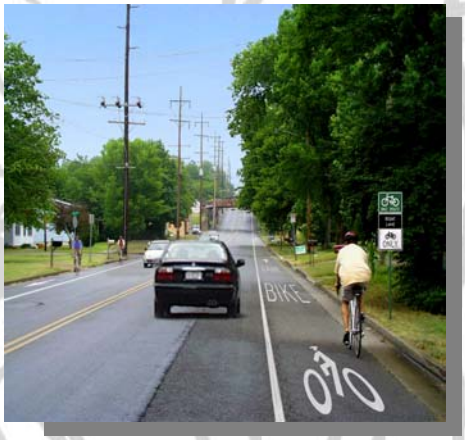
FINAL REPORT

BICYCLE AND PEDESTRIAN MASTER PLAN
City of Lebanon • City of Mt. Juliet • Wilson County
Metropolitan Planning Organization



RPM & Associates
Prepared in Association with
Hawkins Partners, Inc.
Civil & Environmental Consultants, Inc.

FINAL REPORT

BICYCLE AND PEDESTRIAN MASTER PLAN
MT. JULIET • LEBANON • WILSON COUNTY

PREPARED FOR:
THE NASHVILLE AREA METROPOLITAN PLANNING ORGANIZATION
WILSON COUNTY
CITY OF LEBANON
CITY OF MT. JULIET

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1. INTRODUCTION

As a mode of transportation, walking is often overlooked and underestimated. However, walking is the most basic form of transportation available. At various times, almost everyone is a pedestrian, including persons using wheelchairs and other forms of mobility assistance. Walking is often the quickest way to accomplish short trips in urban areas. Walking is free.

The bicycle is one of the most energy efficient forms of transportation ever devised. Bicycles do not generate pollution. Bicycles require a relatively minor amount of pavement width and parking area. The low cost of bicycles ensures greater mobility and transportation choices for people at all income levels. For these reasons, walking and bicycling are important modes of transportation. These modes are necessary components of a balanced transportation system.

As part of the two most recent transportation-funding bills, Congress has mandated that bicyclists and pedestrians be a more integral part of the nation's transportation system. The most recent transportation bill, the Transportation Equity Act for the 21st Century (TEA-21), states that, "Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation projects, except where bicycle and pedestrian use are not permitted."

In response to the TEA-21 legislation, as well as to provide public support and advocacy for improved conditions for bicycling and walking, the Metropolitan Planning Commission of Nashville and Davidson County, Tennessee, on behalf of the Nashville Area Metropolitan Planning Organization (MPO), initiated this Bicycle and Pedestrian Plan for the Cities of Mt. Juliet, Lebanon and Wilson County.

1.1 Purpose

The purpose of this Bicycle and Pedestrian Plan is to enhance the mobility and access needs of each community by recommending improvements that can be successfully integrated into a multi-modal transportation plan for Mt. Juliet, Lebanon and Wilson County. The intention of the plan is to promote a higher quality of life by providing safe, efficient and desirable transportation choices to all people within the community.

The plan identifies the most feasible bicycle and pedestrian routes and recommends specific types of facilities for each location. Design standards and cross-sections for each recommended facility are included. Recommended sidewalk ordinance changes are presented and cost estimates for recommended facilities are provided. This plan is intended to guide local and regional planning and assist appropriate jurisdictions with funding allocations and land use decisions.

1.2 Planning Process

The planning process for this Bicycle and Pedestrian Plan included extensive public involvement through the establishment of a citizen-based Technical Advisory Committee (TAC). A separate committee was established for Mt. Juliet, Lebanon and Wilson County. The primary function of each TAC was to provide continued public involvement and local knowledge to the consultant team. The TAC assisted the consultant team by providing guidance and feedback on local transportation and development issues.

A condensed summary of the major steps taken for this project are listed below:

- *Conduct Inventory and Evaluate Existing Conditions* – An extensive amount of data was compiled including field measurements, roadway characteristics, and photographs.

- *Develop Preliminary Routes* – Potential bicycle and pedestrian routes were suggested and discussed within the TAC. A preliminary map was assembled using collected data.

- *Present Routes and Gather Public Input* – The preliminary routes were illustrated on a map and presented for public comment and review.

- *Analyze Comments and Develop Recommended Routes* – Feedback received from the public was evaluated and further field investigations were conducted. Additional roads and alternative routes were evaluated and an updated map was developed.

- *Gather Input and Comments* – The revised map showing the recommended routes was further displayed for public comment and review.

- *Develop Final Plan and Recommendations* – The final routes and recommendations were selected and presented within this document.

Four meetings were held with each TAC at critical junctures throughout the course of the project. Additionally, open forum public meetings were held for Mt. Juliet, Lebanon and Wilson County. These public meetings provided people opportunities to learn about the project, ask questions and share opinions regarding bicycle and pedestrian issues in their community.

A fundamental objective behind the implementation of this plan is to enhance multi-modal transportation by establishing realistic transportation choices for people in Mt. Juliet, Lebanon and Wilson County. This plan, if implemented, will accomplish this objective by providing well-designed, safe and desirable facilities for bicyclists and pedestrians. These facilities are intended to provide people with increased mobility while improving their safety. Numerous benefits can be attributed to these alternative modes of transportation.

1.3 Benefits

The benefits of walking and bicycling include reductions in traffic congestion, enhanced health, improved safety, potential for economic development and improved mobility.

Traffic Reductions - Traffic congestion is reduced when people walk or ride a bicycle instead of driving a car. A reduction in vehicular traffic results in a reduction of air and noise pollution. Also, fewer vehicle miles traveled will result in a decrease in the consumption of petroleum. Even a small increase in the percentage of bicycle and pedestrian commuters will result in significant improvements in traffic congestion and air quality.

Health – Inherent health benefits are related to walking and cycling. The Surgeon General issued a report in 1996 that showed that Americans of all ages are not getting enough exercise. An alarming fact is that half of all children don't get enough exercise and

almost one-fourth of them engage in no real physical activity. The Centers for Disease Control & Prevention (CDC) estimate that while nearly two-thirds of American children walked to school a generation ago, less than 10% do so today. However, most children do not have a safe and accessible way to walk or bike to school. Implementing a pedestrian and bicycle plan will create the potential for more transportation choices for children and adults. Increased walking and bicycling will lead to healthier lifestyles.

Safety – Improved safety is perhaps the most compelling benefit of well-designed pedestrian and bicycle facilities. Approximately 6,000 pedestrians and bicyclists are killed in traffic every year. Older pedestrians (ages 70+) accounted for about 18% of all pedestrian fatalities. Safer conditions for pedestrians and cyclists can be provided by additional well-designed facilities.

Economic Development - Bicycle and pedestrian facilities serve as economic incentives for communities. By making neighborhoods safer and more livable, good pedestrian and bicycle facilities can raise property values and marketability Businesses benefit by improved access and an environment where people can safely walk or bicycle from neighborhoods to commercial centers. Furthermore, bicycle and pedestrian facilities are attractive to homebuyers. As a recreational amenity, bicycle and pedestrian facilities have been shown to increase property values. Studies have shown that houses adjacent to a greenway have higher resale value than those that are only 1,000 feet away and not adjacent to a greenway.

Mobility – An emerging trend across the country is that new homebuyers are looking for communities that include sidewalks, bike lanes, trails and green space. According to a recent study, people who live in a pedestrian-friendly community make four times as many walking and biking trips and travel far fewer miles than those who do not. The presence of pedestrians and bicyclists in a city makes the sense of community strong. In walkable and bike friendly communities people feel safe walking and biking, social interactions occur more often and children and the elderly have access to bike trails, bike lanes and sidewalks.

Age and disability can sometimes hinder a person's mobility, but with good pedestrian facilities, almost everyone can continue to enjoy some level of mobility. People in low-income households are far more likely to walk or bike than those in other income groups. About a quarter of low-income households do not have access to a car, which means that these individuals must rely on pedestrian and bike facilities, as well as transit for transportation.

An average cyclist can cover two miles in ten or fifteen minutes. Most pedestrians can cover about a half-mile in the same time. Research clearly shows that many people are willing to use alternative modes of transportation for these types of short trips, as long as safe facilities are available. The Federal Highway Administration's 1995 *National Personal Transportation Survey* determined that the average person is willing to walk about a half-mile and bike 2 miles for utilitarian travel. This survey also showed that 40% of all trips in the United States are less than two miles in distance. This information indicates that there is significant potential for increased walking and bicycling trips for the Wilson County study area.

2. GOALS OF THE PLAN

The primary goal of the Mt. Juliet, Lebanon and Wilson County Bicycle and Pedestrian Plan is to establish a transportation system where people can bicycle or walk safely and conveniently to destinations within a reasonable distance. The intent of the plan is to promote a higher quality of life for the community by providing safe and desirable transportation alternatives. These alternatives are specifically focused towards bicyclists and pedestrians.

An important component of a comprehensive bicycle and pedestrian plan is to establish walking and bicycling as attractive and safe modes of transportation that link origin and destination points. This plan is designed to provide an appropriate mix of well-designed facilities for all ages and skill levels of users.

Polices and design standards must be in place to establish walking and bicycling as safe and desirable options for travel. Design standards for bicycle and pedestrian facilities are included in Appendix A to guide each jurisdiction in planning, design and construction.

Procedures must be established to implement well-designed facilities in the future. This plan outlines procedures that Mt. Juliet, Lebanon and Wilson County can use to ensure bicycle and pedestrian modes of travel are properly considered in the development and review of all site plans and infrastructure improvements. The plan seeks to take advantage of good opportunities to construct sidewalks and bikeways. These opportunities include State, County and City roadway widening projects, as well as the construction of new roadways.

2.1 Strategies for Increasing Cycling and Walking

Section 1202 of the national TEA-21 legislation calls for action to be taken to improve the safety of cyclists and pedestrians. The current infrastructure in Wilson County does not provide many opportunities for people to walk or bicycle. This plan will serve as a foundation for implementing safe and effective bikeways and pedestrian facilities throughout Wilson County. It is anticipated that the construction of safe, new facilities will increase the number of cyclists and pedestrians. New facilities, if properly designed, will improve safety for walkers and cyclists. To further encourage people to walk and bike, this plan promotes safe bicycling and walking through the use of engineering, education, encouragement and enforcement.

Engineering – There is a real need for safe, well-designed bicycle and pedestrian facilities throughout the study area. There are several documents that have been established as guides for bikeway and pedestrian facility design. These documents include The Manual on Uniform Traffic Control Devices (MUTCD) and the 1999 AASHTO Guide for the Development of Bicycle Facilities provide standard pavement markings, signing and design guidelines. Good engineering design is a key component of safe facilities.

The design and construction of bicycle and pedestrian facilities within the study area is necessary to increase cycling and walking. Once these types of facilities are built, people will begin to recognize that new choices are available for alternative modes of transportation.

Education – Education should begin at an early age for children. Children tend

to be more vulnerable to accidents because they do not have the coordination or experience of adults. Children should be taught a basic understanding of traffic laws and safe riding behavior. Many cities have developed educational programs for public schools. Bicycle safety could be taught in the county's public schools as a part of an overall safety program.

The Bicycle Federation of America has developed an educational program entitled The Basics of Bicycling, which can be taught to children as well as adults. This course teaches rules of the road as well as coordination skills. In addition to children and cyclists, motorists are a critical target audience. Driver education should stress the importance of sharing the road with cyclists, pedestrians and other users.

Encouragement – There are national programs designed to promote bicycle and pedestrian use. These programs include "Walk to School Day" and "Bike to Work Day". Distributing local area bike route maps will also encourage walking and cycling by showing people where these facilities are located. This will help people realize that many of their daily trips could be accomplished on a bicycle.

As a way to continue interest and education, organizations within Mt.Juliet, Lebanon and Wilson County could host annual bicycle rodeos. These rodeos typically consist of several skill stations to teach safety and bicycle maintenance, as well as to have fun. The rodeos also include an orientation station for parents to watch and learn as well.

The importance of wearing safety gear, including helmet and pads should be emphasized. Several years ago, the State of Tennessee passed a law that requires all children under the age of 12 to wear a helmet when riding on state highways. To encourage children and adults to wear helmets, Mt. Juliet, Lebanon and Wilson County could use public service announcements on local radio and television, post advertisements in schools and public areas and distribute coupons and brochures for safety gear.

Enforcement – By adopting the procedures and programs outlined in this plan, safe and desirable transportation facilities can be provided for cyclists and pedestrians in Mt. Juliet, Lebanon and Wilson County. However, enforcement also has an important role. The same traffic laws apply to cyclists who share the road with motorists. Police enforcement of traffic laws for cyclists as well as motorists may be necessary to ensure adherence.

3. TYPES OF FACILITIES

A wide variety of people, including people with disabilities, rely on a variety of transportation facilities for their daily travel. The Americans with Disabilities Act (ADA) is a Federal law designed to ensure that all Americans have equal access to services and facilities. The ADA requires transportation facilities used by the general public to be designed, constructed, and maintained in a manner that promotes access for everyone. Transportation facilities that are fully accessible enable people with various degrees of mobility and disability to be as self-sufficient and independent as possible.

3.1 Pedestrian Facilities

All roadways should have some type of walking area outside of the vehicular traveled way. The pedestrian network should connect places where people want to go with a direct and continuous route. Sidewalks are an important component of a pedestrian network. These facilities, when properly designed, increase pedestrian mobility, safety and accessibility.

Example of a Sidewalk

Sidewalks and crosswalks should be free of obstructions. Good design characteristics include adequate sidewalk width separated from vehicular traffic by a buffer strip or on-street parking. The crossing distances at intersections and mid-block locations should be minimized. Crosswalks should be designated with pavement markings. Furthermore, pedestrian signal heads and pushbuttons should be provided at actuated signals. Pedestrian facilities that are well designed and maintained encourage walking and promote higher levels of pedestrian travel.

Properly designed pedestrian facilities are particularly desirable for persons with disabilities, children and older adults. Good design should enhance the look and feel of the pedestrian environment. This includes landscaping and open spaces such as plazas, courtyards and building facades that give shape and character to the street. Amenities such as street furniture, art, plantings and historical references will promote a sense of place.

3.2 Multi-Use Paths

Multi-use paths, also referred to as greenways, are Class I bicycle facilities. Class I facilities are paths that are separated from motor vehicle traffic by an open space or barrier. These types of facilities are shared by a variety of users. Typically, pedestrians, runners, skaters and bicyclists use these facilities.

Example of a Multi-Use Path

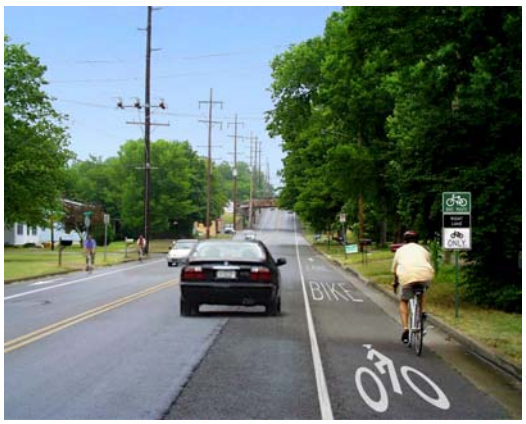
Young cyclists and many casual riders generally prefer multi-use paths to on-street facilities. Although the transportation function of multi-use paths can be great, these types of facilities do not typically have the direct and comprehensive connectivity of a roadway-based network.

Multi-use paths can be located within the roadway right-of-way or within an independent right-of-way. Typical cross-sections for multi-use paths include a minimum width of 10 feet, while 12 to 14 feet is desirable for high use areas. A two-foot stabilized shoulder and unpaved clear zone should be provided on each side of multi-use paths.

Building materials used for multi-use path surfaces may vary depending on design. Paths designed to serve bicycles should be composed of a hard surface such as asphalt or concrete.

3.3 Bike Lanes

Bike lanes are also referred to as Class II bicycle facilities. Bike lanes consist of a striped lane on the edges of a roadway. The minimum width of a bike lane is 4 feet. Typically the widths of bike lanes vary between 4 to 6 feet excluding curb and gutter.



Example of a Bike Lane

Bike lanes are one-way facilities and follow the same direction as adjacent motor vehicle traffic. Cyclists must follow the same rules of the road as motorists. In certain situations, cyclists may leave the bike lane. For example, when making a left turn a cyclist will be required to leave the bike lane and weave across traffic to reach the leftmost lane of travel.

The bike lanes must be well marked to call attention to their preferential use by bicyclists. The clearly defined separate lane improves the safety level and comfort for cyclists. Generally, bike lanes are the preferred facility for most street-based riders, including older children who are experienced cyclists.

3.4 Shared Roadways

Cyclists and pedestrians are legal users of all roadways except where specifically prohibited. Most bicycle travel in the United States occurs on streets and highways that do not have bikeway designations. For the purposes of this study, shared roadways refer to roads designated as bike routes by signage. These shared roadways serve to provide continuity to other bicycle facilities or to designate preferred routes through high-demand corridors. Other shared roadways are used to show a suggested way to link origins and destinations.

Shared roadways are Class III bicycle facilities. Shared roadways typically include wide outside travel lanes or shoulders. These roadways are desirable bike routes because ample pavement width is available for motorists and cyclists to share the road or because low vehicular volumes make bike travel possible. Shared roadways differ from bike lanes because they are not separated from vehicular traffic. Pavement markings may be used in

addition to signs to indicate a shared roadway.

Example of a Shared Roadway

Roadways do not necessarily need to be extra wide for a bike route designation. However, a width of approximately 14 feet in the outside travel lane is desirable as a shared roadway. A wide outside travel lane allows motorists to safely pass cyclists without changing lanes. Some experienced cyclists prefer shared roadways to bike lanes because they are not segregated from other vehicles on the road.

Shared roadway facilities can be appropriate when the pavement width is too narrow for bike lanes. These shared roadways might be roads with a low speed limit or low traffic volumes. A potential shared roadway could simply consist of a low volume roadway that is comfortable for cyclists.

3.5 Traffic Calming

A variety of techniques exist to reduce vehicular speeds and cut-through traffic on neighborhood roads. Traffic calming is the combination of mostly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users.

Traffic calming techniques are intended to slow vehicle speeds and encourage through traffic to use arterial streets rather than collector and local streets.

Typically traffic calming is implemented in residential neighborhoods and sometimes in downtown streets. Traffic calming measures include vertical and horizontal deflections in the roadway. Examples include speed humps, raised intersections, traffic circles, curb extensions and diverters. Narrowing streets to reduce vehicle speeds can be an effective traffic calming measure.

Example of a Speed Hump

Traffic calming measures are effective in reducing motor vehicle speeds and reducing traffic volumes. In many situations, traffic calming measures can be used to improve the street environment for neighborhoods. However, negative effects can potentially result from traffic calming as well. The mobility of local residents and emergency vehicle response times may be diminished by traffic calming devices. The objective and challenge of implementing traffic calming is to determine the best combination of measures that result in a net improvement in the quality of neighborhood life at a reasonable cost and impact.

4. CITY OF MT. JULIET

4.1 Existing Context

The City of Mt. Juliet is located in the northwest corner of Wilson County along the Interstate 40 corridor. The city borders Metropolitan Nashville Davidson County and is approximately eighteen miles east of the heart of downtown Nashville.

Wilson County & Surrounding Counties

The planning area for the City of Mt. Juliet's portion of this study includes the area encompassed by the city's 2020-growth boundary. This area comprises approximately forty-eight square miles. The existing roadways within the Mt. Juliet Study area are sown in Figure 4.1.

4.1.1 Development Pattern. The residential development pattern in Mt. Juliet is characterized by low-density single-family housing scattered throughout the planning area. Most development parallels the major transportation corridors.

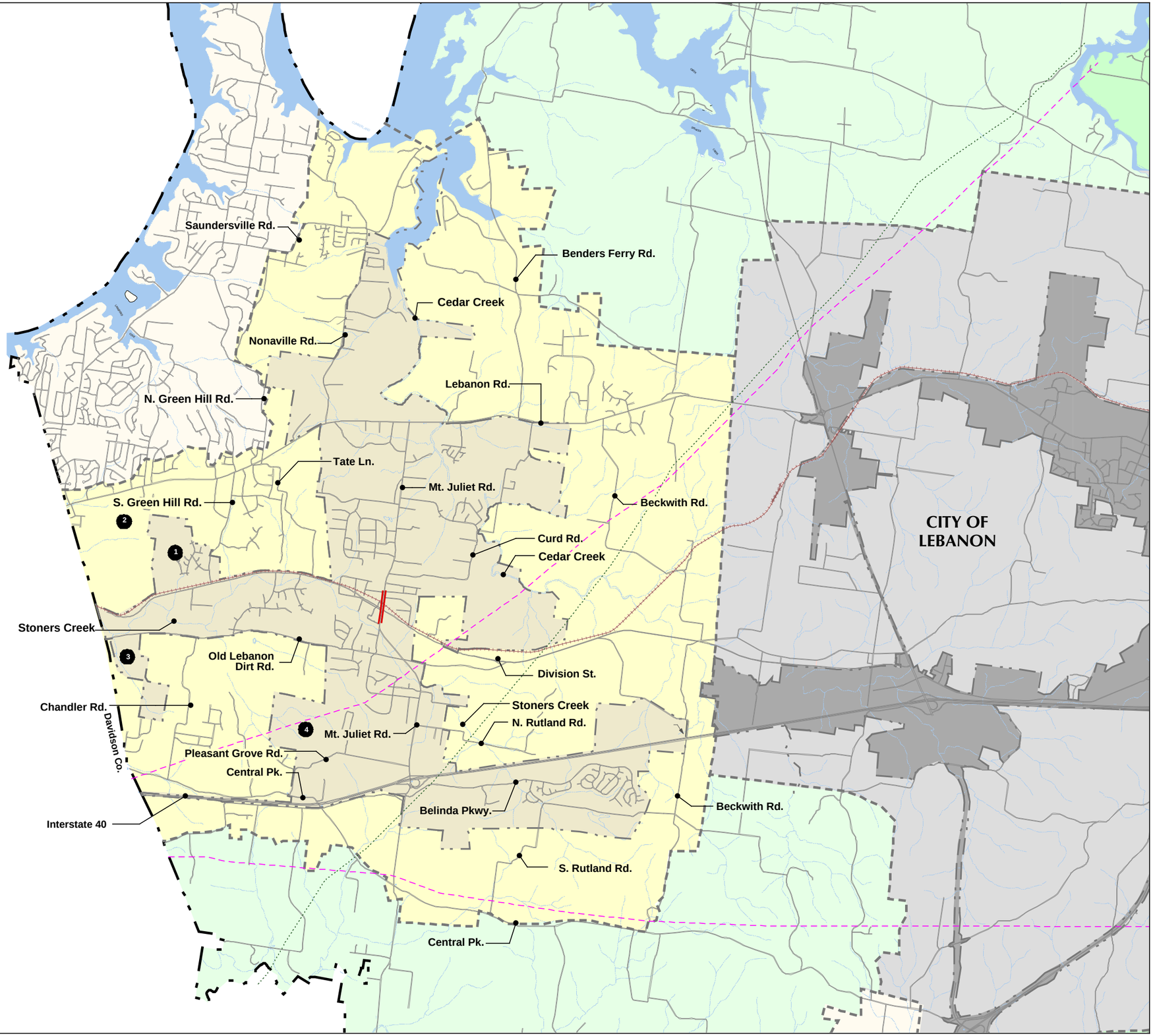
Commercial areas are located along Lebanon Road, Mt. Juliet Road and the Interstate 40 interchange on Mt. Juliet Road. Commercial development is predominantly strip commercial and is characterized by numerous curb cuts and buildings set back from the road with parking in front.

Commercial Development - Lebanon Rd.

4.1.2 Geography. The Mt. Juliet planning area is characterized by gentle rolling forested hills. A series of distinctly more rugged hills run north-south in the western portion of the planning area. These hills start south of Saundersville Road and west of Cedar Creek near Green Hill Road and run south approximately a half-mile west of Mt. Juliet Road to Interstate 40. The terrain to the east of Mt. Juliet Road is more moderate.

Cedar and Stoners Creek form observable valley corridors that meander through the planning area and provide capacity for storing flood events. These areas are critical to flood protection in the study area.

Cedar Creek originates in the south near the intersection of Beckwith Road and South Rutland Road. It begins its northern journey to the Cumberland River generally paralleling Beckwith Road. Approximately one-half mile before intersecting the railroad corridor it abruptly turns west toward the central part of Mt. Juliet before again making another turn to the north and continuing to the Cumberland River.



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 4.1 Existing Conditions

CITY OF MT. JULIET

- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Lebanon Corporate Limits
- Lebanon Growth Area
- Wilson County Area
- Wilson County Growth Area
- Major Water Body
- Streams
- TVA Power Corridor
- Gas Line Easement
- Existing Road
- Railroad
- Existing Sidewalk
- # Subdivision with Existing Sidewalks
  1. Willoughby Station
  2. Hickory Hills
  3. Chandler Pointe
  4. Triple Crown

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Stoners Creek begins in the South Rutland Area near the South Rutland Elementary School. It runs northwest crossing Interstate 40 until it reaches Stoners Creek Elementary School. At this point it turns west and parallels West Division Street as it enters Davidson County. It meanders through Davidson County and empties into the Stones River near Percy Priest Dam.

4.1.3 Trip Generators. The purpose of the recommended bicycle and pedestrian network is to provide a comprehensive bicycle and pedestrian network that connects the majority of citizens to desired destinations within the community. This plan refers to these destinations as "trip generators".

The planning team and Mt. Juliet TAC identified thirty-five trip generators for the Mt. Juliet plan. These generators are shown in Table 4.1. The location of each generator is illustrated in Figure 4.2.

The identified trip generators are grouped into three categories. They include parks, schools, and other miscellaneous generators.

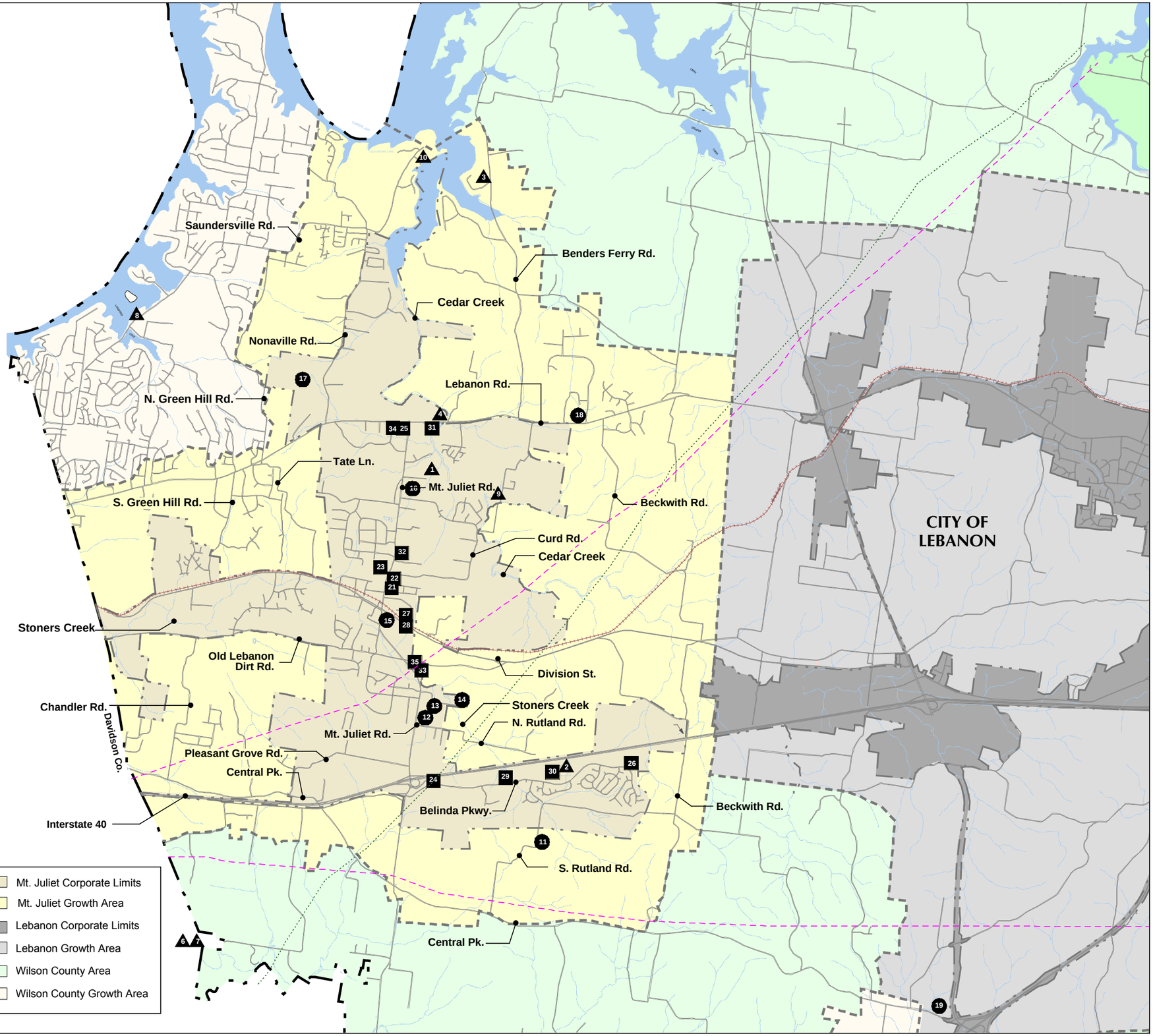
Parks. Parks included all public or semi-public parks and recreation facilities.

Schools. Schools included all private and public educational facilities.

Other. Other included civic destinations, commercial centers, businesses that employ over fifty employees, and transit related facilities.

