale for lowering the default speed limit to 25 MPH is to ensure that the policy is consistent with the other objectives and measures recommended in this plan. Also, if future neighborhood streets are designed for 25 mph, speeding will be reduced.

SIDEWALK ENGINEERING SPECIFICATIONS

New engineering specifications should be adopted by the Engineering Division of Metro Public Works for the sidewalk corridor requirements recommended in the Pedestrian Facilities Design Guidelines. Similarly, **new engineering specifications should be adopted for the most commonly used intersection design features**, in addition to sidewalks, that are recommended in the Pedestrian Facilities Design Guidelines, including residential driveways, pedestrian refuges, curb extensions, traffic circles, and slip lanes.

MPW drawings #ST-300, ST-301, ST-302, ST-304, ST-305 **(as amended), and any other drawing that includes a back curb should be amended so that the back curb is exclusive of the sidewalk width.**

SIDEWALK INSTALLATION SCHEDULING IN SUBDIVISIONS

Current policy, which requires that sidewalks be installed in new subdivisions by the time the development is built-out by 75%, creates some recurring problems.[4] In some instances, the sidewalks are the last feature to be installed on a street, even after many houses are already occupied. Technical difficulties of this policy include:

- Site grading that may not have considered sidewalks and consequently requires invasive additional grading work, re-pouring of driveways and other expensive complications
- ADA compliance problems, especially with cross slopes at driveways
- Awkward junctures at driveways
- Mismatched sidewalk segments that have been installed by different builders
- Sidewalks that may not get installed until years after development of the subdivision begins
- Landscaping that has already been installed by owner-occupants which requires removal for sidewalk installation

It is recommended that Metro develop a revised policy that better addresses the construction of sidewalks in new subdivisions. In developing the revised policy Metro should consult with homebuilders, developers, engineers, and contractors to ensure that the policy is well thought out and accomplishes Metro's goal of providing accessible sidewalks in new developments.

One possible option that should be considered is for Metro to require that sidewalks be installed as part of curb and gutter installation, prior to the issuance of building permits. With this option, Metro would not issue building permits for developments along a newly developed roadway until after the sidewalk was constructed, per standard, along that roadway. This approach would offer the following advantages:

[3] AASHTO, *Policy on Geometric Design of Highways and Streets*
[4] Davidson County, *Subdivision Regulations*, 2002.

- Sidewalks would be continuous and uniform in design, and sidewalk networks would be completed at one time.
- All site grading work would be forced to take into consideration the existing sidewalks.
- The sidewalk inspection process would be streamlined.
- Homebuyers would not have to wait for a future pedestrian infrastructure, nor will they risk investing in landscape materials that may be removed for a future sidewalk.

Developers in cities with such a policy find that careful construction site management minimizes damage to new sidewalks. Using curb cuts and driveway areas for site access, or bridging sidewalks with steel plates can minimize damage during construction. Even after factoring in repair costs from limited damage, in the long run this type of approach is less expensive than addressing the range of complications that stem from post-development sidewalk installation.

PUBLIC PROJECT NOTIFICATION

> *"...Notify the public of planned side-walks <u>before</u> construction begins…"*

Metro Public Works should develop and distribute a written brochure to property owners prior to sidewalk installation. In a congenial tone, the brochure should address the following issues:

- Construction zone issues
- Project schedule
- The benefits of sidewalks, including a potential increase in property values
- Property owners' responsibilities regarding vegetation encroachment, loose gravel, and fencing

The brochure will also serve as notice to property owners should they need to relocate landscaping materials.

It is recommended that, as with zone change and variance applications, physical signs be posted at sites where any public roadway improvement project is proposed. A roadway project can have as great an impact on surrounding properties as other development-related projects. Prior to the design of such projects, the public should be notified.

PEDESTRIAN & BICYCLE FACILITIES MAINTENANCE

Metro Public Works should be provided with adequate staff time to inspect sidewalks for maintenance and encroachment violations, notify property owners of violations, and when necessary, correct the violation and place a lien on the property for associated costs, per current Code provisions.

After any public or private construction project in or adjacent to a roadway, such as a water project or infill development, sidewalks should always be inspected by Metro Public Works to ensure that any damage to sidewalks is repaired by the responsible entity.

It is recommended that Metro Public Works develop a spot improvements program to address pedestrian and bicycle maintenance issues. Almost every city with a successful pedestrian and bicycle program has a quick-response program in place to ensure that facilities are well-maintained. Typically referred to as Spot Improvements Programs, they provide the public with an easy way to report minor maintenance problems, such as broken glass, a new pothole in a bike lane, or a pedestrian crossing signal that has been knocked out of alignment. They also provide the government with an effective way to ensure that the facilities are in good order. Most programs operate in the following manner:

- A budget is dedicated for repairs
- A phone number and online form to report problems are well-publicized
- Pedestrian & Bicycle Program staff refer the problem to the appropriate agency
- Follow-up by staff lets the complainant know when and how the problem will be addressed

Spot improvements programs are intended to address minor, low-cost maintenance and repair problems. Larger problems are incorporated into other maintenance and capital improvement budgets.

A spot improvements program is also an excellent way to encourage the public to function as inspectors. For example, the public can report on whether or not a plumbing company replaces a sidewalk that was damaged during work near a water meter.

RELOCATION OF UTILITY POLES & OTHER OBSTRUCTIONS

Fire hydrants, mailboxes, street signs, utility poles, newspaper boxes and other obstructions create significant barriers to pedestrian travel. Although sidewalks can be detoured around these obstructions and still technically meet ADA standards, these obstructions create problems for sight-impaired pedestrians. These obstructions reduce the usable width of the sidewalk, block sight lines, and are unsightly. Furthermore, ensuring that walking is a desirable form of transportation requires that pedestrian facilities be held to equally high standards as are maintained for vehicular travel.

The following recommendations are intended to serve as a guide for minimizing obstructions. The intent is for all of the recommendations to be implemented as a coordinated strategy.

In coordination with Metro, the Nashville Electric Service (NES) and other utilities should develop a systematic pole placement program that achieves the following objectives:

- Remove all un-used utility poles
- Consolidate poles and minimize the total number of poles
- Relocate poles to alleys, where alleys are present
- Relocate poles outside of the Pedestrian Travelway
- Bury lines, where feasible

The pole program is recommended to operate on two tracks. First, Metro should communicate with NES and other agencies that are responsible for obstructions before a sidewalk retrofit project begins. Concurrently, NES and other agencies that are responsible for obstructions should develop an on-going, parallel program, to ensure Metro is aware of their projects that may interfere with sidewalks. Together, the two tracks will systematically achieve the above objectives on a countywide scale.

Unless extreme physical constraints are present, a Furnishings Zone should be provided as part of sidewalk retrofit projects, per the Pedestrian Facilities Design Guidelines. The Furnishings Zone can preclude the need to relocate obstructions, while offering multiple additional benefits. See the Pedestrian Facilities Design Guidelines for additional information on finding width for a Furnishings Zone.

Street corners should be the highest priority for obstruction removal. At corners, obstructions block pedestrian travel and complicate curb ramp installation. They can also make it very difficult for pedestrians and motorists to see each other at street intersections, which is where conflicts are most likely to occur. Bulky obstructions, such as signal boxes, are especially problematic. In some instances, the relocation of corner obstructions can be avoided by installing curb extensions, which increase pedestrian visibility by moving the curb closer to the true intersection of travel lanes.

CONSTRUCTION ZONE POLICY

A pedestrian traffic control plan should be required for every project that requires a conventional traffic control plan, and for any project that will temporarily alter pedestrian traffic flow patterns. The

A pedestrian traffic control plan should be included in every project that will alter the flow of pedestrian travel.

pedestrian traffic control plan is recommended to be developed in accordance with the Pedestrian Facilities Design Guidelines.

For construction projects that require a traffic control plan and are located on a bikeway corridor, bicycle accommodations should be required as part of the plan, per the Bicycle Facilities Design Guidelines**.**

For sidewalk retrofit projects that involve the replacement of existing sidewalks, alternative pedestrian accommodations should be provided during construction.

BICYCLE FACILITIES DESIGN GUIDELINES

The Bicycle Facilities Design Guidelines developed for this plan should be adopted as the standards to which all bicycle facilities in Davidson County are required to be built. These guidelines are included in Appendix C.

PEDESTRIAN FACILITIES DESIGN GUIDELINES

The Pedestrian Facilities Design Guidelines developed for this plan should be adopted as the standards to which all pedestrian facilities in Davidson County are required to be built. These guidelines are included in Appendix B.

Intersection improvements such as curb extensions should be incorporated into funding, design, and installation.

Engineering specifications should be reviewed and updated to be consistent with the Pedestrian Facilities Design Guidelines.

DOGS, TRASH & LEAVES

Sidewalk audits conducted by Tying Nashville Together, Walk-to-School Day participants, and other organizations frequently indicate that many issues not related to sidewalk design or maintenance significantly affect one's ability to safely walk or bicycle for transportation. Aggressive dogs, leaves, trash, and other negative factors create a climate that can negate the positive presence of new sidewalks or bike lanes. When current participants in neighborhood audits have provided lists of codes violations to Metro, the Codes Department has been responsive. Based on the success of these endeavors, **it is recommended that the Codes Department dedicate additional staff time and new staff positions to neighborhood inspections.** Efforts could be made to target the most common quality-of-life codes violations and schedule sweeps in neighborhoods throughout the city.

BUDGET

<u>SIDEWALK IMPROVEMENT BUDGET ALLOCATIONS</u>

As discussed in Chapter 6, **it is recommended that future sidewalk funding allocations be divided as follows:**

- 50% dedicated to correcting the existing sidewalk problems, including those replacements that are associated with roadway repaving projects, prioritized per the Sidewalk Priority Index
- 15% dedicated to correcting the existing ramp problems, prioritized per the Sidewalk Priority Index
- 20% dedicated to new sidewalk construction, prioritized per the Sidewalk Priority Index
- 7.5% dedicated to general sidewalk maintenance
- 7.5% dedicated to pedestrian enhancements that are independent of sidewalk projects, as described below:

It is recommended that pedestrian improvements at intersections be incorporated into the funding, design, and installation of sidewalk retrofit projects. Such improvements could include pedestrian signals, crosswalk markings, curb extensions, pedestrian refuges, reduced curb radii, or other features per the Pedestrian Facilities Design Guidelines. This approach ensures that pedestrians are provided with safe facilities to cross the street at the same time as they are provided with safe facilities to walk along the street. Otherwise, many streets may function as barriers to pedestrian travel, leaving some new sidewalks underutilized.

As described above, it is recommended that 7.5% of the sidewalk funding be dedicated to pedestrian enhancements, independent of sidewalk retrofit projects. On many streets, existing sidewalks are adequate, yet the sidewalks lead to intersections that are difficult to cross. By dedicating a portion of sidewalk funds to such pedestrian improvements, it ensures that many stand-alone pedestrian crossings are given attention.

It is recommended that roadway improvement projects, including road widening and intersection improvements, incorporate pedestrian facility improvement costs as an integral component of the total project budget. Sidewalk funding allocations should not be used to provide pedestrian facilities for these roadway improvement projects.

BIKEWAY FUNDING

It is recommended that roadway improvement projects, including routine roadway repaving projects, road widening projects and intersection improvement projects, on roadways identified as bikeway corridors on the Bicycle Facilities Vision Map incorporate bicycle facility improvement costs as an integral component of the total project budget.

It is recommended that additional funding be dedicated to bicycle facilities improvement projects independent of roadway improvement projects.

SKATES, SCOOTERS & SEGWAYS

The Metro Code currently regulates the use of roller skates, in-line skates and scooters on city streets and sidewalks. The Code states that "A person may not operate scooters, in-line skates or roller skates on public roadway, except as otherwise provided herein or as otherwise permitted, and subject to the following provisions and all other applicable provisions in this chapter: Whenever a designated bicycle path has been provided adjacent to a roadway or as a part of a roadway, operators of scooters, in-line skates or roller skates shall use such path or designated area and shall not use the roadway."

Roller skates, in-line skates and scooters are generally allowed to operate on sidewalks. The primary exception is for "that center city area bounded by the center lines of the Gay Street connector and First Avenue North on the east, the center line of Broadway on the south, the railroad gulch on the west, and by the center lines of Charlotte Pike and James Robertson Parkway on the north", where these users are not allowed on sidewalks.

No changes are recommended in these policies at this time. **In the future, as skaters and scooter users become more prevalent around Nashville, it is recommended that Metro evaluate the need for changes to the current policies.**

The segway, which is more technically referred to as an Electronic Personal Assistive Mobility Device (EPAMD), is a new product that has received much attention and hype as a vehicle of the future. EPAMDs are not yet on the market. As a result, there has not been a ruling on whether an EPAMD is considered a motor vehicle or a consumer product. The Consumer Product Safety Commission has issued a preliminary opinion letter stating that EPAMDs should be considered "consumer products" and therefore not regulated by the National Highway Traffic Safety Administration. This designation may change when EPAMDs enter the marketplace.

Tennessee is one of the many states that has already passed laws allowing EPAMDs on public streets, as well as on sidewalks. In Tennessee, there are no registration requirements for EPAMDs, there is no minimum age to operate an EPAMD, and helmets are not required.

Since EPAMDs are allowed on sidewalks, the compatibility of EPAMDs and pedestrians is likely to be an important issue in the future. However, at this time it is too early to tell how successful this new technology will be and how much impact the EPAMDs will have on other sidewalk users. This is an issue that Metro should monitor in the future to determine if there needs to be any changes to the Code or to the sidewalk and street design standards to accommodate EPAMDs.

AMENDMENT 1:

2008 UPDATES TO THE NASHVILLE-DAVIDSON STRATEGIC PLAN FOR SIDEWALKS AND BIKEWAYS

2008 UPDATES
TO THE NASHVILLE-DAVIDSON COUNTY STRATEGIC PLAN FOR SIDEWALKS AND BIKEWAYS

JULY 2008

Nashville-Davidson County
strategic plan
for SIDEWALKS & BIKEWAYS

CIVIC ENGINEERING
AND INFORMATION TECHNOLOGIES

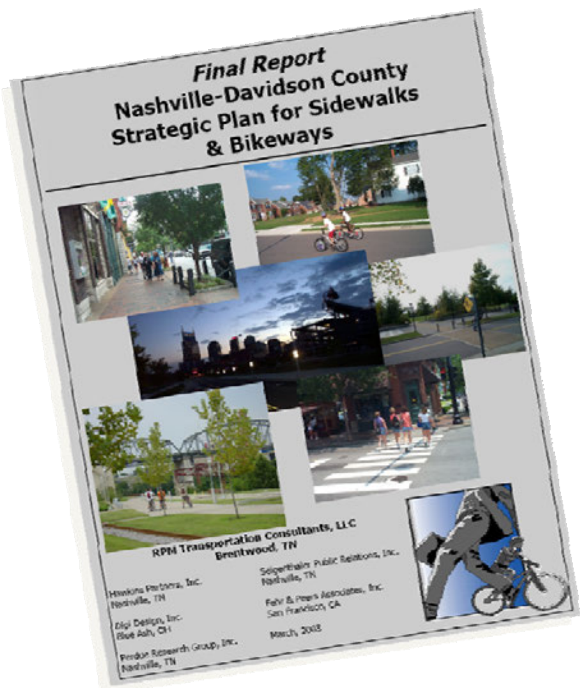
TABLE OF CONTENTS

SECTION 1: HISTORY AND BACKGROUND

1.1. STRATEGIC PLAN HISTORY

Historically, Nashville's approach to transportation, like many cities, had revolved around motor vehicles. In late 2001, Metro took a fresh look at the planning of pedestrian and bicycle facilities by embarking on the development of the *Nashville-Davidson County Strategic Plan for Sidewalks and Bikeways (*hereinafter referred to as the *Strategic Plan)* completed in March 2003.

The Strategic Plan was developed as a community plan and involved significant public input. Public meetings were held throughout the county between January 2002 and September 2002. The meetings were utilized to introduce the plan and provide a forum for public input.



In concert with the *Strategic Plan*, an inventory of the then total of 752 miles of sidewalks in the County was preformed. In addition, Metro roadways were evaluated for the feasibility of incorporating bicycle facilities and thus a Bikeways Vision Plan was drafted as a component of the *Strategic Plan*.

The sidewalk inventory told a story of a need for sidewalk repairs as a priority. In addition, the need for completing areas of short segments of sidewalks that would provide enhanced connectivity within the sidewalk network was apparent. In 2003, a formal program, driven by the *Strategic Plan,* was implemented and fully funded in the 2003-2004 fiscal year.

In addition to sidewalk repairs and constructing missing segments, extending the network was still a priority and part of the program and in January 2002, changes to development regulations allowed for commercial and private development to fuel the timely expansion of the sidewalk network based on urban growth.

To be able to prioritize all the needs county-wide, the plan also provided a logic system known as the Sidewalk Priority Index (SPI). The SPI involved estimating the pedestrian use by evaluating proximity to trip generators as well as taking into account the current and future land use by utilizing a common planning concept known as *transect factors.*

1.2. CALL FOR UPDATES TO THE PLAN

After five successful years of implementation of the Strategic Plan, the Public Works Department had constructed or repaired over 124 miles of sidewalks and completed the replacement or installation of over 7,200 curb ramps. In addition, over 94 miles of the overall Bikeways Vision Plan had been constructed. The *Strategic Plan* had served Metro well. However, changes in land use, pedestrian needs and other factors foreshadowed updates to the original Strategic Plan.

In fall 2007, Mayor Karl Dean called for a review of planning and implementing pedestrian and bicycling facilities. The Public Works and Planning Departments took the lead to review and garner public input and draft and publish an update document to augment the *Strategic Plan for Sidewalks and Bikeways.*

SECTION 2: THE UPDATE PROCESS

2.1. REVIEW OF EXISTING PLAN

The review of the Strategic Plan in preparation for revisions included a process of evaluating "lessons learned" from implementation of the original Plan. The existing sidewalk plan was well developed and comprehensive, but changes in land use, pedestrian needs and other factors urged adjustments to elements of the plan. The entire plan was reviewed for conformity with existing policies and initiatives. For instance, the fact that all of the ADA non-compliant curb ramps indentified in the inventory have been replaced allows efforts to be redirected.

2.2 PUBLIC MEETINGS

As the original Plan was successfully developed with significant public input, the process of revisions involved the same approach. Public meetings were held in each zone of the county (refer to figure 2-1). The revision meetings were advertised via the web, numerous media outlets and via government officials. The following map and table shows the dates and locations of the meetings that were held:

Figure 2-1. County Zone Map

Zone	Meeting Location	Date
1	Bordeaux Elementary	January 31, 2008
2	McGavock High	February 7, 2008
5	Glencliff Elementary	February 21, 2008
4	Hillsboro High	February 28, 2008
3	Downtown Library	March 6, 2008

Table 2-1. Public Meeting Locations

In addition to traditional advertisement methods, the project revision team implemented an e-mail distribution list that enabled any concerned person or organization to subscribe by visiting the Strategic Plan website (*www.nashvilleplan.org)* and opting in for notifications. The e-mail notification service was utilized to send updates on meeting times and locations as well as providing any information that was location or meeting-specific. In addition, the location of the public meeting also publicly advertised the meeting event.

Figure 2-2. Public Meetings Were Announced using Several Concurrent Methods

The public meetings were organized to provide extensive opportunity for public interaction with the Strategic Planning project team. The meeting agenda included an introductory presentation that provided meeting participants with the background and history of the strategic plan. In addition, the presentation also provided some draft revision recommendations for public review and comment.

At the conclusion of the presentation, meeting participants were urged to complete a survey and provide written comments as well as visit any of the several individual discussion stations that were organized to facilitate personal interaction with members of the Strategic Plan team. Each discussion station was outfitted with a large format copy of the Bikeways Vision Plan and a graphical representation of a potential sidewalk prioritization scenario. Along with exhibits, each discussion station was staffed with a least two participants from the Strategic Planning team.

Public comments and suggestions were recorded at public meetings, via standard mail and e-mail and through the Strategic Plan website. Surveys that were submitted were tabulated and analyzed and are presented in Section 3. The primary intent of the surveys was to identify public sentiment on existing elements and proposed enhancements to the Strategic Plan.

2.3 EXISTING GREENWAY FACILITIES

Greenways, like sidewalks and on-street bikeways, provide connectivity to retail centers, offices, parks and other points of activity. Because of the importance of greenways in the overall pedestrian and bicycle facility network, the expanded greenway network has been reviewed to evaluate connectivity.

Since the Strategic Plan for Sidewalks and Bikeways was adopted in 2003, Nashville has constructed an additional 17.5 miles of greenways for a total of 36.5 miles as of February 2008. Several projects have been completed since 2003 that have greatly added to the connectivity of the greenway system. The completion of the Shelby Street Pedestrian Bridge Rehabilitation provided connectivity between the East Bank Greenway and the Riverfront Park and Downtown Riverfront Park Connector. In May 2008, the Cumberland River Pedestrian Bridge was opened, connecting the Shelby Bottoms Greenway and Nature Park to the Stones River Greenway.

SECTION 3: SUMMARY OF PUBLIC INPUT

3.1. INTRODUCTION

As discussed in Section 2, public input was solicited through public meetings as well as through Metro Nashville's sidewalks website and various press releases.

After the presentation at the public meetings, surveys were distributed at the meeting to determine cyclist and pedestrian tendencies, cyclist and pedestrian facility preferences and rankings of existing and proposed pedestrian generators to be utilized in the Sidewalk Priority Index (SPI). Discussion stations were also set up at each public meeting location to provide a venue for additional input for evaluation during the Strategic Plan update. In addition, for those that were not able to attend any of the public meetings, the sidewalk website provided a "Comments or Questions?" section to allow for additional public input at www.nashville.gov/sidewalks.

Figure 3-1. Typical Discussion Station

Comments were compiled and evaluated from these sources for inclusion in the 2008 Update for the *Strategic Plan for Sidewalk and Bikeways*. The following sections provide a summary of the findings from public input. A compilation of specific comments received are included in Appendix A.

3.2 SIDEWALKS

Discussions and Survey responses from meeting participants indicated a desire for increased weighting for certain existing pedestrian generators used in the SPI as well as the need for additional pedestrian generators to be considered for inclusion in the SPI. Neighborhood Centers, Commercial Centers as well as Parks and Greenways acquired higher rankings in the 2008 surveys than that of the original surveys. Public input also indicated that Community Centers (which were not originally included in SPI calculations) have a high ranking among current pedestrian generators.