TABLE 4.1 TRIP GENERATORS
City of Mt. Juliet

Parks
Charlie Daniels Park
Millennium Park
Lone Branch Recreation Area
Little League Park
Camp Easter Seals
Seven Points Recreation Area
Cooks Recreation Area
Shutes Branch Recreation Area
Park Glenn Soccer Complex
Cedar Creek Recreation Area
Schools
Rutland Elementary
Mt. Juliet Christian Academy
Mt. Juliet Jr. High
Stoners Creek Elementary
Mt. Juliet Elementary
Mt. Juliet High School & Annex
W.A. Wright Elementary
West Elementary
Wilson Central High School
Gladeville Elementary
Other
City Hall
U.S. Post Office
Town Center Office Park
Park and Ride Facility
Regional Transit Authority Bus Stop
Orchid International
S&S Industries
John Deal Coating
Jefferds Corporation
Campbell Hausfeld
Putt-Putt
Mt. Juliet Wilson County Library
Retail Center
Kroger Food Store
H.G. Hill Food Store



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 4.2 Trip Generators

CITY OF MT. JULIET

▲ Parks

1. Charlie Daniels Park
2. Millennium Park
3. Lone Branch Recreation Area
4. Little League Park
5. Camp Easter Seals (North of map limits)
6. Seven Points Recreation Area
7. Cooks Recreation Area
8. Shutes Branch Recreation Area
9. Park Glenn Soccer Complex
10. Cedar Creek Recreation Area

● Schools

11. Rutland Elementary
12. Mt. Juliet Christian Academy
13. Mt. Juliet Jr. High
14. Stoners Creek Elementary
15. Mt. Juliet Elementary
16. Mt. Juliet High School & Annex
17. W.A. Wright Elementary
18. West Elementary
19. Wilson Central High School
20. Gladeville Elementary (South of map limits)

■ Other

21. City Hall
22. U.S. Post Office
23. Town Center Office Park
24. Park & Ride Facility
25. Regional Transit Authority Bus Stop
26. Orchid International
27. S&S Industries
28. John Deal Coating
29. Jefferds Corp
30. Campbell Hausfeld
31. Putt Putt
32. Mt. Juliet Wilson County Library
33. Retail Center
34. Kroger Food Store
35. H.G. Hills Food Store

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4.1.4 Existing Transportation Network. An inventory of the existing transportation system network was developed for the City of Mt. Juliet. Characteristics including pavement width, cross-sections, shoulders, ditches, sidewalks, slopes and Average Daily Traffic (ADT) were determined for each road studied. This information is presented in Table 4.2.

A combination of federal, state and local highways and streets serve the City of Mt. Juliet. Interstate 40 and State Highway 70 (Lebanon Road) provide regional east-west access. These routes connect Mt. Juliet with the Nashville metropolitan area to the west and the City of Lebanon to the east.

TABLE 4.2 EXISTING ROADWAY CHARACTERISTICS
City of Mt. Juliet

Existing Facility	Measurement Taken	Width (feet)	# of Lanes	Shoulder	Ditch	Sidewalks	Slope	2000 ADT*
Belinda Pkwy.	Hidden Cove Rd.	50	4	Y	N	N	L	5,880
Belinda Pkwy.	Springdale Dr.	39	3	N	N	N	L	NA
Beckwith Rd.	S. Rutland Rd.	21	2	N	Y	N	M/S	NA
S. Rutland Rd.	Beckwith Rd.	22	2	N	Y	N	M	NA
S. Rutland Rd.	Central Pk.	24	2	N	Y	N	M	NA
Central Pk.	S. Rutland Rd.	22	2	N	Y	N	M	4,010
Central Pk.	Adams Ln.	20	2	N	Y	N	M	2,360
Adams Ln.	Central Pk.	20	2	N	Y	N	M/S	NA
Guill Rd.	John Hager Rd.	20	2	N	Y	N	M	NA
Chandler Rd.	Anthony Ln.	22	2	N	Y	N	S/M	840
Old Lebanon Dirt Rd.	Chandler Rd.	23	2	N	Y	N	M	NA
Old Lebanon Dirt Rd.	Julie Dr.	26	2	N	Y	N	M	1,920
Weston Dr.	Clearview Dr.	21	2	N	Y	N	L/M	NA
Old Mt. Juliet Rd.	Old Lebanon Dirt Rd.	20	2	N	Y	N	L	NA
Main St.	W. Division St.	11	2	N	Y	N	L	NA
W. Division St.	Main St.	22	2	N	Y	N	L	5,580
Curd Rd.	Mt. Juliet Rd.	20	2	N	N	N	L	NA
Woodridge Circle	Woodridge Ct.	23	2	N	Y	N	M/L	870
Hillview Dr.	Hillview Dr.	19	2	N	Y	N	M/S	NA
Faulkner Ln.	Bass Dr.	20	2	N	Y	N	S/M/L	NA
Bass Dr.	Faulkner Ln.	20	2	N	Y	N	L	NA
Charlie Daniels Pkwy.	Mt. Juliet Rd.	33	3	N	N	N	L	NA
Curd Rd.	Greystone Rd.	21	2	N	N	N	L/M	NA
Benders Ferry Rd.	Mays Chapel Rd.	23	2	N	Y	N	M/S	2,530
Lebanon Rd.	Cooks Ct.	37	2	Y	Y	N	L/M	NA
Lebanon Rd.	Mt. Juliet Rd.	55	5	N	N	N	L	14,700
Nonaville Rd.	Lebanon Rd.	37	2	N	N	N	L/M	7,470
Nonaville Rd.	Mt. Juliet City Limits	24	2	N	Y	N	L/M	NA
Saundersville Rd.	Lucy Dr.	24	2	N	N	N	L/M	3,990
N. Green Hill Rd.	Hidden Ridge Dr.	22	2	N	Y	N	S/M	760
Tate Ln.	Tate Ln.	10	2	N	N	N	L/M	NA
Willoughby Station Blvd.	Willoughby Station Blvd.	38	2	N	N	N	L/M	NA
S. Green Hill Rd.	Virginia Hill Dr.	21	2	N	Y	N	M	4,170

* Source: Tennessee Department of Transportation
Y = Yes, N = No, L = Level, M = Moderate, S = Steep

SR 840 and State Highway 109 provide major north-south regional access. SR 840 connects I-40, east of Mt. Juliet to Murfreesboro and southern Middle Tennessee. Highway 109 connects the Mt. Juliet planning area with Gallatin to the north.

Mt. Juliet Road, Nonaville Road, Green Hill Road, and Benders Ferry Road provide major north-south local access within the Mt. Juliet planning area.

Mt. Juliet Road

Lebanon Road, Division Street, Old Lebanon Dirt Road and Saundersville Road provide major east-west local access.

Like many other areas across Tennessee and the country, the majority of the roads were initially built to minimum design standards in an effort to reduce the cost of construction. Most lane widths vary between less than 10 feet to 11 feet wide. Table 4.2 clearly illustrates the narrow roadway widths for the roadways studied in Mt. Juliet.

Asphalt roads with paralleling ditches and no shoulders characterize the majority of the roads in the Mt. Juliet study area. Because of these geometrics, it is difficult to accommodate bicycle facilities within many of the existing pavement widths.

Mass transit amenities within the study area include a regional transit authority bus stop located at the corner of Mt. Juliet Road and Lebanon Road in the Kroger parking lot and a park and ride lot to the southeast of the Mt. Juliet Road interchange at Interstate 40.

Division Street

Central Pike

4.1.5 Utility Corridors. There are three major utility corridors running through the planning area. They include two electric power corridors and one gas line corridor. The electric power corridors run from the Percy Priest Dam located in Davidson County. Both enter the

southwest quadrant of the planning area south of Interstate 40. One runs east-west and the other runs to the northeast reaching the Cumberland River north of the City of Lebanon.

The major gas line running through the planning area is owned by Columbia Gulf and runs below ground. This line originates in the southwest near Suggs Creek at the Wilson County line where it continues northeast to the Cumberland River.

4.1.6 Pedestrian Facilities. There are limited pedestrian facilities within the City of Mt. Juliet. Recently completed subdivisions have been required to include sidewalks. These subdivisions are located in the western portion of the planning area. They include the following:

- Willoughby Station
- Hickory Hills
- Chandler Pointe
- Triple Crown

Sidewalks within these subdivisions are typically narrow and are only on one side of major streets. The sidewalks systems are all contained within the development and do not provide any connections to local streets or other subdivisions. Many of the sidewalks do not comply with current ADA standards due to insufficient width, excessive cross slopes, lack of curb ramps and surfacing. Besides a single painted crosswalk in Chandler Pointe, there are no crosswalks identified within the Mt. Juliet study area.

Remnants of an old sidewalk network are present in downtown Mt. Juliet near Division Street and Mt. Juliet Road. These components of what once was a narrow pedestrian passage are no longer usable.

4.1.7 Bicycle Facilities. Although there are few bicycle facilities in the Mt. Juliet study area, a group of bicycle enthusiasts ride recreationally on many of the area's roadways.

There is one marked bike route on Mt. Juliet Road starting at Adams Lane. The bike route continues south to the Wilson County line and beyond.

Lebanon Road has been designated as the Bristol-to-Memphis Bike Route by the State of Tennessee. However, no signs have been erected nor are there any bike lanes marked along this route at the time of this study. The Bristol-to-Memphis Bike Route is a shared roadway that follows Highway 70 across the state.

4.2 Future Transportation Network

Over the next twenty years, the Tennessee Department of Transportation (TDOT), Wilson County and the City of Mt. Juliet will build additional roads and improve existing facilities. The Wilson County and the Mt. Juliet 2020 Major Thoroughfare Plans identify future roads and upgrades to existing roads within the County and the City of Mt. Juliet. Table 4.3 presents a summary of those planned projects. The projects are graphically shown on Figure 4.3.

The proposed transportation system within Mt. Juliet is intended to reduce the pressure on Mt. Juliet Road by providing an eastern and western by-pass. These bypasses provide desperately needed north-south access within Mt. Juliet. Additional east-west links connect these bypasses to Mt. Juliet Road and create a more intricate transportation network than currently exists.

Additional local connections are planned for South Rutland Road and South Green Hill Road.

The Nashville and Eastern Railroad running through the City, connects Mt. Juliet to Nashville and Lebanon. This corridor has been targeted as a future commuter rail route.

The future transportation projects provide significant opportunities for an improved bicycle and pedestrain system. For example, when roadways are widened, there is an opportunity to include bike and pedestrian facilities as part of the project. Therefore, these future transportation projects can serve as important components of the Mt. Juliet bicycle and pedestrian network.

TABLE 4.3 FUTURE TRANSPORTATION IMPROVEMENTS
City of Mt. Juliet

Project	Begin Project	End Project	Improvement
I-40 Interchange	NA	NA	Add additional interchange to I-40 between Mt. Juliet Rd. & Davidson County line
I-40 Interchange Modification @ Mt. Juliet Rd.	NA	NA	Construct required modifications to existing interchange to improve operational efficiency
I-40 Interchange	NA	NA	Add additional interchange to I-40 at Beckwith Rd.
Mt. Juliet Rd. West Bypass/S. Green Hill Rd.	New I-40 Interchange	Lebanon Rd.	Construct a limited access facility to provide four lanes of capacity
Mt. Juliet Rd. East Bypass	Interstate 40 at Beckwith Road	Lebanon Rd.	Construct a new arterial to provide two lanes of capacity
Mt. Juliet Road Widening	Interstate 40	Division St.	Reconstruct to provide four lanes of capacity
South Mt. Juliet Road	Interstate 40	Central Pike	Reconstruct to provide four lanes of capacity
Belinda Parkway Connector	Belinda Parkway	S. Rutland Extension	Construct an extension to provide two lanes of capacity and improved local circulation
Division Street Connector	Division St.	Mt. Juliet East Bypass	Construct a connector to provide two lanes of capacity and improved local circulation
S. Rutland Road Extension	Mt. Juliet Rd.	S. Rutland Rd.	Construct an extension to provide two lanes of capacity and improved local circulation
Mt. Juliet Road East Connector	Mt. Juliet Rd.	Mt. Juliet East Bypass	Construct an extension to provide two lanes of capacity and improved local circulation
Saundersville Road Extension	Nonaville Rd.	Benders Ferry Rd.	Construct an extension to provide two lanes of capacity and improved local circulation
Needmore Road	North Green Hill Rd.	Lebanon Rd.	Construct an extension to provide two lanes of capacity and improved local circulation
Central Pike	Davidson County Line	Mt. Juliet Rd.	Reconstruct to provide four lanes of capacity
Nonaville Road	Mt. Juliet City Limits	Saundersville Rd.	Improved operational efficiency and safety through improved geometry

Source: Mt. Juliet 2020 Major Thoroughfare Plan & the Wilson County 2020 Major Thoroughfare Plan

WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 4.3 Previously Planned Transportation Improvements

CITY OF MT. JULIET

Saundersville Rd. Extension

Nonaville Rd.

Lebanon Rd.

Needmore Rd. Extension

Mt. Juliet East By-Pass

Mt. Juliet Rd. East Connector

Mt. Juliet Rd.

S. Green Hill Rd.

S. Green Hill Rd. Extension

New Interchange

Division St. Connector

New Interchange

Davidson Co.

Mt. Juliet Rd.

Beckwith Rd.

Central Pk.

S. Rutland Rd. Extension

Belinda Pkwy. Connector

CITY OF LEBANON

- Future New Road*
- Future Road Upgrade*

* As proposed by the Mt. Juliet 2020 Major Thoroughfare Plan

- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Lebanon Corporate Limits
- Lebanon Growth Area
- Wilson County Area
- Wilson County Growth Area
- Major Water Body
- Streams
- TVA Power Corridor
- Gas Line Easement
- Existing Road
- Railroad

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4.3 Opportunities & Constraints. Upon review of the existing conditions the planning team and the TAC identified the opportunities and constraints within the planning area.

4.3.1 Constraints. Six major constraints to bicycle and pedestrian mobility were identified. They include the following:

- Low-Density Development Pattern
- Topography
- Existing Transportation Network
- Existing Road Design
- Interstate 40
- Lack of Existing Bicycle and Pedestrian Facilities

Low-Density Development Pattern. The development pattern of Mt. Juliet presents a difficult challenge to creating an effective comprehensive bicycle and pedestrian network. Since much of the population is scattered over a large area, the distance between many neighborhoods and trip generators is greater than most people are typically willing to travel by bicycling or walking for these types of trips.

The linear commercial strip development that is commonly found along Mt. Juliet Road and Lebanon Road increases the risk of conflict with bicycles and pedestrians because of the numerous curb cuts along the roadways. Each curb cut in effect is a potential conflict.

The development pattern also poses another challenge because many of the destinations are not connected by a sidewalk system. This prohibits users from accessing multiple uses after parking in a single lot, thereby increasing the number of vehicular trips on the transportation system.

Mt. Juliet Road

Mt. Juliet Neighborhood

Chandler Road

Topography. The topography within the planning area poses a challenge to providing safe and effective bicycle and pedestrian facilities due to hills and valleys. Numerous routes require cyclists and pedestrians to overcome these hills, which makes travel more difficult.

Roads that are built in areas with rugged terrain often are characterized by dips and sharp turns. These twists and turns can be dangerous to navigate by bicycle where sight distances are limited.

Existing Transportation Network. As discussed previously, the existing transportation network relies primarily on a coarse network of roads. As a result, there are limited options for providing on-road bicycle and pedestrian facilities on existing roads. This can make it difficult to provide parallel routes to major arterial facilities.

Existing Road Design. As the information in Table 4.2 clearly illustrates, many of the existing roads are narrow and cannot be easily modified to accommodate future bicycle and pedestrian facilities.

Interstate 40. Interstate 40 is a barrier to bicycle and pedestrian mobility because of the limited number of crossings and the high expense to create new ones. There are currently only two crossings within the study area. These crossings are the Mt. Juliet Road interchange and the overpass at Central Pike. A third is scheduled to be constructed at Beckwith Road in the next 3 to 5 years.

Lack of Existing Bicycle and Pedestrian Facilities. There are few existing bicycle and pedestrian facilities. Therefore, there is limited infrastructure to build upon and a much larger investment in the future will be needed to provide bike and pedestrian facilities.

Curd Road

South Rutland Road

Interstate 40

4.3.2 Opportunities. Five major opportunities for bicycle and pedestrian facilities were identified. They include the following:

- Existing Roads
- Future Transportation Improvements
- Railroad Corridor
- Stream Corridors
- Utility Corridors

Existing Roads. Though few in number, there are existing roads within the planning area that are considered as gaps for accommodating bicycle facilities. These roadways include Nonaville Road and Tate Lane.

Nonaville Road, from Lebanon Road to the Mt. Juliet Corporate Limits, has wide lanes and generous shoulder width to accommodate bike lanes on both sides of the road.

Tate Lane is a narrow road that winds from Lebanon Road to Division Street. It is a unique street because of its scenic value. Traveling along Tate Lane gives one the feeling of being transported back in time to historic Middle Tennessee. For its historic value alone, this street should be utilized and preserved if at all possible.

Future Transportation Improvements. All future transportation improvements identified in the previously mentioned thoroughfare plans offer opportunities to include bicycle and pedestrian facilities when they are constructed. It is typically prohibitively expensive to widen existing roads for the sole purpose of providing bicycle facilities. New road improvements however, offer the ability to provide these facilities as part of the project at a minimal additional cost.

Railroad Corridor. Like most railroads, the existing railroad corridor that runs in

Tate Lane

Railroad

Cedar Creek

an east-west direction through the planning area is sited within the flattest topography. Railroad corridors are usually well suited for pedestrian and bicycle facilities. Because of the moderate grades, less energy is required to travel the same distance than on facilities in areas with steeper slopes.

The railroad corridor through Mt. Juliet also provides connections to the City of Lebanon and Davidson County.

Across the country, multi-use trails have safely and successfully shared railroad corridors with trains. Applying this same shared-use concept is also a feasible opportunity for Mt. Juliet.

Stream Corridors. The Cedar Creek and Stoners Creek corridors offer wonderful opportunities for incorporating a multi-use trail system throughout the City of Mt. Juliet. Both corridors connect many of the trip generators previously identified.

Like the railroad corridor, stream corridors are found in areas of flat topography. The moderate topography areas offer the greatest opportunities for all skill levels of cyclists and pedestrians. Unlike conventional development, multi-use trails can be incorporated within the floodplain.

Utility Corridors. Multi-use paths can utilize the TVA electric power and gas line corridors. However, unlike stream and railroad corridors, the terrain can vary significantly. Facilities provided within these corridors may not be suitable for all skill levels.

Stoners Creek

TVA Electric Power Corridor

4.4 RECOMMENDATIONS

The recommended bicycle and pedestrian network includes the following types of facilities:

- Class I: Multi-Use Paths
- Class II: Bike Lanes
- Class III: Shared Roadways
- Bicycle Parking
- Pedestrian Facilities

The recommended bicycle routes for Mt. Juliet are summarized in Table 4.4 and shown in Figure 4.4.

4.4.1 Concept. The recommended bicycle and pedestrian network establishes essential connections between many of the trip generators and the current and future population centers throughout the study area. The plan utilizes a combination of bicycle facilities that can accommodate cyclists of all skill levels and provide a number of route choices to the users for recreation and transportation. Pedestrians are served through the provision of multi-use path facilities and sidewalks along main commercial corridors and within future subdivisions.

Many of the existing roadways cannot accommodate bicycle and pedestrian facilities without widening projects. Therefore, it is envisioned that Class I multi-use path facilities along Cedar Creek, Stoners Creek and the railroad corridor will serve as the foundation of the network. As new roads are built and existing roads upgraded within Mt. Juliet, bicycle and pedestrian facilities should be included with these improvements. These on-road facilities will further reinforce the network over time.

4.4.2 Class I: Multi-Use Path. The plan includes multi-use paths along approximately 29 miles of creek, utility and railroad corridors. Greenway facilities proposed for Mt. Juliet include:

- Cedar Creek Greenway
- Stoners Creek Greenway
- Railroad Greenway
- Stoners/Cedar Creek Greenway Connector

Cedar Creek Greenway. The Cedar Creek Greenway follows 8.8 miles of the Cedar Creek corridor as it meanders through the northern and eastern portions of the Mt. Juliet planning area. It provides important connections between the existing and future neighborhoods north of Lebanon Road and some of the most popular recreation facilities. These include the Little League Park, Charlie Daniels Park and Community Center, the Park Glenn Soccer Complex and the Putt-Putt on Lebanon Road.

Since this facility utilizes the Cedar Creek flood plain, the terrain is relatively flat. This makes this path a safe and easy route for just about any cyclist or pedestrian. It further provides access to some of the most scenic parts of Mt. Juliet.

The Cedar Creek Greenway crosses Lebanon Road and Curd Road. Providing grade-separated crossings would be very desirable, as they would create a clear path of travel under the roads and mitigate potential conflicts. Additional grade separation solutions will need to be employed in future road projects. These include the Mt. Juliet Road East Connector, Division Street Connector and Eastern By-pass.

Stoners Creek Greenway. The Stoners Creek Greenway extends along 10.3 miles of the Stoners Creek corridor as it winds through the western and southern portions of Mt. Juliet. The Stoners Creek Greenway provides important

connections between established and

TABLE 4.4 SUMMARY OF BICYCLE FACILITY RECOMMENDATIONS
City of Mt. Juliet

Project	From	To	Type	Length (mile)	Comments	Cost ($1,000)
Beckwith Rd.	Interstate 40	S. Rutland Rd.	Bike Lanes	0.8	Future Widening Project	$27
Belinda Pkwy.	Mt. Juliet Rd.	S. Rutland Rd.	Shared Roadway	3.1	Existing Road	$26
Belinda Pkwy. Connector	Rutland Rd. Extension	Belinda Pkwy.	Bike Lanes	0.4	Future Road Project	$13
Bender's Ferry Rd.	Lebanon Rd.	Saundersville Rd. Extension	Bike Lanes	1.4	Only If Upgraded in Future	$47
Bender's Ferry Rd.	Saundersville Rd. Extension	Camp Easter Seals	Shared Roadway	4.5	Existing Road	$38
Cedar Creek Greenway	Saundersville Rd. Extension	Lebanon Rd.	Multi-Use Path	4.2	Within Flood Plain	$1,727
Cedar Creek Greenway	Lebanon Rd.	Curd Rd.	Multi-Use Path	1.7	Within Flood Plain	$699
Cedar Creek Greenway	Curd Rd.	Railroad	Multi-Use Path	2.9	Within Flood Plain	$1,192
Central Pk.	Western County Line	Mt. Juliet Rd.	Bike Lanes	3.5	Future Widening Project	$117
Charlie Daniels Pkwy.	Mt. Juliet Road	Charlie Daniels Park	Shared Roadway	0.3	Existing Road	$2
Curd Rd.	Mt. Juliet East By-Pass	Mt. Juliet Rd. East Connector	Bike Lanes	1.3	Only If Upgraded in Future	$43
Division St.	Martha-Leeville Rd. (Lebanon)	Railroad Greenway	Shared Roadway	2.9	Existing Road	$24
Division St. Connector	Division St.	Mt. Juliet East By-Pass	Bike Lanes	1.2	Future Road Project	$40
I-40 Stoners Creek Tunnel	Interstate 40	Interstate 40	Multi-Use Path	0.1	Within Flood Plain	$49
Lebanon Rd.	Eastern Growth Boundary	Western Growth Boundary	Shared Roadway	7.6	Existing Road	$63
Mt. Juliet Western By-Pass/S. Green Hill Rd.	Lebanon Rd.	Central Pk.	Bike Lanes	4.8	Future Road Project/Road Widening	$160
Mt. Juliet Eastern By-Pass	Lebanon Rd.	Interstate 40	Bike Lanes	4.5	Future Road Project	$150
Mt. Juliet Rd.	Lebanon Rd.	Division St.	Bike Lanes	2.1	Future Widening Project	$70
Mt. Juliet Rd.	Division St.	Interstate 40	Bike Lanes	2.1	Future Widening Project	$70
Mt. Juliet Rd.	Interstate 40	Central Pk.	Bike Lanes	1.2	Future Widening Project	$40
Mt. Juliet Rd. East Connector	Mt. Juliet Rd.	Mt. Juliet East By-Pass	Bike Lanes	1.5	Future Road Project	$50
Nonaville Rd.	Mt. Juliet Corp. Limits	Saundersville Rd.	Bike Lanes	1.5	Future Widening Project	$50
Nonaville Rd.	Lebanon Rd.	Mt. Juliet Corp. Limits	Bike Lanes	0.8	Existing Road	$27

Railroad Greenway	Eastern Growth Boundary	Western Growth Boundary	Multi-Use Path	8.0	Within Railroad ROW	$3,289
Rutland Rd. Extension	S. Rutland Rd.	Mt. Juliet Rd.	Bike Lanes	1.6	Future Road Project	$53
S. Rutland Rd.	Beckwith Rd.	Rutland Rd. Extension	Bike Lanes	1.5	Only If Upgraded in Future	$50
Saundersville Rd. Extension	Nonaville Rd.	Bender's Ferry Rd.	Bike Lanes	1.9	Future Road & Widening Project	$63
Stoners Creek Greenway	Western County Line	Mt. Juliet Western By-Pass	Multi-Use Path	3.3	Within Railroad ROW	$1,357
Stoners Creek Greenway	John Wright Rd.	Stoners Creek	Multi-Use Path	0.9	Within Flood Plain	$370
Stoners Creek Greenway	Mt. Juliet Western By-Pass	Mt. Juliet Rd.	Multi-Use Path	1.6	Within Flood Plain	$658
Stoners Creek Greenway	Mt. Juliet Rd.	Interstate 40	Multi-use Path	1.4	Within Flood Plain	$576
Stoners Creek Greenway	Interstate 40	Belinda/S. Rutland	Multi-Use Path	3.1	Within Flood Plain	$1,274
Stoners/Cedar Greenway Connector	Stoners Creek Greenway	Cedar Creek Greenway	Multi-Use Path	2.1	Utilizes Gas Line Easement	$863
Tate Ln.	Lebanon Rd.	Division St.	Shared Roadway	1.7	Existing Road	$14
Woodridge Place	Mt. Juliet Road	Curd Rd.	Shared Roadway	1.0	Existing Road	$8
Total Cost to Implement Recommended Facilities						$13,299.00

future neighborhoods along its banks and many of the city's schools.

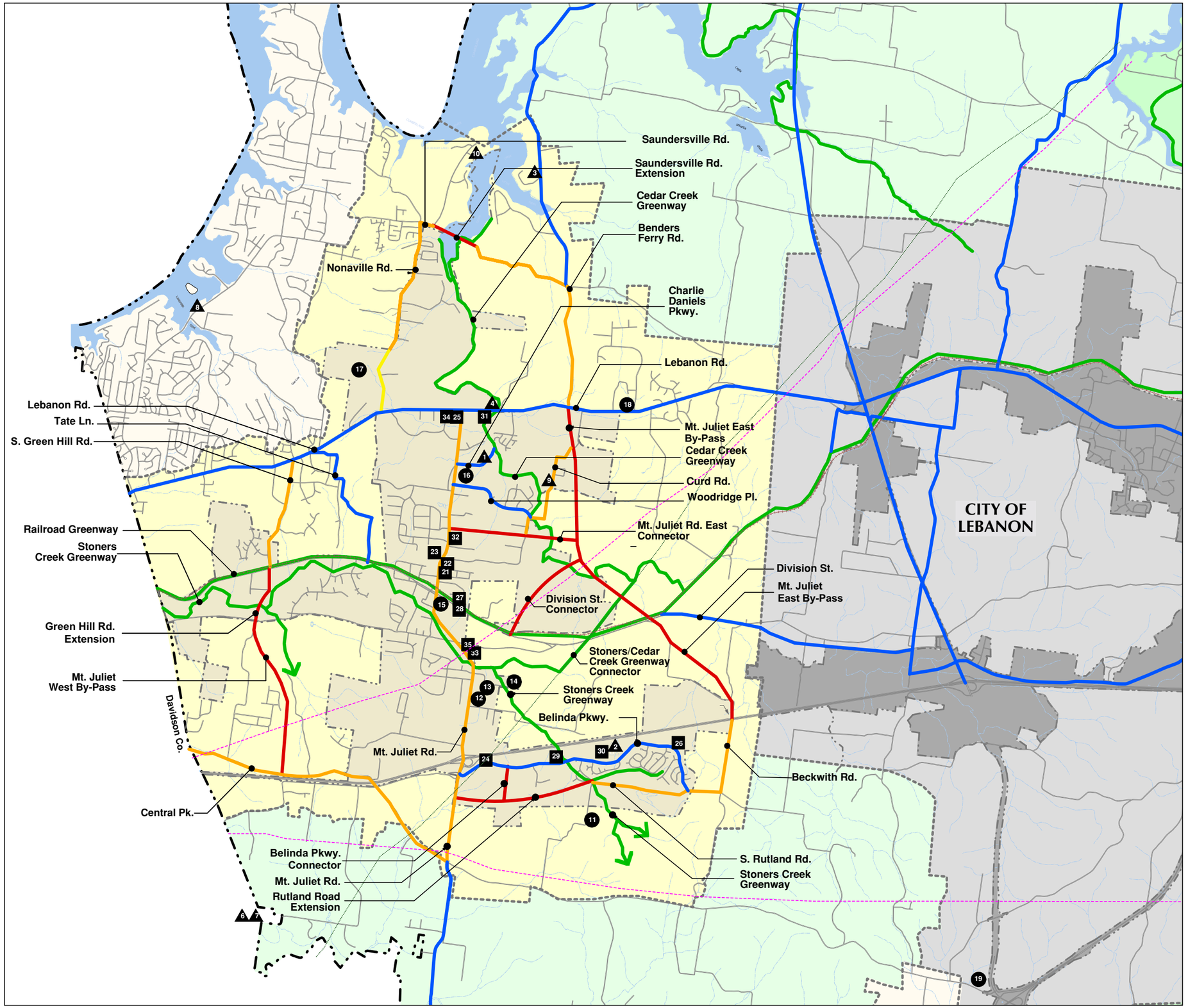
These schools include Mt. Juliet Christian Academy, Mt. Juliet Junior High, Stoners Elementary and Rutland Elementary. It also provides access to the H.G. Hill Food Store and associated retail development. Due to the proximity with downtown Mt. Juliet, the Stoners Creek Greenway can be easily connected with on-road bicycle and pedestrian facilities.

The greenway does offer a potential future regional connection to the Stones River Greenway in Metro Nashville. The connection requires a greenway facility along the portion of Stoners Creek within Davidson County.