Figure 3-3 on the following page illustrates the most common response (mode) as well as the statistical spread or dispersion of the responses (standard deviation) for each of the trip generators as compiled from the survey results.

Figure 3-2. Typical Community Center Facility

Public comments supported the need for sidewalk construction to coordinate with other projects in cases where the SPI may not be the absolute highest in the zone. For instance, many comments supported the concept that sidewalk should be constructed or repaired in cases where the section of sidewalk in question connected to another sidewalk that had been previously built by a developer or another Metro capital project. Coordination of sidewalk construction also provides a benefit of decreased construction impact and increased construction efficiency as opposed to a project constructed autonomously. Public meeting feedback also indicated the need to include sidewalk condition as a factor when evaluating priorities for sidewalk repairs.

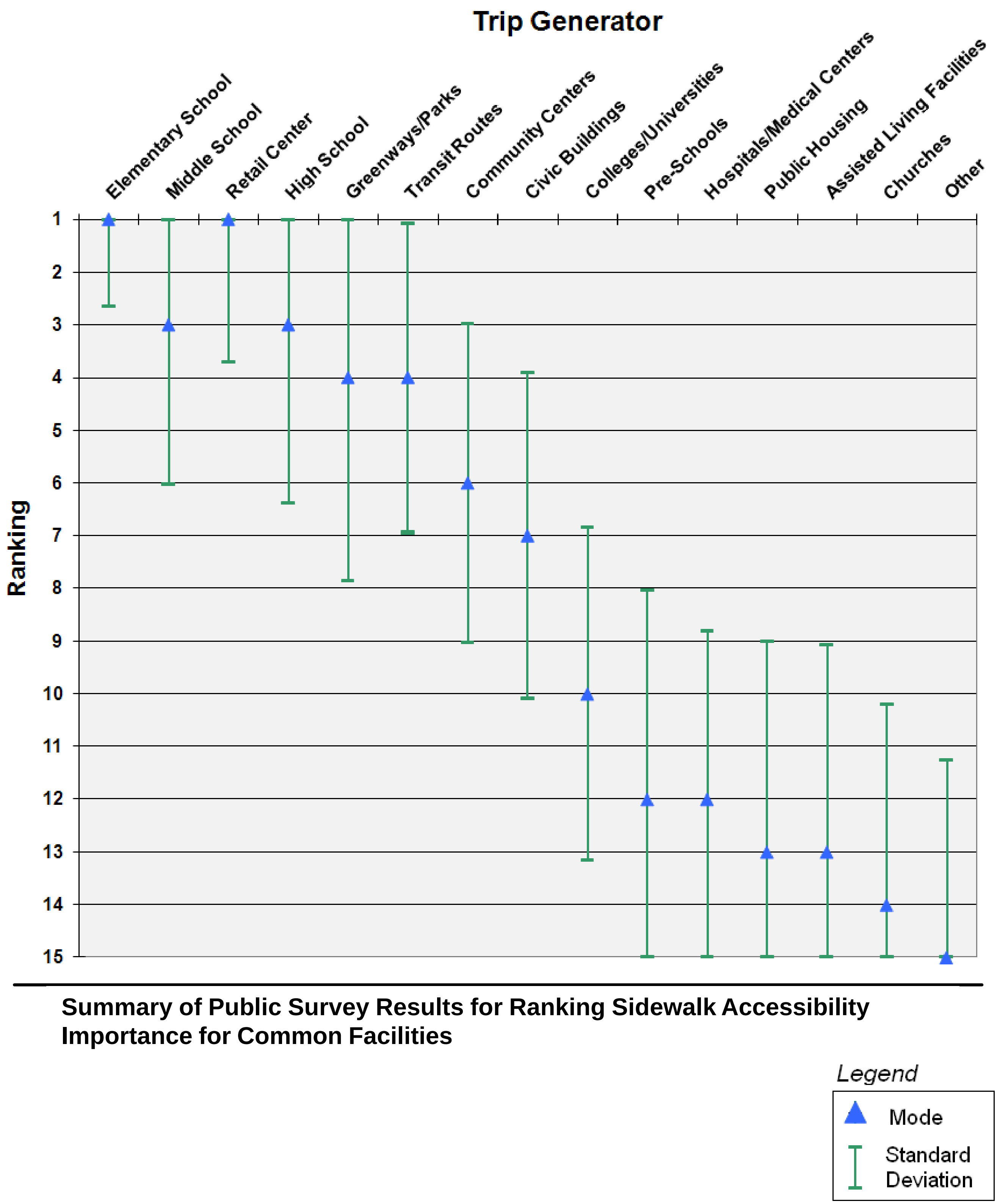


Figure 3-3. Survey Ranking of Sidewalk Accessibility Importance

3.3 BIKEWAYS

The surveys received at the public meetings provided valuable data to assist in the evaluation of the Bikeways Vision Plan. The surveys indicated the frequency of bicycle travel, types of bicycle routes used and types of bicycle trips taken (one-way/destination, exercise, etc.).

Comments received for the bikeways program demonstrated overall support for the Bikeways Vision Plan concept. Most discussion revolved around connectivity to destinations as well as the establishment of bikeways on several of the State and U.S. routes within the county. Most other input for Bikeways included specific requests for routes to be constructed—all of which were evaluated for inclusion in the revised Vision Plan found in Section 5.

SECTION 4: SIDEWALK PLANNING UPDATES

4.1. INTRODUCTION

The 2003 *Nashville-Davidson County Strategic Plan for Sidewalk and Bikeways* calls for a periodic review of the Sidewalk Priority Index (SPI) calculations. The SPI calculations consist of point values assigned to transect zones and trip generators that are combined using a quantitative overlay (see Figure 4-1).

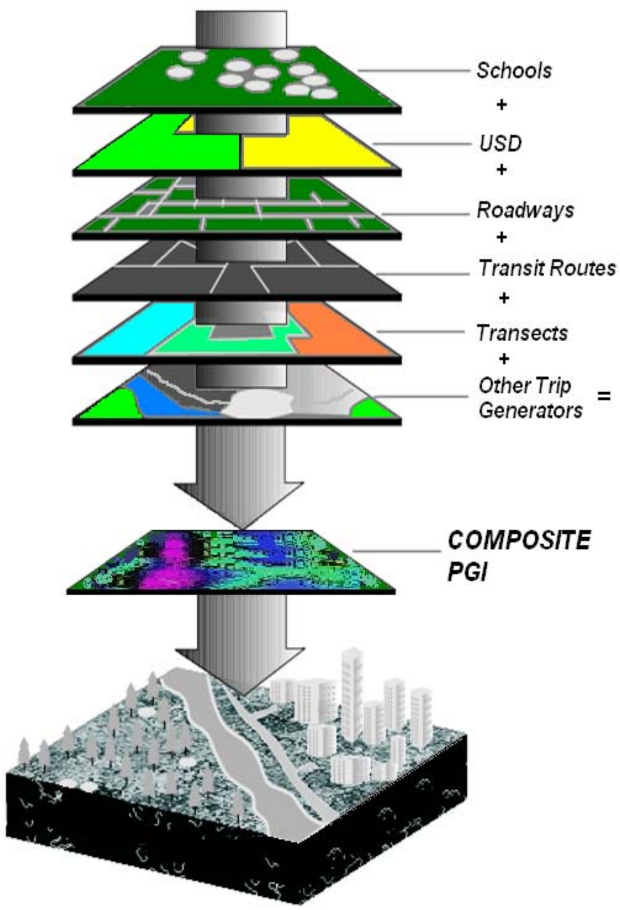


Figure 4-1. Quantitative Overlay

From the inception of the Sidewalk Program, the Sidewalk Priority Index (SPI) has been used as an objective tool for determining where sidewalks can provide the greatest benefit. Public input indicated that coordination with other planned projects (for new and repair projects) and existing sidewalk condition (for repair projects) should also be evaluated when prioritizing sidewalk projects.

A Sidewalk Project Decision Matrix will be utilized when prioritizing sidewalk projects in order to effectively consider the index (currently the SPI), coordination with other planned projects and condition of existing sidewalk in cases of sidewalk repairs. The Matrix is discussed further in Section 4.5.

4.2. PEDESTRIAN GENERATOR INDEX (PGI)

As its name indicates, the Sidewalk Priority Index has been used as a tool for prioritizing sidewalk projects. With the updated method for evaluating and prioritizing sidewalk, the Sidewalk Priority Index will be used as an indicator of potential pedestrian activity rather than a priority index. *Therefore, this index will be referred to as the Pedestrian Generator Index (PGI)* as this terminology better describes how this index will be utilized with the updated method for evaluating and prioritizing sidewalk projects.

As part of the re-evaluation of the Strategic Plan for Sidewalks and Bikeways, pedestrian generators were ranked by order of importance through public input (Figure 3-3). Results from these rankings resulted in some adjustments to point values assigned in the SPI calculations. See Figure 4-2 to see the updated point values used to calculate the PGI.

4.3 COMPARISON OF PGI CALCULATIONS VS. SPI CALCULATIONS

The National Study on Walking and Bicycling, performed by the Federal Highway Administration in 1992, found that 70% of people surveyed would walk up to ½ mile for shopping or personal business if the journey was safe and pleasant. In addition, even more people are willing to walk ¼ mile to a destination. With this in mind, it is reasonable to assume that a pedestrian is more likely to walk the closer they are to a destination.

The previous scoring method provided a static score for each trip generator.

SPI/PGI CALCULATION SHEET

		2003 SPI Point Values	2008 PGI Point Values	Point Value Updates	Public Input
TRANSECT FACTORS					
Core		add 8	add 8	-	
Center		add 8	add 8	-	
Urban		add 6	add 6	-	
	0.25 mi radius of "neighborhood center" or "commercial corridor"	add 2	add 4	+2	Public input indicated a greater importance for pedestrian connectivity to retail centers
District	Medical Center	add 2	add 2	-	
	Industrial	add 2	add2	-	
Suburban		add 2	add 2	-	
	0.25 mi radius of "neighborhood center" or "commercial corridor" in Neighborhood Transect	add 2	add 4	+2	Public input indicated a higher ranking for pedestrian connectivity to retail centers
Rural		subtract 2	subtract 2	-	
Natural		subtract 2	subtract 2	-	
TRIP GENERATOR - 1/2 MILE RADIUS					
Public Schools	Elementary/Middle	add 8	add 8	-	
	High	add 4	add 4	-	
Private Schools	Elementary/Middle	-	add 4	+4	Public input indicated need for connectivity to private schools
	High	-	add 2	+2	Public input indicated need for connectivity to private schools
Libraries and Civic Buildings		add 5	add 5	-	
Parks and Greenways		add 5	add 8	+3	Public input indicated a higher ranking for pedestrian connectivity to Parks and Greenways
Colleges and Universities		add 6	add 6	-	
Senior and Assisted Living Facilities		add 4	add 4	-	
Public and Section 8 Housing		add 6	add 6	-	
Community Centers		-	add 8	+8	Public input indicated a high ranking for pedestrian connectivity to Community Centers
TRIP GENERATOR - 1/4 MILE RADIUS					
Hospitals		add 4	add 2	-2	Public input indicated a reduced ranking for pedestrian connectivity to Hospitals
Transit Route		add 6	add 6	-	
OTHER					
Urban Arterial Roads		add 4	add 6	+2	Comments through the Strategic Plan Re-evaluation indicated a need for a higher ranking for Urban Arterial Roads vs. Rural Arterial Roads
Rural Arterial Roads		add 4	add 4	-	
Collector Roads		add 2	add 4	+2	Comments through the Strategic Plan Re-evaluation indicated a need for a higher ranking for Collector Roads
Urban Services District		add 2	add 2	-	
Missing Segment (within 0.25 mi of existing sidewalk)		add 4	-	-4	Missing segments will be addressed in the Matrix criteria (see Section 4.5)

Figure 4-2. PGI Updated Point Values

The issue with the static score is that it can create inflated scores at trip generator overlaps away from the actual trip generator (Figure 4-3).

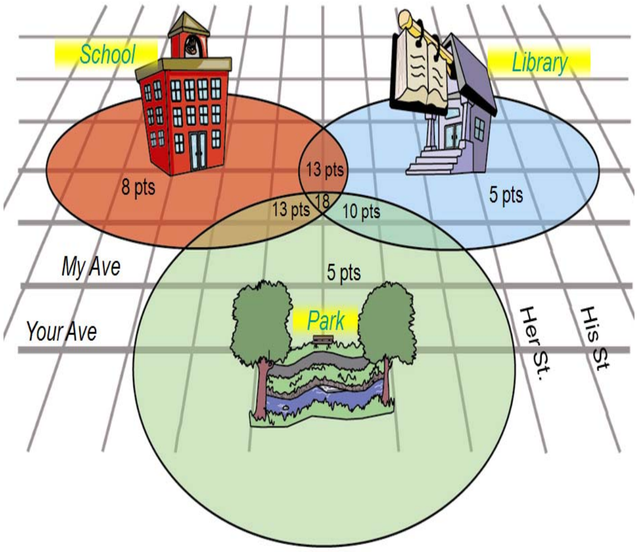


Figure 4-3. Previous Scoring Method

The update to the PGI scoring for each trip generator introduces inverse-distance weighting of the SPI scores, making the highest point value at the trip generator and gradually reducing the point value as the distance away from the trip generator increases (Figure 4-4). Also, since there are some barriers that pedestrians cannot cross, such as, rivers, lakes and some sections of interstates, PGI scores will only be influenced by pedestrian generators that are on coincidental sides of such barriers.

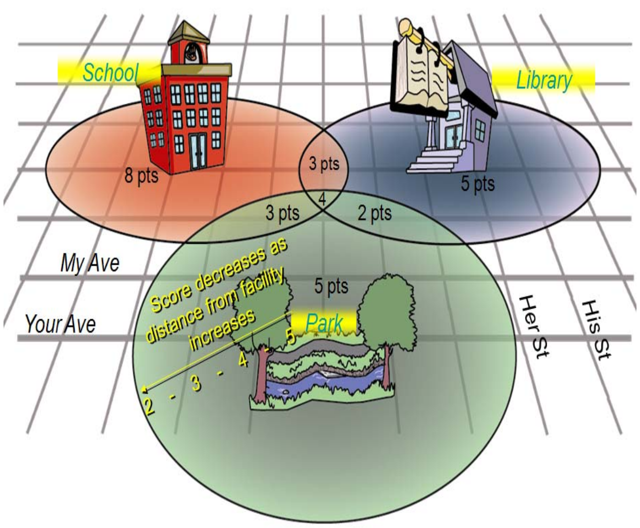


Figure 4-4. Inverse-weighted PGI Scoring Method

4.4. TRIP GENERATORS AND TRANSECTS

In order to properly evaluate the PGI calculations, it is necessary to evaluate changes to land use and pedestrian generating facilities (trip generators) as well as evaluate the current PGI outputs for opportunities for improvement. The transect zone areas as well as trip generator locations have been updated to include changes that have occurred since 2003. In the future, the PGI should be updated every five years or when appropriate to incorporate major changes to transect zone and trip generator point values.

Since the original document, some definitions and terminology referenced in the PGI calculations have evolved or have been refined. Sections 4.4.1. and 4.4.2. include the updated terminology and definitions needed to understand the factors used in the PGI calculations.

4.4.1. Transect Zone Definitions

The *Transect* is a planning tool for categorizing, understanding and guiding the development patterns of a region, from the most rural to the most urban. The Transect is an ordering system, which calls for all elements of the natural and built environment to be consistent with the character of the Transect Category that they are within. The result is that development in the T2 Rural Transect Category should look and feel different than in the T4 Urban Transect Category or the T6 Core (Downtown) Transect Category.

The Transect Categories found in Nashville/Davidson County include the T6 Core (Downtown), T5 Centers, T4 Urban, T3 Suburban, T2 Rural, T1 Natural and D District. The Transect Categories are assigned point values in the PGI based on the potential for pedestrian generation. For example, the density and mix of uses is likely to be higher in T4 Urban (an area like Belmont-Hillsboro or North Nashville), than in T2 Rural (an area like Joelton), resulting in more pedestrians using sidewalks. Definitions as well as some terminology for the Transect Categories have evolved since 2003. The following are updated Transect Category definitions and terminology.

Core
The Core consists of Downtown Nashville (excluding the Hope Gardens neighborhood). The core has a high population density, a wide variety of uses, and high activity at sidewalk levels creating the greatest potential for pedestrian activity.

Center
Centers are mixed use areas of varying scales that serve surrounding communities or even a greater geographic region. With residential, commercial and office uses, it is possible for an individual to live, work and recreate in one center. Centers create a high potential for pedestrian activity.

Neighborhood
Neighborhood areas consist of medium density residential uses including, a mix of single-family, townhouses, stacked flats, civic and religious buildings and small commercial uses. Examples of neighborhood transects are East Nashville, Lenox Village and Hillsboro-West End.

A ***"Neighborhood Center"*** is a sub-zone of the Neighborhood transect and includes areas of mixed- use, civic, and small scale commercial development that serves the immediate neighborhood within a 5 to 10 minute walk.

A ***"Commercial Corridor"*** is a sub-zone of the Neighborhood transect and includes commercial development that serves the immediate neighborhood within a 5 to 10 minute walk.

District
The district transect is applied to any large, single use area. While most district transects apply to areas with little pedestrian potential, Medical Centers and Industrial Parks create pedestrian activity and are assigned point values for inclusion in the PGI.

Suburban
Suburban transects are areas with single-family homes on larger lots and civic and public benefit uses such as schools, churches, libraries, etc. Examples of suburban transects are West Meade, Madison, Donelson, Crieve Hall, and Bellshire.

A ***"Suburban Neighborhood Center"*** is a sub-zone of the Suburban transect and includes areas of mixed- use, civic, and small scale commercial development that serves the immediate neighborhood within a 5 minute drive.

Figure 4-5. Example of a Neighborhood Center

A ***"Suburban Commercial Corridor"*** is a sub-zone of the Suburban transect and includes commercial development that serves the immediate neighborhood within a 5 minute drive.

Rural
Rural areas contain environmentally sensitive, open space and other protected properties. Bells Bend, Joelton, Union Hill and the outer portions of Bellvue are examples of rural areas in Nashville.

Natural
Natural areas include land intended to remain as open space for preservation and recreation needs. Percy and Edwin Warner Parks, Shelby Bottoms, and the Mill Creek Greenway are local examples of natural areas.

4.4.2. Trip Generator Definitions

Definitions for trip generator terminology have been refined since the original adoption of the *Strategic Plan for Sidewalks and Bikeways* in 2003. The following are updated trip generator definitions.

Public Schools
Public schools can generate many daily walking trips by students, whose ages make them among the most vulnerable pedestrians. Based on public input, elementary and middle schools were assigned higher point values than high schools because high schools are generally more regional based.

Private Schools
Unlike public schools, private schools are typically not adjacent to the residential areas that they predominately serve. While attendance of private schools is not zone based, public input indicated that private schools produce some pedestrian traffic for school attendance as well as provide open space for adjacent neighborhoods.

Libraries and Civic Buildings
Libraries and civic buildings provide services to a wide range of users including children, senior adults and disabled people. Civic buildings considered in the PGI calculations include facilities that provide potential to generate pedestrian activity such as post offices, court houses, museums, monuments, public entertainment venues, etc.

Parks and Greenways
Parks and greenways attract recreational users of all ages. Greenways, specifically, are part of the pedestrian infrastructure itself and are used for transportation purposes connecting neighborhoods to retail centers, offices, parks and other points of activity.

Colleges and Universities
Colleges and universities generate heavy pedestrian activity. Factors contributing to this activity include a young population, businesses that cater to students and the fact that many students do not own vehicles. In addition, students, faculty and staff often live nearby.

Senior and Assisted Living Facilities
Those living in senior or other assisted living facilities often cannot drive or do not own cars. The ability to walk to nearby destinations helps them to maintain independence.

Public and Section 8 Housing
Many public and Section 8 housing residents rely on walking and transit for transportation. Some residents may be dependent on these modes of travel to work and for achieving financial independence.

Community Center
Community Centers are Metro-owned buildings serving as venues for community activities. Community centers generate heavy pedestrian traffic due to their close proximity to adjacent residential areas.

Hospitals
Hospitals are large employment centers and generate a considerable amount of pedestrian activity and transit use.

Transit Routes
Almost all bus users begin and end their trips as pedestrians. Accordingly, safe and continuous pedestrian facilities are an integral component of a public transit system.

Urban Arterial Roads
Urban arterial roads are major through-streets in a roadway system that provide direct access to many destinations. Urban arterial roads are located in urban areas where pedestrian activity is more concentrated thus receiving higher point values than Rural Arterial Roads (see definition below). In addition, the speed and volume of motor vehicle traffic intensifies pedestrians' need for separate facilities.

Rural Arterial Roads
Rural arterial roads are major through-streets in a roadway system that provide direct access to many destinations. Rural arterial roads are located in rural areas where pedestrian activity is less concentrated thus receiving lower point values than Urban Arterial Roads. In addition, the speed and volume of motor vehicle traffic intensifies pedestrians' need for separate facilities.

Collector Roads
In contrast to most local roads, many collector roads provide direct access to neighborhood destinations and have higher traffic volumes and

speeds increasing both pedestrian demand and safety concerns.

Urban Services District

Most areas in the USD have a higher density of development and mix of land use, creating greater pedestrian demand.

4.5 SIDEWALK PROJECT DECISION MATRIX

A Sidewalk Project Decision Matrix will be utilized in order to consider additional factors that affect sidewalk maintenance and new construction priorities. The Sidewalk Project Decision Matrix will continue to consider the updated PGI, but will additionally consider factors such as sidewalk condition (for repair projects) and project coordination (for repair and new construction projects). Metro should also re-promote the Bikeways and Sidewalk Advisory Committee to participate in periodic map amendments.

4.5.1. Decision Component 1: *PGI*

The Pedestrian Generator Index (PGI) will be utilized in the Sidewalk Project Decision Matrix as an indicator of pedestrian activity. This component applies to both repair and new construction projects.