Like the Cedar Creek Greenway, the Stoners Creek Greenway utilizes the stream corridor and floodplain. Thus, the greenway follows topography that is a safe and easy route for just about any cyclist or pedestrian.

Grade separated crossing solutions will need to be provided at Mt. Juliet Road and Interstate 40. Interstate 40 poses the greatest challenge. A tunnel could be provided to make this connection. This would provide access between the neighborhoods south of Interstate 40 and the rest of the city.

Grade separation at intersections of future roads would need to be provided at the Mt. Juliet Western By-pass. The pedestrian underpass and overpass



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 4.4 Bicycle Recommendations

CITY OF MT. JULIET

- Class I: Multi-use Path
- Class II: Bike Lanes (Future Road Project)
- Class II: Bike Lanes (Future Road Widening Project)
- Class II:Bike Lanes (Existing Road)
- Class III: Bike Route

- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Lebanon Corporate Limits
- Lebanon Growth Area
- Wilson County Area
- Wilson County Growth Area
- TVA Power Corridor
- Gas Line Easement
- Streams
- Existing Road
- Railroad

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program through TDOT should be examined for these grade separation types of projects. Funding sources are included in Appendix C.

Railroad Greenway. The Railroad Greenway consists of a multi-use path that parallels the railroad for approximately 8 miles. This greenway provides the potential for regional connections to Davidson County and the City of Lebanon. Locally it connects existing and future neighborhoods in the western and eastern portions of the planning area to downtown Mt. Juliet and the Cedar Creek Greenway. Since this greenway closely parallels a large western segment of the Stoners Creek Greenway, the two greenways can be easily connected with on-road bicycle and pedestrian facilities.

Since the greenway utilizes the railroad corridor, the terrain is relatively flat, making this route safe and convenient for cyclists and pedestrians.

Existing railroad bridges will need to be retrofitted to allow for safe pedestrian and bicycle travel. Where this is not feasible, paralleling facilities can be constructed. Similar design features should also be included where the railroad intersects with future roads.

Stoners/Cedar Creek Greenway Connector. The Stoners/Cedar Creek Greenway connector encompasses approximately 2.1 miles of multi-use path that generally follows a portion of the Columbia Gulf Gas line running through the planning area. This facility provides an important connection between the Cedar Creek and Stoners Creek Greenway. This multi-use path provides a link that creates a continuous greenway facility throughout the community.

Since this multi-use path utilizes the gas line easement, the terrain varies based on the characteristics of the land. The facility will be a topographically challenging route compared to the other greenway facilities.

4.4.3 Class II: Bike Lanes. The proposed bicycle network includes approximately 32 miles of bicycle lanes. The majority of these bike lanes are designated on future road improvements.

The plan utilizes bike lanes to create a nearly continuous local bike loop around the city. Other bike lanes are extended from this loop in effort to reinforce the network and provide important connections to the other bicycle facilities, population centers and trip generators.

Bike Loop. Ten future road improvements and one existing facility are combined to form the Bike Loop. They include the following:

- Nonaville Road (within City Limits)
- Nonaville Road Expansion
- Saundersville Road Extension
- Benders Ferry Road
- Mt. Juliet Eastern By-pass
- Beckwith Road Expansion
- South Rutland Road Expansion
- South Rutland Road Extension
- Mt. Juliet Road Widening
- Central Pike Expansion
- Mt. Juliet Western By-pass

Benders Ferry Road and the Rutland Road expansions have not been identified in the Mt. Juliet Major Thoroughfare Plan. If these roads are upgraded in the future, bike lanes are recommended to be included in the road project. All other improvements have been identified in Mt. Juliet's Major Thoroughfare Plan and are expected to be completed over the next twenty years.

Other Facilities. Extensions from the bike loop provide important local and regional connections. The connections include the following:

- Mt. Juliet Road Widening
- Mt. Juliet Road East Connector
- Division Street Connector
- Belinda Parkway Connector
- Central Pike Expansion
- Curd Road
- Mt. Juliet Western Bypass

Because nearly all trip generators within Mt. Juliet are on Mt. Juliet Road, it is critical that bike lanes be included when Mt. Juliet Road is widened.

As shown in the Major Thoroughfare Plan, the Central Pike expansion extends to the Wilson/Davidson County line. This expansion will offer an excellent opportunity to provide an additional connection for cyclists and pedestrians to Davidson County.

The expansion of Curd Road has not been identified in the Mt. Juliet Major Thoroughfare Plan. It is recommended that bike lanes be included on Curd Road, if development pressures require that it be upgraded in the future.

4.4.4 Class III: Shared roadways. The proposed bicycle network includes approximately 21 miles of shared roadways. Shared roadways have been recommended on roads that are not scheduled to be upgraded in the future, but serve as critical connections within the bicycle network. Shared roadways are recommended on the following:

- Lebanon Road
- Division Street
- Benders Ferry Road
- Belinda Parkway
- Charlie Daniels Parkway
- Woodridge Place
- Tate Lane

Lebanon Road. Lebanon Road is designated as the Bristol-to-Memphis Bike Route by the State of Tennessee. The segment of this route within the Mt. Juliet planning area is approximately 7.6 miles in length. This route provides regional connections to Nashville, Lebanon and other cities linked by Highway 70 throughout the state.

Division Street. Division Street provides an on-road critical east-west connection between the Railroad Greenway and the Martha-Leeville Road shared roadway in the Lebanon study area. The shared roadway segment of Division Street is approximately 2.9 miles in length. Division Street serves as a connection with regional links to Davidson County and Highway 109. Although the lane widths of Division Street are somewhat narrow for shared roadway facilities, it has been designated a bike route due to its important connections, ample sight distance, moderate grades, and moderate traffic volumes. It would be desirable for the roadway width to be increased, or to provide improved shoulders in order to enhance this roadway as a bike route.

Benders Ferry Road. Benders Ferry Road from Saundersville Road Extension to Camp Easter Seals provides links to the Army Corps of Engineers Lone Branch Recreation Area and Camp Easter Seals. This 4.5-mile route is primarily a recreational route and was chosen for it's scenic value and low traffic volume, even though its lane widths are narrow for shared roadways. It would be desirable for the roadway width to be increased, or to provide improved shoulders in order to enhance this roadway as a bike route.

Belinda Parkway. Belinda Parkway provides a central connection for Mt. Juliet's neighborhoods south of

Interstate 40, major employers and Millennium Park. Belinda Parkway is 3.1 miles in length. Although the vehicular lane widths on this street are not ideal, its moderate traffic volumes and ability to provide a critical link to Mt. Juliet's southern neighborhoods makes this road an important bicycle route.

Charlie Daniels Parkway. Charlie Daniels Parkway provides a connection from Mt. Juliet Road to Charlie Daniels Park. It is 0.25 miles in length. Again, the vehicular lane widths on this street are not ideally suited for a shared roadway. However, because of its low traffic volume and its linkage to the park, Charlie Daniels Parkway serves as an important component to the plan.

Woodridge Place. Woodridge Place provides a connection to Mt. Juliet High School and surrounding neighborhoods. It is one mile in length. This route was chosen because of its low traffic volume and connectivity, even though its lane widths are relatively narrow for shared roadway facilities. It would be desirable for the roadway width to be increased, or to provide improved shoulders in order to enhance this roadway as a bike route.

Tate Lane. Tate Lane is probably the most unique road in Mt. Juliet. The narrow two-way road is only 1.7 miles in length. The route is characterized by sharp turns, high-banked sides and large cedar trees. If this route is signed and marked as a bike route, traffic calming measures such as speed humps should be considered as an option to further enhance the safety of this road.

Tate Lane does provide a useful connection between Lebanon Road and Division Street. It also connects the neighborhoods along this route.

If development pressures along Tate Lane require an improved roadway, it is recommended instead that a new paralleling road be constructed and Tate Lane be closed and converted to a greenway corridor.

4.4.5 Bicycle Parking. The plan recommends the installation of bicycle storage, including racks and lockers for convenience and safety. These storage areas should be located along the Mt. Juliet Road corridor near trip generators to help promote the use of bicycle facilities.

The trip generators that should be considered for bicycle storage include schools such as Rutland Elementary, Mt. Juliet Elementary, and other facilities that will attract children. Consideration should also be given to recreational parks, businesses, retail centers, and grocery stores. Design guidelines for bicycle storage type facilities are included in Appendix A.

4.4.6 Pedestrian Facilities. Approximately 8.3 miles of roads within Mt. Juliet are recommended for sidewalks. These roads serve as major thoroughfares for Mt. Juliet. The sidewalks should be constructed on both sides of the following roads:

- Nonaville Road
- Lebanon Road
- Mt. Juliet Road
- Division Street

Nonaville Road. Many children utilize Nonaville Road to walk to school. Also, Nonaville Road provides a connection to the commercial areas on Lebanon Road. In an effort to provide a safer route, sidewalks should be provided along the street. This segment of Nonaville Road is 2.3 miles in length.

Lebanon Road. The 1.4-mile segment of Lebanon Road from Nonaville Road

to Cedar Creek has a high concentration of commercial uses. Providing sidewalks along this route would create connections between these uses.

Mt. Juliet Road. Mt. Juliet Road connects many of the older neighborhoods with schools, commercial areas and other desirable destinations. Sidewalks should be included from Lebanon Road to North Rutland Road. This segment is 3.6 miles in length.

Division Street. The 1-mile future segment of Division Street between the Mt. Juliet Western By-pass and Industrial Drive serves as a critical link between the east and west segments of the railroad greenway. It also connects downtown Mt. Juliet to surrounding neighborhoods.

It is recommended that sidewalks be included on all new subdivision streets in Mt. Juliet. The recommendation is consistent with the city's current sidewalk ordinance. For the increased safety of pedestrians, it is recommended that pedestrian crossing facilities be provided at all signalized intersections. Included should be marked crosswalks, pedestrian signals with pushbuttons and sidewalks. Design standards for a variety of crosswalk markings are included in Appendix A.

The plan also identifies the following four key intersections where safe pedestrian crossings should be emphasized:

- Nonaville Road at Lebanon Road
- Lebanon Road at Mt. Juliet Road
- Mt. Juliet Road at Division Street
- Mt. Juliet Road at Weston Drive

The signalized intersections should include crosswalks, pushbuttons and pedestrian signal heads. The unsignalized intersections should include pedestrian crossing signs and well marked crosswalks. Refuge islands and medians would be desirable additions for these intersections.

When signalized intersections are added in the future and sidewalks are present, crossing facilities should be included in the design according to the standards defined in this document.

Figure 4.5 shows the locations for the recommended sidewalk and pedestrian crossing improvements.

WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 4.5 Pedestrian Facilities Recommendations

CITY OF MT. JULIET

Nonaville Rd.

Lebanon Rd.

Mt. Juliet Rd.

Division St.

Mt. Juliet Rd.

CITY OF LEBANON

Davidson Co.

- Proposed Sidewalks
- Improved Pedestrian Facilities
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Lebanon Corporate Limits
- Lebanon Growth Area
- Wilson County Area
- Wilson County Growth Area
- Major Water Body
- Streams
- TVA Power Corridor
- Gas Line Easement
- Existing Road
- Railroad

RPM & associates

Hawkins Partners, Inc. landscape architects

CEC

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4.5 Mt. Juliet Sidewalk Ordinance

Pedestrian facilities are an important component of a city's overall transportation system. In Middle Tennessee, many communities have recognized the desirability and need for sidewalks. As a result, these communities are beginning to require that sidewalks be constructed for new subdivisions and new roadways. One of the components of this bicycle and pedestrian plan is an evaluation of the current sidewalk requirements of the City of Mt. Juliet and a determination if any changes need to be made.

As part of this evaluation, the consultant team reviewed sidewalk ordinances from approximately fifty cities throughout the country. Also, sidewalk regulations for the majority of the cities and counties within Middle Tennessee were reviewed.

The current City of Mt. Juliet Subdivision Regulations includes specific requirements for sidewalks. These requirements are presented below.

4-103 Streets and Pedestrian Ways

4-103.1 Pedestrian Ways

4-103.101 Sidewalks Along New Streets

Sidewalks shall be required along all "urban" streets (see Table on following page) constructed in all subdivisions except those proposed for industrial use. Sidewalks shall not be required along streets designated as "rural" when all lots fronting such streets are one (1) acre or larger in size and have average road frontage of one hundred fifty (150) feet or more.

4-103.102 Sidewalks Along Existing Streets

Within any zone district no developer shall be required to install sidewalks along an existing public street unless sidewalks presently exist upon property, which directly adjoins the proposed subdivision, or unless reconstruction of the existing street is required by an approved traffic impact study.

4-103.103 Location of Sidewalks

Sidewalks shall be required along one side of all streets designated as "residential access lanes or urban residential streets". Along streets designated as "urban residential collector or community collector" streets sidewalks shall be required along both sides. When sidewalks are to be constructed in a subdivision adjoining a developed area with sidewalks, the sidewalks shall be joined and extended along the same side of the street. Transition of sidewalks from one side of a street to another will be permitted when topography makes continuation along the same side of the street impractical. Transitions shall only be made at street intersections. In residential zone districts, sidewalks will not be required on permanent dead-end street less than three hundred (300) feet in length.

Sidewalks shall be included within the dedicated non-traffic way portion of the right-of-way of all public ways. Concrete curbs are required for all public ways. Concrete curbs are required for all public ways where sidewalks are to be constructed. A median strip of grassed or landscaped area at least two (2) feet wide shall separate all sidewalks from adjacent curbs, except within ten (10)

MINIMUM RIGHT-OF-WAY OR EASEMENT AND PAVEMENT WIDTH (FEET)
BY STREET TYPE AND INTENSITY OF DEVELOPMENT

	RESIDENTIAL SERVICE						NON-RESIDENTIAL	
STREET TYPE	**Low Density**		**Medium Density**		**High Density**			
	Up to 2 UPA[a]		3 to 8 UPA[a]		9 or more UPA[a]			
	ROW	**Pavm't**	**ROW**	**Pavm't**	**ROW**	**Pavm't**	**ROW**	**Pavm't**
Access Lane								
Urban[b]	40[c]	20	40[c]	20	40[c]	26	N/A	N/A
Rural[b]	40[c]	18	40[c]	18	40[c]	26	N/A	N/A
Access Street								
Urban	40	22	40	22	50	36	50	36
Rural	40	20	40	20	N/A	N/A	N/A	N/A
Residential Collector								
Urban								
2,000 or less ADT	50	22	50	22	60	38	N/A	N/A
+2,000 ADT	50	24	50	24	60	40	N/A	N/A
Rural								
2,000 or less ADT	50	20	50	20	N/A	N/A	N/A	N/A
+2,000 ADT	50	22	50	22	N/A	N/A	N/A	N/A
Community Collector								
Urban	60	38	60	38	70	48	70	48
Rural	50	24	50	24	N/A	N/A	N/A	N/A

Notes:

a. UPA = Units Per Acre

b. Urban Streets – All streets classified as urban are curbed streets. These street sections are to be utilized on all properties located within the city regardless of size of lots and on all lots smaller than one acre in size located within the unincorporated portion of the planning jurisdiction.
Rural Streets – Streets classified as rural may be utilized only to serve lots one acre or larger in size when such lots are located within the unincorporated portion of the planning jurisdiction.

c. The planning commission may permit a right-of-way of thirty (30) feet minimum width when the subdivision is within a Planned Unit Development District or is developed as a Variable Lot Residential Development.

feet of intersections no grass strip will be required. No sidewalk shall be constructed closer than one (1) foot from any lot line.

4-103.104 Sidewalk Width
The width of sidewalks shall be as follows. Widths shall be exclusive of encroachments such as utility poles, fire hydrants, parking meters, sign standards, street furniture, etc.

SIDEWALK WIDTH			
Street Classification	**Land Use Classification**		
	Residential	**Commercial**	**Industrial**
Access Lane	4 feet	N/A	N/A
Access Street	4 feet	5 feet	N/A
Residential Collector	4 feet	N/A	N/A
Community Collector	5 feet	6 feet	6 feet
Arterial Public Way	5 feet	6 feet	6 feet

4-103.105 Alternative Pedestrian Ways

Within PUD Districts and developments approved under the Variable Lot provisions of the zoning ordinance, the Planning Commission may approve pedestrian walkways at locations other than along rights-of-way of streets. Within these developments, pedestrian walkways may be provided within a system of pathways located within areas of commonly held open space. Within such developments, the Planning Commission shall approve the plan of pedestrian walkways upon the recommendation of the City Engineer.

4-103.106 Pedestrian Accesses

The Planning Commission may require, in order to facilitate pedestrian access from the public way to schools, parks, playgrounds, or other nearby public ways, perpetual unobstructed easements at least twenty (20) feet in width. Easements shall be indicated on the plat.

4.5.1 Evaluation of the Current Sidewalk Requirements. In general, the City's sidewalks regulations are very good. In particular, the regulations promote the construction of sidewalks in residential neighborhoods, which is a vital component of the City's bicycle and pedestrian plan. In Mt. Juliet, sidewalks are required on "urban" streets but not "rural" streets. However, the majority of new streets that will be built in the city will be urban streets, since by the city's definition of rural streets can only serve lots one acre or larger and must be located in the unincorporated portion of the planning jurisdiction.

It would be desirable to include sidewalks for all new streets. However, it is recognized that pedestrian demand on rural streets will be low and that as the incorporated areas of the city expand, the number of roadways without sidewalks will decrease.

Currently, developers are not required to construct sidewalks along an existing public street unless sidewalks presently exist on adjoining property, or unless reconstruction of the existing street is required by an approved Traffic Impact Study. Since there are very few streets with sidewalks, this provision will effectively limit the construction of new sidewalks on existing streets. Therefore, it is recommended that this provision be eliminated from the regulations. The incremental addition of new sidewalks on existing streets as redevelopment occurs can be an effective way to ultimately provide a continuous system of sidewalks.

The requirements state that sidewalks on Access Lanes and Access Streets are to be at least four feet wide. All other sidewalks are to be at least five feet wide. Recent ADA guidelines specify that the minimum clear width for pedestrian access routes is to be five feet. Therefore, it is recommended that Mt. Juliet consider increasing the minimum width of all required sidewalks to five feet. If a variance is approved to eliminate the grass strip, the minimum curbed sidewalk width should be six feet wide.

Sidewalks should be required on both sides of the street. To comply with ADA standards, obstructions within the sidewalks that restrict access must be removed. A grass strip buffer of at least four feet is required to allow ample space for trees, utilities, driveways and other obstructions. As a result, increasing the grass strip buffer to a width of at least four feet should be considered by Mt. Juliet. This will also enhance the comfort level of pedestrians by providing further separation from vehicles.

5. CITY OF LEBANON

5.1 Existing Context

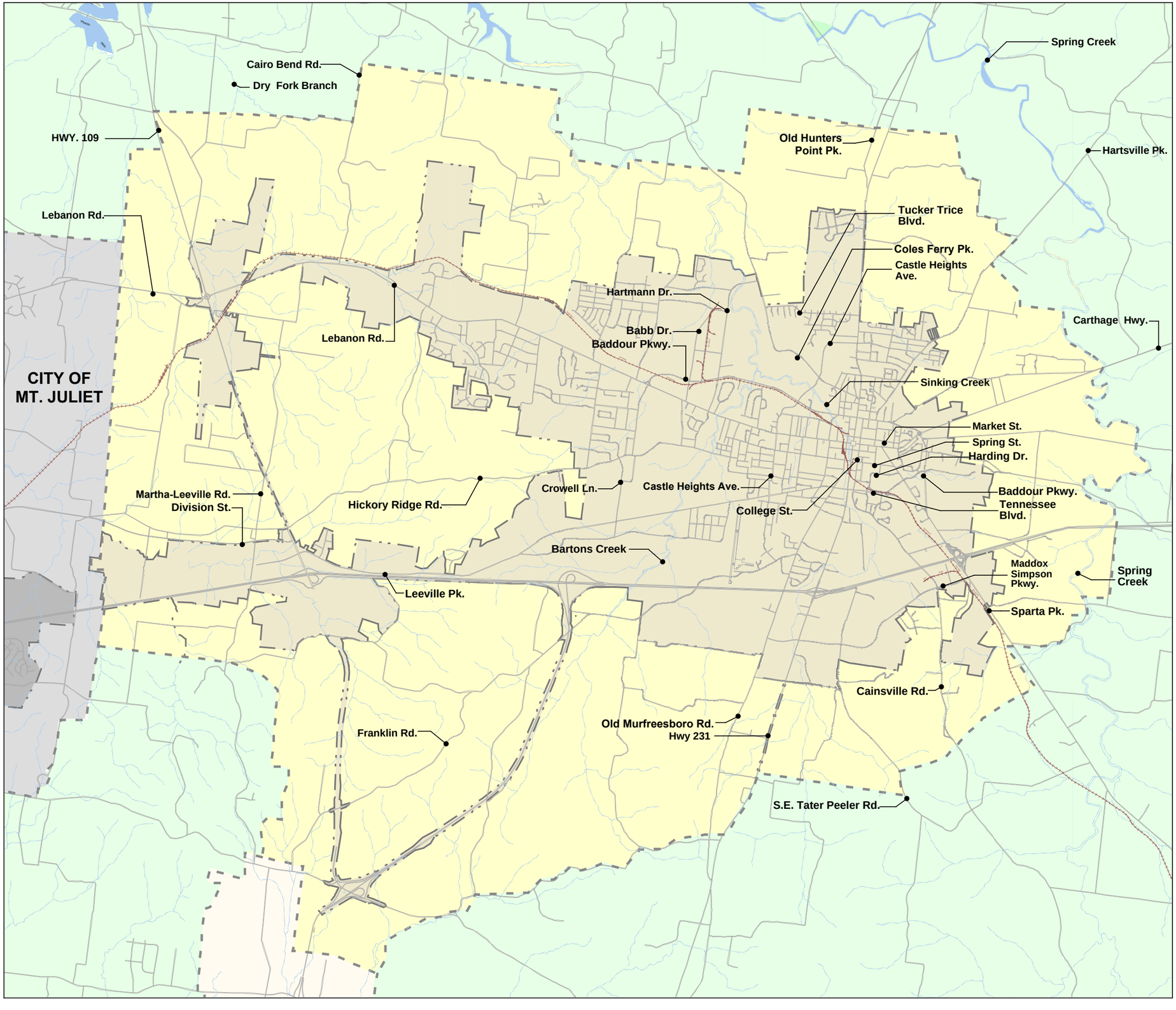
The City of Lebanon is located near the center of Wilson County along the Interstate 40 corridor. The 2020 growth boundary for Lebanon is used to define the planning area for the purposes of this study. The study area for Lebanon is approximately 92 square miles. The existing roadways within this Lebanon study area are shown in Figure 5.1.

5.1.1 Development Pattern. The City of Lebanon consists of residential, commercial, public and vacant land. The downtown square is a vital component for the city's identity and commercial development. Primary businesses in this area consist of antique and collectible stores, other retail stores and professional office space. Retail and commercial development has occurred along U.S. Highway 231 extending from the Interstate 40 interchange to the downtown square. Commercial areas are also found along West Main Street extending west from the downtown square. Much of the new growth and development has occurred primarily to the west towards Highway 109.

The residential development within the core of Lebanon consists of older single-family homes. Adequate roadway connections and traditional type neighborhoods are found throughout the inner areas of Lebanon. New residential development has occurred further outside the City of Lebanon, yet within the growth boundary. These areas include more subdivision type neighborhoods. Generally, these developments provide fewer roadway connections and no sidewalks, therefore pedestrian mobility is limited.

Wilson County & Surrounding Counties

Lebanon Downtown Square



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 5.1 Existing Conditions

CITY OF LEBANON

- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Major Water Body
- Wilson County Growth Area
- Streams
- Existing Road
- Railroad

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Hawkins Partners, Inc. landscape architects

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5.1.2 Geography. The Lebanon planning area is situated on the Cumberland Plateau nestled amongst rolling hills in all directions. The topography throughout the core of Lebanon is relatively flat. The east-west corridors along Highway 70 and Interstate 40 exhibit moderate slopes. The northern portion of the study area near Hunters Point is mostly flat with a few small hills. The southern region is comparably more rugged with some rolling hills. Portions of Highway 231 to the south of Lebanon exhibit moderate slopes.

The three major waterways in the Lebanon growth area are Spring Creek, Sinking Creek, and Bartons Creek. Approaching Lebanon from the south, Sinking Creek flows northward through downtown Lebanon and joins Bartons Creek near the Lebanon Country Club. Bartons Creek continues northward and empties into Old Hickory Lake. Spring Creek also flows northward originating near Watertown and continuing to Old Hickory Lake. These waterways are critical to flood protection in the study area.

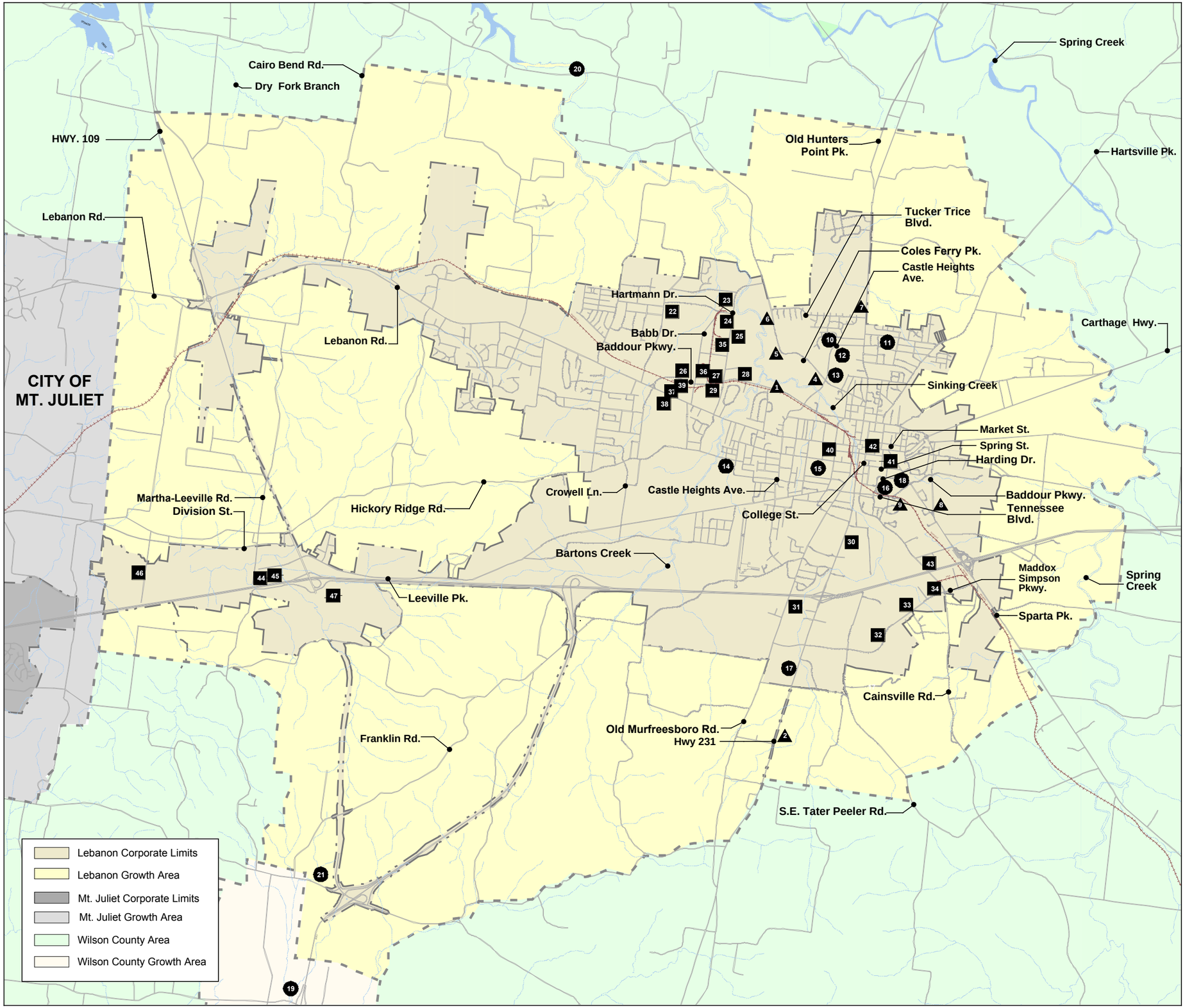
5.1.3 Trip Generators

The bicycle and pedestrian plan network attempts to provide a comprehensive transportation system that connects desired destinations within the Lebanon community. The plan defines these destinations as “trip generators.” The trip generators identified for Lebanon are listed in Table 5.1 and shown in Figure 5.2.

As shown in Table 5.1 and in Figure 5.2, forty-seven trip generators are identified for the Lebanon study area. The identified trip generators are grouped into parks, schools and a miscellaneous category labeled other.

TABLE 5.1 TRIP GENERATORS
City of Lebanon

Parks
Don Fox Park
Shady Acres Campgrounds
Cedars of Lebanon State Park
Jim Floyd Family Center
Lebanon Golf and Country Club
Coles Ferry Recreation Center
Hunters Point
James E. Ward Agricultural Center
William Baird Park
Schools
Chue (5-6)
Sam Houston Elementary (K-4)
Walter J. Baird (7-8)
Coles Ferry (K-4)
Byars Dowdy (K-4)
Cumberland University
Lebanon High School (9-12)
South Side School (K-8)
Wilson County Vocational School
Gladeville Elementary School
Friendship Christian Academy
Wilson County High School
Other
Toshiba
Perma Pipe
Fortune Plastics
Cracker Barrel
UMC Hospital
Hartmann Luggage
TRW Steering Division
Parker Seals
Wal-Mart Supercenter
Outlet Village
PFG (K.O. Lester)
Famous Footwear
PFG (K.O. Lester)
Rock Tennessee
Custom Packaging
K-Mart Shopping Center
Kroger Shopping Center
Martin Triple Theater
Lebanon Wilson County Library
Post Office
Chapel Playhouse Community Theater
Briskin Manufacturing
National Fulfillment
Dell Computers
Nashville Auto Auction
Park and Ride Lot



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 5.2 Trip Generators

CITY OF LEBANON

▲ Parks

1. Don Fox Park
2. Shady Acres Campgrounds
3. Cedars of Lebanon State Park (South of map limits)
4. Jim Floyd Family Center
5. Lebanon Golf & Country Club
6. Coles Ferry Recreation Center
7. Hunters Point
8. James E. Ward Agricultural Center
9. William Baird Park

● Schools

10. Chue (5-6)
11. Sam Houston Elementary (K-4)
12. Walter J. Baird Jr. High (7-8)
13. Coles Ferry (K-4)
14. Byars Dowdy (K-4)
15. Cumberland University
16. Lebanon High School (9-12)
17. South Side School (K-8)
18. Wilson County Vocational School
19. Gladeville Elementary School
20. Friendship Christian Academy
21. Wilson County High School

■ Other

22. Toshiba
23. Perma Pipe
24. Fortune Plastics
25. Cracker Barrel
26. UMC Hospital
27. Hartmann Luggage
28. TRW Steering Division
29. Parker Seals
30. Wal-Mart Supercenter
31. Outlet Village
32. PFG (K.O. Lester)
33. Famous Footwear
34. PFG (K.O. Lester)
35. Rock Tennessee
36. Custom Packaging
37. K-Mart Shopping Center & Retail
38. Kroger Shopping Center
39. Martin Triple Theater
40. Lebanon Wilson County Library
41. Post Office
42. Chapel Playhouse Community Theater
43. Brisken Manufacturing
44. National Fulfillment
45. Dell Computers
46. Nashville Auto Auction
47. Park and Ride Lot

RPM & associates

Hawkins Partners, Inc. landscape architects

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5.1.4 Roadway Network. An inventory of the existing transportation system network was developed for the City of Lebanon. Characteristics including pavement width, cross-sections, shoulders, ditches, sidewalks, slopes and Average Daily Traffic (ADT) were determined for each road. This information is presented in Table 5.2.

A combination of state, federal and local roads provide regional and local access throughout Lebanon. The roadway network near the core of Lebanon is structured as a grid type pattern of streets. To compare Lebanon to a coordinate system, the downtown square serves as the center point or origin for the roadway network. Thus, the town square defines the north, south, east and west quadrants of the City. Interstate 40 follows an east-west direction dividing the Lebanon study area approximately 1.5 miles south of the town square.

U.S. Highway 231 serves as the y-axis in the Lebanon roadway network. This highway generally follows a north-south direction and bisects Lebanon through the town square. U.S. Highway 231 has multiple street names and cross-sections throughout the Lebanon study area. U.S. Highway 231 is a two-lane highway from the south to Stumpy Lane at which point a center turn lane is added. As U.S. Highway 231 extends north across Interstate 40, the cross-section is widened to five lanes. At Leeville Pike, U.S. Highway 231 narrows to four lanes and continues this cross-section north past the town square to Forrest Avenue. Within the city limits of Lebanon, U.S. Highway 231 is also referred to as Cumberland Street. North of Lebanon, Cumberland Street changes to Hunters Point Pike and maintains a two-lane cross-section.

U.S. Highway 70 serves as the x-axis in the Lebanon roadway network. This highway generally follows an east-west direction and intersects U.S. Highway 231 at the town square. U.S. Highway 70 is a two-lane highway referred to as Lebanon Road in the western portion of the study area. This roadway widens to a three-lane cross-section as it approaches the Lebanon City Limits.

Within the City of Lebanon, Highway 70 is referred to as Main Street. Main Street has a four-lane cross-section in the vicinity of the town square. East of the town square, U.S. Highway 70 narrows back to a two-lane cross-section and changes names from Main Street to York Street. At Baddour Parkway East, U.S. Highway 70N is referred to as Carthage Highway and continues east out of Lebanon.

Baddour Parkway serves as the U.S. Highway 70N By-pass around the north side of Lebanon. In the vicinity of Cumberland Street, Baddour Parkway is referred to as High Street. South of Carthage Highway, this road is called Baddour Parkway East. SR 840 and State Highway 109 provide major north-south regional access to Lebanon. The interchange at SR 840 and Interstate 40 is located in the western portion of the Lebanon growth boundary. SR 840 extends south and connects Lebanon with Murfreesboro. Highway 109 extends north from Interstate 40 to Gallatin. Highway 109 is also in the western portion of the growth boundary.

Old Murfreesboro Road also provides a north-south connection for Lebanon. This roadway parallels U.S. Highway 231 and changes from Old Murfreesboro Road to Maple Street near downtown Lebanon. Leeville Pike provides an additional east-west connection for Lebanon. Leeville Pike parallels Interstate 40 to the north and intersects Tennessee Boulevard at U.S. Highway 231.

TABLE 5.2 EXISTING ROADWAY CHARACTERISTICS
City of Lebanon

Existing Facility	Measurement Taken	Speed Limit	Width	# of Lanes	Shoulder	Ditch	Sidewalk	Slope	2000 ADT
Arlington Rd.	Lexington Dr.	30	19'	unstriped	N	N	N	L	N/A
Babb Dr.	Baddour Pkwy.	30	27'	2 lanes	Y	Y	N	L	4,020
Barton's Creek Rd.	Old Murfreesboro Rd.	N/A	15'	unstriped	N	Y	N	L	N/A
Beckwith Rd.	Hickory Ridge Rd.	45	20'	2 lanes	N	N	N	L	N/A
Berea Church Rd.	Manners Rd.	N/A	19'	2 lanes	N	N	N	L	N/A
Bethlehem Rd.	Roanoke Dr.	30	25'	2 lanes	N	Y	N	L	N/A
Blair Ln.	Woodside Dr.	30	20'	2 lanes	N	N	N	L	2,320
Bluebird Rd.	Trousdale Ferry Pk.	30	17'	2 lanes	N	N	N	L	480
Bluegrass Pkwy.	Martha-Leeville Rd.	30	20'	2 lanes	N	Y	N	M	N/A
C.L. Manier St.	McGregor St.	30	35'	2 lanes	Curb & Gutter	N	Y	L	590
Cainsville Rd.	Maddox Simpson Pkwy.	30	24'	2 lanes	Y	N	N	L	N/A
Cairo Bend Rd.	Lebanon Rd	N/A	25'	2 lanes	N	Y	N	L	N/A
Carver Ln.	Toshiba Dr.	30	20'	unstriped	N	Y	N	M	N/A
Castle Heights Ave.	Spring St.	30	31'	2 lanes	Y	Y	N	L	4,050
Castle Heights Ave.	Franklin Rd.	30	31'	2 lanes	Y	Y	N	L	4,400
Cedar St.	Market St.	30	24'	2 lanes	N	N	Y	L	3,180
Cherokee Dr.	Blair Ln.	N/A	22'	unstriped	N	Y	N	L	N/A
Clearview Dr.	W. Spring St.	N/A	21'	2 lanes	N	N	N	L	N/A
Cole's Ferry Pk.	Castle Heights Ave. N.	30	26'	2 lanes	Curb & Gutter	N	Y	L	5,350
Cole's Ferry Pk.	Castle Heights Ave. N.	30/40	21'	2 lanes	N	N	Y	L	N/A
Crowell Ln.	Leeville Pk.	45	23'	2 lanes	Y	Y	N	L	5,330
Cumberland St	Lester St.	30	46'	4 lanes	Curb & Gutter	N	Y	L	14,930
Cumberland St.	Market St.	30	46'	4 lanes	Curb & Gutter	N	Y	L	12,450
Cumberland St.	Spring St.	30	46'	4 lanes	Curb & Gutter	N	Y	L	13,200
Cumberland St.	I-40	30	50'	5 lanes	Curb & Gutter	N	Y	L	25,220
E. Baddour Pkwy.	TN Blvd.	45	34'	3 lanes	Y	Y	N	L	12,830
E. Forrest St.	N. Lake St.	30	18'	2 lanes	N	Y	Y	L	1,510
E. High St.	Hartsville Pk.	30	54'	5 lanes	Curb & Gutter	N	Y	L	12,450
E. High St.	U.S. Hwy. 70-N	30	54'	5 lanes	Curb & Gutter	N	Y	L	12,980
E. Main St.	Park Ave.	30	40'	4 lanes	Curb & Gutter	N	Y	L	7,780
East Division St.	Beckwith Rd.	45	19'	2 lanes	N	Y	N	L	N/A
East Gate Blvd.	Hwy. 109	30	24'	2 lanes	Y	N	N	L	N/A
East Spring St.	S. College St.	30	24'	unstriped	N	N	Y	L	2,180
Eastland Ave.	Mayfair Dr.	30	25'	2 lanes	N	Y	N	L	840
Edgewood Dr.	Blair Ln.	N/A	20'	unstriped	N	Y	N	L	N/A
Ewing Dr.	Palmer Rd.	30	25'	2 lanes	N	Y	N	L	N/A
Franklin Rd.	Shannon Rd.	45	23'	2 lanes	N	N	N	L	2,330
Gulf St.	Cainsville Rd.	N/A	24'	2 lanes	Y	N	N	L	N/A
Gwin Pl.	Quarry Rd.	N/A	17'	unstriped	N	N	N	L	N/A
Hartmann Dr.	Baddour Pkwy.	30	28'	2 lanes	N	N	N	L	6,680
Hartmann Dr.	Coles Ferry Pk.	30	28'	2 lanes	N	N	N	L	3,810
Hartsville Pk.	Hartmann Dr.	45	22'	2 lanes	Y	Y	N	M	6,680
Hartsville Pk.	Hartmann Dr.	45	22'	2 lanes	Y	Y	N	M	6,240
Hickory Ridge Rd.	Blair Ln.	35	21'	2 lanes	N	N	N	L	960
Hickory Ridge Rd.	Westhill Dr.	35	16'	2 lanes	N	Y	N	M	3,410
Hill St.	North Hatton Ave.	30	22'	2 lanes	N	N	N	L	N/A
Hunt Ln.	Martha Leeville Rd.	N/A	15'	unstriped	N	N	N	L	N/A
Hunters Point Pk.	Tucker Trice Blvd.	45	25'	2 lanes	Y	N	N	L	11,570
Hwy. 109	Powell Grove Rd.	55	24'	2 lanes	Y	Y	N	L	13,970
Indian Hill Rd.	Cherokee Dr.	N/A	22'	unstriped	N	Y	N	M	N/A
Lebanon Rd.	Bethlehem Rd.	55/45	23'	2 lanes	Y	Y	N	L	N/A
Leeville Pk.	Crowell Ln.	50	24'	2 lanes	Y	Y	N	M	6,750
Leeville Pk.	Taryton Dr.	50	24'	2 lanes	Y	Y	N	L	5,470
Leeville Pk.	Castle Heights Ave.	50	24'	2 lanes	Y	N	Y	L	8,550
Leeville Rd.	Safari Camp Rd.	30	22'	2 lanes	Y	N	N	L	N/A
Lexington Dr.	Ewing Dr.	30	29'	2 lanes	N	N	N	L	N/A
Lindsley Rd.	Cainsville Rd.	N/A	19'	2 lanes	N	Y	N	M	N/A
Lovers Ln.	Rome Pk.	45	20'	2 lanes	N	N	N	L	N/A
Maddox Simpson Pkwy.	S.E. Tater Peeler Rd.	30/45	25'	unstriped	Y	Y	N	L	4,210
Mann Rd. (New Section)	Coles Ferry Pk.	30	31'	2 lanes	Y	N	N	L	N/A

Mann Rd. (Old Section)	Manners Rd.	35	20'	2 lanes	N	N	N	M	N/A
Manners Rd.	Coles Ferry Pk.	N/A	28'	unstriped	N	Y	N	L	N/A
Maple Hill Rd.	Carver Ln.	30	28'	2 lanes	N	N	N	L	N/A
Market St.	N. Cumberland St.	N/A	32'	2 lanes	curb	N	Y	L	N/A
Martha-Leeville Rd.	Eastgate Blvd.	40	24'	2 lanes	N	Y	N	L	N/A
McClain Ave.	Greenwood Ave.	15	20'	unstriped	N	Y	N	L	N/A
N. Castle Heights Ave.	Coles Ferry Pk.	30	35'	2 lanes	Curb & Gutter	N	Y	L	7,880
N. Castle Heights Ave.	W. Main St.	30	36'	2 lanes *	Curb & Gutter	N	Y	L	8,800
N. Fairview St.	W. Baddour Pkwy.	30	22'	2 lanes	Y	N	N	L	1,710
N. Greenwood St.	W. Main St.	N/A	23'	2 lanes	N	Y	Y	L	2,480
N. Greenwood St.	Coles Ferry Pk.	N/A	23'	2 lanes	N	Y	N	L	720
Nokes Rd.	Safari Camp Rd.	40	25'	2 lanes	Y	Y	N	L	N/A
North College St.	Market St.	N/A	32'	2 lanes	N	N	Y	L	4,690
North Hatton Ave.	W. Main St.	N/A	24'	unstriped	curb	N	Y	L	N/A
North Maple St.	Main St.	N/A	22'	2 lanes	N	N	Y	L	2,570
Oak Dale Dr.	Hartsville Pk.	30	24'	2 lanes	Y	N	N	L	N/A
Old Laguardo Rd.	Hwy. 109	35	16'	unstriped	N	N	N	L	N/A
Old Murfreesboro Rd.	Barton's Creek Rd.	45	23'	2 lanes	N	Y	N	M	N/A
Old Shannon Rd.	Franklin Rd.	30	17'	2 lanes	N	Y	N	L	N/A
Palmer Rd.	Ewing Dr.	35	19'	2 lanes	N	Y	N	L	N/A
Park Ave.	Baddour Pkwy.	30	30'	2 lanes	curb	N	Y	L	2,920
Park Ave.	Peyton Rd.	30	50'	4 lanes	curb	N	Y	L	14,770
Pennsylvania Ave.	W. Spring St.	30	30'	2 lanes	Curb & Gutter	N	Y	L	770
Peyton Rd.	Park Ave.	30	19'	unstriped	N	N	N	L	N/A
Powell Grove Rd.	Quarry Rd.	40	27'	2 lanes	N	Y	N	L	N/A
Quarry Rd.	Hickory Ridge Rd.	40	19'	2 lanes	Y	Y	N	L	N/A
Roanoke Dr.	Bethlehem Rd.	N/A	22'	2 lanes	N	Y	N	M	N/A
Rome Pk.	Lovers Ln.	30	22'	2 lanes	N	Y	N	M	N/A
Rutland Dr.	Beckwith Rd.	45	21'	2 lanes	N	Y	N	L	N/A
Rutledge Ln.	Hartsville Pk.	N/A	20'	2 lanes	N	Y	N	M	N/A
S Greenwood Ave.	Leeville Pk.	N/A	23'	2 lanes	N	Y	Y	L	3,340
S. College St.	East Spring St.	N/A	28'	2 lanes	curb	N	Y	L	5,960
S. College St.	Briskin Ln.	N/A	28'	2 lanes	curb	N	Y	L	3,290
Safari Camp Rd.	Nokes Rd.	40	19'	2 lanes	N	Y	N	M	N/A
Saratoga Dr.	Lebanon Rd.	N/A	19'	unstriped	N	Y	N	L	N/A
Shorter Rd.	Cainsville Rd.	45	19'	2 lanes	N	Y	N	L	N/A
South Hatton Ave.	W. Main St.	N/A	36'	unstriped	curb	N	Y	L	N/A
South Maple St.	Ligon Dr.	30	26'	2 lanes	N	N	Y	L	3,500
South Maple St.	West Spring St.	30	26'	2 lanes	N	N	Y	L	5,620
South Rutland Rd.	Beckwith Rd.	N/A	24'	2 lanes	N	Y	N	S	N/A
Sparta Pk.	I-40	55	24'	2 lanes	Y	Y	N	L	N/A
Sparta Pk.	Maddox Simpson Pkwy.	45	35'	3 lanes	Y	Y	N	L	N/A
Stumpy Ln.	U.S. Hwy. 231	N/A	19'	unstriped	N	N	N	L	N/A
Sullivan Bend Rd.	Leeville Rd.	N/A	20'	unstriped	N	Y	N	L	N/A
Tarver Ave.	W. Main St.	30	20'	2 lanes	N	N	Y	L	N/A
Tater Peeler Rd.	Maddox Simpson Pkwy.	45	19'	2 lanes	N	N	N	L	N/A
Tennessee Blvd.	E. Baddour Pkwy.	30	25'	2 lanes	Y	N	Y	L	5,340
Tennessee Blvd.	S. College St.	35	28'	2 lanes	Curb & Gutter	N	Y	L	N/A
Toshiba Dr.	Carver Ln.	30	23'	unstriped	Y	Y	N	L	N/A
Trousdale Ferry Pk.	Bluebird Rd.	30	22'	2 lanes	Y	Y	N	L	2,350
Tucker Trice Blvd.	Coles Ferry Pk.	N/A	30'	2 lanes	Curb & Gutter	N	N	L	N/A
Tuckers Gap Rd.	Crowell Ln.	30	17'	unstriped	N	N	N	L	N/A
U.S. Hwy. 231	Stumpy Ln.	55	36'	3 lanes	Y	Y	N	L	N/A
U.S. Hwy. 231	Stumpy Ln.	55	24'	2 lanes	Y	Y	N	L	14,690
U.S. Hwy. 70-N	Eatherly Dr.	55/45	24'	2 lanes	Y	Y	N	L	5,880
W. Baddour Pkwy.	Hartmann Dr.	45	34'	3 lanes	Y	Y	N	L	11,990
W. Baddour Pkwy.	Hartmann Dr.	45	34'	3 lanes	Y	Y	N	L	21,410
W. High St.	Cumberland St.	30	54'	5 lanes	Curb & Gutter	N	Y	L	19,340
W. Main St.	Greenwood St.	30	40'	4 lanes	Curb & Gutter	N	Y	L	13,230
W. Main St.	Babb Dr.	30	40'	4 lanes	Curb & Gutter	N	Y	M	20,440
W. Main St.	Carver Ln.	30	35'	3 lanes	Y	Y	N	L	17,910
West Spring St.	Tarver Ave.	30	20'	2 lanes	N	Y	Y	L	3,780
West Spring St.	Castle Heights Ave.	30	20'	2 lanes	N	Y	N	L	2,790
Westhill Dr.	W. Main St.	30	28'	2 lanes	N	Y	N	L	2,640
Westland Dr.	Blair Ln.	N/A	30'	unstriped	N	Y	N	L	N/A
Winwood Dr.	Hickory Ridge Rd.	30	30'	2 lanes	N	Y	N	L	4,330
Woodside Dr.	Blair Ln.	30	20'	unstriped	N	Y	N	L	N/A
York St.	Baddour Pkwy.	N/A	24'	2 lanes	Y	Y	N	L	6,070

* Median Divided Roadway
NOTE: Width represents total pavement width
L = Level, M = Moderate, S = Steep

Sparta Pike, Hartsville Pike and Coles Ferry Pike provide additional regional access to Lebanon. Sparta Pike is a two-lane highway that is also classified as State Highway 26 and U.S. Highway 70S. Sparta Pike provides a connection to Lebanon from the southeast and converges at Park Avenue and Baddour Parkway East. Hartsville Pike is a two-lane roadway that provides a connection to Lebanon from the northeast. Coles Ferry Pike extends from North Cumberland Street to the northwest.

5.1.5 Sidewalks. The City of Lebanon has the most extensive sidewalk network in Wilson County. However, there are currently no requirements for new sidewalks in the current Lebanon Zoning Ordinance.

Most of the existing sidewalk network in Lebanon is oriented around the town square. These sidewalks serve primarily older residential sections of downtown Lebanon. Sidewalks are also provided along Main Street and Cumberland Street, which have commercial development. The construction of new sidewalk has occurred in the vicinity of new developments such as schools and churches. However, many missing sidewalk links and a general lack of connectivity are apparent throughout much of Lebanon.

Main Street

5.1.6 Bicycle Facilities. There are currently existing signed bike routes on Sparta Pike, Lebanon Road, U.S. Highway 231, SR 109 and SR 141 Bypass. These shared roadways are designated with signs along portions of the roadways. These roads typically possess a wide shoulder width, which provides cyclists a desirable separation from vehicular traffic. A short bike lane section is also provided along Castle Heights Avenue, between Baddour Parkway and Coles Ferry Pike.

An existing multi-use path is also located at Don Fox Park. This path consists of a hard asphalt surface approximately 8 feet wide. The path provides two directions of travel and extends from Don Fox Park to North Greenwood Avenue.

A short section of Greenwood Avenue in the vicinity of Cumberland University is signed as a bike route. However, the signing in place is not consistent with standards and fails to provide a continuous route for cyclists.

Greenwood Avenue

5.2 Future Transportation Network

Over the past several years, the City of Lebanon has experienced steady growth. Future transportation system improvements have been identified and evaluated to meet the needs of this growing city. In response to anticipated growth, the Lebanon 2020 Major Thoroughfare Plan identifies short and long term transportation projects for the City of Lebanon over the next 20 years. These projects are listed in Table 5.3.

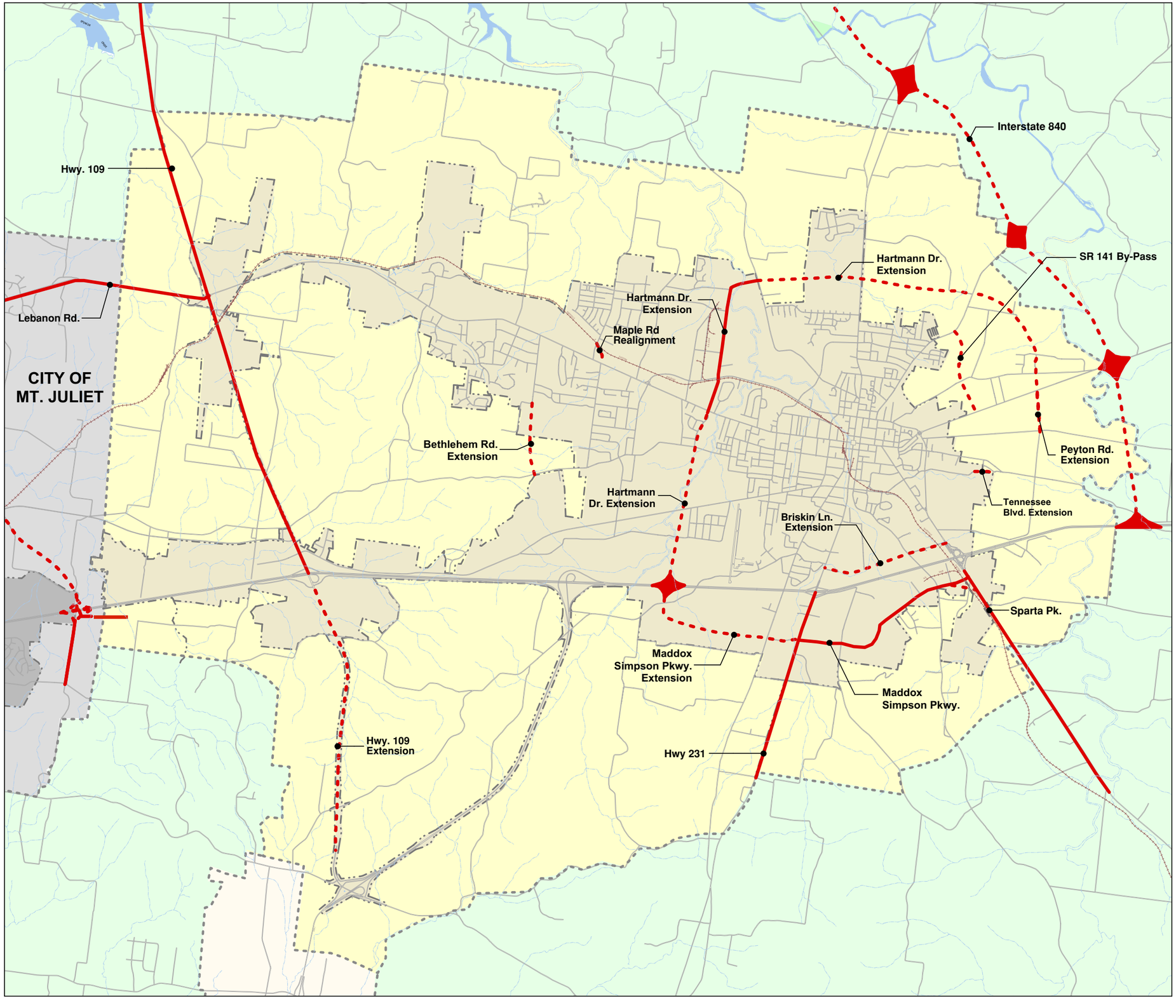
The recommended projects shown in Table 5.3 are intended to help improve the overall efficiency of the transportation network for Lebanon. The locations of these transportation improvement projects are illustrated on Figure 5.3. The combination of the Hartmann Drive extension south to the new interchange on Interstate 40 at Franklin Road and the extension of Maddox Simpson Parkway from U.S. Highway 231 to the new interchange will substantially improve traffic circulation in Lebanon.

The location of the downtown square on U.S. Highway 231 is a constriction to north-south traffic movement through Lebanon. The extension of both Hartmann Drive and Maddox Simpson will relieve traffic congestion in the downtown area by providing better access to Interstate 40 at the proposed interchange near Franklin Road.

In addition to roadway improvements to the transportation network, commuter rail possibilities are also being explored. The Nashville Regional Commuter Rail Evaluation was conducted to establish a practical and affordable commuter rail plan for the Greater Nashville area. The study evaluated six different railroad corridors. The East Corridor would incorporate the existing Nashville & Eastern Railroad line, which extends from Nashville to Mt. Juliet and Lebanon.

TABLE 5.3 FUTURE TRANSPORTATION IMPROVEMENTS 2000-2020
City of Lebanon

Project	Begin Project	End Project	Improvement
Interstate 40 Interchange	In vicinity of Franklin Road	N/A	Construct a new interchange to I-40 in the vicinity of Franklin Road
Briskin Lane Extension	U.S. Highway 231	Sparta Pike	Construct a roadway extension to provide two travel lanes and improve local circulation
Hartmann Drive	New Interstate 40 Interchange	U.S. Highway 70 (W. Main Street)	Construct a new 4-lane roadway that provides a connection between the proposed I-40 interchange and W. Main Street
Hartmann Drive	U.S. Highway 70 (W. Main Street)	Coles Ferry Pike	Construct a new 4-lane roadway to improve local traffic circulation
Hartmann Drive	Coles Ferry Pike	U.S. Highway 231 North	Construct a new 4-lane roadway to improve local traffic circulation
Highway 109 Extension	Interstate 40	SR 840	Construct a new 4-lane roadway to improve local traffic circulation
Highway 109	Interstate 40	Northern Lebanon Growth Boundary	Reconstruct the existing facility to provide four lanes
Lebanon Road	Highway 109	West Baddour Parkway	Reconstruct the existing facility to provide five lanes (four through lanes with two-way left turn lane)
Maddox-Simpson Parkway	New Interchange with I-40 at Franklin Road	U.S. Highway 231 South	Construct an additional segment of the Maddox-Simpson Bypass to provide two lanes of capacity
Maple Hill Road Realignment	Maple Hill Road	Blair Lane	Realignment of Maple Hill Road with Blair Lane
Peyton Road Extension	Trousdale Ferry Pike	Hartsville Pike	Construct an extension to provide two travel lanes and improve local circulation
Sparta Pike	Maddox-Simpson Parkway	Southern Lebanon Growth Boundary	Reconstruct to a 4-lane facility
SR 141 Bypass	Trousdale Ferry Pike	Hartsville Pike	Construct a new 2-lane roadway to improve local traffic circulation
Tennessee Boulevard Extension	Tennessee Boulevard	Blue Bird Road	Construct an extension to provide two travel lanes and improve local circulation
U.S. Highway 231	Walnut Grove Road	Interstate 40	Reconstruct the existing facility to provide five lanes (four through lanes with two-way left turn lane)



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 5.3 Previously Planned Transportation Improvements

CITY OF LEBANON

- Future New Road*
- Future Road Upgrade*

* As proposed by the Lebanon 2020 Major Thoroughfare Plan

- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Major Water Body
- Wilson County Growth Area
- Streams
- Existing Road
- Railroad

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Hawkins Partners, Inc.

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5.3 Opportunities & Constraints

A list of opportunities and constraints for bicycle and pedestrian facilities was developed for the Lebanon study area. This list was compiled based on existing conditions data, planned future transportation improvements, and comments received from the TAC. The constraints that have been identified are impediments that are encountered by cyclists and pedestrians. Opportunities are also identified for potential bicycle and pedestrian facilities. The opportunities and constraints are used in the formulation of the recommended bicycle and pedestrian plan.

5.3.1 Constraints. Four major constraints to potential bicycle and pedestrian facilities were identified in the Lebanon study area. They include the following:

- Interstate 40
- Topography
- Land Use Pattern
- Roadway Cross-sections

Interstate 40. Interstate 40 is a controlled access facility that bisects the Lebanon study area. The interstate acts as a barrier and divides Lebanon into a northern and southern region. A limited number of bridges are available to cross Interstate 40. There are currently interchanges at Highway 109, U.S. Highway 231 and Sparta Pike. However, crossing Interstate 40 at these interchanges is difficult for cyclists and pedestrians due to narrow bridges, high traffic volumes and vehicular speeds.

Bridges across Interstate 40 or undercrossings are also provided along Franklin Road, Old Murfreesboro Road and Cainsville Road. A new interchange is proposed along Interstate 40 in the vicinity of Franklin Road at the Hartmann Drive and Maddox Simpson Extensions. An additional interchange within the Lebanon study area exists at Interstate 40 and SR 840. However, this interchange does not provide a way to cross Interstate 40.

Topography. The relatively flat terrain throughout the Lebanon study area is generally desirable topography for bicycle and pedestrian facilities. However, rolling hills and valleys located throughout the northern and southern extremities of the study area can increase the level of difficulty of a facility. Steep slopes pose a challenge for cyclists and pedestrians by requiring more concentration and energy.