4.5.2. Decision Component 2: *Coordination*

Metro Public Works maintains continuous communication with other agencies including, but not limited to schools, Metro Transit Authority, Metro Parks and Recreation, Metro Police Department, Metro Water Services, Metro General Services, Metro Development and Housing Agency (MDHA) and Tennessee Department of Transportation (TDOT) to coordinate construction projects once the projects have been identified. Coordination with these agencies will be considered in addition to the PGI when prioritizing projects for sidewalk maintenance and new sidewalk construction. Considering coordination when prioritizing sidewalk construction allows Metro to consider connectivity to new facilities that are built between PGI trip generator updates as well as increases construction efficiency to construct or repair as much sidewalk as possible. The coordination component is applied to both repair and new construction projects.

4.5.3. Decision Component 3a: *Condition (Repairs)*

Sidewalk repair project selection should also consider the condition of the existing sidewalk when evaluating priorities. Sidewalks will be rated as Good, Fair or Poor based on the following established criteria.

Sidewalk Condition Ratings

Condition	Description
Good	< 10% Damaged*
Fair	10% to 35% Damaged*
Poor	> 35% Damaged*

***Damaged sidewalk is considered to be sidewalk that is broken or has significant cracking**

Table 4-1. Sidewalk Condition Rating Parameters

The following are examples of sidewalks in ***good***, ***fair*** and ***poor*** conditions.

Figure 4-6. Example of "Good" Sidewalk Condition

Figure 4-7. Example of "Fair" Sidewalk Condition

Figure 4-8. Example of "Poor" Sidewalk Condition

4.5.4. Decision Component 3b: Project Type *(New Sidewalk Construction – Gap/Extension)*

New sidewalk construction should consider the type of sidewalk project when evaluating priorities. New sidewalk construction types will be divided into Gap or Extension projects. Gap projects refer to sidewalk projects that provide connectivity to existing sidewalk at both ends of the project within the existing sidewalk network. Extension projects refer to sidewalk projects that extend the sidewalk network. Priority should be given to gap projects to promote connectivity of the already existing network prior to extending the existing network.

4.6 SIDEWALK MATRIX EXAMPLE (Repair)

Project selection for sidewalk repair projects will consider the sidewalk's PGI score, the condition of the sidewalk and coordination with other projects. The following is an example of a sidewalk matrix that will be used to examine these factors when selecting sidewalk repair projects. While coordination is illustrated simply here, the extent of coordination can have a great range from none, to minimal, to extensive. Considering all elements in Table 4-2, and assuming that coordination for candidate 'C' has a storm drainage project that coordinates within the same limits of the sidewalk repair, the project would be prioritized first (See Table 4-2).

Sidewalk Matrix - Repair

Project Candidate	PGI	Condition	Coordinating Project
A	32	Poor	No
B	33	Fair	No
C	31	Poor	Yes
D	30	Good	No

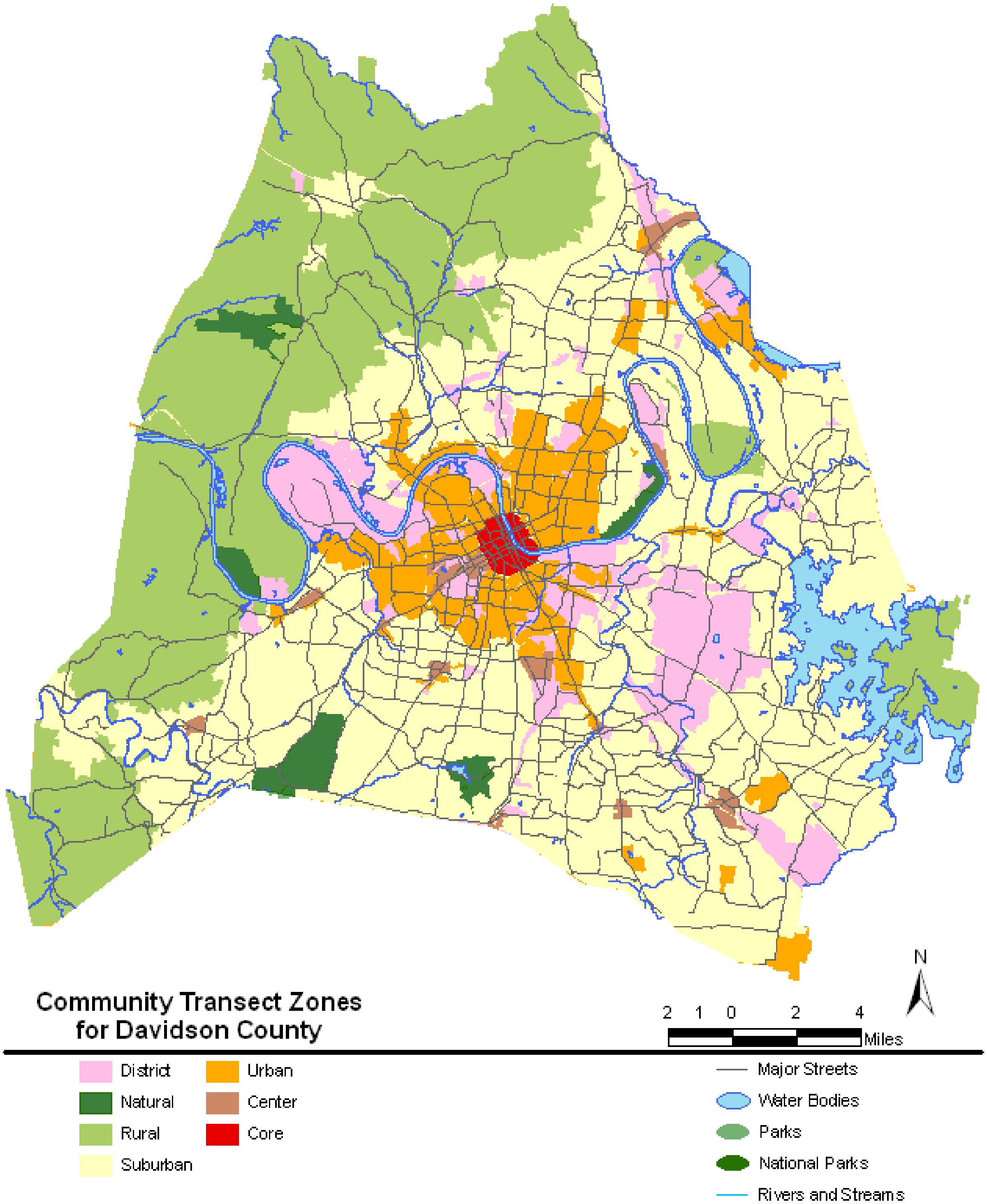
Table 4-2. Sidewalk Matrix Example - Repair

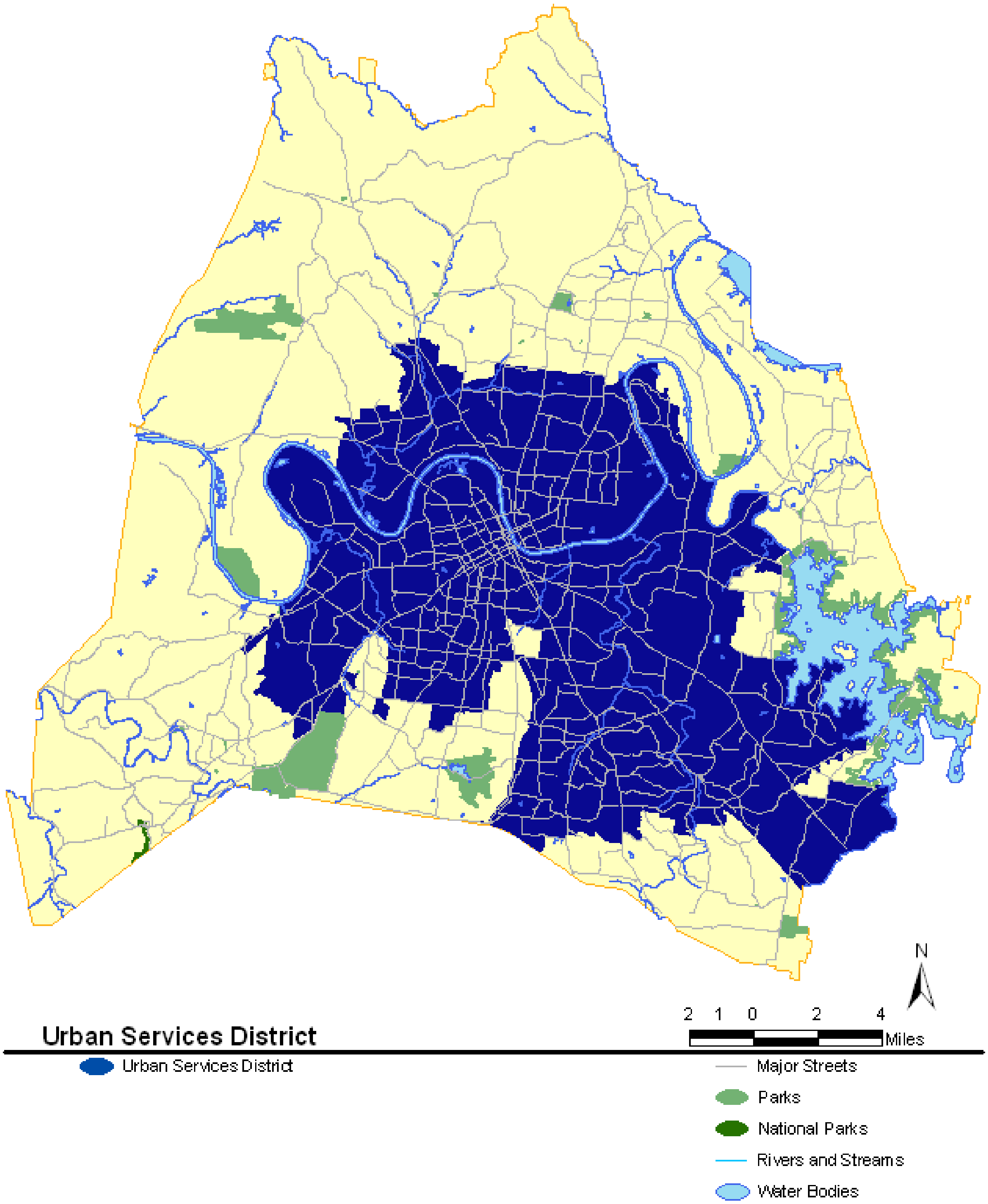
4.7 SIDEWALK MATRIX EXAMPLE (New Sidewalk)

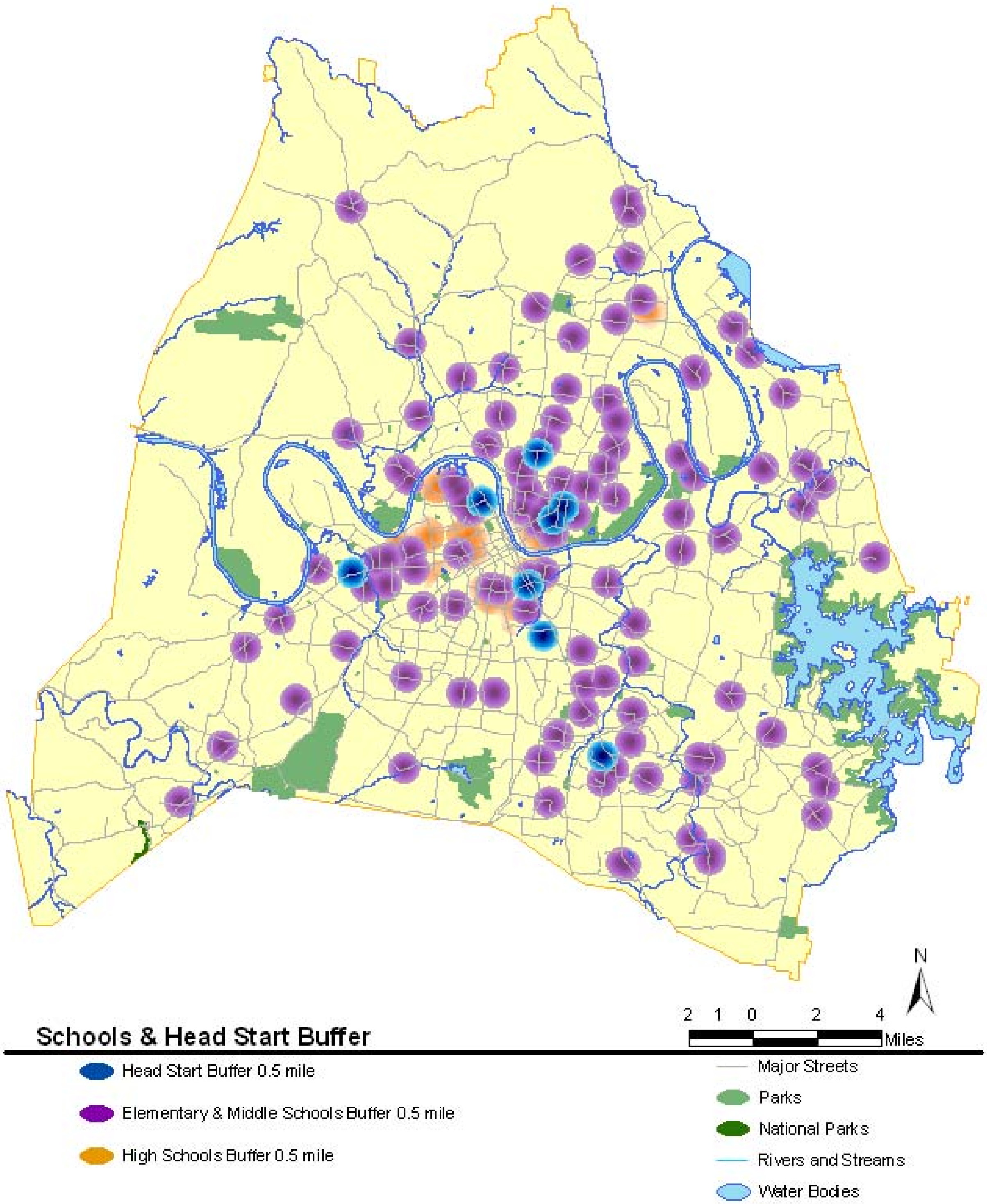
Project selection for sidewalk new projects will consider the sidewalk's PGI score, the project type and coordination with other projects. The following is an example of a sidewalk matrix that will be used to examine these factors when selecting new sidewalk projects. While coordination is illustrated simply here, the extent of coordination can have a great range from none, to minimal, to extensive. Considering all elements below, and assuming that coordination for candidate 'B' has a roadway widening project that coordinates within the same limits of the new sidewalk project, the project would be prioritized first (See Table 4-3).

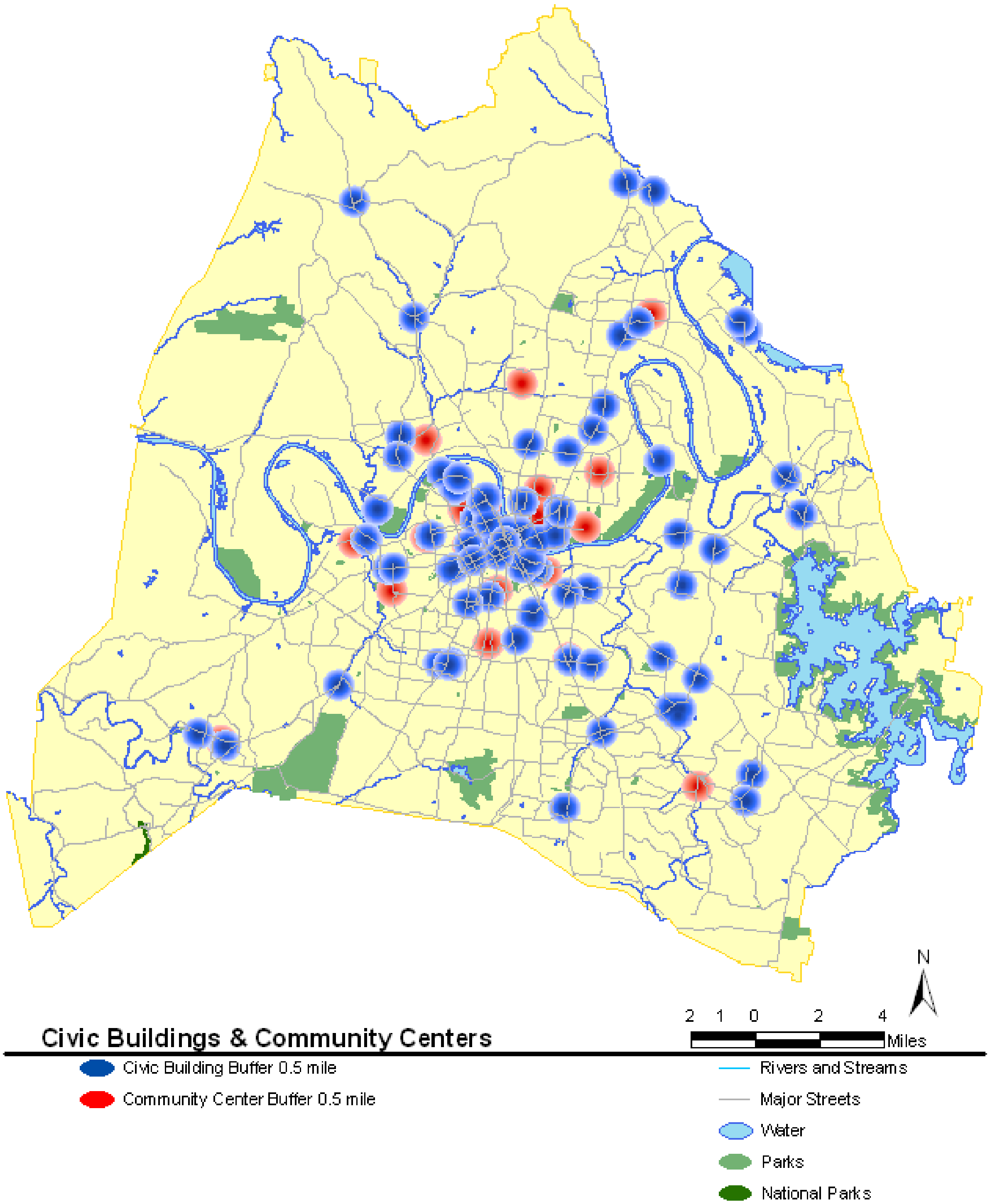
Project Candidate	PGI	Type	Coordinating Project
A	35	Extension	No
B	32	Gap	Yes
C	31	Extension	Yes
D	30	Gap	No

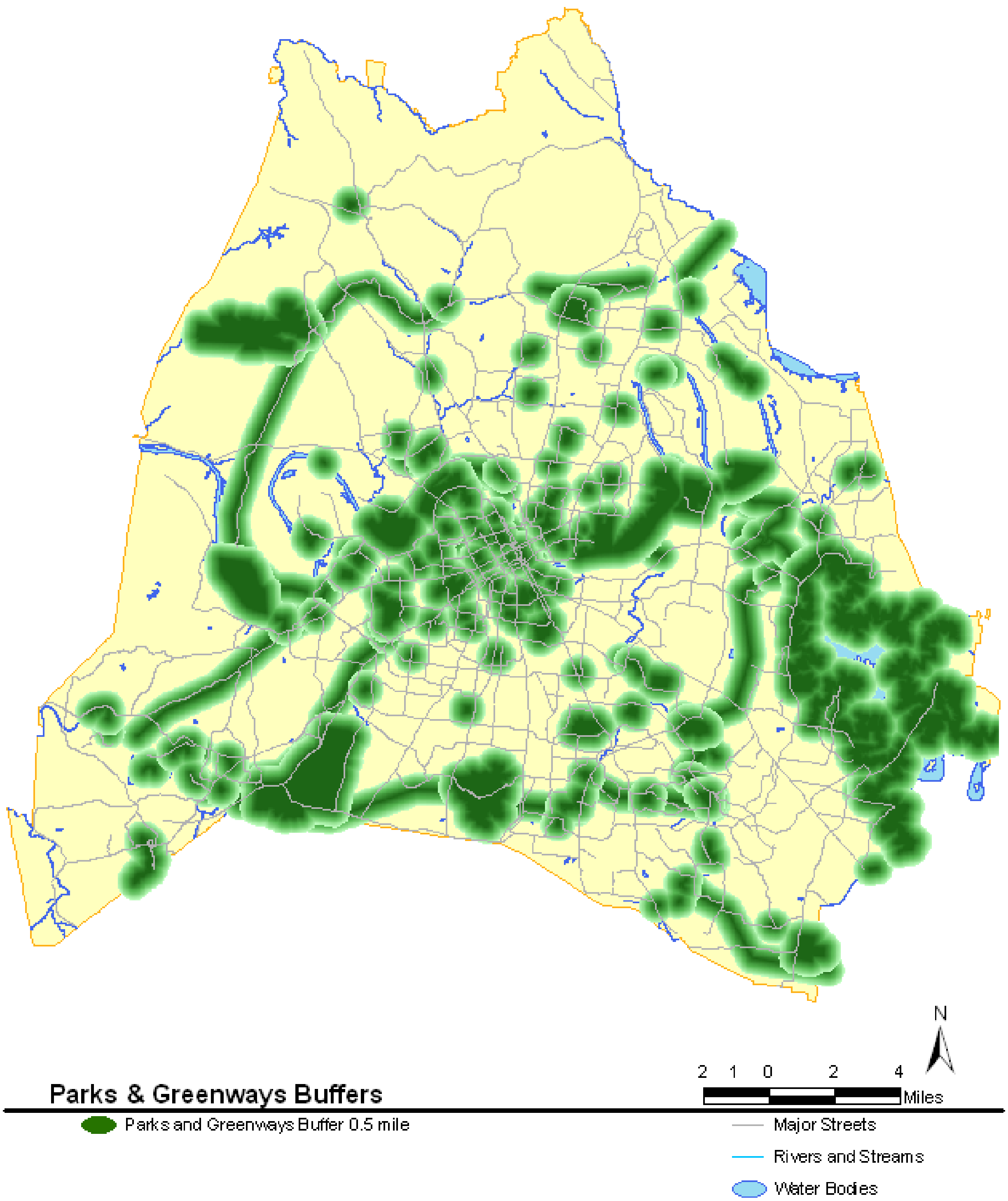
Table 4-3. Sidewalk Matrix Example – New Sidewalk

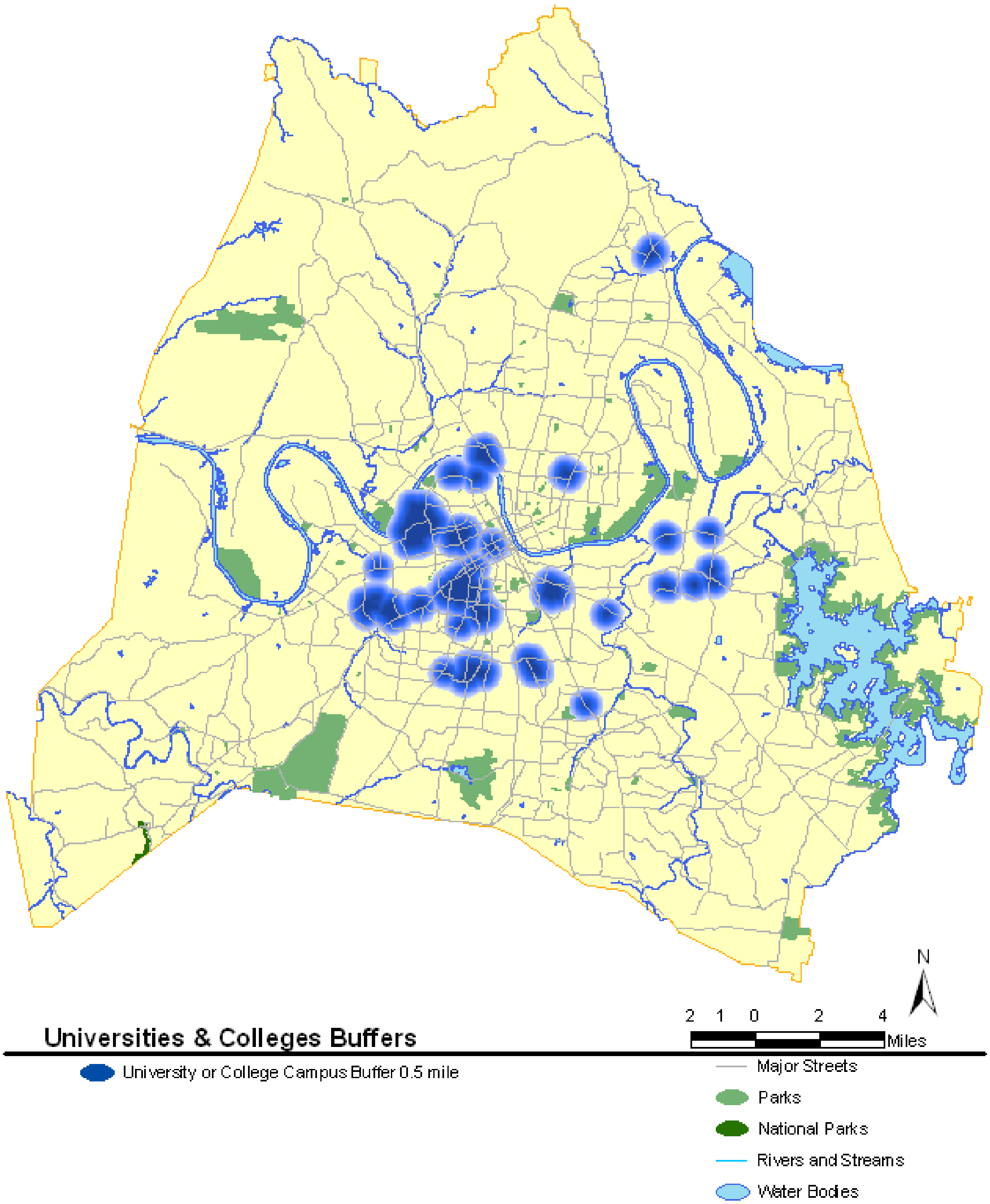

Community Transect Zones
for Davidson County
2 1 0 2 4
Miles
N
District
Natural
Rural
Suburban
Urban
Center
Core
Major Streets
Water Bodies
Parks
National Parks
Rivers and Streams


Urban Services District
2 1 0 2 4
Miles
N
Urban Services District
Major Streets
Parks
National Parks
Rivers and Streams
Water Bodies

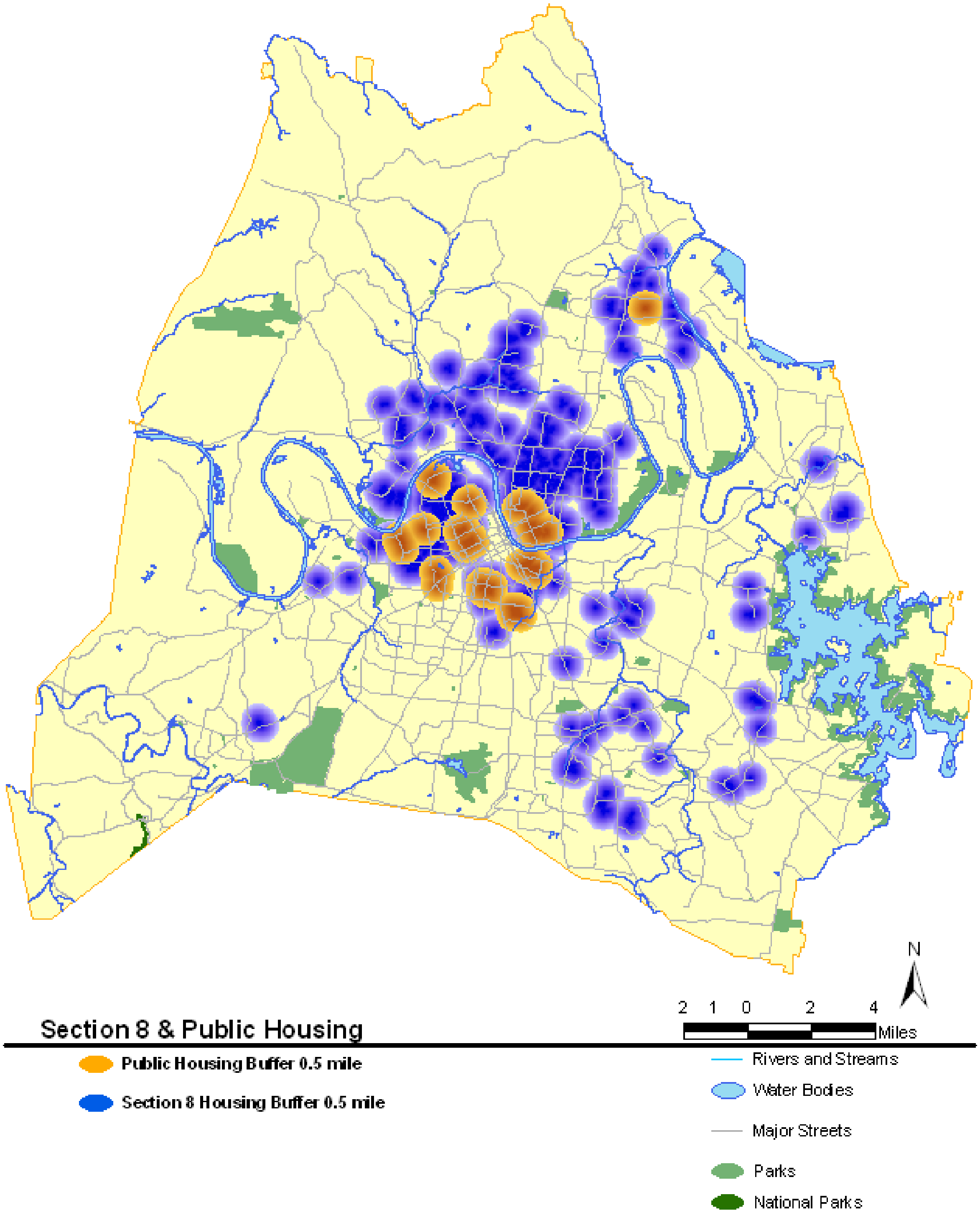

N
2 1 0 2 4
Miles
Schools & Head Start Buffer
Head Start Buffer 0.5 mile
Elementary & Middle Schools Buffer 0.5 mile
High Schools Buffer 0.5 mile
Major Streets
Parks
National Parks
Rivers and Streams
Water Bodies

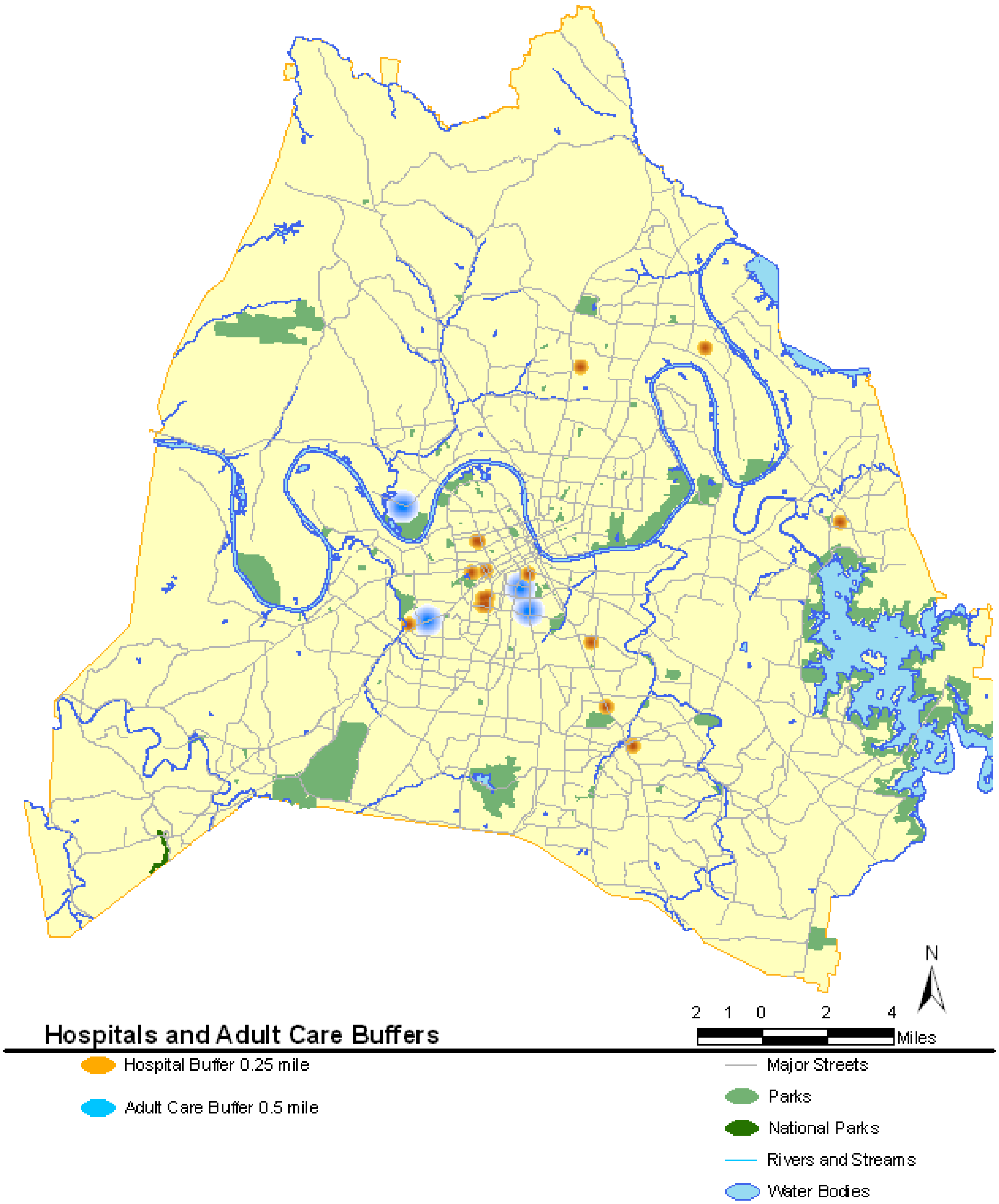

N
2 1 0 2 4
Miles
Civic Buildings & Community Centers
Civic Building Buffer 0.5 mile
Community Center Buffer 0.5 mile
Rivers and Streams
Major Streets
Water
Parks
National Parks


N
2 1 0 2 4
Miles
Parks & Greenways Buffers
Parks and Greenways Buffer 0.5 mile
Major Streets
Rivers and Streams
Water Bodies

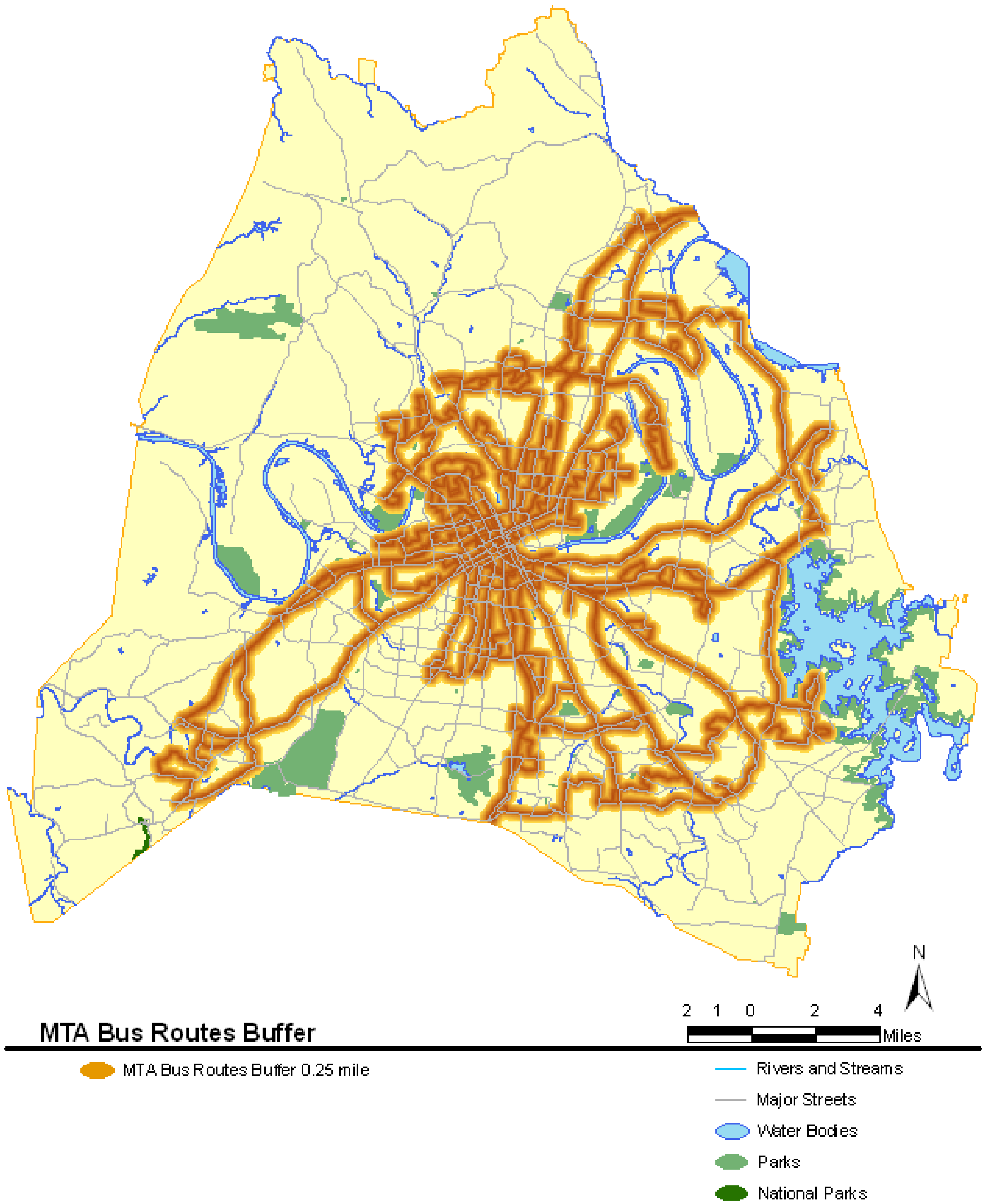


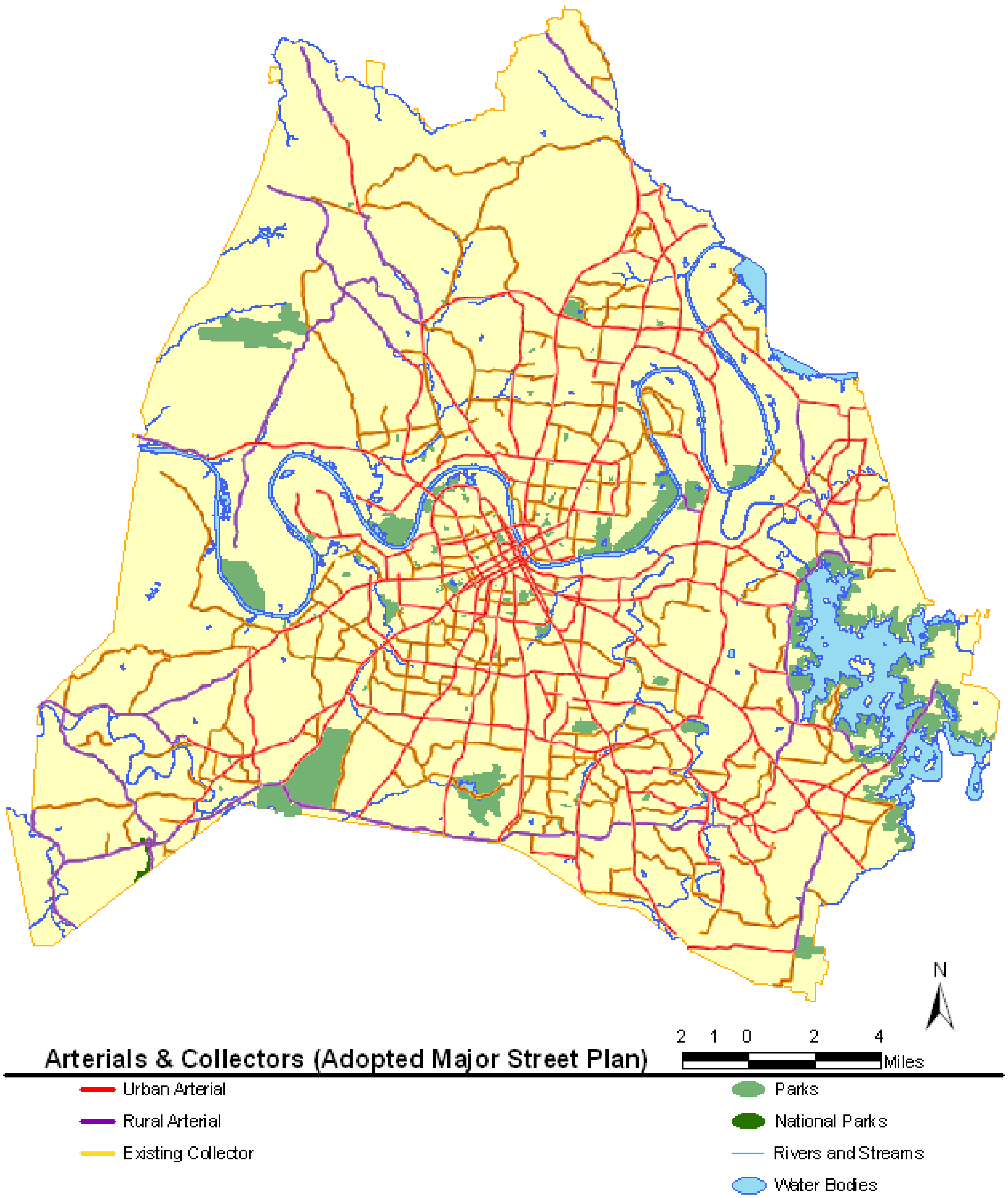
N
2 1 0 2 4
Miles
Universities & Colleges Buffers
University or College Campus Buffer 0.5 mile
Major Streets
Parks
National Parks
Rivers and Streams
Water Bodies

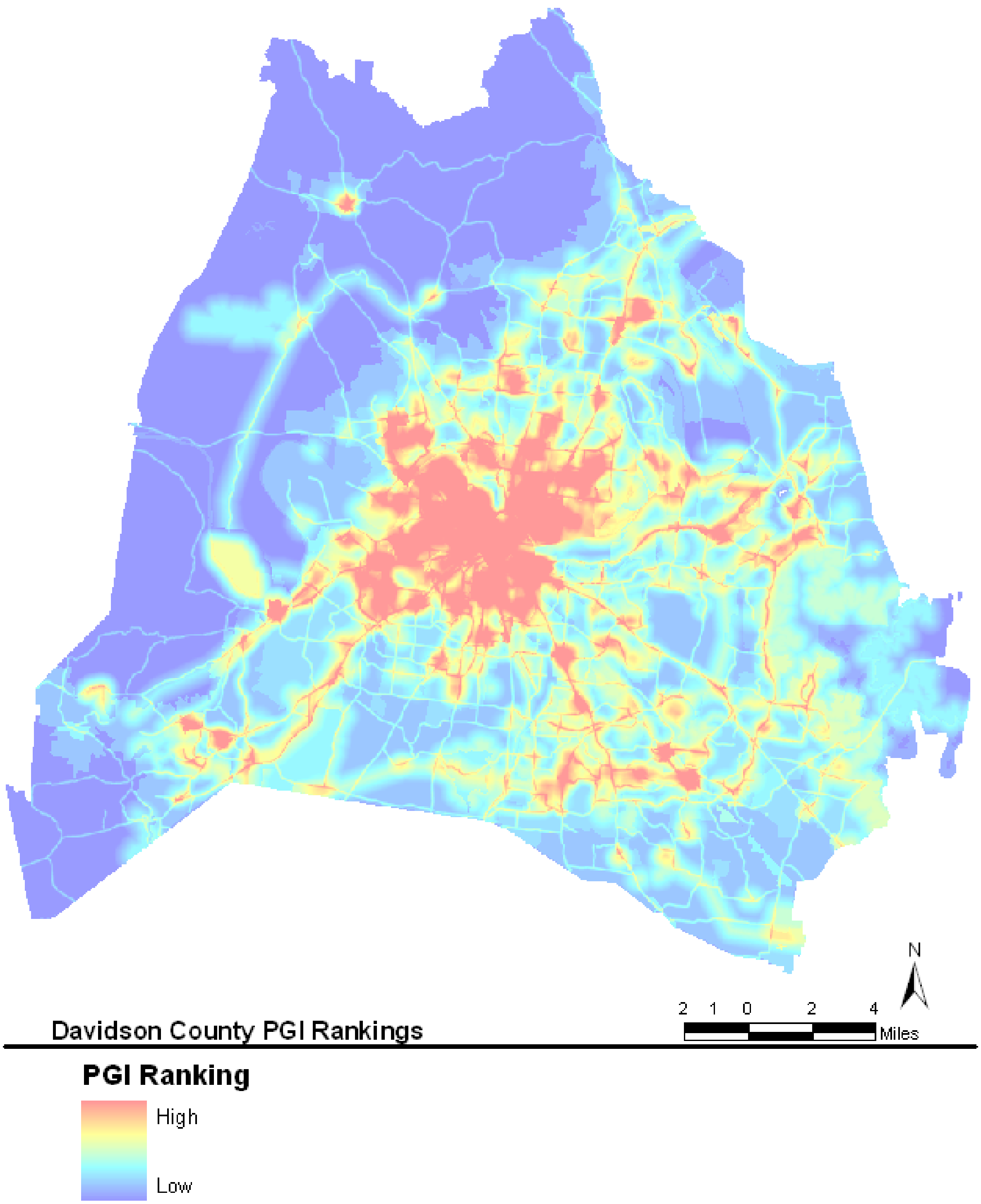

N
2 1 0 2 4
Miles
Section 8 & Public Housing
Public Housing Buffer 0.5 mile
Section 8 Housing Buffer 0.5 mile
Rivers and Streams
Water Bodies
Major Streets
Parks
National Parks



N
2 1 0 2 4
Miles
Hospitals and Adult Care Buffers
Hospital Buffer 0.25 mile
Adult Care Buffer 0.5 mile
Major Streets
Parks
National Parks
Rivers and Streams
Water Bodies


MTA Bus Routes Buffer
N
2 1 0 2 4
Miles
MTA Bus Routes Buffer 0.25 mile
Rivers and Streams
Major Streets
Water Bodies
Parks
National Parks


N
2 1 0 2 4
Miles
Arterials & Collectors (Adopted Major Street Plan)
Urban Arterial
Rural Arterial
Existing Collector
Parks
National Parks
Rivers and Streams
Water Bodies


N
2 1 0 2 4
Miles
Davidson County PGI Rankings
PGI Ranking
High
Low

SECTION 5: BIKEWAYS PLANNING UPDATES

5.1. INTRODUCTION

Bikeways facilities have seen a boom since the implementation of the original Strategic Plan in 2003. In 2003, Metro Nashville had only two on-street bike routes: the Davidson Street Connector and the bike route on Highway 70S. These two bikeways comprised the total of 11 miles of facilities. Since 2003, Metro Public Works has constructed over 83 miles of bikeways along Metro-maintained roadways with the implementation of Phase 1 of the Bikeways Vision Plan, bringing the total length of bike routes within the county to 94 miles.