Roads throughout these rugged areas are often characterized by dips and sharp turns. These horizontal and vertical curves can create sight distance problems. Sight distance limitations are especially hazardous to cyclists on shared roadway bike route facilities.

Rome Pike

Topography is also a constraint along many of the creeks throughout the Lebanon study area. Constrained conditions occur when a stream has no discernible creek bed such as portions of Sinking Creek, or when the banks along the stream are steep and heavily wooded. These situations increase the difficulty and expense of installing a multi-use path facility.

Some of the railroad corridors particularly south of the town square near Interstate 40 exhibit steep slope and ditch-like characteristics adjacent to the railroad tracks. This topography serves as a constraint for multi-use path facilities.

Land Use Pattern. The low-density development pattern throughout much of the outlying areas in the Lebanon study area is a constraint for an effective comprehensive bicycle and pedestrian network. This is because the distance between neighborhoods and trip generators increases outside of downtown Lebanon.

Much of the population is spread over a large area along rural roads and highways. These high-speed, narrow roadways are the only option for non-motorized travel. This decreases the likelihood of bicycle and pedestrian trips for transportation purposes.

Linear commercial strip development is typically found along U.S. Highway 231 and throughout sections of Lebanon. The risk of potential conflicts with bicycles and pedestrians is increased by numerous curb cuts.

Roadway Cross-sections. As shown in Table 5.2, many of the existing road widths are designed to minimum standards. In many areas, existing development has built up abutting the roadway right-of-way. Existing buildings, retaining walls, utility lines and other obstructions often make it difficult for a roadway to be easily modified to accommodate bicycle and pedestrian facilities.

5.3.2 Opportunities. Four general opportunities were identified throughout the City of Lebanon for potential bicycle and pedestrian facilities. They include the following:

- Existing Roads
- Future Road Improvements
- Railroad Corridor
- Stream Corridors

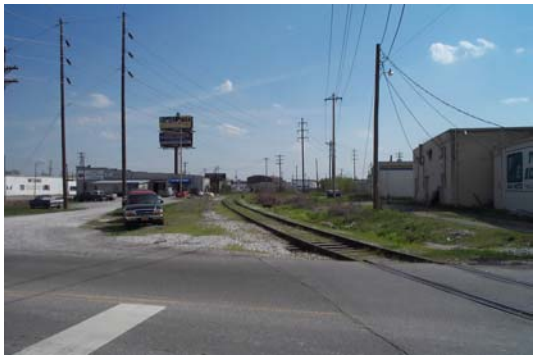
Existing Roads. While many of the roadway cross-sections throughout the Lebanon study area act as constraints due to narrow pavement width, some existing roads can be easily modified for bicycle facilities. The roadways with wide cross-sections shown in Table 5.2 are opportunities for potential bicycle facilities.

Specific roadways that include a wide outside travel lane or shoulder are: Baddour Parkway, Castle Heights Avenue, Hartmann Drive, Highway 109, Maddox Simpson Parkway, Market Street, Park Avenue, Powell Grove Road, South Hatton Avenue, Sparta Pike, Tennessee Boulevard, U.S. Highway 70, U.S. Highway 231 and Winwood Drive.

Tennessee Boulevard

Future Road Improvements. All of the future transportation improvements identified in Section 5.2 offer an opportunity to include bicycle and pedestrian facilities for the Lebanon study area. Typically, roadways are not improved for the sole purpose of providing bicycle and pedestrian facilities because of the cost involved. However, when improvements are made to these roadways, an opportunity exists to include bicycle and pedestrian facilities in the construction project at a relatively minor additional cost.

Railroad Corridor. The existing Nashville & Eastern Railroad line provides an opportunity for a multi-use path facility throughout much of the Lebanon study area. This railroad line generally follows an east-west direction from Nashville to Mt. Juliet and Lebanon. The railroad enters the Lebanon study area near U.S. Highway 70, which it follows to the town square. The railroad exits to the southeast along Sparta Pike.



Nashville & Eastern Railroad

Stream Corridors. As described in Section 5.1.2, numerous creeks and streams flow across the Lebanon study area. These waterways provide additional opportunities for multi-use path facilities. Creeks generally flow along relatively flat topography, which is desirable for all skill levels of cyclists and pedestrians.

Much of the land adjacent to a creek or stream is within the floodplain and is poorly suited for development. However, multi-use paths can often be implemented within the floodplain. With proper design, these facilities are a transportation opportunity while providing erosion control, runoff protection and other environmental benefits to the creek.

Hickory Ridge Creek

5.4 Recommendations

The recommended bicycle and pedestrian network for the Lebanon study area consists of the previously discussed types of facilities:

- Class I: Multi-Use Paths
- Class II: Bike Lanes
- Class III: Shared Roadways
- Bicycle Parking
- Pedestrian Facilities

All of the recommended facilities for Lebanon are summarized in Table 5.4 and illustrated in Figure 5.4.

5.4.1 Concept. The recommended bicycle and pedestrian network establishes essential connections between many of the trip generators and the current and future population centers throughout the city. The plan utilizes a combination of bicycle facilities that can accommodate cyclists of all skill levels and provides a number of route choices to the users for recreational travel and transportation. Pedestrians are served through the provision of multi-use path facilities and sidewalks along main commercial corridors and future subdivisions.

Class I multi-use path facilities along Bartons Creek, Spring Creek, Sinking Creek and portions of the railroad corridor will serve as important routes through Lebanon due to the constraints along many of the existing roadways. The widening of existing roads and construction of new roads will also provide important opportunities to implement bicycle facilities.

5.4.2 Class I: Multi-Use Path. The plan includes approximately 45 miles of multi-use paths that are comprised of the following facilities:

- Bartons Creek Greenway
- Cedar City Trail
- Dry Fork Branch Greenway
- Horn Springs Branch Greenway
- Railroad Greenway
- Sinking Creek Greenway
- Spring Creek Greenway

Bartons Creek Greenway. The Bartons Creek Greenway consists of a multi-use path along the creek extending approximately 9.4 miles across the middle of the Lebanon study area. The creek generally flows from south to north and empties into Old Hickory Lake. The Bartons Creek Greenway provides important connections between the northern study area to Don Fox Park and across Interstate 40 to the south.

The Bartons Creek Greenway extends through many residential neighborhoods in Lebanon. There are also many businesses adjacent to and in the vicinity of Bartons Creek. This provides a valuable connection between homes and businesses, which promotes utilitarian bicycle and pedestrian trips and increases potential commuter trips.

Furthermore, Bartons Creek extends past Friendship Christian Academy and Byars Dowdy School. A greenway along this corridor would provide students with a facility they could use to walk or bike to school. Multi-use paths are desirable facilities for children to use because they are separated from vehicular traffic along roadways and at intersections.

Bartons Creek crosses Interstate 40 just east of the SR 840 interchange. The Bartons Creek Greenway would provide a safe route for cyclists and pedestrians to cross Interstate 40. In order to provide a crossing of Interstate 40, it will be necessary to provide an underpass.

TABLE 5.4 SUMMARY OF BICYCLE AND PEDESTRIAN RECOMMENDATIONS
City of Lebanon

Project	From	To	Type	Length (mile)	Comments	Cost ($1,000))
Babb Dr.	Baddour Pkwy.	Hartmann Dr.	Bike Lanes	0.9	Restripe Roadway	$30
Baddour Pkwy.	Carthage Hwy.	Sparta Pk.	Shared roadway	0.9	Existing Roadway	$8
Bartons Creek Greenway	Northern Growth Boundary	Franklin Rd.	Multi-Use Path	9.4	Within Flood Plain	$3,865
Bethlehem Rd.	Main St.	Hickory Ridge Rd.	Shared roadway	1.6	Future Road Project	$13
Briskin Ln.	U.S. Hwy. 231	Sparta Pk.	Bike Lanes	1.5	Future Road Project	$50
Cainsville Rd.	Tennessee Blvd.	Southern Growth Boundary	Shared roadway	3.6	Existing Roadway	$30
Cairo Bend Rd.	Lebanon Rd.	Northern Growth Boundary	Shared roadway	2.4	Existing Roadway	$20
Castle Heights Ave.	Leeville Pk.	Baddour Pkwy.	Shared roadway	1.3	Existing Roadway	$11
Crowell Ln.	Leeville Pk.	Hickory Ridge Rd.	Shared roadway	0.8	Existing Roadway	$7
Dry Fork Branch Greenway	Western Growth Boundary	Cairo Bend Rd.	Multi-Use Path	1.6	Within Flood Plain	$658
East Division St.	Western Growth Boundary	Martha-Leeville Rd.	Shared roadway	2.3	Existing Roadway	$19
East Gate Blvd.	Hwy. 109	Martha-Leeville Rd.	Shared roadway	0.6	Existing Roadway	$5
East Spring St.	College St.	Park Ave.	Shared roadway	0.4	Existing roadway	$3
Greenwood Ave.	McClain Ave.	Sinking Creek Greenway	Multi-Use Path	0.7	Cedar City Trail	$288
Greenwood Ave.	Leeville Pk.	McClain Ave.	Shared roadway	0.1	Existing Roadway	$1
Gulf St.	Tennessee Blvd.	Harding Dr.	Shared roadway	0.2	Existing Roadway	$2
Harding Dr.	Gulf St.	Park Ave.	Shared roadway	0.3	Existing Roadway	$3
Hartmann Dr. Extension	I-40	Main St.	Bike Lanes	2.1	Future Road Project	$70
Hartmann Dr. Extension	Coles Ferry Pk.	Hartsville Pk.	Bike Lanes	2.6	Future Road Project	$87
Hartmann Dr. Extension	Main St.	Coles Ferry Pk.	Bike Lanes	1.4	Future Widening	$47
Hartsville Pk.	High St.	SR 840	Shared roadway	2.8	Existing Roadway	$93
Hickory Ridge Rd.	Crowell Ln.	Winwood Dr.	Shared roadway	0.2	Existing Roadway	$2
Horn Springs Branch Greenway	I-40	Bartons Creek Greenway	Multi-Use Path	5.1	Within Flood Plain	$2,100
Hunters Point Pk.	Castle Heights Ave.	Old Hunters Point Pk.	Shared roadway	1.8	Existing Roadway	$15
Hwy. 109	SR 840	Northern Growth Boundary	Shared roadway	9.4	Future Road Project	$78
Lebanon Rd./W. Main St.	Western Growth Boundary	Castle Heights Ave.	Shared roadway	8.3	Existing Roadway	$69
Leeville Pk.	Hwy. 109	Cainsville Rd.	Shared roadway	6.8	Existing Roadway	$57

Maddox-Simpson Pkwy.	U.S. Hwy. 231	Sparta Pk.	Shared roadway	2.0	Existing Roadway	$17
Maddox-Simpson Pkwy. Extension	I-40	U.S. Hwy. 231	Bike Lanes	1.9	Future road Project	$63
Market St.	College St.	York St.	Shared roadway	0.6	Existing Roadway	$5
Martha-Leeville Rd.	Eastgate Blvd.	Powell Grove Rd.	Shared roadway	3.0	Existing Roadway	$25
McClain Ave.	Tarver Ave.	Greenwood Ave.	Multi-Use Path	0.3	Cedar City Trail	$123
N. Castle Heights	Baddour Pkwy.	Cumberland St.	Bike Lanes	1.2	Restripe roadway	$40
Nashville Eastern Railroad Greenway	Western Growth Boundary	Sinking Creek Green Way	Multi-Use Path	7.1	Within RR ROW	$2,920
Old Hunters Point Pk.	Hunters Point Pk.	Northern Growth Boundary	Shared roadway	0.7	Existing Roadway	$6
Old Murfreesboro Rd.	Murfreesboro Rd.	Leeville Pk.	Shared roadway	5.0	Existing Roadway	$42
Park Ave.	East Spring St.	Sparta Pk.	Shared roadway	0.7	Existing Roadway	$6
Peyton Rd. Extension	Trousdale Ferry Pk.	Hartsville Pk.	Bike Lanes	2.0	Future Road Project	$67
Powell Grove Rd.	Hwy. 109	Lebanon Rd.	Shared roadway	1.7	Existing Roadway	$14
Quarry Loop Rd.	Quarry Rd.	Hwy. 109	Shared roadway	0.4	Existing Roadway	$3
Quarry Rd.	Nashville Eastern RR Greenway	Quarry Loop Rd.	Shared roadway	0.6	Existing Roadway	$5
S. College St.	Tennessee Blvd.	Market St.	Shared roadway	0.6	Existing Roadway	$5
S.E. Tater Peeler Rd.	Maddox-Simpson Pkwy.	Southern Growth Boundary	Shared roadway	2.0	Existing Roadway	$17
SR 141 Bypass	U.S. Hwy. 70	Hartsville Pk.	Bike Lanes	1.0	Future Road Project	$33
Sinking Creek Greenway	Bartons Creek Greenway	Dixie Ave.	Multi-Use Path	4.9	Within Flood Plain	$2,016
Sparta Pk.	Baddour Pkwy.	I-40	Shared roadway	0.9	Existing Roadway	$8
Sparta Pk.	I-40	Southern Growth Boundary	Shared roadway	1.6	Future Widening	$53
Spring Creek Greenway	Hunters Point Pk.	Cainsville Rd.	Multi-Use Path	18.6	Within Flood Plain	$7,650
Tarver Ave.	McClain Ave.	Spring St.	Multi-Use Path	0.2	Cedar City Trail	$82
Tennessee Blvd.	College St.	Sparta Pk.	Shared roadway	0.6	Existing Roadway	$5
Tucker Trice Blvd.	Coles Ferry Pk.	Hunters Point Pk.	Shared roadway	1.1	Future Road Project	$9
U.S. Hwy. 231	Dixie Ave.	Southern Growth Boundary	Shared roadway	3.0	Future Widening	$100
U.S. Hwy. 70-N (Carthage Hwy.)	Baddour Pkwy.	Eastern Growth Boundary	Shared roadway	2.3	Existing Roadway	$19
W. Baddour Pkwy.	Main St.	Castle Heights Ave.	Bike Lanes	1.9	Restripe Roadway	$63
Winwood Dr.	Hickory Ridge Road	Lebanon Rd.	Shared roadway	0.9	Existing Roadway	$8
York St.	Market St.	Baddour Pkwy.	Shared roadway	0.1	Existing Roadway	$1
Total Cost to Implement Recommended Facilities						**$20,036**

The multi-use path along Bartons Creek would help facilitate north-south travel and provide a route into downtown Lebanon from the southwest region of the Lebanon study area. A connection between the Bartons Creek Greenway and the Cedar City Trail at Don Fox Park would greatly expand the greenway network throughout Lebanon. This would enhance the feasibility for cyclists and pedestrians of all skill levels to utilize non-vehicular transportation for a variety of their daily trips.

Cedar City Trail. The Cedar City Trail is an existing multi-use path located in Don Fox Park. The MPO has included plans for extensions of the Cedar City Trail in the Transportation Improvement Program for 2000 through 2002. The proposed extension would connect Don Fox Park with Cumberland University along Greenwood Avenue. This extension of the Cedar City Trail offers additional connection possibilities with potential greenways along the railroad and Sinking Creek corridors.

Another proposed phase of the Cedar City Trail extension would follow Bartons Creek to the south. The intent of this extension is to connect Don Fox Park with Byars Dowdy School. This is a valuable opportunity to enhance the existing Cedar City Trail. Furthermore, this extension would establish a multi-use path along Bartons Creek. Once constructed, the potential for this facility to be extended to the north and south along Bartons Creek would be greatly increased.

All of the proposed extensions to the Cedar City Trail should be constructed to accepted design standards. Appendix A shows cross-section dimensions and design specifications for multi-use paths. The expansion of the Cedar City Trail is an important step in establishing the backbone of the greenway system in Lebanon.

Sinking Creek Greenway. The multi-use paths along the Sinking Creek Greenway extend along approximately 2.6 miles of the creek corridor. This greenway is proposed in conjunction with a portion of the Railroad Greenway. The multi-use path along portions of Sinking Creek is intended to provide a route through downtown Lebanon. The Sinking Creek Greenway would extend south from the Railroad Greenway near Newby Street. This multi-use path would follow the Sinking Creek floodplain and cross underneath Leeville Pike and U.S. Highway 231. The Sinking Creek Greenway could eventually tie into the bike lanes proposed along the new Briskin Lane Extension.

The Sinking Creek Greenway would continue from the intersection of U.S. Highway 231 and the new Briskin Lane Extension/Holloway Drive. The multi-use path would follow Sinking Creek south under Interstate 40 and tie into Dixie Avenue near the Outlet Village. The Sinking Creek Greenway links this popular destination to the bicycle and pedestrian network.

The shared roadway along U.S. Highway 231 in conjunction with the Sinking Creek Greenway will provide a vital north-south bike route into the heart of Lebanon. Furthermore, the multi-use path along Sinking Creek is a desirable crossing at Interstate 40. The separation from high traffic volumes at the U.S. Highway 231 interchange at Interstate 40 is a primary advantage of the Sinking Creek Greenway. This route provides cyclists and pedestrians an alternative to the high-speed traffic volumes on U.S. Highway 231 north of Interstate 40.

Railroad Greenway. The Railroad Greenway comprises 7.1 miles of multi-use path paralleling the Nashville Eastern Railroad corridor. This greenway provides potential regional connections to Mt. Juliet and Davidson County. The Railroad Greenway enters the Lebanon study area to the west from Mt. Juliet and continues east towards the town square. The proposed multi-use path would follow the railroad corridor southwest of the town square. Topography constraints inhibit the feasibility of continuing a multi-use path along the railroad corridor to the southeast. Therefore, the Railroad Greenway should connect with the Sinking Creek Greenway in the vicinity of Newby Street. This will enhance the continuity of the multi-use path and provide cyclists and pedestrians with greater mobility to access additional routes throughout the network.

The multi-use path along the railroad corridor provides an extended east-west route throughout much of the Lebanon study area. The route follows mostly flat terrain and would provide cyclists of all skill levels with a desirable regional facility. Existing railroad bridges will need to be retrofitted to allow for safe pedestrian and bicycle travel. Where this is not feasible, paralleling facilities can be constructed. Similar design features should also be included where the railroad intersects future roads.

Dry Fork Branch Greenway. The Dry Fork Branch Greenway is located in the northwest corner of the Lebanon study area. This 1.6-mile greenway extends from Cairo Bend Road to the northwestern boundary of the Lebanon study area. However, this Greenway continues into Wilson County and eventually leads to Old Hickory Lake. This multi-use path does not connect any of the trip generators identified for Lebanon and would primarily serve as a recreational facility.

The Dry Fork Branch Greenway provides an east-west connection between proposed shared roadway facilities on Highway 109 and Cairo Bend Road.

Horn Spring Branch Greenway. The Horn Spring Branch Greenway is also located to the northwest of the Lebanon study area. Similar to Dry Fork Branch, the 5.1 mile Horn Spring Branch Greenway would primarily serve as a recreational facility. The multi-use path proposed along this greenway would connect the Bartons Creek Greenway to the Railroad Greenway.

Spring Creek Greenway. Spring Creek flows primarily through the eastern portion of Wilson County from Watertown to Old Hickory Lake. A portion of this creek defines the eastern boundary of the Lebanon study area. The section of the Spring Creek Greenway between Hunters Point Pike and Cainsville Road is approximately 18.6 miles in length and provides a scenic opportunity for a north-south bicycle and pedestrian route just east of Lebanon. This portion of the Spring Creek Greenway connects Cainsville Road, Sparta Pike, Carthage Highway, Hartsville Pike and Hunters Point Pike with a multi-use path.

5.4.3 Class II: Bike Lanes. The proposed bicycle network includes approximately 16.5 miles of bicycle lanes. These proposed bike lane facilities have been identified for existing roads and roads that are planned for future improvements.

Planned roadway improvements provide an opportunity to install bike lanes that would nearly encircle Lebanon. Additional bike lanes are recommended for roads to reinforce the network and to provide important connections to other bicycle facilities, population centers and trip generators.

Roadways within the Lebanon study area that have been recommended for bike lanes include the following:

- Babb Drive
- Baddour Parkway
- Briskin Lane Extension
- Hartmann Drive & Hartmann Drive Extension
- Maddox-Simpson Parkway Extension
- N. Castle Heights Avenue
- Peyton Road Extension
- SR 141 Bypass

The Maddox Simpson Parkway Extension, Hartmann Drive Extension and Peyton Road Extension are planned roads that will eventually link together to form three-quarters of a loop around Lebanon. Bicycle lanes are recommended along these new roadways. This will establish valuable and definitive connections for cyclists to many additional routes within the network. This provides greater mobility and improves the feasibility of utilizing non-vehicular modes of transportation.

Babb Drive, Baddour Parkway and Castle Heights Avenue are existing roadways recommended for bike lanes. These roads are located in the northwest quadrant of the City and connect many of the miscellaneous trip generators and schools. Providing bike lanes on these roads encourages utilitarian trips such as commuting to work or bicycling to school. All of these bike lanes connect with one another further increasing the desirability of these facilities.

Additional bike lanes are proposed for Briskin Lane and SR 141 Bypass. Bike lanes along the Briskin Lane Extension will connect to U.S. Highway 231 and Sparta Pike, which are both shared roadways. A connection with the Sinking Creek Greenway is also possible along Briskin Lane. Bike lanes on SR 141 Bypass can connect the shared roadways of Hartsville Pike and Carthage Highway.

5.4.4 Class III: Shared Roadways. Shared roadways proposed for the bicycle and pedestrian network include approximately 71.6 miles of designated bike routes in the Lebanon study area. The recommended shared roadways for the Lebanon network are distributed over 36 different roadways.

Shared roadways have been recommended for the Lebanon study area on a variety of roads. Many of these proposed shared roadways serve as critical connections and provide continuity to other bicycle facilities within the network. Other proposed shared roadways are preferred routes through high-demand corridors often used by avid cyclists. Segments of roadways that are recommended for signage as designated bike routes in the Lebanon study area are shown in Table 5.4 and Figure 5.4.

Many of the roads recommended for shared roadways in the Lebanon study area are popular cycling routes in Wilson County that provide a connection into Lebanon. These routes include:

- Cairo Bend Road
- Hunters Point Pike
- Highway 109
- Old Hunters Point Pike
- Old Murfreesboro Road
- S.E. Tater Peeler Road
- Sparta Pike
- U.S. Highway 231
- U.S. Highway 70-N

Additionally, Lebanon Road and East Division Street provide desirable connections to Lebanon from Mt. Juliet.

Proposed shared roadways within Lebanon provide continuity to other bicycle and pedestrian facilities to establish a network. Maddox Simpson Parkway is an example of a shared roadway which promotes continuity with other bicycle facilities. This route connects the bike lanes on Maddox Simpson Parkway Extension to the bike route on Sparta Pike. The Maddox Simpson shared roadway also intersects shared roadways on S.E. Tater Peeler Road and Cainsville Road.

Maddox Simpson Parkway

5.4.5 Bicycle Parking. The installation of bicycle storage facilities, including racks and lockers is recommended for convenience and safety. These storage areas should be located along the corridor near trip generators to help promote the use of bicycle facilities. As these bicycle facilities are constructed, the need for bike parking and storage will become apparent in certain high demand locations.

The trip generators that should be considered for bicycle storage include schools such as Sam Houston Elementary School, Gladeville Elementary School, and other facilities that will attract children. Consideration should also be given to recreational parks, businesses, retail centers and grocery stores.

5.4.6 Pedestrian Facilities. This plan recommends the construction of new sidewalks throughout the City of Lebanon. The proposed locations for new sidewalks are intended to improve the existing sidewalk network. Figure 5.5 shows existing sidewalks and proposed new sidewalks in Lebanon. The existing sidewalks have been further classified by the condition of the facility. Sidewalks in poor condition should be improved or replaced.

Sidewalk in Poor Condition

Missing sidewalk links throughout the existing network have been identified. New sidewalks are recommended along all of the missing links to establish better continuity and usability for pedestrians. Residential neighborhoods and areas within the City of Lebanon have been targeted for new sidewalk construction.

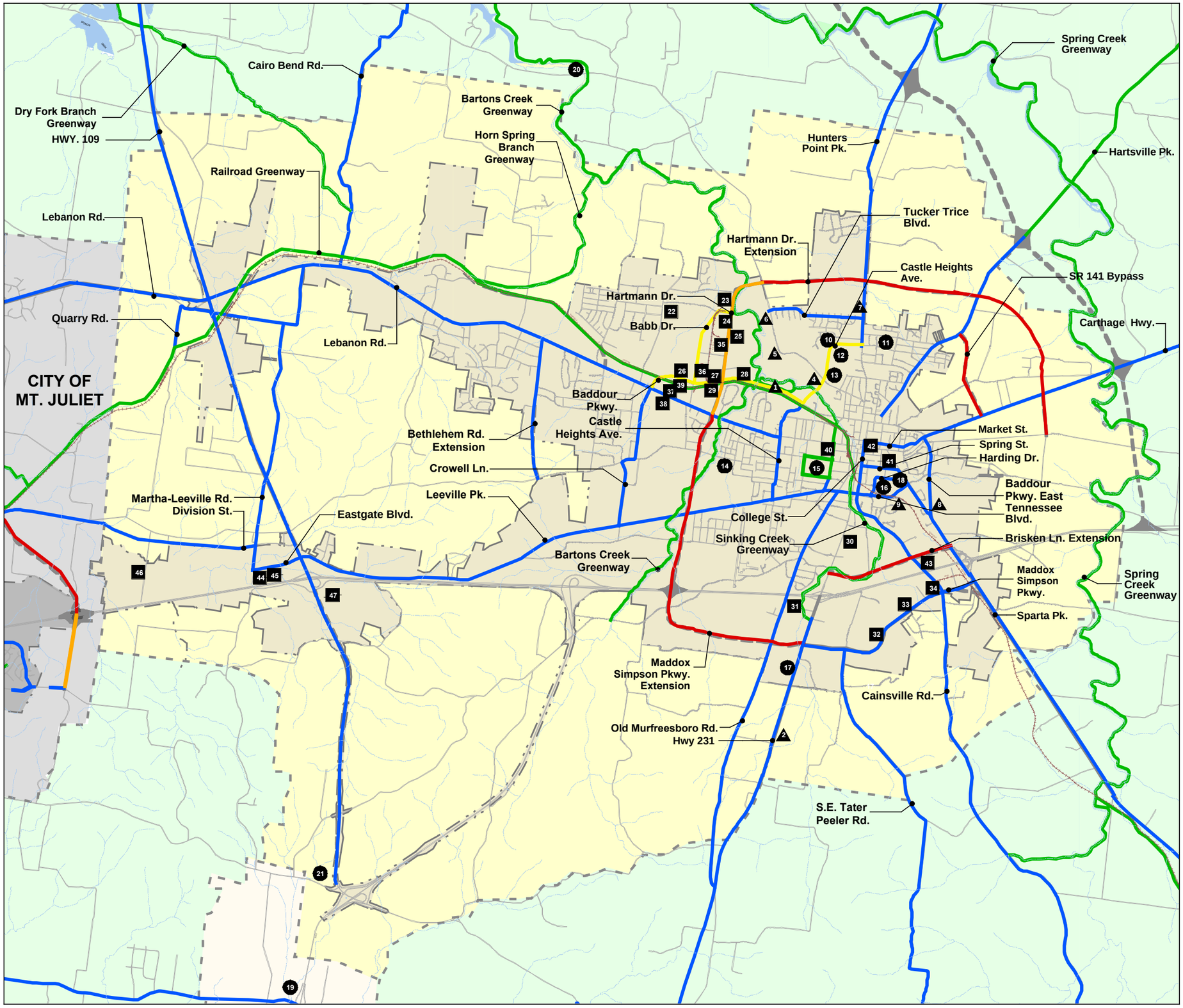
Sidewalk in Good Condition

Public comment indicated Hartsville Pike is badly in need of sidewalks. The residential area between Leeville Pike and West Main Street in the southwest quadrant of Lebanon is also a strong candidate for new sidewalks. This traditional type neighborhood follows a grid design of interconnecting streets. Byars Dowdy Elementary School is located in the vicinity.

Additional sidewalk recommendations include extending sidewalks along both sides of U.S. Highway 231 south to Interstate 40. High-density commercial development is located along this corridor. Sidewalks along West Main Street should also be extended to Baddour Parkway.

Unless otherwise signed, crosswalks are already legally present at all intersections, although many may be unmarked. For the increased safety of pedestrians, it is recommended that pedestrian crossing facilities be provided at all signalized intersections.

Crossing facilities should also be considered for intersections near schools, parks and future greenway trailheads. These are typical locations of high pedestrian volumes, which may warrant crossing facilities. Signalized intersections should include crosswalks, pedestrian signal heads and pushbuttons. Design standards for a variety of crosswalk markings are included in Appendix A.



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 5.4 Bicycle Recommendations

CITY OF LEBANON

- Class I: Multi-use Path
- Class II: Bike Lanes (Future Road Project)
- Class II: Bike Lanes (Future Road Widening Project)
- Class II:Bike Lanes (Existing Road)
- Class III: Bike Route
- Only if ungraded in future
- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Wilson County Growth Area
- Streams
- Existing Road
- Railroad

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WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 5.5 Pedestrian Facilities Recommendations

CITY OF LEBANON

- Existing Sidewalks in Good Condition
- Existing Sidewalks in Poor Condition
- Proposed Sidewalks
- Lebanon Corporate Limits
- Lebanon Growth Area
- Wilson County Area
- Streams
- Existing Road
- Railroad

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5.5. Lebanon Sidewalk Ordinance

5.5.1 General. Pedestrian facilities are an important component of a city's overall transportation system. In Middle Tennessee, many communities have recognized the desirability and need for sidewalks. As a result, these communities are beginning to require that sidewalks be constructed for new subdivisions and new roadways. Lebanon does not currently require that sidewalks be constructed for new development. One of the components of this bicycle and pedestrian plan is to develop sidewalk requirements for the City of Lebanon.

It is recommended that the City of Lebanon adopt the following text regarding sidewalks.

5.5.2 Recommendation for Sidewalk Ordinance. The purpose of this provision is to provide for the safety, health and welfare of the citizens of Lebanon by requiring the construction of pedestrian access ways in all new commercial and residential developments in the City of Lebanon.