Over the past five years, much progress has been made in providing bicycle facilities through the implementation of the *Strategic Plan for Sidewalks and Bikeways.* In that same time, the demand for and use of bicycle facilities has also changed dramatically. Where the first five years of the *Strategic Plan* involved providing bikeways as an amenity to become a first-class city, the use of bikeways is rapidly changing. Rising gas prices, concern about climate change, concern about obesity and community health, and an aging population that requires transportation alternatives are all factors that call for the creation of complete streets featuring facilities for vehicles, transit, pedestrians and bicycles.

The 2008 update of the *Strategic Plan* recognizes a fundamental shift in planning for bikeways. These facilities are no longer regarded solely as amenities for recreation, but as meaningful transportation options in a complete, multi-modal system.

The 2005 American Community Survey, conducted by the U.S. Census Bureau, measured cities for percentage of bicycling commuters. Among the leaders were cities as diverse as Portland (3.5 percent of commuters cycled), Minneapolis (2.4 percent), Tucson (2.2 percent), Sacramento (1.8 percent), Washington DC (1.7 percent) and Denver (1.4 percent). According to the survey, Nashville currently has 0.2 percent of commuters using bicycles to ride to work. This update of the *Strategic Plan* recommends additions to the bikeway network to facilitate improvement to that ranking. In addition, motorized transportation costs and other concerns increase the likelihood that more residents will consider cycling to work.

Phase 2 of the Bikeways Vision Plan, proposed in Figures 5-1 through 5-4 on the following pages, attempts to link residential areas with employment centers and commercial centers to give residents the option of a commuting to work or to meet their daily needs on a safe, comfortable, convenient bikeway and make cycling a true transportation option for Nashville/Davidson County.

5.2 BIKEWAYS VISION PLAN

The Bikeways Vision Plan (shown on Figures 5-1 through 5-4 on the following pages) is a dynamic map of existing and proposed Bikeways in the County that is evaluated for additions and changes regularly. An updated list of the roadway segments inventoried in the Vision Plan is included in Table 5-1. The Vision Plan is based on several factors including significant input from cycling advocates. The Vision Plan represents an approximate 15 year plan of incorporating cycling facilities into existing roadway corridors.

5.3 BIKEWAYS PROJECT IMPLEMENTATION

The implementation of the vision plan is dependent on several factors. Because in a majority of cases the proper incorporation of cycling facilities on a roadway requires roadway widening, paving, striping, signage, intersection improvement and other incidentals, the initiative to construct bikeways is primarily done as a coordination program with other corridor improvements. In addition, the Bicycle Compatibility Index (BCI) should continue to be utilized in conjunction with project coordination when prioritizing bikeways construction.

Metro will continue to update and review the Bikeway Vision Plan and implement bikeway projects actively in coordination with other capital projects such as roadway widening and intersection projects, resurfacing and sidewalk construction projects as well as any other opportunity to implement cycling facilities. Metro should continue to implement bike lanes, shared use routes as applicable and feasible at every available opportunity. Metro should also re-promote the Bikeways and Sidewalk Advisory Committee to participate in periodic map amendments.

Figure 5-1. The Bike Lane Installation on Belmont Boulevard was Coordinated with a Resurfacing Project

This 2008 update of the *Strategic Plan for Sidewalks and Bikeways* includes the "Phase 2 Bikeways" (in blue on Figures 5-1 through 5-4 on the following pages). These are bikeways that Metro, working with community members, has determined to be the critical links to enhance Metro's network of bikeways. These proposed bikeways and the network they create will help make cycling a true transportation option for residents of Nashville-Davidson County. Meanwhile, "Master Vision Plan Bikeways" represent bikeways to be added in the more distant future (in purple on Figures 5-1 through 5-4 on the following pages).

The Phase 2 Bikeways Plan provides a roadmap to focus future bikeway projects. The Phase 2 plan, in addition to the overall Vision Plan is consulted when improvements to a roadway corridor are planned. Proposed right-of-way improvements are evaluated considering the needs of the corridor. This process involves balancing the needs for on-street parking, cycling facilities, proper vehicular lane configurations, pedestrian facilities and other similar right-of-way needs. Metro should follow the adage of "Share the Road" from the planning stage to the completion of a project, as well as through rider and driver education. Facilities should be planned in order to meet the overall intent of the *Strategic Plan for Sidewalks and Bikeways*, their ability to enhance the bikeways network, and ultimately to help Nashville-Davidson County meet its multi-modal goals by making cycling a true transportation option.

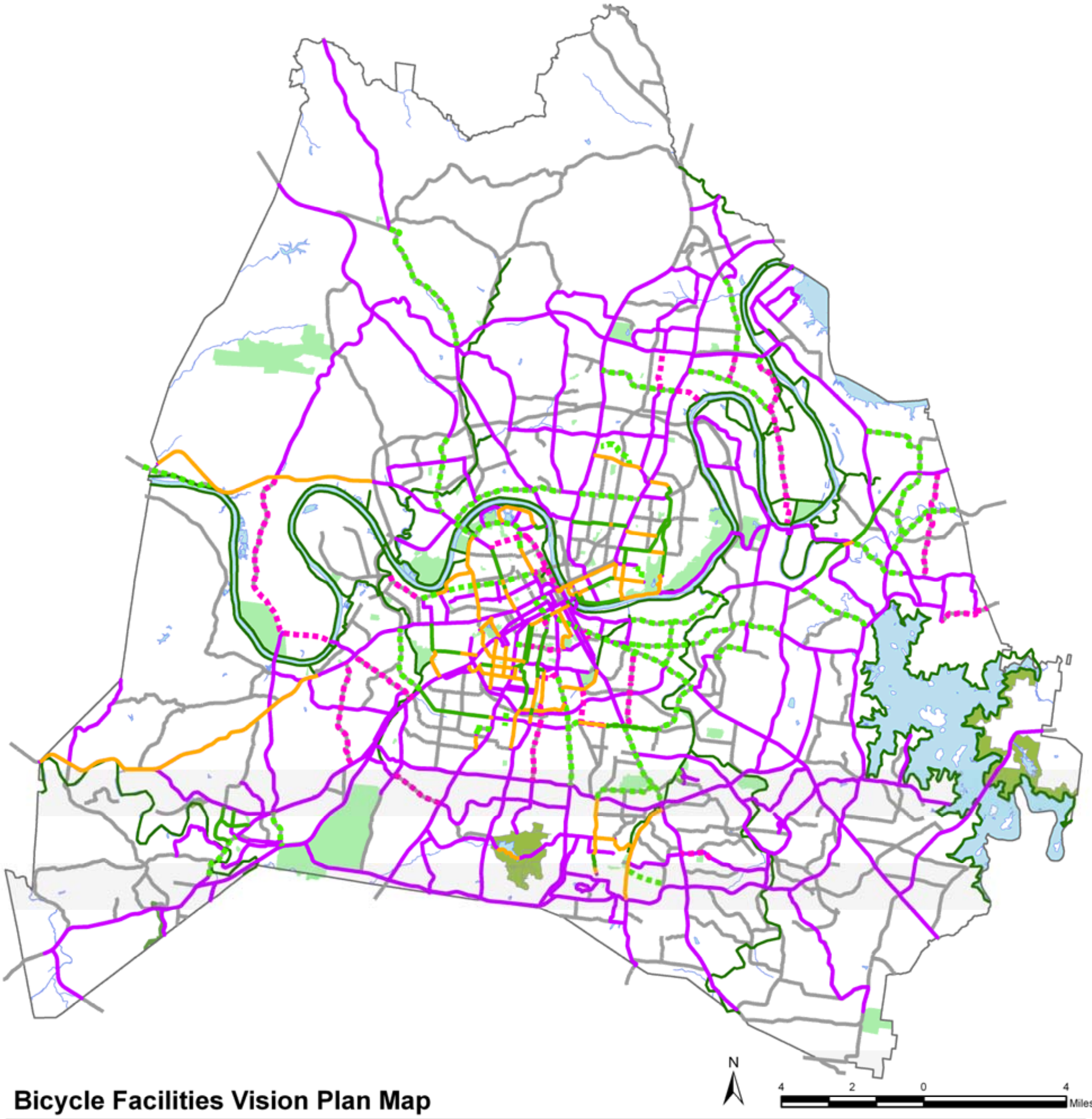
5.4 EDUCATION

In keeping with the original Strategic Plan, education should be considered an important part of bikeways planning to promote the safety of cyclists. Public awareness of cyclists and the rules of the road pertaining to cyclists is vital to the safety of existing and planned bikeways. Metro should consider the following avenues to include education in the bikeways program:

Bikeways Coordinator Education
Metro's Bikeways Coordinator should be sufficiently qualified to ensure understanding of the safety issues faced by cyclists. Continued training and education of the Bikeways Coordinator should be encouraged.

Cyclist Education Classes
Metro should promote cycling safety in elementary, junior high and high schools. For example, Metro should consider including cycling education classes in the Safe Routes to Schools program as well as in high school driver's education classes. Cyclist Education classes and materials should be prepared and presented by qualified instructors.

Public Awareness
An advertising campaign should be implemented to increase public awareness of cyclists and rules of the road pertaining to cyclists. 3-foot law signage should also be installed along specified bikeways and heavily travelled corridors to provide education to general motorists.



Bicycle Facilities Vision Plan Map

Completed Bikeways
- Bike Lane
- Shared Route

Planned Phase 2 Bikeways*
- Bike Lane
- Shared Route

Master Vision Plan Bikeways

Major Streets
Water Bodies
Metro Parks
State Land

*Note: Phase 2 Projects were identified based on public input, connectivity and coordination with upcoming corridor improvement projects. The facility type shown on this map (bike lane or shared route) shall ultimately be determined by formal engineering assessments at time of implementation.

FIGURE 5-1

BICYCLE COMPATIBILITY INDEX RESULTS

Bicycle Compatibility Index	Bicycle Suitablity
Extremely High	Most Suitable
Very High	More Suitable
Moderately High	Suitable
Moderately Low	Less Suitable
Very Low	Least Suitable
Extremely Low	

The compatibility levels for the roadway segments inventoried are listed in this table:

Table 5-1

Road name	From	To	Compatibility Level
1st Ave	Union St	Broadway	Very Low
1st Ave	Broadway	Demonbreun St	Moderately Low
1st Ave	Demonbreun St	Peabody St	Moderately Low
1st Ave	LaFayette St	Chestnut St	Moderately Low
2nd Ave	Ensley Blvd	Chestnut St	Moderately Low
2nd Ave	Chestnut St	Lafayette St	Very Low
2nd Ave	Lafayette St	Demonbreun St	Very Low
2nd Ave	Demonbreun St	Broadway	Moderately Low
3rd Ave	Clay St	Garfield St	Moderately High
3rd Ave	Garfield St	Van Buren St	Moderately High
3rd Ave	Van Buren St	Madison St	Moderately High
3rd Ave	Madison St	Railroad	Moderately High
3rd Ave	Railroad	Union Street	Moderately Low
4th Ave	Broadway	Peabody St	Very Low
4th Ave	Peabody St	Nolensville Rd	Moderately Low
6th Ave	Bass St	Mulberry St	Moderately High
6th Ave	Mulberry St	Lafayette St	Moderately High
6th Ave	Lafayette St	Franklin St	Moderately High
6th Ave	Franklin St	Demonbreun St	Moderately High
6th Ave	Demonbreun St	Broadway	Moderately High
6th Ave	Broadway	Charlotte Ave	Moderately Low
8th Ave	I-40 / I-65	Jefferson St	Moderately Low
8th Ave	Jefferson St	James Robertson Pkwy	Moderately Low
8th Ave	Church St	Lafayette St	Extremely Low
8th Ave	Lafayette St	I-40 / I-65	Moderately Low
8th Ave / Franklin Pk	I-40 / I-65	Douglas Ave	Very Low

Road name	From	To	Compatibility Level
10th St	Woodland St	Shelby Ave	Moderately Low
10th Ave	I-440	Halcyon Ave	Moderately High
10th Ave	Halcyon Ave	Lawrence Ave	Moderately High
10th Ave	Lawrence Ave	Acklen Ave	Moderately High
11th St	Shelby Ave	Woodland St	Moderately Low
11th Ave	12th Ave	Charlotte Ave	Moderately Low
12th Ave	Charlotte Ave	Demonbreun St	Very Low
12th Ave	Demonbreun St	11th Ave	Very Low
12th Ave	Division St	Wedgewood Ave	Moderately Low
12th Ave	Wedgewood Ave	Ashwood Ave	Very Low
12th Ave	Ashwood Ave	Halcyon Ave	Moderately High
12th Ave	Halcyon Ave	Gale Ln	Moderately Low
18th Ave	Clarksville Pk	Cass St	Very Low
18th Ave	Charlotte Ave	Broadway	Very Low
18th Ave	Magnolia Blvd	Portland Ave	Moderately High
21st Ave	I-440	Fairfax Ave	Extremely Low
24th Ave	Blair Blvd	Bernard Ave	Moderately High
24th Ave	Bernard Ave	Fairfax Ave	Moderately High
24th Ave	Fairfax Ave	Blakemore Ave	Moderately Low
24th Ave	Blakemore Ave	Garland Ave	Moderately Low
25th Ave	Garland Ave	West End Ave	Moderately Low
25th Ave	West End Ave	Brandau Pl	Moderately Low
25th Ave	Brandau Pl	Patterson St	Moderately High
25th Ave	Patterson St	Charlotte Ave	Moderately High
28th Ave	Charlotte Ave	I-40	Moderately High
28th Ave	I-40	Jefferson St	Moderately Low
31st Ave	Natchez Trace	West End Ave	Very Low
31st Ave	West End Ave	Park Plz	Moderately High
31st Ave	Park Plz	Parthenon Ave	Moderately Low
46th Ave	Murphy Rd	Charlotte Ave	Moderately Low
46th Ave	Charlotte Pk	Michigan Ave	Moderately High
49th Ave	Delaware Ave	Michigan Ave	Moderately High
49th Ave	Michigan Ave	Kentucky Ave	Moderately High
49th Ave	Kentucky Ave	Dr. Walter S. Davis Blvd	Moderately High
Acklen Ave	Wedgewood Ave	12th Ave	Moderately Low
Alta Loma (Dry Creek)	Dickerson Pk	I-65	Moderately High
Alta Loma (Dry Creek)	I-65	Gallatin Pk	Moderately High
Andrew Jackson Pkwy	Chandler Rd	Highland View Dr	Moderately Low
Andrew Jackson Pkwy	Highland View Dr	Lebanon Pk	Moderately Low
Andrew Jackson Pkwy	Lebanon Pk	Saundersville Rd	Moderately Low
Andrew Jackson Pkwy	Old Lebanon Dirt Rd	Old Hickory Blvd	Moderately Low
Antioch Pk	Blue Hole Rd	Haywood Ln	Very Low
Antioch Pk	Haywood Ln	Harding Pl	Very Low

Road name	From	To	Compatibility Level
Antioch Pk	Harding Pl	Nolensville Pk (McCall St)	Moderately Low
Apple Valley Rd	Campbell Rd	I-65	Moderately High
Ashland Dr	Otter Creek Rd	Kingsbury Dr	Moderately Low
Ashland City Hwy	Clarksville Pk	Briley Pkwy	Moderately High
Ashland City Hwy	Briley Pkwy	County Line	Very High
Baptist World Center Dr	W Trinity Ln	Weakley Ave	Moderately Low
Bass St	6th Ave	Fort Negley Blvd	Moderately High
Battery Ln / Harding Pl	General Lowrey Dr	Franklin Pk	Moderately Low
Beechwood Ave	21st Ave	12th Ave	Moderately Low
Bell Rd	New Hope Rd	Stewarts Ferry Pk	Very Low
Bell Rd	Stewarts Ferry Pk	Elm Hill Pike	Moderately Low
Bell Rd	Elm Hill Pike	Smith Springs Rd	Extremely Low
Bell Rd	Smith Springs Rd	Murfreesboro Pk	Moderately Low
Bell Rd	Murfreesboro Pike	Bell Forge Ln	Very Low
Bell Rd	Bell Forge Ln	I-24	Moderately High
Bell Rd	I-24	Blue Hole Rd	Very Low
Bellevue Rd	Old Hickory Blvd	Baugh Road	Moderately High
Belmont Blvd	Portland Ave	I-440	Very Low
Belmont Blvd	I-440	Woodmont Blvd	Moderately Low
Belmont Blvd	Woodmont Blvd	Shackleford Rd	Moderately Low
Ben Allen Rd	Dickerson Pk	Hart Ln	Moderately Low
Benita Dr	Paragon Mills Rd	Park Ent	Moderately High
Blair Blvd	Natchez Trace	21st Ave	Moderately Low
Blair Blvd	21st Ave	Belmont Blvd	Moderately Low
Blakemore Ave	Natchez Trace	21st Ave	Very Low
Blue Hole Rd	Bell Rd	Antioch Pk	Moderately Low
Bransford Ave	Craighead St	Thompson Ln	Moderately Low
Brick Church Pk	West Trinity Ln	Ewing Dr	Moderately Low
Brick Church Pk	Ewing Dr	Old Hickory Blvd	Moderately Low
Brick Church Pk	Old Hickory Blvd	Hunter's Ln	Moderately Low
Briley Pkwy	I-40	Hydes Ferry Pk	Very Low
Broadmoor Rd	Dickerson Pk	Grinstead Pl (RR)	Moderately Low
Broadmoor Rd	Grinstead Pl (RR)	Gallatin Pk	Moderately Low
Broadway Ave	1st Ave	5th Ave	Very Low
Broadway Ave	5th Ave	7th Ave	Moderately Low
Broadway Ave	7th Ave	12th Ave	Very Low
Broadway Ave	12th Ave	West End Ave	Extremely Low
Brook Hollow Rd	Highway 70 S	Charlotte Pk	Moderately Low
Burkitt Rd	Old Hickory Blvd	Nolensville Pk	Moderately Low
Bush Rd	Ezell Rd	Quarry Site	Moderately High
Cane Ridge Rd	Bell Rd	Chimney Top Dr	Moderately Low
Cane Ridge Rd	Chimney Top Dr	502 Cane Ridge Rd	Moderately High
Cane Ridge Rd	502 Cane Ridge Rd	Old Hickory Blvd	Moderately Low
Cass St / Dominican Way	Metro Center Blvd	9th Ave	Moderately Low