1.) Sidewalks shall be required in all commercial and residential areas, with the exception of those subdivisions: (a) which were approved prior to _____, 2002. (b) that are final plats of additional sections of subdivisions where sidewalks were not required in previously recorded sections. (c) that are located on cul-de-sac streets containing no more that 20 lots or are minor subdivisions containing 5 lots or less.

2.) If non-existing at the time of development, sidewalks are required to be constructed on both sides of the street.

3.) The design, dimensions, dedications, easements, and reservations for all sidewalks shall conform to applicable City of Lebanon regulations. Sidewalks shall be constructed within the public rights-of-way and shall be installed in accordance with the adopted standards of the City of Lebanon. (a) Sidewalks shall be constructed of Portland cement concrete and shall be 5 to 6 feet in width in residential areas and 6 feet in width for non-residential subdivisions. (b) Sidewalks shall maintain a minimum thickness of 4 inches except at driveway areas where the minimum thickness is 8 inches. (c) Along streets where concrete curbs are required, a median strip of grassed or landscaped area at least 4 feet wide shall be provided between the curb and sidewalk. When sidewalks are constructed along existing substandard streets, the sidewalks shall be located in relation to the future curb line.

4.) A continuous, all-weather internal sidewalk network shall be provided in all commercial developments to connect all building entryways and exits to parking areas. The internal sidewalk system shall connect to sidewalks or potential future sidewalks in the public right-of-way. All new sidewalks shall conform to ADA requirements. Industrial subdivisions are exempt from the internal sidewalk requirement.

5.) Unless otherwise provided for in a permit issued for other construction work, a permit from the City of Lebanon Public Works Department shall be required prior to the original construction or any replacement or reconstruction of a sidewalk, or portion thereof.

6.) In any case where the reconstruction or construction of a sidewalk or other pedestrian walkway is required by contract, the City of Lebanon may require the contractor to

secure a bond for the construction of the sidewalk or walkway.

7.) The City of Lebanon Planning Commission may determine that the construction of a sidewalk or pedestrian walkway is unfeasible due to special circumstances. This may include, but is not limited to: impending road construction, significant trees or severe roadside conditions and may instead require either: (a) payment in lieu of sidewalk construction or (b) a combination of sidewalk and/or alternative walkways and/or payment in lieu funds. Payment in lieu provisions for sidewalks should be developed by the City of Lebanon so that this is an option available for the city to exercise.

8.) It shall be the duty of all owners of property abutting or adjacent to any sidewalk, whether such sidewalk is in a public right-of-way, or subject to public easement, to maintain such sidewalks in good repair. The adjacent property owner is therefore responsible for the repair, replacement and general upkeep of the sidewalk. In circumstances where maintenance of the sidewalk is required due to the encroachment of vegetation or other reasons, the City of Lebanon may choose to conduct the necessary sidewalk maintenance at the property owner's expense.

5.5.3 Bike Lanes and Paths. The Lebanon Planning Commission may approve an alternate pedestrian walkway system or bicycle path for a given development. Alternative pedestrian walkways and bikeways may include walking trails or multi-use paths. (a) Multi-use paths, where required by the planning commission, shall be included within a dedicated right-of-way and shall be improved as required by the city engineer. (b) These walkways and multi-use paths may be located in public right-of-way independent of the roadway right-of-way. Thus, these facilities are not restricted to alongside streets. (c) Bike lanes, where required by the planning commission, shall be included within a dedicated street right-of-way and shall be designated as a portion of the roadway. Bike lanes shall be designed according to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities.

The planning commission may require, in order to facilitate pedestrian and bicycle access from the roads to schools, parks, playgrounds or other nearby roads, perpetual unobstructed easements at least 20 feet in width. Easements shall be indicated on the plat.

6. WILSON COUNTY

6.1 EXISTING CONTEXT

Wilson County is located in Middle Tennessee just east of and contiguous to Metropolitan Nashville and Davidson County. It is part of the five-county regional planning organization, the MPO. The existing roadways within the Wilson County study area are shown in Figure 6.1.

Wilson County & Surrounding Counties

Three planning areas exist within the county: Mt. Juliet, Lebanon and Wilson County. For this study, the planning limits utilized for both Lebanon and Mt. Juliet include the areas encompassed by the respective 2020 growth boundaries. The planning area utilized for the county includes the remainder of Wilson County.

The Interstate 40 corridor that runs east-west between Nashville and Knoxville cuts through the county near the mid-point from north to south. The county comprises approximately 570.6 square miles. Lebanon and Mt. Juliet City limits comprise approximately 17.8 and 11.8 square miles, respectively.

6.1.1 Development Pattern. The county's residential development pattern is characterized by low-density, single-family housing scattered throughout the county, and small to medium farming. More densely developed areas exist in the Watertown area, and in the northwesterly portion of the county adjacent to Davidson and Sumner Counties.

Significant commercial areas are not found outside of Lebanon, Mt. Juliet or Watertown.

6.1.2 Geography. The northern half (north of I-40) and the southwestern quadrant of the county planning area are generally characterized by gentle rolling forested hills. The southeastern quadrant of the county planning area is generally characterized by flat to gently rolling open spaces.

General Terrain

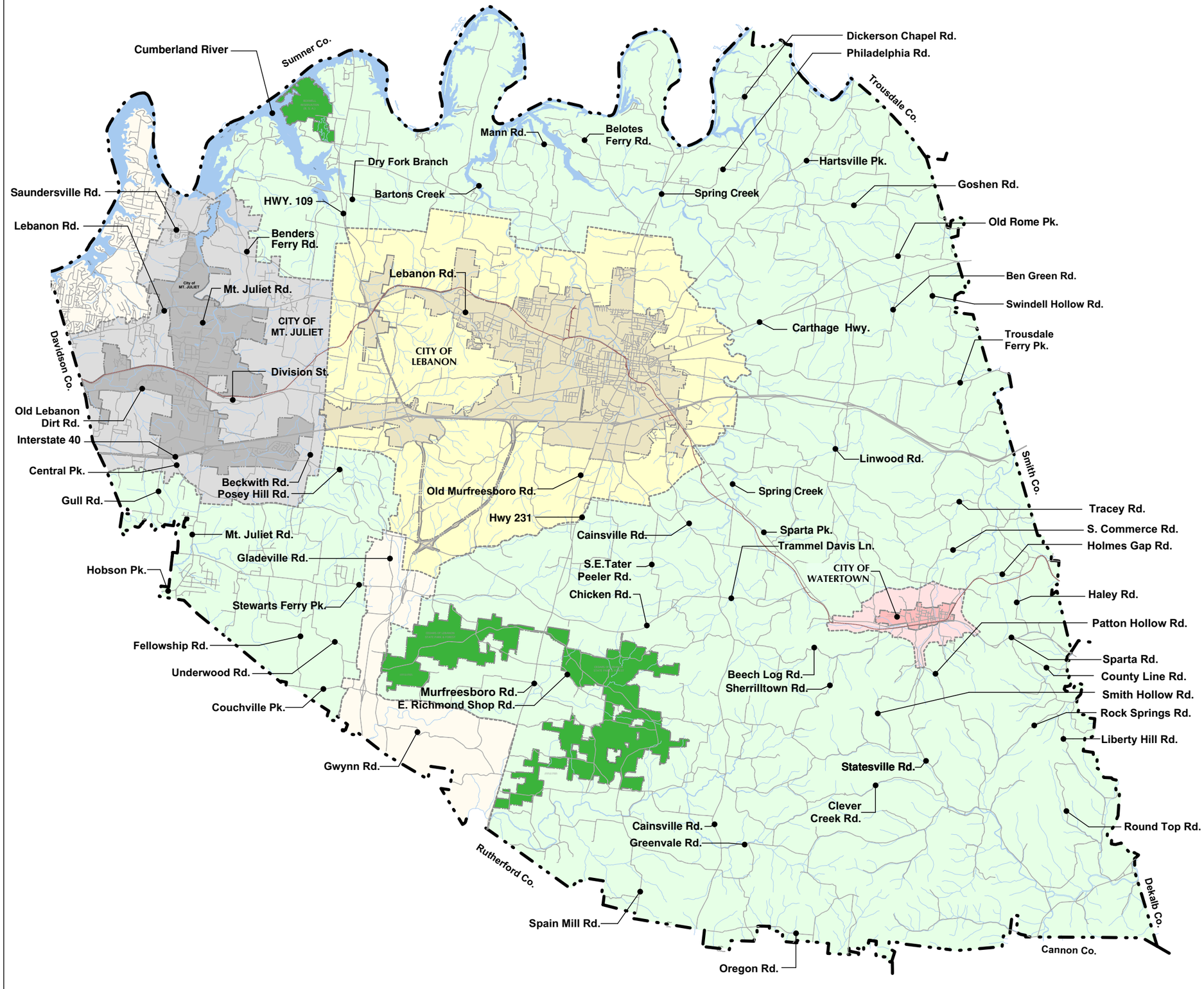
Bartons Creek, Sinking Creek and Spring Creek, all in the north to northwestern portion of the county form observable valley corridors that meander through the planning area. These creeks provide capacity for storing flood events and create opportunities for multi-use path greenways. Spring Creek extends far into the southeastern portion of the county.

These valley areas are critical to flood protection within the study area.

WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 6.1 Existing Conditions



WILSON COUNTY

- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Wilson County Growth Area
- Watertown Corporate Limits
- Watertown Growth Area
- State Owned Land
- Streams
- Existing Road
- Railroad

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6.1.3 Trip Generators. The purpose of the bicycle and pedestrian network is to provide a comprehensive alternative transportation system that connects citizens to desired destinations within the community. This plan refers to these destinations as "trip generators."

As shown in Table 6.1 the planning team and the Technical Advisory Committee (TAC) identified sixteen trip generators for the Wilson County plan. Figure 6.2 identifies the location of each trip generator.

TABLE 6.1 TRIP GENERATORS
Wilson County

Parks
Cedars of Lebanon State Park
Seven Points Recreation Area
Cooks Recreation Area
Lone Branch Recreation Area
Shady Acres Camp Ground
Camp Easter Seals
Shutes Branch Recreation Area
Cedar Creek Recreation Area
Schools
Gladeville Elementary
Wilson County High School
Friendship Christian Academy
Rutland Elementary
West Elementary
Other
Nashville Auto Auction
National Fulfillment
Dell Computers

The identified trip generators are grouped into three categories. They include parks, schools, and other miscellaneous generators.

Parks. Parks included are all public or semi-public park and recreational facilities.

Schools. Schools included are all private and public educational facilities.

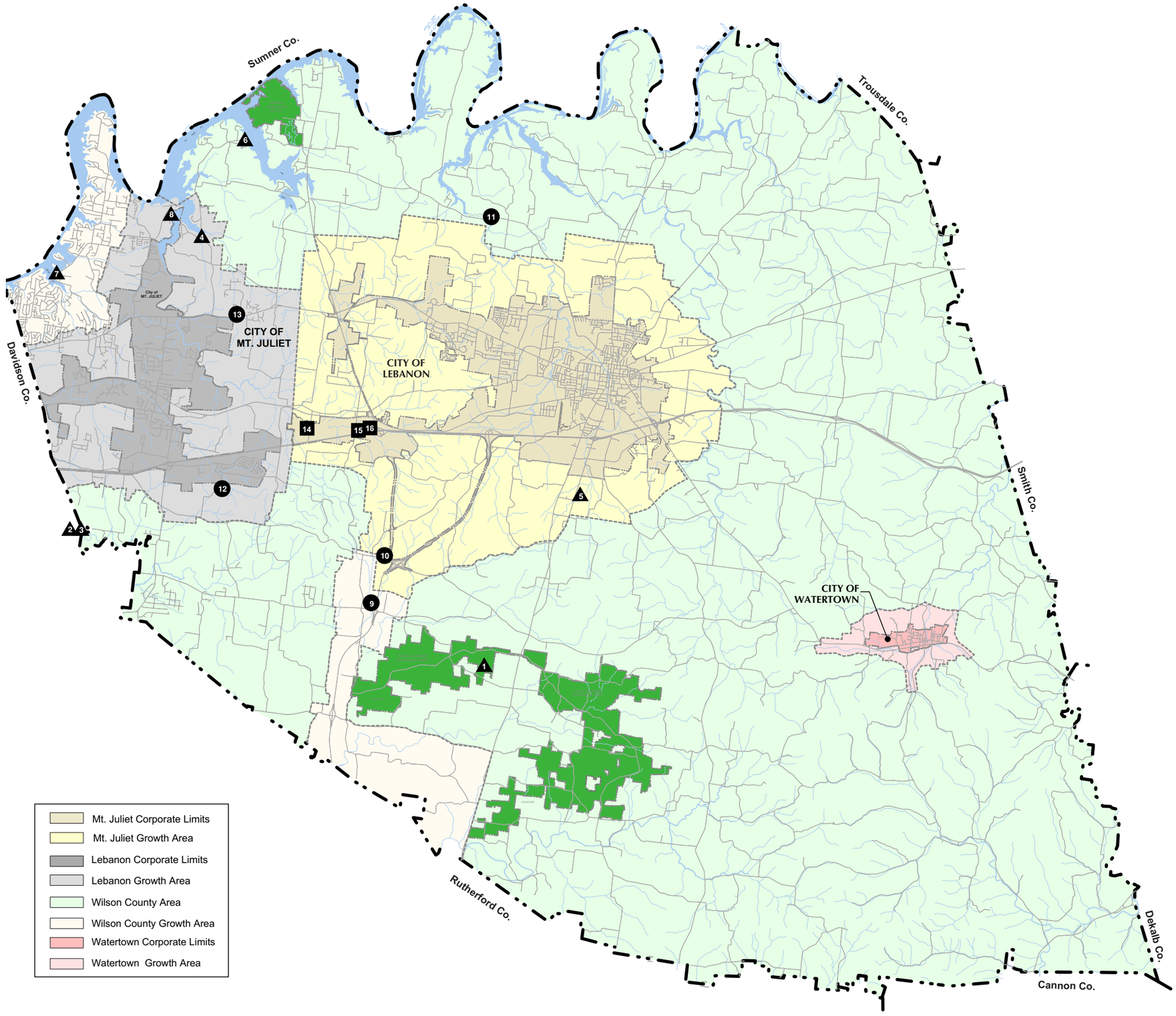
Other. Other includes civic destinations, commercial centers, businesses that employ over fifty employees, and transit related facilities.

6.1.4 Existing Transportation Network. A combination of federal, state and local roadways including interstates, expressways, arterials and collectors make up the existing surface transportation network within Wilson County. Other transportation amenities (e.g. mass transit) within the county are omitted here but are discussed in the Mt. Juliet and Lebanon sections of this study.

Interstate 40, Carthage Highway (U.S. 70N), and Sparta Pike (U.S. 70, SR 26) provide regional east-west access. These routes connect Nashville, Mt. Juliet and Lebanon, and areas to the east of Lebanon. Interstate 40 is considered significant within this study because of the constraint it poses to bicyclist and pedestrians.

SR 840, SR 109, and U.S. Highway 231 (Hunters Point Pike/ Murfreesboro Road) provide regional north-south access. These routes connect the Lebanon and Mt. Juliet area to the Gallatin area in Sumner County to the north, and connect the Lebanon and Mt. Juliet area to the Murfreesboro area in Rutherford County to the south. Again SR 840 is considered significant within this study not because of its potential to contribute to the bicycle and pedestrian network, but because of the constraint it poses to bicyclists and pedestrians.

Like many other areas across Tennessee and the country, many of the existing county roads were originally built to minimum design standards in an effort to reduce the initial cost of construction. As a result, in many cases, existing pavement widths will not easily accommodate the addition of bicycle facilities.



WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 6.2 Trip Generators

WILSON COUNTY

▲ Parks

1. Cedars of Lebanon State Park
2. Seven Points Recreation Area
3. Cooks Recreation Area
4. Lone Branch Recreation Area
5. Shady Acres Camp Ground
6. Camp Easter Seals
7. Shutes Branch Recreation Area
8. Cedar Creek Recreation Area

● Schools

9. Gladeville Elementary
10. Wilson County High School
11. Friendship Christian Academy
12. Rutland Elementary
13. West Elementary

■ Other

14. Nashville Auto Auction
15. National Fulfillment
16. Dell Computers

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TABLE 6.2 EXISTING ROADWAY CHARACTERISTICS
Wilson County

Existing Facility	Measurement Taken	Width	# of Lanes	Shoulder	Ditch	Sidewalks	Slope	2000 ADT*
Bill France Boulevard	Murfreesboro Road	60'	5	Y	N	N	L	N/A
Cainsville Road	Sherrilltown Road	22'	2	Y	Y	N	L	NA
Cairo Bend Road	Coles Ferry Pike	22'	2	N	Y	N	L/M	1,090
U.S. Hwy. 70N	Big Spring Road	24'	2	Y	Y	N	L/M	NA
Chicken Road – Trammell Lane	Tater Peeler Road	20'	2	N	Y	N	L	NA
Hartsville Pike	Taylorsville Road	24'	2	Y	Y	N	L/M	3,720
Hobson Pike	Stewarts Ferry Pike	24'	2	Y	Y	N	L	NA
Hunters Point Pike – Canoe Branch	Philadelphia Road	22'	2	N	Y	N	L/M	NA
Murfreesboro Road (U.S. Highway 231)	Central Pike	24'	2	Y	Y	N	L	NA
Sherrilltown Road – Beach Log Road	Sherrilltown Road – Beach Log Road	18'	2	N	Y	N	L	360
Sparta Pike	Greenwood Road	24'	2	Y	Y	N	L/M	NA
Highway 109	Double Log Cabin Road	24'	2	Y	Y	N	L/M	13,920
Statesville Road	Rocky Branch Road	22'	2	Y	Y	N	L	840
Stewarts Ferry Pike – Central Pike	Central Pike	22'	2	Y	Y	N	L	NA
Tater Peeler Road	Chicken Road	20'	2	N	Y	N	L	NA

* Tennessee Department of Transportation
Y=Yes, N=No, L= Level, M=Moderate, S=Steep

Many of the roadways within the county may be characterized as asphalt roads having no shoulders with paralleling ditches.

In Table 6.2 is a list of those existing roadways within the county that the planning team and TAC identified as significant potential contributors to the bicycle and pedestrian network. A complete list of the existing roadway network for Wilson County, including information similar to that presented in Table 6.2, may be found in the Wilson County 2020 Major Thoroughfare Plan beginning on Page 4-1 and following.

6.1.5 Utility Corridors. Significant major utility corridors that exist within the county, other than those listed in the Mt. Juliet and Lebanon sections of this plan, neither inhibit nor aide the development of the county portion of the bicycle and pedestrian master plan.

6.1.6 Pedestrian Facilities. There were no facilities specifically constructed for pedestrian use that were inventoried within the county planning area. Since residential development is scattered and sparse, sidewalks are rarely built as part of the development.

6.1.7 Bicycle Facilities. There are no facilities specifically constructed for bicycle use that were inventoried within the county planning area. However, there appears to be a small, but hearty, group of bicycle enthusiasts that ride recreationally on many of the highways within the area.

Also, a group of avid bicyclists have promoted riding between Lebanon and the Watertown area, specifically on Tater Peeler Road and adjacent roadways. They have produced a one-page card (3 ½" by 8 ½") printed on both sides with information about bicycling within the Watertown area.

U.S. Highway 70 (Lebanon Road) has been designated as the Bristol-to-Memphis Bike Route by the State of Tennessee. No signs have been erected nor pavements marked along the route at the time of this study. The Bristol-to-Memphis Bike Route is a shared roadway that follows U.S. Highway 70 across the state.

6.2 Future Transportation Network

Over the next twenty years, Wilson County, and the Cities of Mt. Juliet and Lebanon, will build additional roads and improve existing surface transportation facilities. The Wilson County 2020 Major Thoroughfare Plan identifies recommended roadway system improvements for the county, including future roadways and upgrades to existing roads. In Table 6.3 is a list of those roadway improvements identified within the Wilson County 2020 Major Thoroughfare Plan that the planning team and TAC identified as significant potential contributors to the bicycle and pedestrian network.

TABLE 6.3 FUTURE TRANSPORTATION IMPROVEMENTS 2000-2020
Wilson County

Project	Begin Project	End Project	Improvement
Hartsville Pike (SR 141)	SR 840	Trousdale County	Reconstruct to median divided four lane facility
Sparta Pike (U.S. Hwy. 70, SR 26)	Interstate 40	Greenwood Road	Reconstruct to four lane facility
Highway 109	Interstate 40	Sumner County	Reconstruct to four lane facility

Source: Wilson County 2020 Major Thoroughfare Plan

6.3 Opportunities & Constraints

Upon review of the existing conditions, the planning team and the Technical Advisory Committee (TAC) identified the following potential constraints and opportunities within the county.

6.3.1 Constraints. Five major constraints were identified. They include the following:

- Interstate 40
- Existing Roadway Cross-Sections
- Low-Density Development Pattern
- Topography
- Lack of Existing Bicycle and Pedestrian Facilities

Interstate 40. Interstate 40 is a barrier to bicyclists and pedestrians due to the limited number of crossings and the high cost of creating new ones. There is currently only one grade-separated crossing within the county that is not included in the Mt. Juliet or Lebanon study areas. This crossing is in the eastern part of the county at Bobo Road.

Existing Roadway Cross-Sections. Existing road cross-sections that do not meet minimum standards will be expensive to upgrade to allow for bicycle lanes. However, improvements to several roadways are slated to be constructed with state funds.

Hartsville Pike

Low-Density Development Pattern. The county's development pattern presents a difficult challenge to creating an effective comprehensive bicycle and pedestrian network that would be heavily utilized by many citizens. Since much of the population is scattered over a large area, the distance between neighborhoods and trip generators is greater than the average person is typically willing to travel by bicycling or walking for these types of trips.

Topography. The hill and valley nature of the topography within the planning area poses a challenge to providing safe and effective bicycle and pedestrian facilities. This is due to the numerous routes where cyclists and pedestrians must overcome hills, which increases the level of difficulty. Roadways that are built in areas with rugged terrain often are characterized by dips and sharp turns. The twists and turns can be dangerous to navigate by bicycle where sight distances are limited.

Lack of Existing Bicycle and Pedestrian Facilities. Since there are few existing bicycle and pedestrian facilities, there is little to build upon and thus, a much larger investment in the future will be required.

6.3.2 Opportunities. Four major opportunities were identified. They include the following:

- Existing Roads
- Future Transportation Improvements
- Railroad Corridor
- Stream Corridors

Existing Roads. Existing roads within the planning area that can accommodate bicycle facilities include: SR 109; Cairo Bend Road; Hunters Point Pike (U.S. 231) – Canoe Branch; Hartsville Pike (SR 141); Carthage Highway (U.S. Highway 70N); Sparta

Pike (U.S. Highway 70, SR 26); Statesville Road (SR 267) – SR 96; Cainsville Road (SR 266); Murfreesboro Road (U.S. Highway 231); Bill France Boulevard; Stewarts Ferry Pike – Central Pike; and Hobson Pike.

Cairo Bend Road

Canoe Branch Road

Cainsville Road

Tater Peeler Road

Future Transportation Improvements. All future transportation improvements identified in the previously mentioned thoroughfare plans offer an opportunity to include bicycle and pedestrian facilities when they are constructed. It is typically prohibitively expensive to widen existing roads for the sole purpose of providing bicycle facilities. However, new road improvements create the opportunity to provide these facilities at a reduced cost.

Railroad Corridor. Like most railroads, the existing railroad corridor that runs from Lebanon to Watertown is constructed with very flat grades. This corridor creates an opportunity for a rail-with-trail, or "multi-use" path. The railroad corridor also provides connections to the City of Lebanon and points beyond.

Stream Corridors. The Sinking Creek and Spring Creek Corridors offer a wonderful opportunity for incorporating a multi-use trail system throughout the area.

Like railroad corridors, stream corridors typically have very flat grades. These areas of moderate topography offer the greatest opportunities for all skill levels of cyclists and pedestrians. Unlike conventional development, multi-use trails can be incorporated into the floodplains.

6.4 RECOMMENDATIONS

The recommended bicycle and pedestrian network utilizes the following types of facilities:

- Class I: Multi-Use Paths
- Class II: Bike Lanes
- Class III: Shared roadways
- Bicycle Parking

6.4.1 Concept. The recommended bicycle and pedestrian network establishes essential connections between many of the trip generators and the current and future population centers throughout the county. The plan utilizes a combination of bicycle facilities that can accommodate cyclists of all skill levels and provides a number of route choices to the users for recreation and transportation. Pedestrians are served through the provision of multi-use path facilities and sidewalks within future subdivisions.

The recommended network consists of three multi-use paths (each a part of the recommendations for Lebanon) and several bicycle routes. The bicycle and pedestrian facilities for Wilson County are shown in Table 6.4.

6.4.2 Class I: Multi-Use Path. The plan includes approximately 37.7 miles of multi-use paths that are comprised of the following facilities:

- Bartons Creek Greenway
- Sinking Creek Greenway
- Spring Creek Greenway/Watertown Railroad Greenway

Bartons Creek Greenway. The Bartons Creek Greenway follows 5.9 miles of the creek corridor as it meanders through the northeastern portion of the county planning area. It provides an important connection between the waterfront recreational points of interest on Old Hickory Lake and neighborhoods in the northwestern area of the City of Lebanon. It further provides a vital link to the greenway network proposed within the Cities of Lebanon and Mt. Juliet.

The proposed greenway follows the stream corridor and therefore will provide relatively flat topography that will accommodate cyclists and pedestrians of any skill level. It further provides access to some very scenic areas of the county.

Conflicts and crossings of concern include three crossings of SR 109 between Double Log Cabin Road and N. W. Williams Road. These crossings will require considerable thought by the designer of the greenway system in order to provide adequate safety to bicyclists and pedestrians.

Sinking Creek Greenway. The Sinking Creek Greenway follows 5.3 miles of the creek corridor as it winds through the northern portions of the county.

Sinking Creek also provides an important connection between the waterfront recreational points of interest on Old Hickory Lake and neighborhoods in the northern area of Lebanon. It also provides a vital link to the greenway network proposed within the Cities of Lebanon and Mt. Juliet.

The proposed greenway follows the stream corridor and therefore will provide a relatively flat facility that will accommodate cyclists or pedestrians of any skill level. It also provides access to some very scenic areas of the county.

Conflicts and crossings of concern include one crossing at Coles Ferry Pike. This crossing will require considerable thought by the designer of the greenway system in order to provide adequate safety to bicyclists and pedestrians.

TABLE 6.4 BICYCLE AND PEDESTRIAN FACILITY RECOMMENDATIONS
Wilson County

Project	From	To	Type	Length (mile)	Comments	Cost ($1,000)
Bartons Creek Greenway	Northern Lebanon Boundary	Old Hickory Lake/Spencer Creek	Multi-Use Path	5.9	Within Flood Plain	$2,430
Bender's Ferry Rd.	Northern Mt. Juliet Boundary	Old Hickory Lake/Spencer Creek	Shared Roadway	2.4	If Upgraded in Future	$20
Bill France Blvd.	Murfreesboro Rd. (U.S. Hwy. 231)	Nashville Motor Speedway	Shared Roadway	1.6	Existing Road	$10
Cainsville Rd. (SR 266)	Lebanon Planning Boundary	Rutherford County Line	Shared Roadway	13.8	Existing Road	$120
Cairo Bend Rd.	Northern Lebanon Boundary	Old Hickory Lake	Shared Roadway	6.3	Existing Road	$50
Carthage Hwy. (U.S. Hwy. 70N)	Eastern Lebanon Boundary	Smith County Line	Shared Roadway	6.9	Existing Road	$60
Chicken Rd. - Trammell Lane	Murfreesboro Rd. (U.S. Hwy. 231)	Sparta Pk. (U.S. Hwy. 70, SR 26)	Shared Roadway	7.9	Existing Road	$70
Hartsville Pk. (SR 141)	Lebanon Planning Boundary	Trousdale County Line	Shared Roadway	7.8	Existing Road	$70
Hobson Pk.	Southern Mt. Juliet Boundary	Davidson County Line	Shared Roadway	3.5	Existing Road	$30
Hunters Point Pk. (U.S. Hwy. 231) - Canoe Branch	Northern Lebanon Boundary	Old Hickory Lake	Shared Roadway	6.5	Existing Road	$50
Murfreesboro Rd. (U.S. Hwy. 231)	Southern Lebanon Boundary	Rutherford County Line	Shared Roadway	9.4	Existing Road	$80
Sherrilltown Rd. - Beach Log Rd.	Cainsville Rd. (SR 266)	Sparta Pk. (U.S. Hwy. 70, SR 26)	Shared Roadway	7.0	Existing Road	$60
Sinking Creek Greenway	Northern Lebanon Boundary	Old Hickory Lake	Multi-Use Path	5.3	Within Flood Plain	$2,180
Sparta Pk. (U.S. Hwy. 70, SR 26)	Lebanon Boundary	Greenwood Road	Shared Roadway	1.4	Existing Road	$10
Sparta Pk. (U.S. Hwy. 70, SR 26)	Greenwood Rd.	Dekalb County Line	Shared Roadway	11.8	Existing Road	$100
Spring Creek Greenway / Watertown R.R.	Old Hickory Lake	Watertown	Multi-Use Path	26.5	Within Flood Plain / R.R. ROW	$10,890
Hwy. 109	Lebanon Planning Boundary	Sumner County Line	Shared Roadway	5.1	Existing Road	$40
Statesville Rd. (SR 267) - SR 96	Sparta Pk. (U.S. Hwy. 70, SR 26) in Watertown	Cannon County Line	Shared Roadway	11.3	Existing Road	$90
Stewarts Ferry Pk. - Central Pk.	Hobson Pk.	Murfreesboro Rd. (U.S. Hwy. 231)	Shared Roadway	11.0	Existing Road	$90
Tater Peeler Rd.	Southern Lebanon Boundary	Chicken Rd.	Shared Roadway	3.90	Existing Road	$30
Total Cost to Implement Recommended Facilities						$15,480

Spring Creek Greenway / Watertown Railroad Greenway. The Spring Creek Greenway / Watertown Railroad Greenway comprises 26.5 miles as it meanders through the eastern portion of the county planning area, from north of Lebanon to Watertown.