Road name	From	To	Compatibility Level
Cass St	9th Ave	15th Ave	Moderately High
Cass St	15th Ave	18th Ave	Moderately Low
Centennial Blvd / Dr. Walter S. Davis Blvd	Ed Temple Blvd	44th Ave	Moderately Low
Centennial Blvd / Dr. Walter S. Davis Blvd	44th Ave	51st Ave	Extremely High
Centennial Blvd	51st Ave	63rd Ave	Moderately Low
Central Pk	Lebanon Pk	I-40 Ramp	Moderately Low
Central Pk	I-40 Ramp	Old Hickory Blvd	Very Low
Central Pk	Old Hickory Blvd	County Line	Moderately Low
Chandler Rd	Old Lebanon Dirt Rd	4417 Chandler Rd	Moderately Low
Chandler Rd	4417 Chandler Rd	Oakcrest Ln	Moderately Low
Chandler Rd	Oakcrest Ln	County Line	Moderately Low
Charlotte Ave	Courthouse	8th Ave	Moderately Low
Charlotte Ave	8th Ave	12th Ave	Very Low
Charlotte Ave	12th Ave	I-40 / I-65	Extremely Low
Charlotte Ave	I-40 / I-65	33rd Ave	Moderately Low
Charlotte Ave	33rd Ave	40th Ave	Very Low
Charlotte Ave	40th Ave	54th Ave	Extremely Low
Charlotte Ave	54th Ave	White Bridge Pk	Moderately High
Charlotte Pk	White Bridge Pk	Westboro Dr	Moderately High
Charlotte Pk	Westboro Dr	Hillwood Blvd	Moderately Low
Charlotte Pk	Hillwood Blvd	I-40	Moderately Low
Charlotte Pk	I-40	River Rd	Moderately Low
Charlotte Pk	River Rd	County Line	Moderately Low
Cherokee Rd	Aberdeen Rd	West End Ave	Moderately High
Chestnut St / Edgehill Ave	Lafayette St	16th Ave	Moderately High
Chestnut St / Edgehill Ave	16th Ave	21st Ave	Moderately Low
Chestnut St / Edgehill Ave	8th Ave	Fort Negley Blvd	Moderately Low
Church St	8th Ave	9th Ave	Moderately Low
Church St	9th Ave	George L. Davis Blvd	Moderately Low
Church St	George L. Davis Blvd	15th Ave	Extremely Low
Church St	15th Ave	21st Ave	Very Low
Clarksville Pk	Clay St	Metrocenter Blvd	Very Low
Clarksville Pk	Metrocenter Blvd	Trinity Ln	Extremely Low
Clarksville Pk	Trinity Ln	Ashland City Hwy	Extremely Low
Clarksville Pk	Ashland City Hwy	Abernathy Rd	Very Low
Clarksville Pk	Abernathy Rd	Briley Pkwy	Moderately Low
Clarksville Pk	Briley Pkwy	County Line	Moderately High
Cleghorn Ave	Abbott Martin Rd	Crestmoor Rd	Moderately Low
Cloverland Dr	Copperfield Ct	Edmonson Pk	Moderately Low
Conference Dr	Gallatin Pk	Long Hollow Pk	Moderately Low
Copperfield Ct	Copperfield Way	Cloverland Dr	Moderately High
Copperfield Way	Old Hickory Blvd	Copperfield Ct	Moderately High
County Hospital Rd	John Mallette Dr	Camilia Caldwell Ln	Moderately Low
County Hospital Rd	Camilia Caldwell Ln	Briley Pkwy	Moderately High

Road name	From	To	Compatibility Level
Craighead St	Franklin Pk	Bransford Ave	Moderately Low
Craighead St	Bransford Ave	Nolensville Pk	Moderately Low
Cunniff Pkwy	I-65	Dickerson Pk	Moderately Low
Crestmoor Rd	Hillsboro Pk	Dead End	Moderately Low
Davidson Dr	Davidson Rd	Windrowe Dr	Moderately Low
Davidson Dr	Windrowe Dr	Charlotte Pk	Moderately High
Davidson Rd	Davidson Dr	Post Rd	Moderately High
Davidson St	Gateway Bridge	5th St	Extremely High
Davidson St	5th St	12th St	Very High
Davidson St	in Shelby Park	------	Moderately High
Delaware Ave	46th Ave	51st Ave	Moderately Low
Demonbreun St	1st Ave	3rd Ave	Moderately High
Demonbreun St	3rd Ave	4th Ave	Moderately Low
Demonbreun St	4th Ave	6th Ave	Moderately Low
Demonbreun St	6th Ave	7th Ave	Moderately Low
Demonbreun St	7th Ave	8th Ave	Moderately Low
Demonbreun St	8th Ave	9th Ave	Moderately Low
Demonbreun St	9th Ave	10th Ave	Moderately Low
Demonbreun St	10th Ave	12th Ave	Moderately Low
Demonbreun St	12th Ave	Roundabout	Moderately Low
Dickerson Pk / 1st St	Spring St Interchange	Douglas Ave	Very Low
Dickerson Pk	Douglas Ave	Hunters Ln	Extremely Low
Dickerson Pk	Hunters Ln	County Line	Very Low
Dodson Chapel Rd	Bell Rd	Old Hickory Blvd	Moderately Low
Donelson Pk	Harding Place	Murfreesboro Pk	Very Low
Donelson Pk	Murfreesboro Pk	Elm Hill Pk	Extremely Low
Donelson Pk	Elm Hill Pk	Lebanon Pk	Extremely Low
Douglas Ave	Gallatin Pk	Ellington Pkwy	Moderately Low
Douglas Ave	Ellington Pkwy	Dickerson Pk	Moderately High
Dr. D.B. Todd Jr. Blvd	Charlotte Ave	Jo Johnston Ave	Moderately Low
Dr. D.B. Todd Jr. Blvd	Jo Johnston Ave	Herman St	Moderately Low
Dr. D.B. Todd Jr. Blvd	Herman St	Jackson St	Moderately Low
Dr. D.B. Todd Jr. Blvd	Jackson St	Jefferson St	Moderately High
Dr. D.B. Todd Jr. Blvd	Jefferson St	Clay St	Moderately High
Due West Ave	Dickerson Pk	I-65	Moderately Low
Due West Ave	I-65	Gallatin Pk	Moderately Low
Due West Ave	Fernbank Dr	Gallatin Pk	Moderately Low
Earhart Rd	Central Pk	S. John Hager Rd	Moderately Low
Eastland Ave	Riverside Dr	Porter Rd	Moderately Low
Eastland Ave	Porter Rd	Gallatin Pk	Moderately High
East Trinity Ln	Dickerson Pk	Overby Rd	Moderately Low
East Trinity Ln	Overby Rd	Ellington Pkwy	Moderately High
East Trinity Ln	Ellington Pkwy	Gallatin Pk	Very Low

Road name	From	To	Compatibility Level
Eatons Creek Rd	Kings Ln	Ashland City Hwy	Very High
Edgehill Av	8th Ave	21st Ave	Moderately High
Edmondson Pk	Nolensville Pk	McMurray Dr	Moderately Low
Edmondson Pk	McMurray Dr	Old Hickory Blvd	Moderately Low
Edmondson Pk	Old Hickory Blvd	County Line	Very Low
Ed Temple Blvd	Clarksville Hwy	Jefferson St	Very Low
Elliston Pl	21st Ave	25th Ave	Very Low
Elm Hill Pk	Bell Rd	Patio Dr	Moderately Low
Elm Hill Pk	Patio Dr	McCrory Creek Rd	Very Low
Elm Hill Pk	McCrory Creek Rd	Donelson Pk	Moderately Low
Elm Hill Pk	Donelson Pk	Massman Dr	Very Low
Elm Hill Pk	Massman Dr	Fesslers Ln	Very Low
Elm Hill Pk	Fesslers Ln	Murfreesboro Pk	Very Low
Elmington Ave	Richardson Ave	West End Ave	Moderately High
Elysian Fields Rd	Trousdale Dr	Nolensville Pk	Moderately Low
Ensley Blvd	2nd Ave	Moore Ave	Moderately Low
Ewing Dr	Knight Dr	Dickerson Pk	Very Low
Fairfax Ave	21st Ave	Natchez Trace	Moderately Low
Fairfax Ave	Natchez Trace	Chesterfield Ave	Very High
Fairfield Ave	Murfreesboro Pk	Hermitage Ave	Moderately High
Fern Ave	Dickerson Pk	Brick Church Pk	Moderately Low
Fern Ave	Brick Church Pk	Weakley Ave	Moderately Low
Fesslers Ln	Hermitage Ave	Murfreesboro Pk	Very Low
Fort Negley Blvd	Bass St	Hamilton Ave	Moderately Low
Foster Ave	Murfreesboro Pk	Thompson Ln	Moderately Low
Franklin Limestone Rd	Murfreesboro Pk	Quarry Entrance	Moderately Low
Franklin Limestone Rd	Quarry Entrance	Antioch Pk	Moderately Low
Franklin Pike Circle	Old Hickory Blvd	Regent Dr	Moderately Low
Franklin Pk	Douglas Ave	Kirkwood Ave	Moderately High
Franklin Pk	Kirkwood Ave	Woodmont Blvd	Moderately High
Franklin Pk	Woodmont Blvd	Otter Creek Road	Very Low
Franklin Pk	Otter Creek Road	Old Hickory Blvd	Moderately High
Gale Ln	Franklin Pk	Belmont Blvd	Moderately High
Gallatin Ave	Main Street	Eastland Ave	Moderately Low
Gallatin Ave	Eastland Ave	Cahal Ave	Very Low
Gallatin Pk	Cahal Ave	Iverson Ave	Very Low
Gallatin Pk	Iverson Ave	Briley Pkwy	Moderately Low
Gallatin Pk	Briley Pkwy	Lakewood Dr	Extremely Low
Gallatin Pk	Lakewood Dr	Madison St	Moderately Low
Gallatin Pk	Madison St	County Line	Moderately Low
Garland Ave	24th Ave	25th Ave	Moderately Low
Granny White Pk	Maryland Way	Tyne Blvd	Moderately Low

Road name	From	To	Compatibility Level
Granny White Pk	Tyne Blvd	Shackleford Rd	Moderately Low
Granny White Pk	Shackleford Rd	Grandview Dr	Moderately Low
Granny White Pk	Grandview Dr	Gale Ln	Very Low
Great Circle Rd	Metrocenter Blvd	Vantage Way	Moderately Low
Greenfield Ave	Golf St	Gallatin Pk	Moderately Low
Harding Pl	Harding Rd	Windsor Dr	Moderately Low
Harding Pl	Windsor Dr	Belle Meade Blvd	Moderately Low
Harding Pl	Belle Meade Blvd	Hillsboro Pk	Moderately Low
Harding Pl	Hillsboro Pk	General Lowrey Dr	Moderately Low
Harding Pl	Franklin Pk	I-65	Moderately High
Harding Pl	I-65	Timberhill Dr	Very Low
Harding Pl	Timberhill Dr	Nolensville Rd	Moderately Low
Harding Pl	Nolensville Pk	I-24	Extremely Low
Harding Pl	I-24	Ezell Rd	Moderately Low
Harding Pl	Ezell Rd	Donelson Pk	Moderately Low
Harding Pk	Bosley Springs Rd	Hillwood Blvd	Extremely Low
Harding Pk	Hillwood Blvd	Leake Ave	Moderately Low
Harding Pk	Leake Ave	Highway 70 S	Moderately Low
Harpeth Bend Dr	Highway 100	Beech Bend Dr	Extremely High
Hart Ln / Ben Allen Rd	Saunders Ave	Ellington Pkwy	Very Low
Hart Ln	Ellington Pkwy	Dickerson Pk	Moderately Low
Trousdale Dr	Hill Rd	Hearthstone Ln	Moderately High
Herman St	8th Ave	12th Ave	Moderately High
Herman St	12th Ave	19th Ave	Moderately Low
Herman St	19th Ave	21st Ave	Moderately High
Herman St	21st Ave	28th Ave	Moderately High
Hermitage Ave	Peabody St	RR Crossing	Very Low
Hermitage Ave	RR Crossing	Spence Ln	Very Low
Hicks Rd	Sawyer Brown Rd	Highway 70 S	Moderately Low
Highway 70 S	Harding Rd / Hwy 70 Split	Old Harding Pk	Very Low
Highway 70 S	Old Harding Pk	Old Hickory Blvd	Moderately Low
Highway 70 S	Old Hickory Blvd	Sawyer Brown Rd	Very Low
Highway 70 S	Sawyer Brown Rd	I-40	Very Low
Highway 70 S	I-40	Charlotte Pk	Moderately Low
Highway 96	Highway 100	County Line	Very High
Highway 100	W. Tyne Blvd	Old Hickory Blvd	Moderately High
Highway 100	Old Hickory Blvd	County Line	Moderately Low
Hill Rd	Franklin Pike Cr	Hill Rd 657	Moderately Low
Hill Rd	657 Hill Rd	Hill Rd Cir	Moderately Low
Hill Rd	Woodridge Ct	Old Hickory Blvd	Moderately Low
Hill Rd Cr	Hill Rd	Woodridge Ct	Moderately Low
Hillsboro Pk	Old Hickory Blvd	Harding Pl	Very Low
Hillsboro Pk	Harding Pl	Graybar Ln	Moderately Low

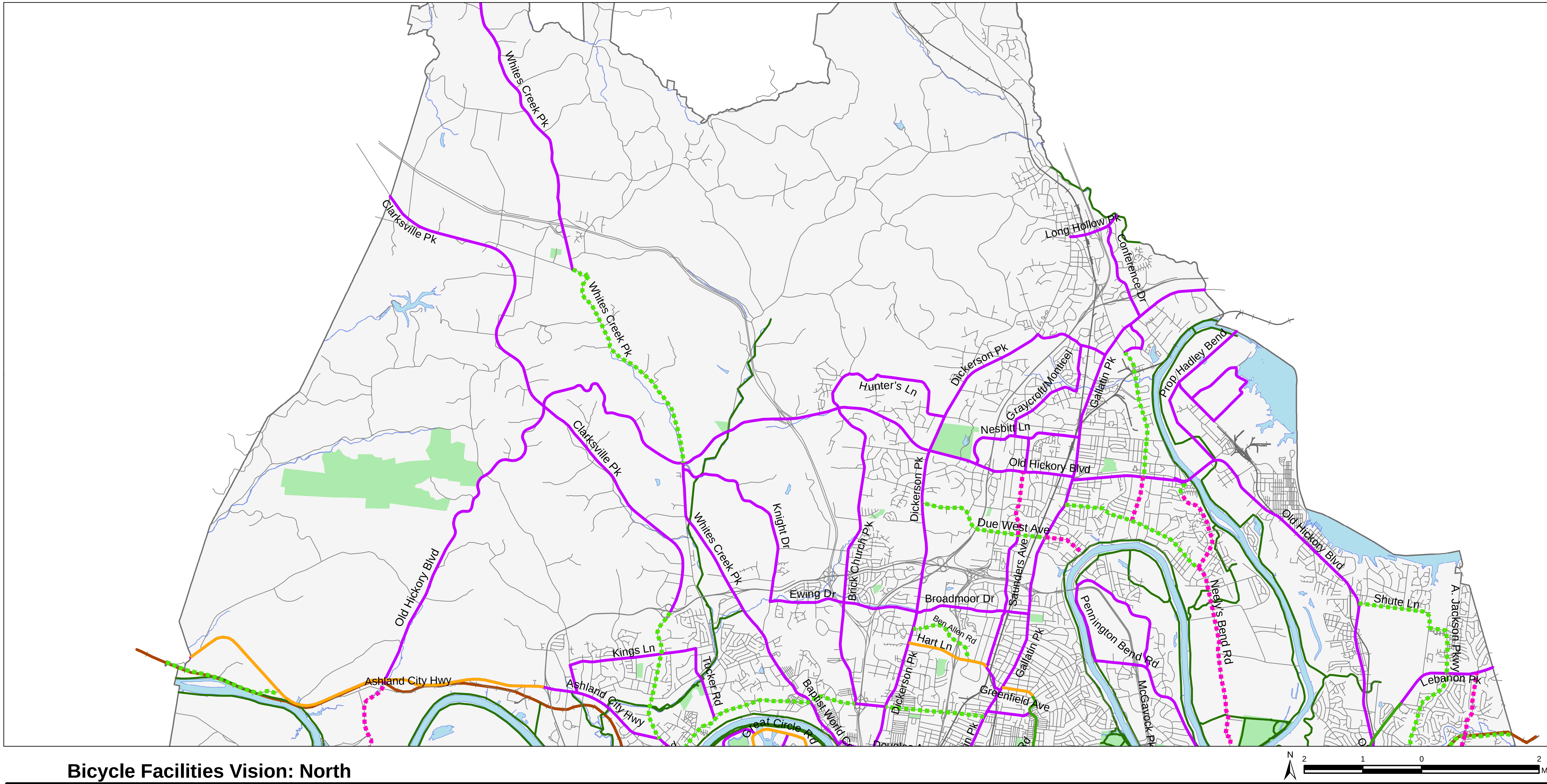
Road name	From	To	Compatibility Level
Hillsboro Pk	Graybar Ln	I-440	Very Low
Hillwood Blvd	Charlotte Pk	Harding Pk	Moderately Low
Hobson Pk	Murfreesboro Pk	County Line	Moderately High
Hogan Rd	Franklin Pk	Overton Rd	Moderately Low
Hunter's Lane	Dickerson Pk	Brick Church Pk	Moderately Low
Huntington Pkwy	Edmondson Pk	Amalie Dr	Very High
James Robertson Pkwy	Charlotte Ave	8th Ave	Moderately Low
James Robertson Pkwy	8th Ave	Church St	Extremely Low
Jefferson St	5th Ave	8th Ave	Very Low
Jefferson St	8th Ave	I-40	Very Low
Jefferson St	I-40	Ed Temple Blvd	Very Low
John Hager Rd	New Hope Rd	Earhart Rd	Moderately Low
John Merritt Blvd	Ed Temple Blvd	39th Ave	Moderately Low
Karen Dr	Knights of Columbus Blvd	Patricia Dr	Moderately Low
Kings Ln	Tucker Rd	Clarksville Pk	Moderately Low
Kings Ln	Clarksville Pk	Eatons Creek Rd	Moderately Low
Kingsbury Dr	Ashland Dr	Harpeth River Dr	Moderately High
Knight Dr	Whites Creek Pk	Brick Church Ln	Moderately Low
Knight Dr	Brick Church Ln	Ewing Dr	Moderately Low
Knight Dr	Ewing Dr	Whites Creek Pk	Very High
Knights of Columbus Blvd	McGavock Pk	Karen Dr	Moderately Low
Lafayette St	8th Ave	I-40	Very Low
Lakeview Dr	Overton Lea Rd	End	Moderately High
Lealand Ln	I-440	Maplehurst Ave	Moderately Low
Lealand Ln	Maplehurst Ave	Tyne Blvd	Moderately Low
Lealand Ln	Tyne Blvd	Overton Lea Rd	Moderately Low
Lebanon Pk	Omahundro Pl	Spence Ln	Moderately High
Lebanon Pk	Spence Ln	Briley Pkwy	Moderately High
Lebanon Pk	Briley Pkwy	Donelson Pk	Moderately Low
Lebanon Pk	Donelson Pk	Disspayne Dr	Very Low
Lebanon Pk	Disspayne Dr	Stones River	Moderately Low
Lebanon Pk	Stones River	County Line	Moderately High
Long Hollow Pk	Dickerson Pk	County Line	Moderately Low
Main St	Spring St	Cumberland River	Very Low
Mainstream Dr	Metrocenter Blvd	Great Circle Rd	Moderately High
McCroy Ln	Highway 100	Highway 70 S	Moderately High
McGavock Pk	Gallatin Pk	Riverside Dr	Moderately Low
McGavock Pk	Pennington Bend Rd	Meadowood Dr	Moderately Low
McGavock Pk	Meadowood Dr	Lebanon Pk	Moderately Low
McGavock Pk	Lebanon Pk	Elm Hill Pk	Very Low
McGavock Pk	Elm Hill Pk	Knights of Columbus Blvd	Moderately Low
McMurray Dr	Tusculum Rd	Brewer Dr	Moderately Low

Road name	From	To	Compatibility Level
Murfreesboro Pk	Briley Pkwy	Donelson Pk	Moderately Low
Murfreesboro Pk	Donelson Pk	County Line	Extremely Low
Murphy Rd	West End Ave	Bowling Ave	Moderately Low
Murphy Rd	Bowling Ave	46th Ave	Moderately High
Myatt Dr	Spring Branch Rd	Anderson Ln	Extremely Low
Myatt Dr	Anderson Ln	Old Hickory Blvd	Very Low
Myatt Dr	Old Hickory Blvd	Neelys Bend	Very Low
Randy Rd	Old Hickory Blvd	Neely's Bend	Moderately Low
Nashboro Blvd	Bell Rd	Murfreesboro Pk	Moderately High
Natchez Trace	West End Ave	Blakemore Ave	Moderately Low
Natchez Trace	Blakemore Ave	Fairfax Ave	Moderately High
Natchez Trace	Fairfax Ave	Blair Blvd	Moderately Low
Natchez Trace	Blair Blvd	Woodlawn Dr	Moderately High
Natchez Trace Pkwy	Highway 100	County Line	Moderately Low
Neely's Bend	Gallatin Pk	Cumberland River	Very Low
Nesbitt Ln	Gallatin Pk	Heritage Dr	Moderately High
Nesbitt Ln	Heritage Dr	Ronnie Rd	Moderately High
Nesbitt Ln	Ronnie Rd	I-65	Moderately High
Nesbitt Ln	Old Hickory Blvd	End	Very High
New Hope Rd	Central Pike	John Hager Rd	Moderately High
Nolensville Pk	Wingrove St	I-440	Moderately High
Nolensville Pk	I-440	Thompson Ln	Moderately High
Nolensville Pk	Thompson Ln	Haywood Ln	Moderately Low
Nolensville Pk	Haywood Ln	Old Hickory Blvd	Moderately Low
Nolensville Pk	Old Hickory Blvd	County Line	Moderately Low
North Graycroft Ave	Nesbitt Ln	Slayton Dr	Moderately Low
North Graycroft Ave	Slayton Dr	Monticello Ave	Moderately High
Oakley Dr	Overton Rd	Cochran Dr	Moderately High
Old Charlotte Pk	Highway 70 S	County Line	Moderately Low
Old Harding Pk	Highway 100	Highway 70 S	Moderately Low
Old Hickory Blvd	River Rd	Old Charlotte Pk	Moderately Low
Old Hickory Blvd	Old Charlotte Pk	Charlotte Pk	Moderately High
Old Hickory Blvd	Charlotte Pk	Highway 70 S	Very Low
Old Hickory Blvd	Highway 70 S	Highway 100	Moderately Low
Old Hickory Blvd	Highway 100	Hillsboro Rd	Very Low
Old Hickory Blvd	Hillsboro Rd	Granny White Pk	Very Low
McMurray Dr	Brewer Dr	Edmonson Pk	Moderately Low
Metrocenter Blvd	I-65	Clarksville Pk	Moderately Low
Morton Mill Rd	Old Harding Rd	Northridge Dr	Moderately High
Morton Mill Rd	Northridge Dr	Riverbend Ln	Moderately High
Murfreesboro Pk	I-65 / I-40	(RR) Menzler Rd	Extremely Low
Murfreesboro Pk	(RR) Menzler Rd	Briley Pkwy	Moderately Low