Spring Creek forms an important connection between Old Hickory Lake, neighborhoods in the northern area of Lebanon, neighborhoods in the eastern area of Lebanon, and the Watertown area. Spring Creek also provides a vital link to the bicycle and pedestrian network in Lebanon.

The proposed greenway follows the stream corridor and railroad bed and therefore will provide a relatively flat facility that will accommodate cyclists or pedestrians of any skill level. It too provides a scenic view of the county.

Conflicts and crossings of concern include: SR 840 (four crossings); Hunters Point Pike (U.S. Highway 231); Hartsville Pike (SR 141); Carthage Highway (U.S. Highway 70N); Interstate 40; and, Sparta Pike (U.S. Highway 70, SR 26). These crossings will require considerable thought by the designer of the greenway system in order to provide adequate safety to bicyclists and pedestrians.

This greenway will be easily connected with on-road bicycle and pedestrian facilities throughout the eastern and northern areas of the county.

6.4.3 Class II: Bike Lanes. Bike lanes are appropriate along street corridors where there is significant bicycle demand. These are areas where distinct needs can be served by bike lanes. Most of the roads in Wilson County are long stretches of highway or local county roads. Therefore, shared roadways and multi-use paths are recommended instead of bike lanes for Wilson County.

6.4.4 Class III: Shared Roadways. This component of the proposed bicycle network includes approximately 103.3 miles of shared roadways. Shared roadways have been recommended on roads that are not scheduled to be upgraded in the future. These shared roadways either serve as critical connections within the bicycle network or designate desired routes for avid cyclists. The following segments are recommended as signed bike routes.

- Benders Ferry Road
- Cairo Bend Road
- Hunters Point Pike (U.S. Highway 231) - Canoe Branch
- Carthage Hwy. (U.S. Highway 70N)
- Statesville Road (SR 267) - SR 96
- Sherrilltown Road – Beach Log Road
- Cainsville Road (SR 266)
- Tater Peeler Road
- Chicken Road - Trammell Lane
- Murfreesboro Road (U.S. Highway 231)
- Bill France Boulevard (Highway 452)
- Stewarts Ferry Pike - Central Pike
- Hobson Pike
- SR 109
- Hartsville Pike (SR 141)
- Sparta Pike (SR 26)

Benders Ferry Road. Benders Ferry Road extends from within the Mt. Juliet planning area to Old Hickory Lake at Spencer Creek. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects to bicycle and pedestrian facilities within the Mt. Juliet planning area.

Hunters Point Pike (U.S. Highway 231) - Canoe Branch. Hunters Point Pike (U.S. Highway 231) - Canoe Branch extends from within the Lebanon planning area to Old Hickory Lake. This

roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects to the network of bicycle and pedestrian facilities within Lebanon.

Carthage Highway (U.S. Highway 70N). Carthage Highway extends from within the Lebanon planning area into Smith County. This roadway provides a link into Smith County for avid cyclists. The route connects to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Sparta Pike (U.S. Highway 70, SR 26). Sparta Pike extends from within the Lebanon planning area through Watertown and into Smith County. Bike Lanes are proposed from the Lebanon planning limit out to Greenwood Road. A bicycle route is proposed from Greenwood Road to Watertown and on to the Smith County line. This route provides a link from Lebanon into Watertown and beyond for avid cyclists. The route connects to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Sparta Pike (U.S. 70, SR 26)

Statesville Road (SR 267) - SR 96. Statesville Road and SR 96 extend from within the Watertown area into Cannon County. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects cyclists to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Statesville Road (SR 267)

Sherrilltown Road - Beach Log Road. Sherrilltown Road and Beach Log Road extend from within the Watertown area southwesterly into Wilson County. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects cyclists to the network of facilities within the Lebanon planning area.

Beach Log Road

Cainsville Road (SR 266). Cainsville Road extends from within the Lebanon planning area to SR 96 in Rutherford County. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects to the network of bicycle and pedestrian

facilities within the Lebanon planning area.

Tater Peeler Road. Tater Peeler Road extends from within Lebanon to the southern portion of Wilson County. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects cyclists to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Chicken Road - Trammell Lane. Chicken Road and Trammell Lane extend from Sparta Pike (U.S. Highway 70, SR 26) to Murfreesboro Road (U.S. Highway 231) within southern Wilson County. This roadway is scenic and will provide a relatively safe route for avid cyclists. The route connects cyclists to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Murfreesboro Road (U.S. Highway 231). Murfreesboro Road extends from the Lebanon planning area to Rutherford County. This roadway will provide a relatively safe route for avid cyclists. The route connects to the network of bicycle and pedestrian facilities within the Lebanon planning area.

Bill France Boulevard (Highway 452). Bill France Boulevard provides access between Murfreesboro Road and the new Speedway. This five-lane highway was built specifically as a result of the construction of the Nashville Motor Speedway

Stewarts Ferry Pike - Central Pike. Stewarts Ferry Pike and Central Pike run east-west within the southern part of the county. This proposed route provides a vital connection between Murfreesboro Road (U.S. Highway 231) and Hobson Pike. This route also connects some of the trip generators to the bicycle and pedestrian network.

Stewarts Ferry Pike

Hobson Pike. Hobson Pike extends from within the Mt. Juliet planning area to J. Percy Priest Lake and on into Davidson County. This roadway will provide a relatively safe route for avid cyclists. The route connects to the network of bicycle and pedestrian facilities within the Mt. Juliet planning area.

SR 109 and Sparta Pike (U.S. Highway 70, SR 26) are proposed to be widened to 4-lane facilities as reported in the 2020 Wilson County Major Thoroughfare Plan. Hartsville Pike (SR 141) is proposed to have geometric improvements according to the plan.

6.4.5 Bicycle Parking. The plan recommends the installation of bicycle storage, including racks and lockers for convenience and safety. These storage areas should be located in high demand areas such as trailheads and near trip generators to help promote the use of bicycle facilities.

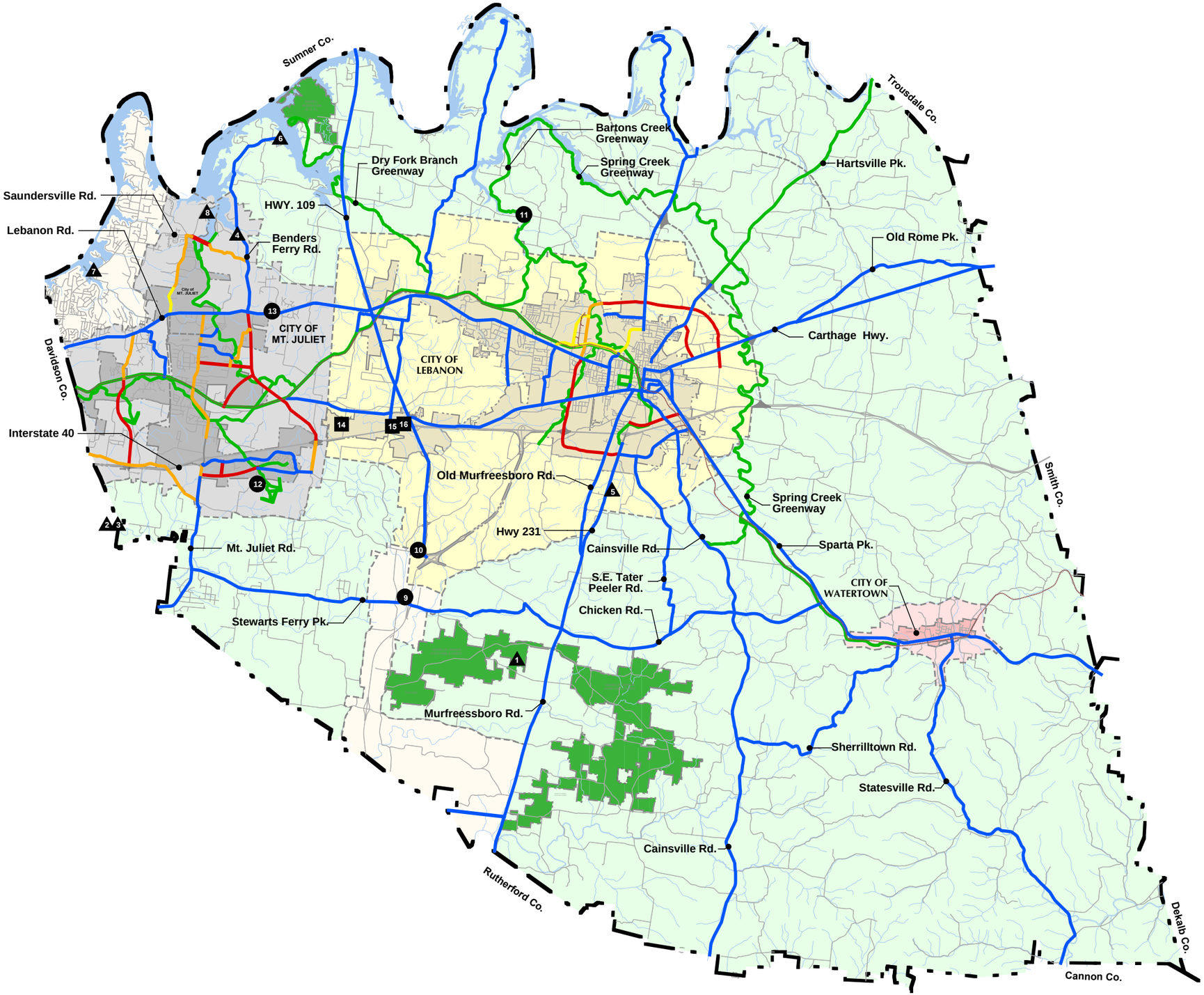
Trip generators that should be considered for bicycle storage include elementary schools, middle schools, and high schools that will attract students. Consideration should also be given to recreational parks, businesses, retail centers, and grocery stores.

WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 6.3 Long Term Recommendations for Bike Plan

WILSON COUNTY



- Class I: Multi-use Path
- Class II: Bike Lanes (Future Road Project)
- Class II: Bike Lanes (Future Road Widening Project)
- Class II:Bike Lanes (Existing Road)
- Class III: Bike Route
- Only if ungraded in future
- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Wilson County Growth Area
- Watertown Corporate Limits
- Watertown Growth Area
- State Owned Land
- Streams
- Existing Road
- Railroad

Note: This plan not adopted by Wilson County Commission. See Figure 6.4 for adopted plan.

KFM & associates

Hawkins Partners, Inc. landscape architects

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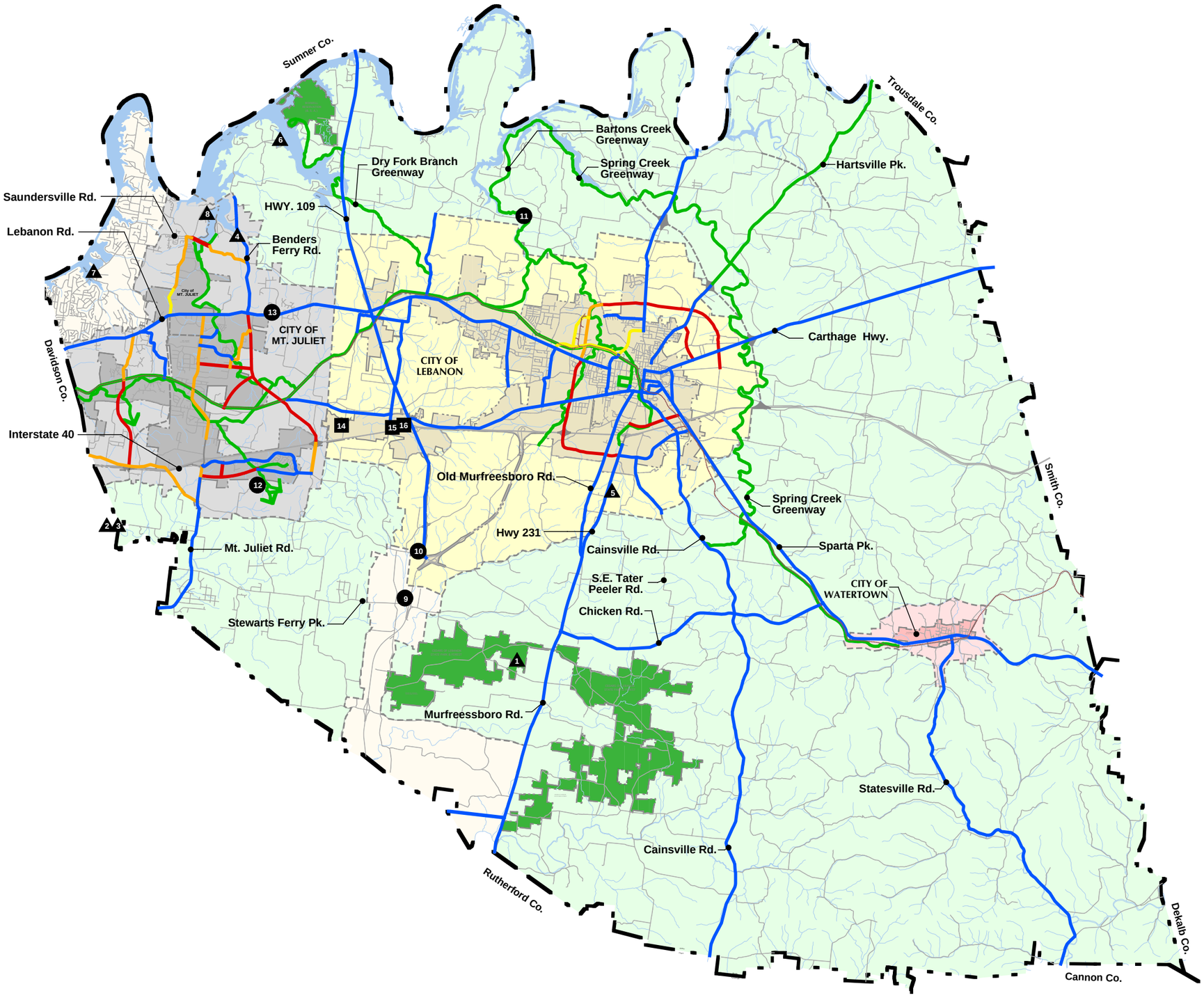

WILSON COUNTY

Bicycle & Pedestrian Master Plan

Figure 6.4 Adopted Bicycle Recommendations

WILSON COUNTY

- Class I: Multi-use Path
- Class II: Bike Lanes (Future Road Project)
- Class II: Bike Lanes (Future Road Widening Project)
- Class II:Bike Lanes (Existing Road)
- Class III: Bike Route
- Only if ungraded in future
- Lebanon Corporate Limits
- Lebanon Growth Area
- Mt. Juliet Corporate Limits
- Mt. Juliet Growth Area
- Wilson County Area
- Wilson County Growth Area
- Watertown Corporate Limits
- Watertown Growth Area
- State Owned Land
- Streams
- Existing Road
- Railroad

KFM & associates

Hawkins Partners, Inc. landscape architects

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6.5 Wilson County Sidewalk Ordinance

6.5.1 General. Pedestrian facilities are an important component of an overall transportation system. In Middle Tennessee, many communities have recognized the desirability and need for sidewalks. As a result, these communities are beginning to require that sidewalks be constructed for new subdivisions and new roadways. Wilson County does not currently require that sidewalks be constructed for new development. One of the components of this bicycle and pedestrian plan is to develop sidewalk requirements for Wilson County.

It is recommended that Wilson County adopt the following text regarding sidewalks.

6.5.2 Recommendation for Sidewalk Ordinance. The purpose of this provision is to provide for the safety, health and welfare of the citizens of Wilson County by requiring the construction of pedestrian access ways in all new commercial and residential developments in Wilson County.

1.) Sidewalks shall be required in all commercial and residential areas, with the exception of those subdivisions: (a) which were approved prior to _____, 2002. (b) that are final plats of additional sections of subdivisions where sidewalks were not required in previously recorded sections. (c) where the average lot line frontage is greater than 150 feet. (d) that are located on cul-de-sac streets containing no more that 20 lots or are minor subdivisions containing 5 lots or less.

2.) If non-existing at the time of development, sidewalks are required to be constructed on both sides of the street.

3.) The design, dimensions, dedications, easements, and reservations for all sidewalks shall conform to applicable Wilson County regulations. Sidewalks shall be constructed within the public rights-of-way and shall be installed in accordance with the adopted standards of Wilson County. (a) Sidewalks shall be constructed of Portland cement concrete and shall be 5 to 6 feet in width in residential areas and 6 feet in width for non-residential subdivisions. (b) Sidewalks shall maintain a minimum thickness of 4 inches except at driveway areas where the minimum thickness is 8 inches. (c) Along streets where concrete curbs are required, a median strip of grassed or landscaped area at least 4 feet wide shall be provided between the curb and sidewalk. When sidewalks are constructed along existing substandard streets, the sidewalks shall be located in relation to the future curb line.

4.) Unless otherwise provided for in a permit issued for other construction work, a permit from Wilson County Public Works Department shall be required prior to the original construction or any replacement or reconstruction of a sidewalk, or portion thereof.

6.) In any case where the reconstruction or construction of a sidewalk or other pedestrian walkway is required by contract, Wilson County may require the contractor to secure a bond for the construction of the sidewalk or walkway.

7.) The Wilson County Planning Commission may determine that the construction of a sidewalk or pedestrian walkway is unfeasible due to special circumstances. This may include, but is not limited to: impending road construction, significant trees or severe

roadside conditions and may instead require either: (a) payment in lieu of sidewalk construction or (b) a combination of sidewalk and/or alternative walkways and/or payment in lieu funds. Payment in lieu provisions for sidewalks should be developed by Wilson County so that this is an option available for the county to exercise.

8.) It shall be the duty of all owners of property abutting or adjacent to any sidewalk, whether such sidewalk is in a public right-of-way, or subject to public easement, to maintain such sidewalks in good repair. The adjacent property owner is therefore responsible for the repair, replacement and general upkeep of the sidewalk. In circumstances where maintenance of the sidewalk is required due to the encroachment of vegetation or other reasons, Wilson County may choose to conduct the necessary sidewalk maintenance at the property owner's expense.

6.5.3 Bike Lanes and Paths. The Wilson County Planning Commission may approve an alternate pedestrian walkway system or bicycle path for a given development. Alternative pedestrian walkways and bikeways may include walking trails or multi-use paths. (a) Multi-use paths, where required by the planning commission, shall be included within a dedicated right-of-way and shall be improved as required by the county engineer. (b) These walkways and multi-use paths may be located in public right-of-way independent of the roadway right-of-way. Therefore, these facilities are not restricted to alongside streets. (c) Bike lanes, where required by the planning commission, shall be included within a dedicated street right-of-way and shall be designated as a portion of the roadway. Bike lanes shall be designed according to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities.

The planning commission may require, in order to facilitate pedestrian and bicycle access from the roads to schools, parks, playgrounds or other nearby roads, perpetual unobstructed easements at least 20 feet in width. Easements shall be indicated on the plat.

7. IMPLEMENTATION

In effort to promote bicycling and walking as serious alternative modes of transportation in Mt. Juliet, Lebanon and Wilson County, the following policies and programs are recommended. These policies and programs were developed to fulfill the engineering, education, encouragement and enforcement goals and objectives of the bicycle and pedestrian plan.

7.1 Policies

The success of this plan depends on the institutionalization of walking and bicycling in all facets of City or County government. Each department should understand the importance and benefits of bicycling and walking. It is recommended that Mt. Juliet, Lebanon and Wilson County adopt the following policies:

- Adopt this recommended bicycle and pedestrian plan.
- Adopt the bicycle and pedestrian design standards recommended by the bicycle and pedestrian plan.
- Provide copies of this plan to the appropriate departments within the Cities, County, TDOT and MPO.
- Complete a detailed feasibility study for implementing multi-use paths.
- Complete construction documentation for bike route signing and marking.
- Aggressively seek opportunities for funding of the proposed facilities.
- Encourage City and County employees to bike or walk to work.
- Provide bicycle parking at all public facilities.
- Educate key city staff (planners, engineers, and administrators) with regard to bicycle and pedestrian planning, design issues and standards.
- Integrate bicycle and pedestrian planning into the overall planning process for the Cities and County.
- Incorporate designated bicycle and pedestrian facilities into future roadway projects.
- Review all TDOT plans to ensure the inclusion of bicycle and pedestrian facilities.
- Review all plan submittals, both residential and commercial, for compliance with the adopted bicycle and pedestrian plan.
- Require all sidewalk, multi-use path and bike lane routing be reviewed and approved as an integral part of the plat submittal, review and approval process.
- Require developers to provide the segments or components of the plan that are contained within their development.
- Require developers, builders and/or contractors to prepare subgrades for sidewalks and multi-use paths simultaneously with the preparation for roadways, and inspect subgrade for sidewalks and multi-use paths during the pavement base inspection.
- Encourage connections to adjacent subdivisions and trip generators.
- Encourage developers to create a highly connective street network within their development.
- Encourage mix use development so that multi-purpose trips can occur

- Encourage shared parking arrangements with businesses in the same area.

- Encourage the consolidation of curb cuts in existing and proposed development.

- Discontinue use of parallel storm grates on all streets.

- Encourage businesses to provide bicycle parking near entry areas, particularly those businesses along the designated bike corridors.

7.2 Programs

- The Cities, County and the Chamber of Commerce should promote Mt. Juliet as a bicycle and pedestrian friendly place.

- The Cities, County, local bike advocates and bicycle related businesses should establish annual bicycle/motorist education programs for all ages.

- The Cities and County should air public services announcements that promote bicycling and walking.

- The Cities and County should program and budget for the on-going operation and maintenance of bicycle and pedestrian facilities.

7.2.1 Local Projects. The process of implementing the recommendations identified in this plan will vary from project to project, but typically include:

1. Adoption of Plan by the Mt. Juliet, Lebanon and Wilson County.

2. A qualified consultant should prepare a detailed feasibility study of the Class I: Multi-use path network for the appropriate jurisdiction. The final product should yield preferred routes, identify required property acquisition and easements, environmental assessment, and accurate cost estimating.

3. A feasibility study is not required for shared roadways and bike lanes. Construction documents should be prepared that includes pavement marking layouts, signage locations, related details and an accurate cost estimate. The Cities, County, or a qualified consultant should prepare these plans.

4. Funding sources for construction need to be identified. The required documentation submitted for approval to the funding agency(ies). For multi-use paths, the feasibility study should be used to leverage funding. For the shared roadways and lanes, the construction documents would be substituted for the feasibility study.

5. Once funding is secured, construction documents should then be prepared for the identified scope of Class I: multi-use path network by the Cities and County or a qualified consultant. Construction documents should include plans, details, and specifications, environmental clearance documents and cost estimates.

6. Following construction document completion, bids for construction can be obtained from qualified contractors.

7. The final step is to complete construction for the scope of work identified and funded. Should there be other segments of the corridors to be completed by phase, steps 4-6 would be repeated.

APPENDIX A - DESIGN GUIDELINES

SECTION ONE: INTRODUCTION

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 the Mt. Juliet, Lebanon, Wilson County region.

Application of these design guidelines will ensure consistency in facilities 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.

The guidelines in this document are based primarily on the national guidelines established by the American Association of State and 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 consulted. Furthermore, the guidelines have been developed in response to the specific needs, objectives, and circumstances of the Mt. Juliet, Lebanon, Wilson County region.

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.

A. RELATED PLANNING ISSUES

A.1. LAND USE

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 for about fifteen minutes, or one-half mile, for transportation trips (See Figure 1). This distance has become a benchmark planning principle 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 buildings 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.

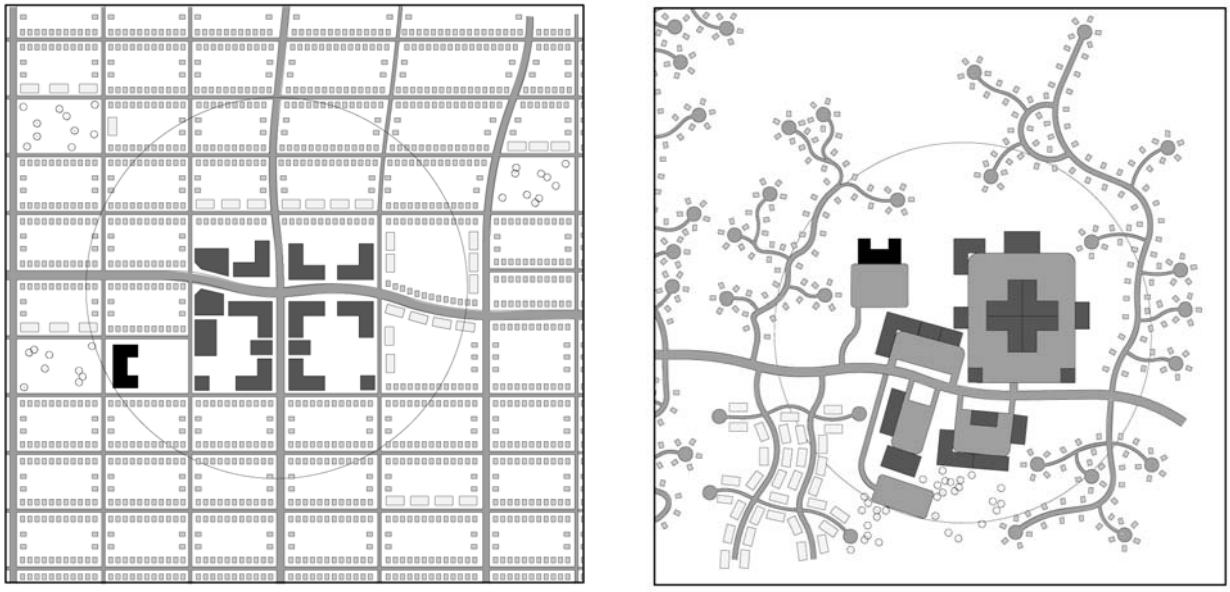


Figure 1: **The illustration on the left shows a half-mile radius around the commercial center of a densely developed, mixed use area with a grid street network. The illustration on the right shows the same radius in a low-density area with segregated uses.**

A.2. ROADWAY NETWORK

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 collectors and arterials, can result in single points of access to many destinations, and often requires significant out-of-direction travel. While indirect travel routes are not always a major deterrent to drivers, they can result in considerable 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 does not 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.

A.3. ACCESS MANAGEMENT (See Figure 2)

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 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 cyclists riding along the roadway.

By limiting or consolidating driveways, and using other access management design tools such as curbed medians, both cyclists and drivers benefit:

- 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

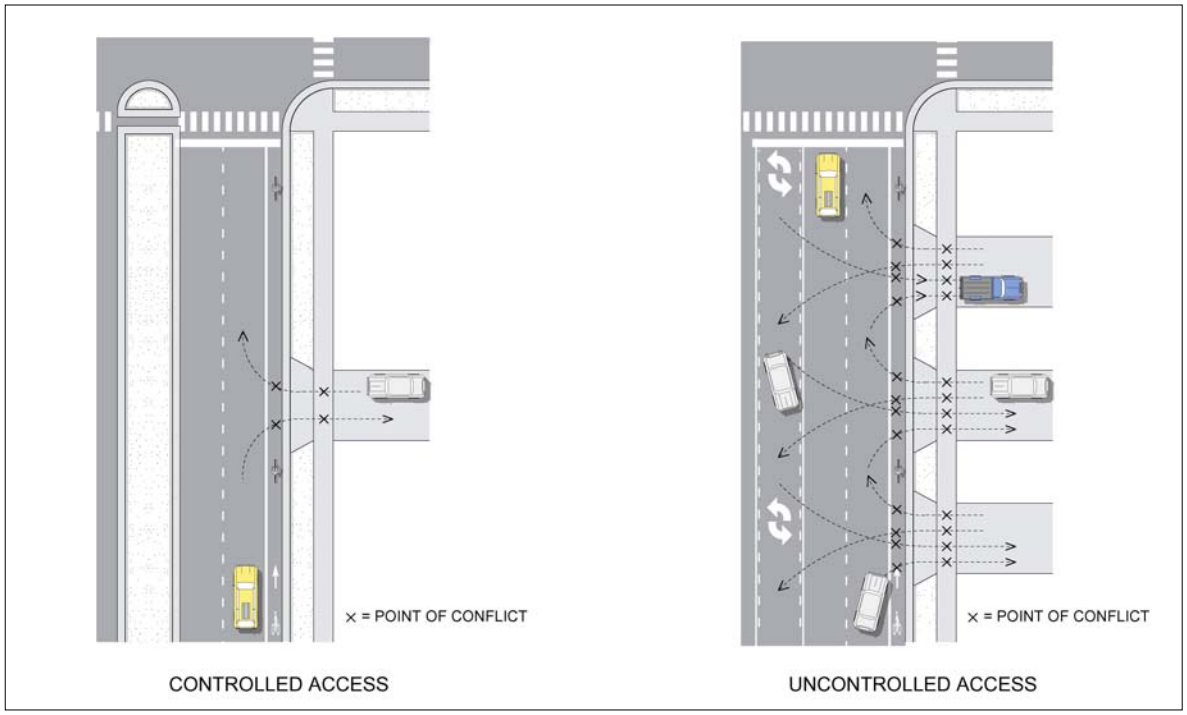


Figure 2: **Access management reduces the number of conflict points between bicyclists, pedestrians and motorists**

Any access management design should also 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.

A.4. ROADWAY DESIGN STANDARDS

The roadway design standards adopted by the various agencies in the Mt. Juliet, Lebanon, Wilson County region should be amended to include cross-sections that incorporate the bicycle facilities recommended in this plan.

SECTION TWO: DESIGN GUIDELINES

A. MULTI-USE PATHS (GREENWAYS)

Off-street paths 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 rights-of-way, 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, paths may be the preferred facility. And greenways are 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. A community-wide bicycle infrastructure should 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 3. 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.

A.1. GENERAL DESIGN PRINCIPLES

Design practices that encourage the use of paths for bicycle transportation include:

- Providing frequent access points from the street network. This practice minimizes out-of-direction travel to enter or exit the path.
- Directional signs that direct users to and from the path.
- Minimal at-grade roadway crossings.
- Terminating the path 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 path at streets that include on-street bicycle facilities.