Road name	From	To	Compatibility Level
Old Hickory Blvd	Granny White Pk	Franklin Pk	Extremely Low
Old Hickory Blvd	Franklin Pk	Valley View Rd	Extremely Low
Old Hickory Blvd	Valley View Rd	Blue Hole Rd	Moderately Low
Old Hickory Blvd	Blue Hole Rd	Bell Rd	Moderately Low
Old Hickory Blvd	Bell Rd	I-40	Moderately Low
Old Hickory Blvd	I-40	Central Pk	Very Low
Old Hickory Blvd	Central Pk	Lebanon Pk	Moderately Low
Old Hickory Blvd	Lebanon Pk	Bennnet Dr	Very Low
Old Hickory Blvd	Bennnet Dr	Myatt Dr	Moderately Low
Old Hickory Blvd	Myatt Dr	Gallatin Pk	Moderately High
Old Hickory Blvd	Gallatin Pk	I-65	Moderately Low
Old Hickory Blvd	I-65	Dickerson Pk	Moderately High
Old Hickory Blvd	Dickerson Pk	Whites Creek Pk	Very Low
Old Hickory Blvd	Whites Creek Pk	Ashland City Hwy	Moderately Low
Old Hickory Blvd	Ashland City Hwy	Cumberland River	Moderately Low
Old Hickory Blvd	Burkitt Rd	Owen Dr	Moderately Low
Old Hickory Blvd	Owen Dr	Murfreesboro Rd	Moderately Low
Otter Creek Rd	Hillsboro Pk	Ashland Dr	Moderately High
Otter Creek Rd	Ashland Dr	Granny White Pk	Moderately Low
Otter Creek Rd	Granny White Pk	West of Radnor Lake Park	Moderately High
Otter Creek Rd	Inside Radnor Lake Park	------	Moderately High
Otter Creek Rd	East of Radnor Lake Park	Franklin Pk	Moderately Low
Overton Rd	Hogan Rd	Oakley Dr	Moderately Low
Overton Lea Rd	Lakeview Dr	Lealand Ln	Moderately Low
Park Pl	31st Ave	Parthenon Ave	Moderately Low
Patricia Dr	Karen Dr	Thompson Pl	Moderately High
Patterson St	21st Ave	25th Ave	Moderately Low
Pennington Bend	McGavock Pk (W)	Music Valley Dr	Moderately Low
Pennington Bend	Music Valley Dr	McGavock Pk (E)	Moderately Low
Poplar Creek Rd	Old Harding Rd	Willow Oak Dr	Moderately Low
Poplar Creek Rd	Willow Oak Dr	Rolling River Pkwy	Moderately Low
Poplar Creek Rd	Rolling River Pkwy	River Fork Dr	Moderately Low
Poplar Creek Rd	River Fork Dr	McCrory Ln	Moderately Low
Portland Ave	18th Ave	Belmont Blvd	Moderately High
Post Rd	Hillwood Blvd	Highway 70 S	Moderately Low
Regent Dr	Franklin Pike Cr	Hogan Rd	Moderately High
River Rd	Charlotte Pk	Old Hickory Blvd	Moderately Low
River Trc	Ashland City Hwy	County Line	Moderately High
Riverside Dr	Huntleigh Dr	Golf St	Very High
Rolling River Pkwy	Poplar Creek Rd	End	Extremely High
Ronnie Rd	Old Hickory Blvd	Nesbitt Ln	Moderately High

Road name	From	To	Compatibility Level
Rosedale Ave	Nolensville Pk	Craighead St	Moderately High
Saunders Ave / E. Marthona Rd	Hart Ln	Old Hickory Blvd	Moderately Low
Saunders Ave	Due West Ave	Old Hickory Blvd	Moderately Low
Saundersville Rd	Andrew Jackson Pkwy	Shute Ln	Moderately Low
Sawyer Brown Rd	Old Harding Pk	Highway 70 S	Extremely High
Sawyer Brown Rd	Highway 70 S	Charlotte Pk	Moderately Low
Shelby Ave	Cumberland River	4th St	Moderately Low
Shelby Ave	4th St	5th St	Moderately Low
Shelby Ave	5th St	10th St	Moderately Low
Shelby Ave	10th St	14th St	Moderately Low
Shelby Ave	14th St	20th St	Very Low
Shephard Hills	Gallatin Pk	Spring Branch Rd	Moderately High
Shute Ln	Saundersville Rd	Old Hickory Blvd	Moderately Low
Smith Springs Rd	Bell Road	End	Moderately Low
South Douglas Ave	8th Ave	10th Ave	Moderately High
Spence Ln	Murfreesboro Pk	Elm Hill Pk	Moderately Low
Spence Ln	Elm Hill Pk	Hermitage Ave / Lebanon Pk	Moderately Low
Spring Branch Rd	Shephard Hills Dr	Myatt Dr	Moderately High
Stewart's Ferry Pk	Lebanon Pk	Bell Rd	Very Low
Stokesmont Rd	Stokes Ln	Dead End	Moderately Low
Sweetbriar Ave	Granny White Pk	21st Ave	Moderately High
Temple Rd	Highway 100	Sneed Rd	Moderately Low
Thompson Ln	Bridge Dr (Crestridge)	Powell Ave	Very Low
Thompson Ln	Powell Ave	Thompson Ln / Briley Pkwy	Moderately Low
Thompson Ln	Thompson Ln / Briley Pkwy	Murfreesboro Pk	Moderately High
Thompson Pl	Patricia Dr	Murfreesboro Pk	Moderately High
Trinity Ln	Dickerson Pk	Brick Church Pk	Very Low
Trinity Ln	I-65	Baptist World Center Dr	Moderately Low
Trinity Ln	Baptist World Center Dr	Tucker Rd	Moderately Low
Buena Vista Pk	Tucker Rd	Clarksville Pk	Moderately Low
Trousdale Dr	Elysian Fields Rd	Harding Pl	Moderately High
Tucker Rd	I-65	West Hamilton Rd	Very High
Tucker Rd	West Hamilton Rd	Trinity Ln	Moderately Low
Tulip Grove Rd	Central Pk	Lebanon Pk	Moderately Low
Tusculum Rd	Blue Hole Rd	Nolensville Pk	Moderately Low
Tusculum Rd	Nolensville Pk	McMurray Dr	Moderately Low
Tyne Blvd	Highway 100	Belle Meade Blvd	Moderately High
Tyne Blvd	Belle Meade Blvd	Hillsboro Pk	Moderately Low
Tyne Blvd	Hillsboro Pk	Franklin Pk	Moderately High
Una Antioch Pk	Antioch Pk	Piccadilly Row	Moderately Low
Una Antioch Pk	Piccadilly Row	Murfreesboro Rd	Moderately Low
Vantage Way	Metrocenter Blvd	Great Circle Rd	Moderately Low

Road name	From	To	Compatibility Level
Weakley Ave	Fern Ave	Baptist World Center Dr	Moderately High
Wedgewood Ave	21st Ave	Franklin Ave	Very Low
Wedgewood Ave	Franklin Ave	I-65	Very Low
Wedgewood Ave	I-65	Fairgrounds	Moderately Low
Wedgewood Ave	Fairgrounds	Nolensville Pk	Very High
West End Ave	Natchez Trace	Blakemore	Very Low
West End Ave	Blakemore Ave	Murphy Rd	Extremely Low
West End Ave	Murphy Rd	I-440	Moderately Low
West End Ave	I-440	Bosley Springs Rd	Very Low
West End Ave	Broadway split	25th Ave	Extremely Low
Westlawn Dr	Murphy Rd	Aberdeen Rd	Moderately High
White Bridge Pk	Harding Pk	Charlotte Pk	Very Low
Whites Creek Pk	Trinity Ln	Briley Pkwy	Moderately Low
Whites Creek Pk	Briley Pkwy	Buena Vista Pk	Moderately High
Whites Creek Pk	Buena Vista Pk	Old Hickory Blvd	Very High
Whites Creek Pk	Old Hickory Blvd	Old Clarksville Pk	Moderately Low
Whites Creek Pk	Old Clarksville Pk	I-24	Moderately Low
Whites Creek Pk	I-24	County Line	Moderately Low
Whitland Ave	West End Ave	Bowling Ave	Moderately High
Woodland St	5th Ave	10th Ave	Moderately Low
Woodland St	10th Ave	17th Ave	Moderately Low
Woodland St Bridge	-----	1st Ave	Very Low
Woodlawn Dr	Natchez Trace	21st Ave	Moderately Low
Woodmont Blvd	Harding Pk	Hillsboro Pk	Moderately High
Woodmont Blvd	Hillsboro Pk	Franklin Pk	Very Low



Bicycle Facilities Vision: North

Completed Bikeways
- Bike Lane
- Shared Route

Planned Phase 2 Bikeways*
- Bike Lane
- Shared Route

Master Vision Plan Bikeways

Existing & Future Greenways

Rails-to-Trails

Railroad

Local Roads

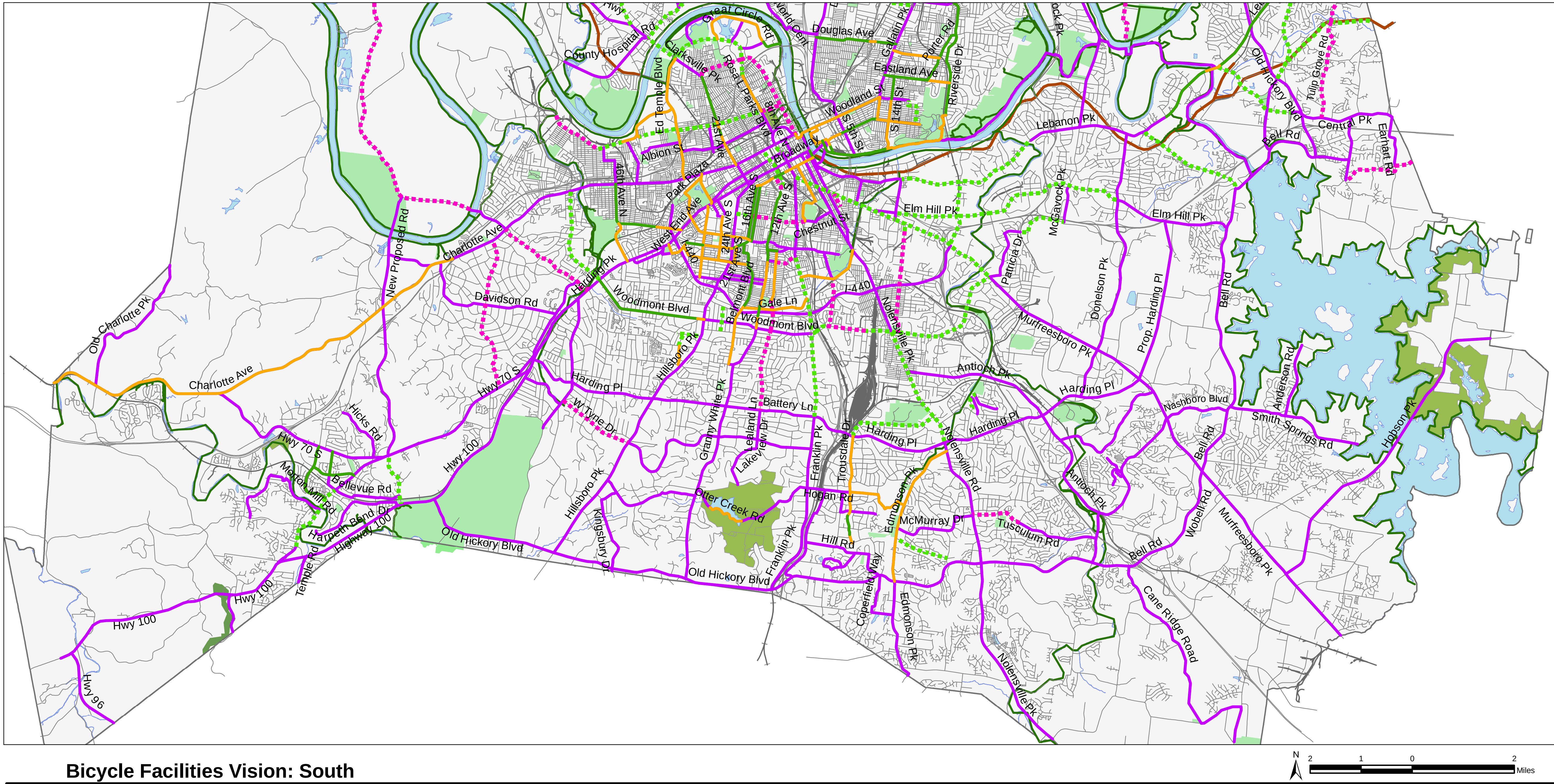
Water Bodies

Metro Parks

State Land

*Note: Phase 2 Projects were identified based on public input, connectivity and coordination with upcoming corridor improvement projects. The facility type shown on this map (bike lane or shared route) shall ultimately be determined by formal engineering assessments at time of implementation.

Figure 5-2



Bicycle Facilities Vision: South

Completed Bikeways
- Bike Lane
- Shared Route

Planned Phase 2 Bikeways*
- Bike Lane
- Shared Route

Master Vision Plan Bikeways

Existing & Future Greenways

Rails-to-Trails

Railroad

Local Roads

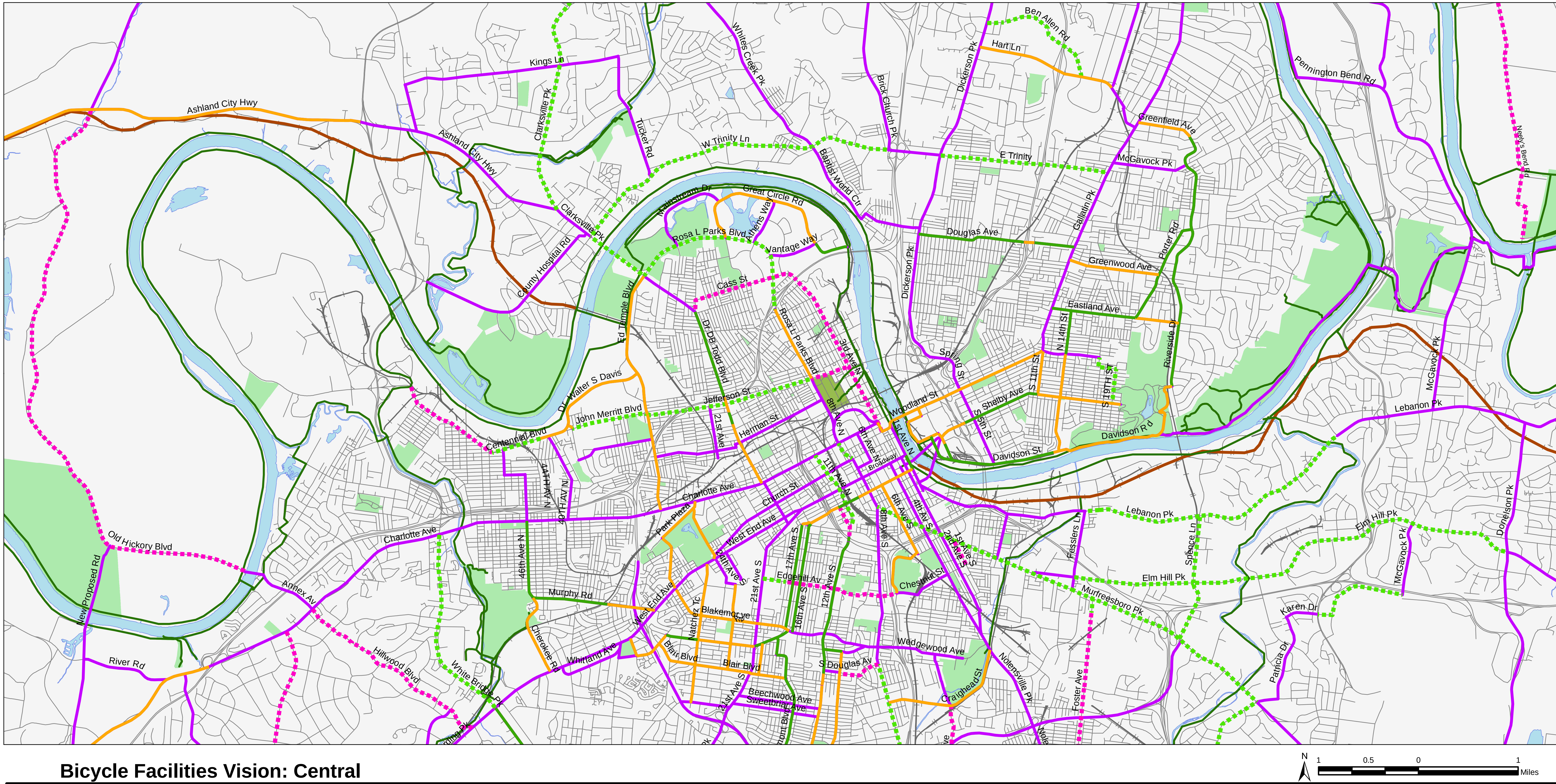
Water Bodies

Metro Parks

State Land

*Note: Phase 2 Projects were identified based on public input, connectivity and coordination with upcoming corridor improvement projects. The facility type shown on this map (bike lane or shared route) shall ultimately be determined by formal engineering assessments at time of implementation.

Figure 5-3



Bicycle Facilities Vision: Central

Completed Bikeways	Planned Phase 2 Bikeways*				
Bike Lane	Bike Lane	Master Vision Plan Bikeways	Existing & Future Greenways	Railroad	Water Bodies
Shared Route	Shared Route		Rails-to-Trails	Local Roads	Metro Parks
					State Land

*Note: Phase 2 Projects were identified based on public input, connectivity and coordination with upcoming corridor improvement projects. The facility type shown on this map (bike lane or shared route) shall ultimately be determined by formal engineering assessments at time of implementation.

Figure 5-4

SECTION 6: OTHER RELATED GUIDELINES AND SUGGESTIONS

6.1. BIKEWAYS FUNDING

The previously-adopted *Strategic Plan for Sidewalks and Bikeways* recommended that bikeways be constructed in conjunction with routine roadway maintenance and other road improvement projects. This practice has been beneficial to the Bikeways Program as it has significantly reduced the cost of creating bikeways by sharing routine cost of replacing grates and pavement markings with Metro Public Works' Paving Program.

This practice should continue, but when additional state or federal funding for bikeway projects becomes available, Metro should consider spending funds on widening shoulders of roadways to allow the addition of bike lanes or wide outside lanes (WOL) where these facilities were not previously feasible and where additional bikeways results in more complete streets and provides more transportation options.

A portion of bikeway funding should be allocated to non-roadway uses such as bicycle parking and other needed facilities. The availability of safe and convenient bicycle parking is critical to make cycling a viable transportation options for commuting, conducting errands, etc. Metro should consider using a portion of the annual bikeway budget to upgrade or provide new bicycle parking at Metro-owned public buildings.

6.2. BICYCLE PARKING

Like motorists, cyclists need secure convenient parking facilities for their bicycles when they reach their destination. The lack of adequate bicycle parking facilities and fear of theft are significant deterrents to cycling as a real transportation option in Nashville. Well-designed bicycle racks and lockers located close to building entrances increase overall parking capacity and encourage bicycle use. Because it is less land-intensive, providing parking for bicycles is a good way to ease parking lot congestion and meet parking demand. While all-day bicycle commuting requires bike parking indoors or lockers, outdoor parking is often both convenient and appropriate for messengers, shoppers and others making brief visits to buildings.

Metro Nashville should adopt an ordinance requiring new developments such as commercial establishments, office, and multi-family housing to provide bicycle parking. As previously noted, Metro should lead the way by providing bicycle parking at all Metro-owned public buildings.

6.3. TENNESSEE'S "THREE FEET LAW"

Tennessee has a newly-adopted law requiring that vehicles provide at least three feet of distance when passing cyclists.

The "Jeff Roth and Brian Brown Bicycle Protection Act of 2007", signed into law on May 3, 2007, by Governor Phil Bredesen states:

"The operator of a motor vehicle, when overtaking and passing a bicycle proceeding in the same direction on the roadway, shall leave a safe distance between the motor vehicle and the bicycle of not less than three feet (3') and shall maintain the clearance until safely past the overtaken bicycle."

This state law further recognizes that Tennessee roads are, by necessity, multi-modal. The law codifies the practice of sharing the road when vehicles encounter cyclists and vice versa. When "sharing the road", motorists in Nashville should abide by the new law and also remember to:

1. Reduce speeds when encountering cyclists,
2. Wait for safe road and traffic conditions before passing, and
3. Check over your shoulder before moving back in the travel lane.

6.4. TDOT POLICY AND COORDINATION

After the adoption of the *Strategic Plan for Sidewalks and Bikeways* in 2003, the Tennessee Department of Transportation (TDOT) approved a new "routine accommodation" policy. The policy states that TDOT will "routinely integrate bicycling and pedestrian facilities into the transportation system as a means to improve the mobility and safety of non-motorized traffic" if the local jurisdiction has an adopted plan that recommends the bicycle and pedestrian facilities. The policy also states TDOT will provide facilities provided that "the cost of providing bicycle and pedestrian facilities would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the projects total right-of-way costs." TDOT's routine accommodation policy indicates that the State of Tennessee is committed to providing bikeways and sidewalks as real mobility options.

TDOT, Metro Public Works and Metro Planning have successfully worked to include bikeways on several improvement projects including the Demonbreun Viaduct, Thompson Lane and Lebanon Pike. The update to the *Strategic Sidewalks and Bikeways Plan* applauds the coordination of projects between TDOT and Metro to implement, on state routes, the bikeways envisioned in the *Strategic Plan*.

6.5. EMERGING PRACTICE AND INNOVATIONS

The original *Strategic Plan for Sidewalks and Bikeways,* adopted in 2003, places a strong emphasis on retrofitting Nashville and Davidson County's roadways with sidewalks, crosswalks and bikeways to make the city more pedestrian and cyclist friendly. The success of these efforts is apparent. The update of the *Strategic Plan* in 2008 shifts the emphasis to providing sidewalks and bikeways strategically to create a fully multi-modal transportation system in Nashville/Davidson County with walking and cycling as viable transportation options.

The ease, comfort, safety and convenience with which people can walk and bike in Nashville is also dramatically impacted by street design. For example, a commercial street with sidewalk at the curb and numerous, uncoordinated curb cuts (access points for vehicles), creates an unsafe pedestrian environment. Meanwhile, a commercial street with a well-designed planting strip and sidewalk and with coordinated, well-marked and well-designed vehicular access points will make for fewer pedestrian/vehicle conflicts.

The following are concepts and practices that Metro Nashville should consider as existing roadways are improved and new roadways are designed to create streets. These concepts and practices are crucial to moving toward street design that includes walking and cycling as real transportation options that are accommodated safely, comfortable and efficiently.

6.5.1 Context Sensitive Solutions (CSS) or Context Sensitive Design (CSD)

While transportation planning and street design often place primary importance on moving vehicular traffic, CSS encourages transportation planning and design that provides facilities for all modes of travel (vehicular, transit, bicycle and pedestrian) and that respects the physical setting of the street and preserves scenic, aesthetic, historic and environmental resources, while maintaining the safety and mobility for all roadway users. The CSS approach to transportation decision-making and design takes into consideration the context of the community and lands which streets, roads, and highways pass through. The process allows stakeholders the flexibility needed to create a transportation system that fits the needs and character of the area.

Policies and regulations at the federal level have created momentum to pursue transportation projects through a CSS process locally and at the state level. In 2003, the Federal Highway Administration (FHWA) set a goal of achieving CSS integration within all state Departments of Transportation (DOTs) by September, 2007. In August, 2005 Congress enacted the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users SAFETEA-LU.* Sections of this act encouraged agencies to use CSS in designing transportation projects. In 2006, the American Association of State Highway and Transportation

Organizations (AASHTO) developed strategic goals and objectives for CSS representing a fundamental change in the way roadway projects would be undertaken. This change included considering motor vehicle speed not only as an issue of improving time travel, saving money, and improving driver convenience, but also in terms of how speed impacts community goals. The change also recognized the influence context has on driver characteristics and performance.

The Tennessee Department of Transportation's policy states that TDOT is committed to CSS as a process to plan, design, construct, maintain and operate its transportation system in order to establish and achieve transportation, community, and environmental goals. In committing to the CSS process, TDOT partners with the community in creating cost effective transportation systems that improve safety, mobility and preserve the scenic, aesthetic, historic, environmental and other community values. TDOT has recently undertaken projects around the state using the CSS process including Clarksville Highway (SR -112) in Nashville Davidson County and the Demonbreun Viaduct.

6.5.2 Complete Streets

Related to CSS, the complete streets theory calls for roadways to be designed and operated with all potential users in mind. Complete streets are safe, attractive, and comfortable for users that may include pedestrians, cyclists, transit riders, the disabled, and motorists. In Nashville, the redesign of Shelby Street, makes it a complete street, with facilities for the safety and comfort of pedestrians, cyclists, vehicles and mass transit users.

The following items are considered when creating complete streets. Different elements are included depending on the roadway location and use:

- *Bikeways*
- *Sidewalks*
- *Crosswalks*
- *Raised crosswalks or crossing tables*
- *Pedestrian crossing island in appropriate midblock and intersection locations*
- *Medians*
- *Well planned motor access in controlled locations*
- *Bus pullouts*
- *Pedestrian signals*
- *Well designed on street parking that is considerate of pedestrians and cyclists*
- *Sidewalk bulb-outs*

Metro Nashville currently utilizes several of these roadway design applications. Efforts should be made to include these features concurrently, in the appropriate combination on appropriate roadways. This will help create more "complete streets" that will benefit all potential users of roadways in Nashville.

6.5.3 Access Management

The benefit of sidewalks and bikeways is diminished when access management – or providing vehicular access to land uses in a manner that preserves both the efficiency and safety of all users – is not followed. Access management is implemented by systematically controlling the location, spacing, design and operation of driveways, medians openings, interchanges, and street connections to roadways. Access management can be implemented to varying degrees depending on the classification and type of the roadway. A local roadway in a residential area may require less access control than a major roadway with continuous commercial development. The existing and future land uses envisioned for a roadway are important factors in determining levels of needed access control.

The Transportation Research Board manual on access management recommends the following guidance to begin implementing access management at a local level:

- Prepare an access management plan as a component of area wide or corridor plans;
- Address access management in corridor plans;
- Ensure that geometric design standards incorporate best practices for access management;

- Ensure that traffic impact analysis procedures address access management; and
- Ensure that traffic signal criteria are consistent with the access classification system.

The manual outlines the following benefits when properly utilizing Access Management:

- Motorists
  - Face fewer decision points and traffic conflicts, which simplifies the driving task and increases driver safety
  - Experience fewer traffic delays and decrease travel times
- Cyclists
  - Face fewer decision points and conflicts with traffic, which simplifies the cycling task and increases safety for cyclist
  - Benefit from more predictable motorist travel patterns
  - Can choose alternate travel routes as local supporting roadway systems are developed
- Pedestrians
  - Face fewer and less frequent access points where motorist enter and exit the roadway, making it safer to walk along major roadways
  - Can use medians as a refuge when crossing several lanes of traffic.

6.5.4 Road Diets

A "road diet" is a technique in transportation planning where the number of travel lanes and/or effective travel lane width is reduced in order to achieve systemic improvements. The technique is often utilized, for example, on four-lane roadways with two-way traffic. In implementing the technique, the four-lane roadway is converted to a three-lane roadway with a center turn lane in the middle, one-way travel lanes in each direction and optional on-street auto parking or bike lanes as needed. While the "four-lane to three-lane" example of a Road Diet is common, Road Diets can also be successful on larger and smaller roads with the goal of providing complete streets. When determining if a Road Diet is appropriate, consideration should be given to traffic volume, as well as the multi-modal goals for the road, the parking goals for the road and the streetscape to be created.

Benefits of implementing Road Diets include:

- Calmer street traffic;
- Decreased number in traffic accidents;
- Improved pedestrian safety;
- Improved driving attentiveness;
- Promoting cycling (with bicycle lanes); and
- Consistent flow in roadway traffic (with turn lanes).

Road Diets should be considered as an option for roadways as future improvement projects are undertaken to use pavement width to accommodate multiple modes of transportation and create streets that complement the neighborhoods and centers through which they pass.

6.6. CONSTRUCTION ZONE MANAGEMENT

The Construction Zone Policy from the original *Strategic Plan* recommended that construction projects with required traffic control plans also include a pedestrian traffic control plan and/or a bicycle accommodation plan if the construction is on a bikeway corridor. Enforcement of this policy should be re-examined to provide an opportunity to improve bicycle and pedestrian access during construction projects in which sidewalks or bikeways are temporarily closed. Violations to this policy can currently be reported the Metro Public Works Permits Section by dialing 311.

6.7. SIDEWALK STANDARD SECTION VARIANCES

Metro currently has sidewalk and planting strip/furnishing zone standards, which are applied to sidewalk projects undertaken both by Metro and by private developers. These standards are maintained with rare exceptions provided for unusual site limitations. Variations to these standards could be considered in light of creating or maintaining a different character – rural, suburban or urban – in different areas of Davidson County. Guidance for such variation may be provided by the Community Plan or Detailed Design Plan for the area. The need for variation may also be determined by on-site analysis.

APPENDIX A: PUBLIC COMMENTS

Summary of Public Comments (Received through mail, e-mail, or at public meetings)

- Do not add sidewalks to Skyview Drive and areas south of Eastland.
- Add sidewalk to aid pedestrian traffic through Shelby Bottoms greenway.
- Add sidewalk to McKennie Ave/North 14th Street.
- Add sidewalk on other side of North 14th between Eastland & Douglas (sidewalk is only on one side).
- Add sidewalk in Bellevue on shoulder beside 70 South. (Heavy traffic area).
- Add sidewalks in Green Hills/Lipscomb Area.
- Add sidewalk at Belwood Street, near 31st & Long.
- Improve sidewalk on Nolensville Rd in front of Southern Hills Medical Center. Covered in mud runoff from hospital property.
- Build sidewalks around telephone poles so that the poles are not placed in middle of sidewalk.
- Repair sidewalk on both sides of street at Douglas Avenue from Gallatin to Scott.
- Add sidewalks to Gallatin Road cross streets on west side of Gallatin Road, such as Baxter Avenue in Inglewood, just north of Hart Lane & west of Gallatin Road.
- Encourage and recommend Mayor Dean to appoint a Bicycling and Pedestrian Advisory Committee.
- Encourage and recommend Metro to work toward including bicycle parking in all public parking areas, including all Metro Public Buildings.
- Encourage and recommend Metro establish the Music City Bikeway, a designated network of bike lanes, bikeways, and greenways crossing Davidson County to connect Percy Priest Lake to the Warner Parks.
- Encourage and recommend Metro establish locations for high-quality crosswalks with raised surfaces and lighting to improve pedestrian safety
- Consider installing multi-purpose bicycle/pedestrians paths where otherwise installing a bike way or bike lane without a nearby sidewalk would encourage pedestrians to walk in the bike way.
- Implement a Bikeway Priority Index (BPI) similar to the SPI, with points for connectivity between points on interest and current greenways, schools and along major transit corridors.
- Set aside funding for yearly update of SPI and BPI.
- Increase points on the SPI for major roadways without sidewalks.
- Increase points for sidewalks that connect to greenways.
- Increase points in BPI or place priority on arterials without bike lanes.
- Require Metro Police department to provide a yearly report of bicycle and pedestrian injury incident locations including a map indicating these locations.
- Work with Metro Nashville Public Schools to establish a Safe Routes to Schools Advisory Committee to establish a priority system for Safe Routes to School infrastructure and education projects.
- Work to establish a list of roads which may be eligible for road diets.
- Work to establish a list of roads that could accommodate a bike route if shoulders were widened or if other construction was implemented to better accommodate cyclists.
- Ensure that new development constructs or provides space for bikeways where applicable.
- Require new buildings to provide a pedestrian path from the street to building entrance, enabling pedestrians to avoid walking across large parking lots without a protected path.

- Ensure that connecting sidewalks and bike lanes around a two-mile radius of schools remains top priority.
- Work with Metro Public Schools to ensure that school siting is coordinated with areas that are more conducive to walking and bicycling.
- Work to establish a priority system to sidewalk funds paid by private developers to ensure that this money goes first to sidewalks highest on the SPI.
- Work towards the adoption of Complete Streets legislation for the city, emphasizing that roadways should accommodate all modes of travel, not just vehicular modes.
- Ensure that sidewalks and bikeways give top priority to connectivity between schools and universities, civic centers, parks, senior centers and transit stops.
- Establish a base-line of funding within the Public Works capital budget to be spent on non-motorized transportation.
- Continue to enhance the online sidewalk map, expanding it to include greenways, bikeways, planned and current projects.
- Include grocery stores into account when setting priorities for sidewalks.
- Add sidewalks on Hillsboro in several locations.
- Extend bikeway on Granny White Pike to Old Hickory Blvd.
- Add sidewalks for children walking to and waiting for school bus on James Avenue.
- Add sidewalk along length of Vaughns Gap for access to park, Jewish Community Center and Westmeade Elementary School.
- Add sidewalk on Murphy Avenue between 39th and 40th Avenue and Nebraska Avenue.
- Add sidewalk on Saunders Avenue in Inglewood area.
- Add sidewalk on Woodberry Drive in Donelson.
- Continue sidewalk on Greenland Avenue in Inglewood area.
- Continue sidewalks on Murphy, Bowling, Woodlawn, Sharondale and Hillsboro.
- Add more sidewalks & bikelanes in Sylvan Park/Richland Creek for neighborhood access to greenways and bike lanes and safe crosswalks.
- Add sidewalk to other side of street on 14th Street at Franklin Avenue in Eastwood.
- Repair sidewalks on Cleveland Avenue.
- Continue sidewalk to bridge on Cross Creek Rd that crosses Sugar Tree Creek.
- Add sidewalk on Abbott Martin from Abbottsford down to commercial area.
- Improve sidewalk on corner of Hamilton Lane and Lipton Place. (water stands in corner)
- Add sidewalk along Davidson Road and Hickory Valley Road.
- Repair sidewalk along Davidson Road.
- Add sidewalk to Cherokee Road at cut-through to West End.
- Add sidewalk on Stokes Lane between Hillsboro & Belmont.
- Add sidewalk on Hillsboro Road between Lombard and Woodmont.
- Add sidewalk on Hopkins between Stokes & Woodmont.
- Add sidewalk to Bowling Ave.
- Do not build sidewalk on Ensworth Place.
- Add sidewalk on Bowling between Woodmont & Woodlawn.
- Do not add sidewalks to Valley Vista Rd/Bellwood Ave/ Saratoga Drive.
- Add sidewalk to Rolland Road between Leonard to South Wilson.

- Add sidewalk on South Wilson from Rolland Avenue to Woodlawn.
- Improve Metro codes to enforce guidelines about maintaining accessible walkways during construction.
- Add sidewalk to Bowling Avenue between Hampton Avenue and Golf Club.
- Rebuild sidewalk on Estes.
- Repair sidewalk on north end of Kenner.
- Add sidewalk on St. Thomas side of Harding Road & on opposite side of street from office building to Belle Meade City Hall.
- Repair sidewalk along Davidson Road from Post Road to Bresslyn.
- Pave alleys at intersection of Ashwood Avenue and Belmont Boulevard.
- Add sidewalk or speed bumps in area approximate to Norman Binkley School.
- Prioritize future growth and addition of more Greenways and connections to Greenways.
- Add sidewalk on Vaughns Gap Road to allow access to St. Henrys and Akiva.
- Prioritize PGI to recognize private schools.
- Add sidewalks throughout West Meade area.
- Add sidewalk on Jocelyn Hollow between West Meade and Vaughns Gap.
- Add sidewalk and bikeways in the West Meade Hills Neighborhood.
- Add sidewalk on Brook Hollow Road, Davidson Road and Hillwood Boulevard.
- Add sidewalk between Hillwood High School and HG Hill Middle School.
- Add sidewalk on Leake Avenue from Belle Meade City Limit to Harding Road.
- Add sidewalk to Delmas Street.
- Add sidewalk along Caldwell Lane from Granny White to Franklin Road.
- Add sidewalk connecting Sugartree Road and Cross Creek to Abbott Martin.
- Add sidewalk on Nolensville Road from Concord Road to Old Hickory Boulevard.
- Add sidewalk along Vaughn's Gap between Highway 70 and 100.
- Add sidewalk in Sylvan Park Area on Charlotte Avenue to St. Ann School.
- Add sidewalks in Green Hills business district, Hillsboro High, Crestmoor Road and Cleghorn, Abbott Martin, Cross Creek Road and Overhill Drive.
- Add sidewalks for kids waiting for school bus on Vivelle and Whitney.
- Add sidewalk up to Hickory Valley to reach residents on the Hillwood side of Davidson.
- Add sidewalk on Drakes Branch Road/Kings Lane Area.
- Add sidewalk on Chesapeake to Brick Church Pike.
- Add sidewalk on Brick Church Pike along Ewing Drive.
- Add sidewalk on Mallett Drive around schools in that area.
- Add crosswalk at 46th and Utah at Sylvan Park Elementary.
- Add sidewalk to Straftord Avenue
- Add sidewalk on McKinney in East Nashville between Gallatin Road and Chapel.
- Add sidewalk on Woodbury Drive between McGavock Pike and Donelson Pike.
- Add sidewalk on East Webster from East Palistine to Gallatin Pike.
- Add sidewalk in the Inglewood Area.
- Add sidewalk on Dodson Chapel Road from Old Hickory Boulevard to Albee Drive.

- Add sidewalks in Crieve Hall Area: Edmondson Pike around Tusculum Elementary and McMurray Middle.
- Add sidewalk at Edmonson Library and Nippers Corner.
- Repair sidewalks on Chapel Avenue – poles in sidewalks.
- Repair sidewalk on 16th Street – obstructions in redone sidewalks.
- Add sidewalks down Bell Road.
- Add sidewalk on Anderson Road, near the lake.
- Connect sidewalks in Nolensville road area.
- Add sidewalk on Hillsboro between 440 and Green Hills shopping center.
- Add sidewalk on Hillsboro between 440 to Harding Place.
- Add sidewalk on Apollo Drive.
- Connect sidewalks between Abbott Martin, Estes and Woodmont and Dartmoth with Woodmont.
- Add sidewalks on Glen Echo due to Hillsboro High School, post office and the library.
- Add either sidewalk or bikeway to Davidson Road, which connects Charlotte and West End/Harding.
- Add sidewalk in front of Hillsboro.
- Add sidewalk on Woodlawn.
- Width of sidewalks is a concern
- Sidewalks are 66" wide outside of St. Henry's and 48" wide outside of Jewish Community Center. 48" is sufficient.
- Repair sidewalks in Burton Hills from Burton Hills to Green Hills.
- Antioch/Harding Place area has people that ride bikes or walk due to need rather than want.
- Add connector from West Meade to Percy Warner Park. Neighborhood representative have proposed a new stop light and new short walk connector. Extend existing sidewalk down Vaughn's Gap.
- Add sidewalk on Bowling Street between Woodlawn and Woodmont in the Hampton Avenue neighborhood.
- Add sidewalk at highway 71 split next to Percy Warner Park to West Meade Elementary.
- Add sidewalk at Ashwood Avenue from 20th to 18th.
- Add crosswalks at the highway 100 intersection crossing over to Percy Warner.
- Add sidewalk on Foster Avenue.
- Repair sidewalks leading to Lakeview school.
- Add sidewalk to Apollo Drive for children at JE Moss & Apollo Middle Schools.
- Add sidewalk on each side of Bridge on Antioch Pike.
- Repair sidewalks on Douglas Avenue in East Nashville on both sides of street from Gallatin to Scott.
- Build sidewalks without having telephone poles in middle in Eastwood Neighborhood.
- Encourage the Mayor & Metro to encourage & recommend bikeways
- Add bike lanes, bikeways and greenways crossing Davidson County to connect Percy Priest Lake to the Warner Parks.
- Install multi-purpose bike/pedestrian paths when installing a bike way or bike lane without a nearby sidewalk.
- Work with Metro Schools to establish a safe routes to schools advisory committee.
- Add sidewalk on Baxter Avenue in Inglewood.
- Add a bike route that connects Richland Greenway with the bikeway system beginning at Elmington Park. Roads include Aberdeen, Central and Bowling.

- Add bike route system that connects Porter Road with the Forrest Green trailhead at Shelby Bottoms.
- Add connections for the several greenways that are short distances from established sidewalks and bikeways. An example is Brookemeade Greenway only needs 50 feet of sidewalk and crosswalk to connect with the sidewalk on Davidson Road in front of Brookemeade School.
- Add a means of crossing Highway 70 from Old Harding and Highway 100.
- Add a Bike Lane down Post Road to connect to the Richland Creek Greenway.
- Add crosswalk from Green Hills Public Library to Post office or Bank across street.
- Add crosswalk across Hillsboro road between I-440 and Green Hills Mall.
- Add sidewalks in neighborhood around Julia Green School.
- Add greenway in Green Hills to run along creek that passes in front of the YMCA.
- Add bikeway to run along Granny White Pike to be extended all the way to Old Hickory Boulevard.
- Add sidewalks on Vaughn's Gap on NW side of 70S/Harding Road. Also add crosswalk across 70S
- Add sidewalks along Melinda Drive, connecting Vaughn's Gap to Westmeade Elementary.
- Add sidewalk on Vaughn's Gap between Percy Warner Boulevard and Highway 100.
- Add sidewalk on Belmont Park Terrace from Shackleford Rd to Green Hills Park.
- Extend sidewalk on east side of Belmont Blvd. between Glen Echo and Woodmont.
- Add sidewalk to block of Murphy Road between 39th & 40th Avenue.
- Add sidewalks to Winding Way, off Gallatin Pike that connects to Hedgewood near Issac Litton Middle School
- Add greenway or bikeway to connect Green Hills to Greenway on White Bridge Rd/McCabe Golf Course.
- Sidewalk missing section on Lone Oak between Overhill Drive and Shackleford Rd.
- Add pedestrian crosswalk at split of Hwy 100/70 towards Page Rd.
- Add sidewalk on Castleman between Trimble and Lindwood.
- Add sidewalk along Dickerson Pike up to Trinity Lane.
- Add sidewalk along US41, Whites Creek Bridge.
- Repair sidewalk on Rural Hill Road.
- The plan should recognize that bikeways are for transportation, not solely recreation.
- The plan should include key planning principals including: Complete Streets, Context Sensitive Design and Road Diets.
- The plan should recognize the need for bike parking.
- The plan should recognize that prioritizing sidewalk building and repair includes many factors and requires sound judgment.
- The plan should mention the Tennessee 3-ft law.
- The rationale and implications of proposed switch to gradient scoring in SPI (PGI) needs to be more fully considered.
- The Sidewalk Matrix is unclear as to how sidewalk will be actually prioritized and should consider other important variables.
- The update should give clear guidelines when building new sidewalks will have priority over repairs.
- Phase I of the bike plan has not been completed.
- Phase 2 of the bike plan does not include several major arterials, which is crucial for inclusion by TDOT.
- Phase 2 should include recommendation for the Music City Bikeway..

- The update should address priority of crosswalks.
- The update should recommend the establishment of the Bicycle and Pedestrian Advisory Committee.
- The update should address the impact and implications of the new sidewalk regulations passed since the adoption of the original plan.
- The update should include a recommendation for funding of yearly updates to SPI (or PGI).
- The update should include a section publishing public comments about the update.
- Extend sidewalk from Brighton along Bowling to Woodmont Blvd.
- I do not think the PGI gives sufficient credit for commercial nodes in the suburban transect. As the PGI is configured in the draft, urban areas will continue to take funding priority over those in the suburban areas.
- A major goal of the sidewalk plan should be to provide connectivity to all transit stops within a ¼ mile.
- The decision matrix should include consideration of those sidewalks that can be built more cheaply than others.
- When considering a trip generator, have a tool to determine if that destination is actually accessible. E.g., a commercial node within a ¼ mile of a neighborhood separated by an interstate should be thrown out of the data set.
- The plan should be updated for new facilities.
- A major goal of the plan should be to manage expectations and hold Metro accountable.
- The plan updates need to be incorporated into the complete sidewalk plan.
- Use of "green infrastructure" should be addressed in the plan.
- Plan should be updated for changes in costs, etc.
- There needs to be a capital plan for sidewalks as part of the overall Strategic Plan.