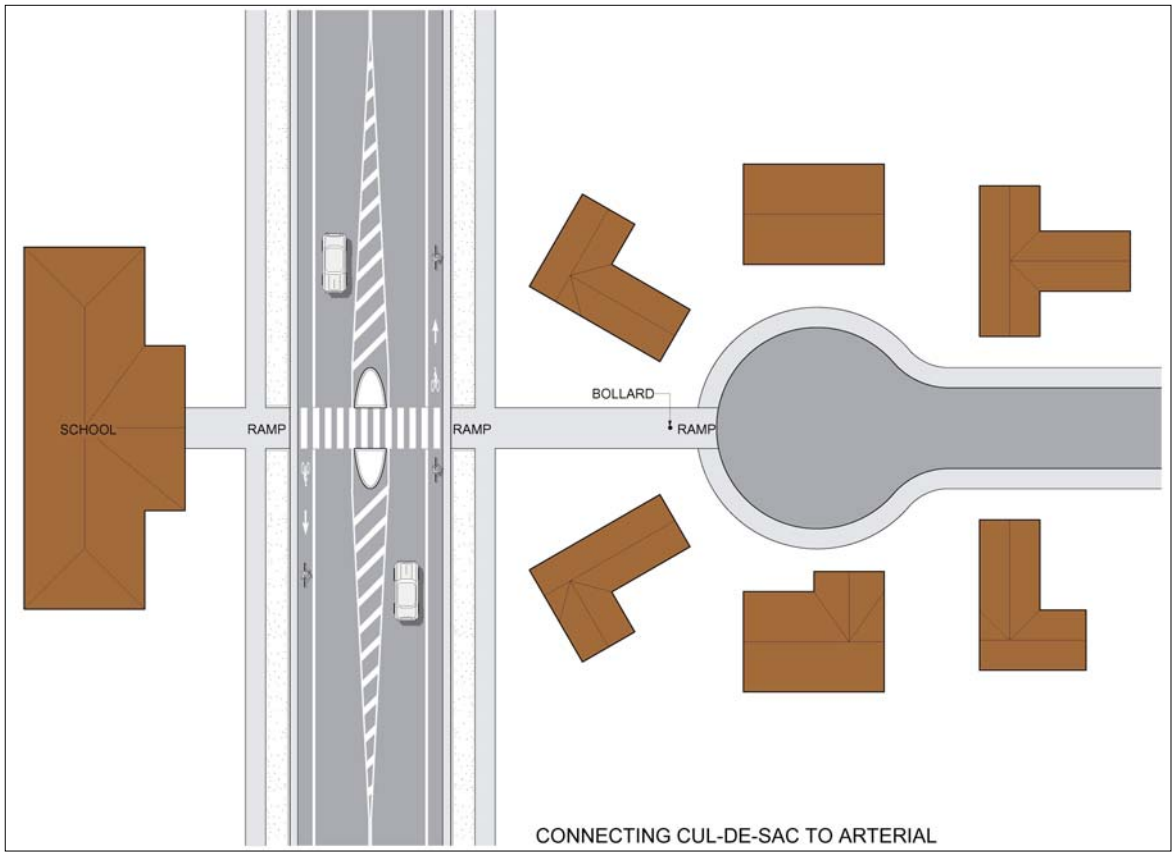


Figure 3: Overland connector paths can create direct linkages between destinations that would otherwise require out-of-direction travel on streets.

Because paths accommodate pedestrians as well as bicyclists, they must meet all ADA design standards.

One-way paths tend to be used as two-way facilities, particularly by pedestrians, and should generally be avoided.

A.1.a. PATHS PARALLEL TO ROADWAYS

Paths immediately adjacent to roadways have the potential to create a number of 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 and entrances, where exiting drivers are often only looking in one direction for on-coming traffic. Furthermore, the presence of a parallel path tends to create an expectation among drivers that all bicyclists should use the path instead of the street. But many transportation cyclists prefer the connectivity and access the street provides, and will continue to use a street even if a parallel path 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 path connects at one or both ends to other paths outside the road right-of-way, or to high quality on-street bike/pedestrian facilities.
- Expected path users include a high percentage of children or other novice or recreational riders.
- The path will be at least five feet from the edge of roadway pavement or include a structural barrier, such as a “jersey wall”, between the path and road.
- Cross-streets are few and grade separated crossings are maximized.

The presence of a path should not be used to justify the exclusion of bicycle facilities on, or to restrict bicycle use off, the adjacent roadway.

A.2. DESIGN GUIDELINES FOR PATHS (See Figure 4)

A.2.a. WIDTH AND CLEARANCE

Width

Ten feet is the standard pavement width for a two-way multi-use path. Path width should be increased to twelve feet where high use is anticipated, such as dense urban areas. Eight-foot wide paths are not recommended except in circumstances with severe physical constraints and where long-term use is expected to be low.

Lateral Clearance

Stable, two-foot shoulders with a cross-slope of no greater than 1:6 should be provided on all paths. 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.

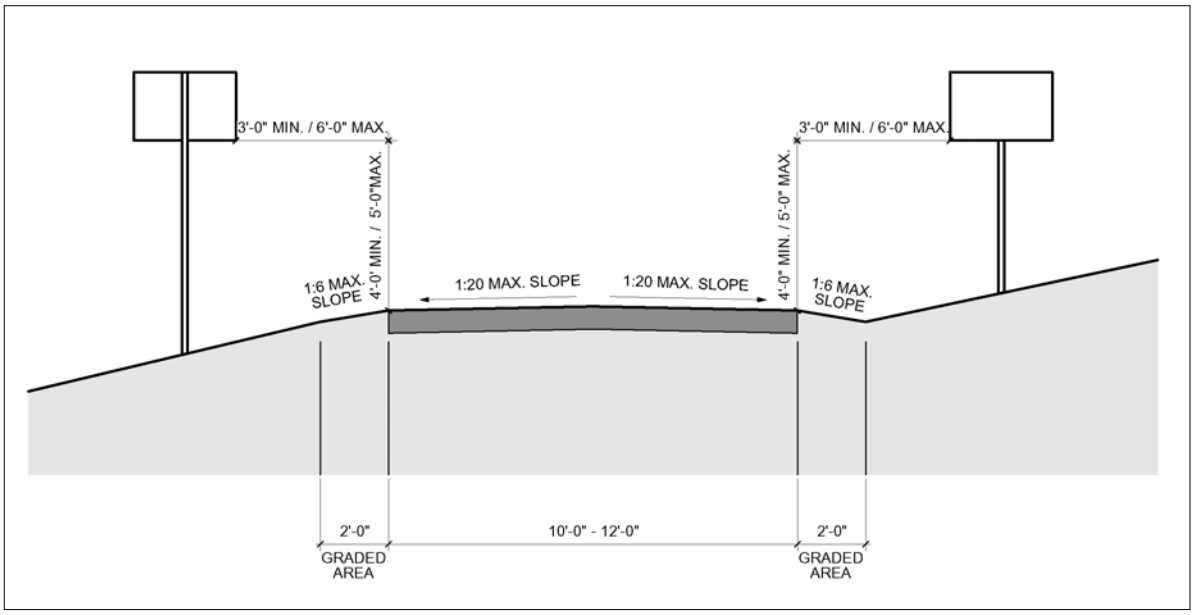


Figure 4: Clearance and slope standards for paths.

A.2.b DESIGN SPEED, SLOPES & RADII

Design Speed

AASHTO recommends a design speed of 20 MPH for paths, which is the speed at which some faster cyclists may be riding. However, it is important to remember that paths 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, paths should not be designed 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 paths.

The document recommends the following:

- The maximum running slope of paths 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 path should not exceed 1:20.

To help bicyclists maintain balance, paths should be banked low, up to 1:20, on the inside of a curve.

Curve Radii

At 20 MPH, the minimum recommended radius on curves is one hundred feet, along with adequate stopping sight distances. When such a standard cannot be met, warning signs or supplemental pavement markings can alert path users to approaching conditions. Path widening at sharp curves can also improve safety.

A.2.c. PATH/ROADWAY INTERSECTIONS

Grade Separated Crossings

Grade separated path/street crossings should be provided 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. All crossings should include appropriate pavement markings and signage. For intersections with signal controls and signal loop detectors, detectors should also be placed in the path.

At intersections or at mid-block crossings on wide streets, a curbed center median should be provided, as shown in Figure 5. The median will allow path users to cross half of the lanes and wait safely in the median refuge before crossing the second half of the roadway. A median should be at least six feet wide 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.

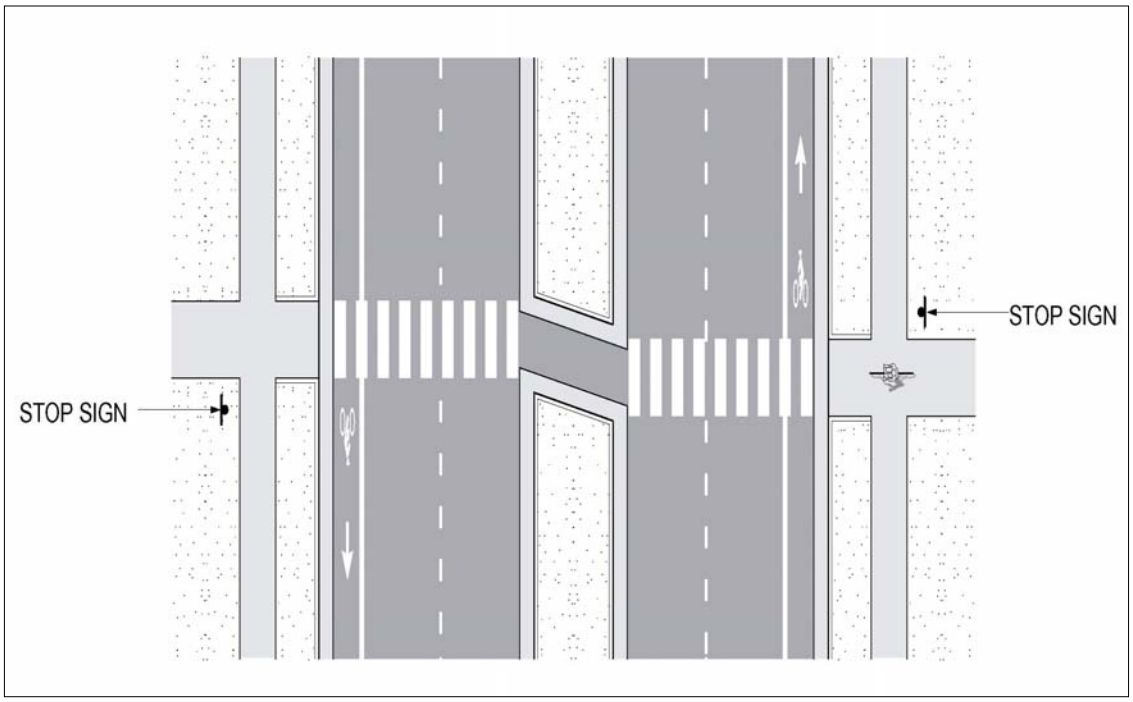


Figure 5: At-grade path crossing. Median refuge is angled toward oncoming traffic to provide better visibility for path users.

A.2.d. RAILINGS, FENCES & BARRIERS

Barrier treatments such as fences or railings are sometimes needed to provide separation between a path and a hazard - such as a steep slope, or to eliminate path user access - such as to a high-speed freeway. As shown in Figure 6, 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 should be located at a height of 36 inches. Openings in a barrier should not exceed six feet.

Barriers should be placed as far from the trail as possible. When barriers encroach into two-foot path shoulders, they reduce the usable width of the path. When such instances cannot be avoided, it is desirable to increase the overall pavement width of the path.

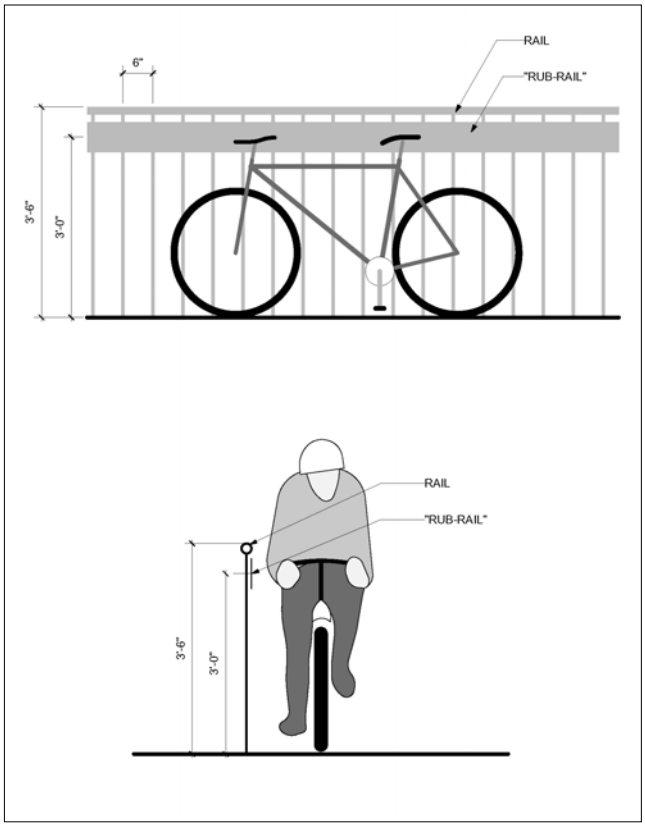


Figure 6: Railing heights for paths.

A.2.e. MOTOR VEHICLE BARRIERS

Bollards are commonly used to restrict motor vehicle access to paths. Use of bollards should be carefully considered because they can create a significant hazard for bicyclists. The width between bollards should not be less than four feet, which is the narrowest width that can accommodate a bike trailer. Five feet is the preferred width.

Since most paths are two-way, a single, removable bollard should be placed in the center of the path. Bollards should never be placed 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 path, where head-on collisions may occur.

Bollards should 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 7. 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.

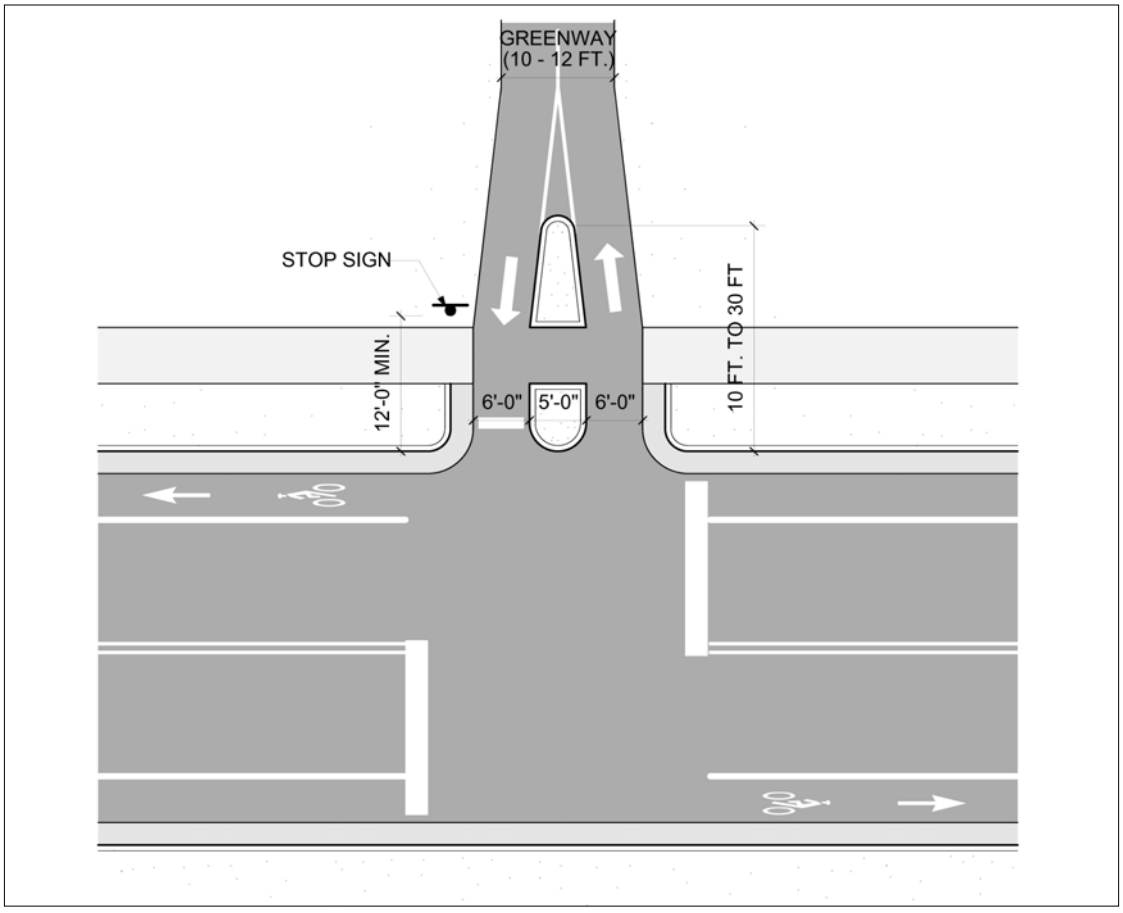


Figure 7: An alternative to bollards at path entrances

B. BICYCLE LANES

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 typical for rural-style roadways without curbs and gutters. Bicycle-related pavement markings are not typically used on shouldered bikeways, since they can also be used as a vehicle breakdown lane.

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.

B.1. WIDTH (See Figure 8)

When measured from the face of a curb or the edge of pavement, a bicycle lane or shouldered bikeway should be four to six feet wide. When a gutter pan is present, a bicycle lane should be measured from the gutter pan seam.

If possible, bike lanes and shoulders should be wider than the four-foot minimum when the following circumstances are present:

- On-street parking
- When travel lanes are less than ten feet wide
- High traffic volumes
- High traffic speeds
- High truck volumes
- Guard rails immediately adjacent to the bike lane
- Steep grades

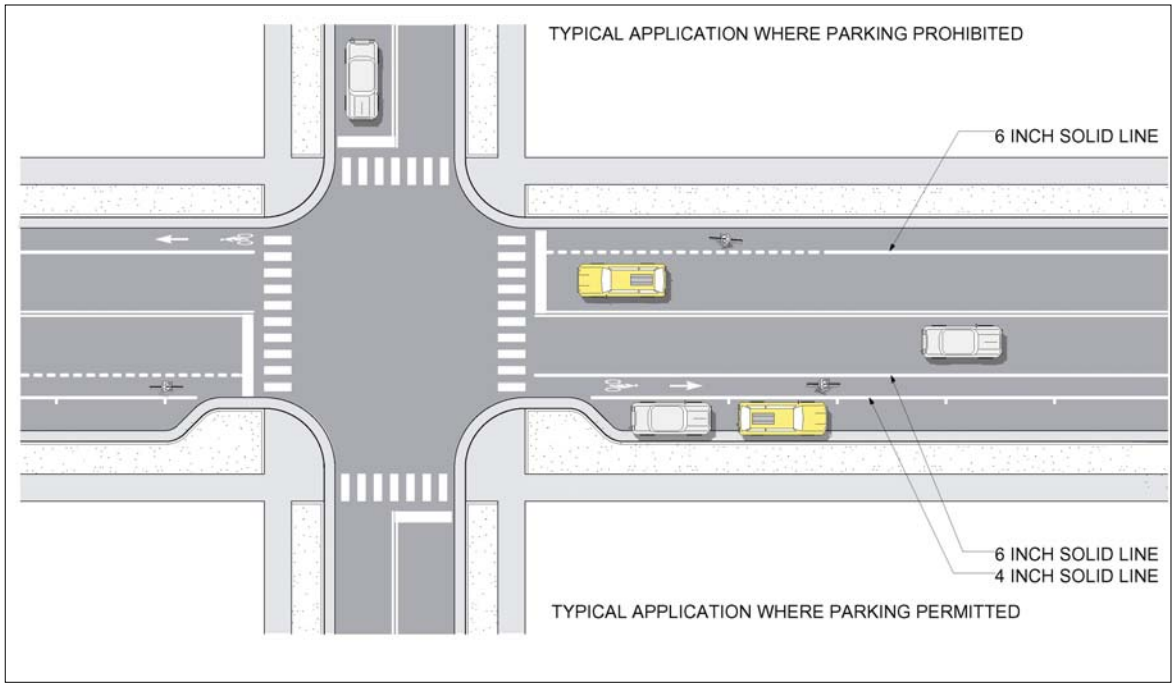


Figure 8: Typical bike lane details on streets with and without on-street parking. Note that the pedestrian bulbs at the intersection do not extend into bike lanes.

B.2. CONSIDERATIONS FOR SHOULDERED 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 bikeway as bike lanes.

B.3. BUS/BIKE LANES (See Figure 9)

Where exclusive bus lanes exist, and pavement width precludes the striping of separate bike lanes, shared bus/bicycle lanes can reduces 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.

B.3.a. APPLICATION PRINCIPLES & DESIGN CONSIDERATIONS

- Where pavement width permits, a five-foot bike lane should be placed 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 re-stripe with bike lanes.

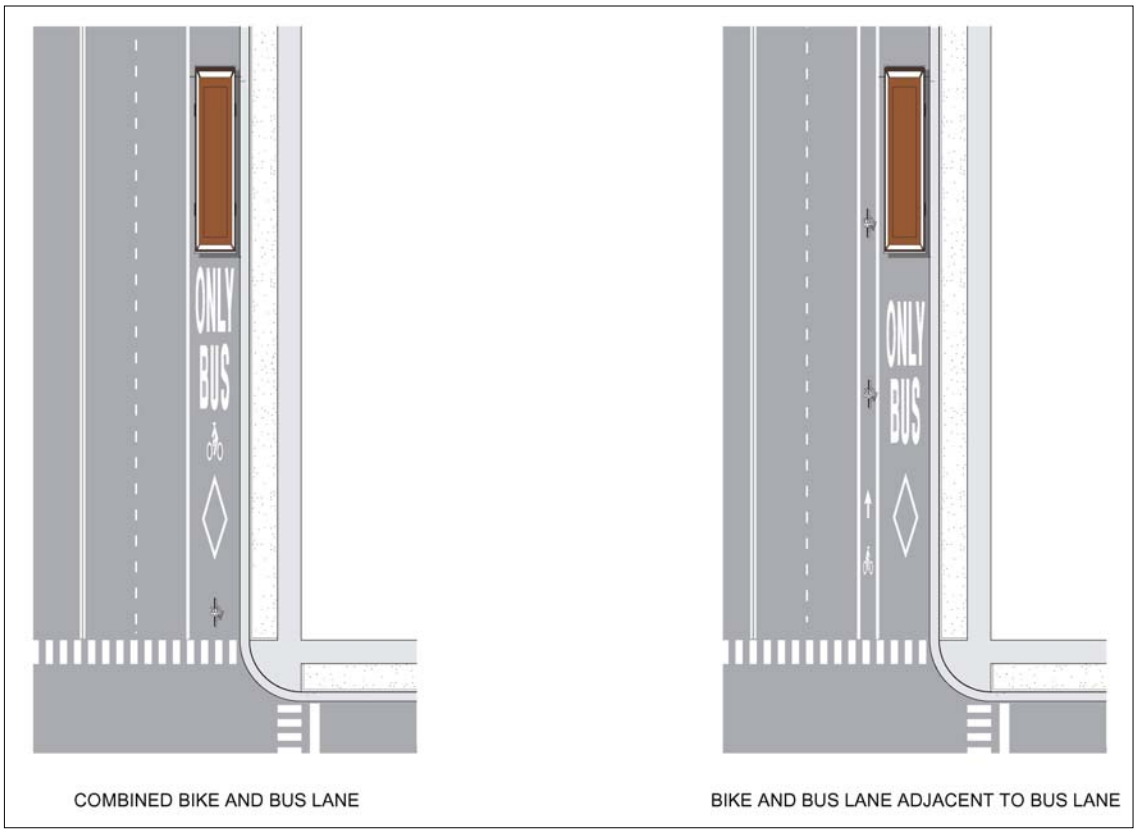


Figure 9: **The diagram at left shows a combined bus/bike lane. The diagram at right shows a roadway with both a bus lane and a bike lane.**

- If pavement width is limited and the dedicated bus lane is warranted, a shared bus/bike lane is the preferred solution, particularly where bus traffic volume is light or express. Such lanes should 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).

B.4. OTHER CONSIDERATIONS

Bicycle lanes should be separated from other travel lanes with a six-inch, single solid white line.

When on-street parking is present, a 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 should generally be avoided, since they can be used for parking or conventional travel lanes.

On one-way streets, bike lanes should be on 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.

C. SHARED ROADWAYS (BIKE ROUTES)

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.

C.1. WIDE OUTSIDE LANES (WOLs)

On major collector and arterial streets, where severe physical constraints preclude bike lanes, wide outside lanes are a desirable alternative. WOLs should 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, parking spaces should 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.

C.2. 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 ADT, most bicyclists can comfortably share the roadway with motor vehicles.

However, many local streets carry more traffic at greater speeds than they were designed for. Although such streets could be good candidates for bike lanes, traffic calming is usually the most appropriate strategy for increasing their bicycle suitability. Speed humps, pedestrian bulbs, and other traffic calming features can improve conditions for bicycling, and also address the underlying traffic problems that may be impacting the street. See Section Four G for additional information.

C.3. SIGNED SHARED ROADWAYS (SSRs)

SSRs are roadways 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 should maximize optimal conditions for bicyclists.

SSRs can 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.

C.3.a. DESIGN CONSIDERATIONS

The outside lanes on SSRs should be as wide as possible, and not less than twelve feet wide, exclusive of gutter pans.

Traffic signals should comply with the guidelines outlined in Section Three H.

Storm grates, railroad crossings, pavement surface quality, bridges, and all other features should comply with the guidelines outlined in Section Four.

SECTION 3: INTERSECTION DESIGN

Intersections are where most conflicts between all roadway users occur. By nature, intersections put one group of travelers in the path of others. Clearly, a bicyclist is at a disadvantage when confronted by a motor vehicle, and it is at intersections where guidance and well-designed accommodations for bicycles can increase safety for all roadway users.

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.

A. 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 should create 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.

Free flowing intersection features, such a 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 should continue to the stop bar/crosswalk. Bike lanes should not be marked through pedestrian crossings.

B. INTERSECTIONS WITHOUT RIGHT-TURN LANES

At signalized or stop-controlled intersections on streets with bike lanes, but no exclusive right-turn lanes, the solid bike lane stripe should 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.

C. INTERSECTIONS WITH EXCLUSIVE RIGHT-TURN LANES

Exclusive right-turn lanes present an additional conflict between through-cyclists and right-turning motorists, and should only be used when warranted by a traffic study.

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.

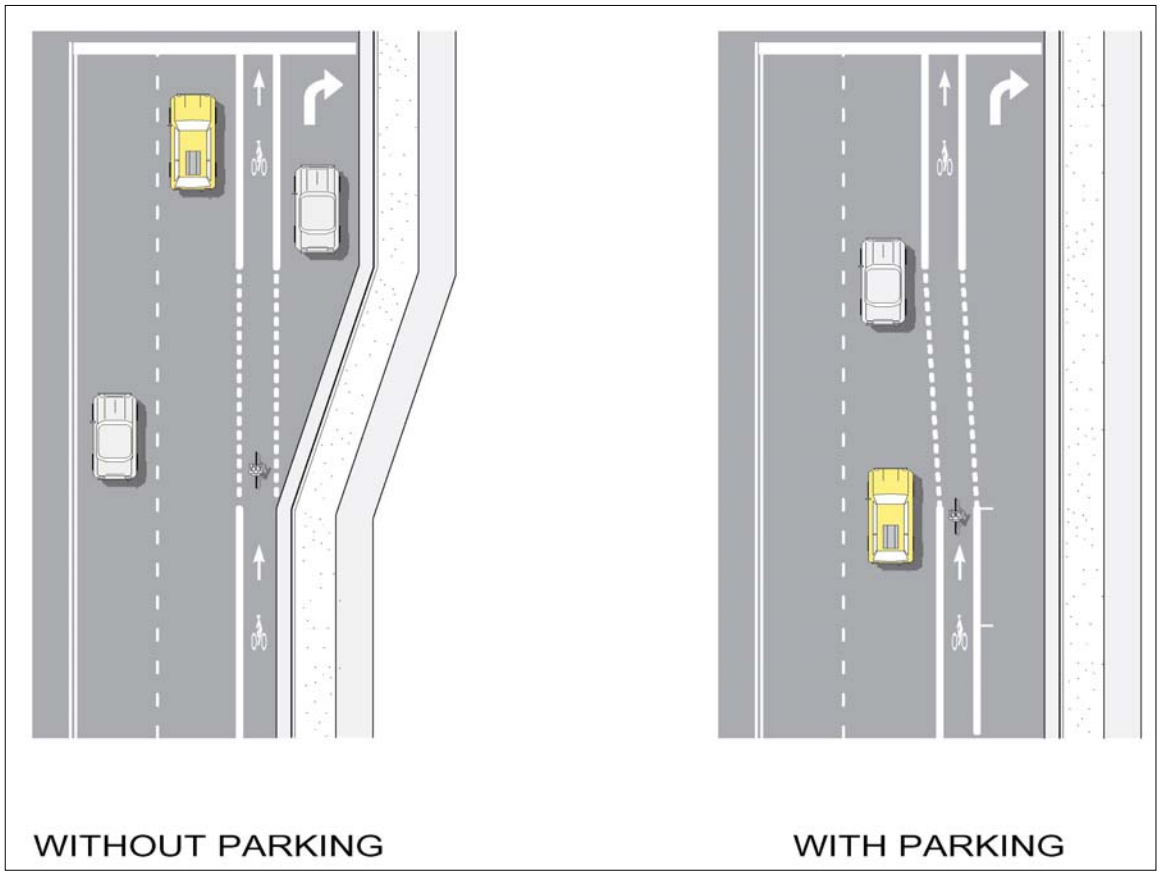


Figure 10: Bike lane markings at exclusive right turn lanes

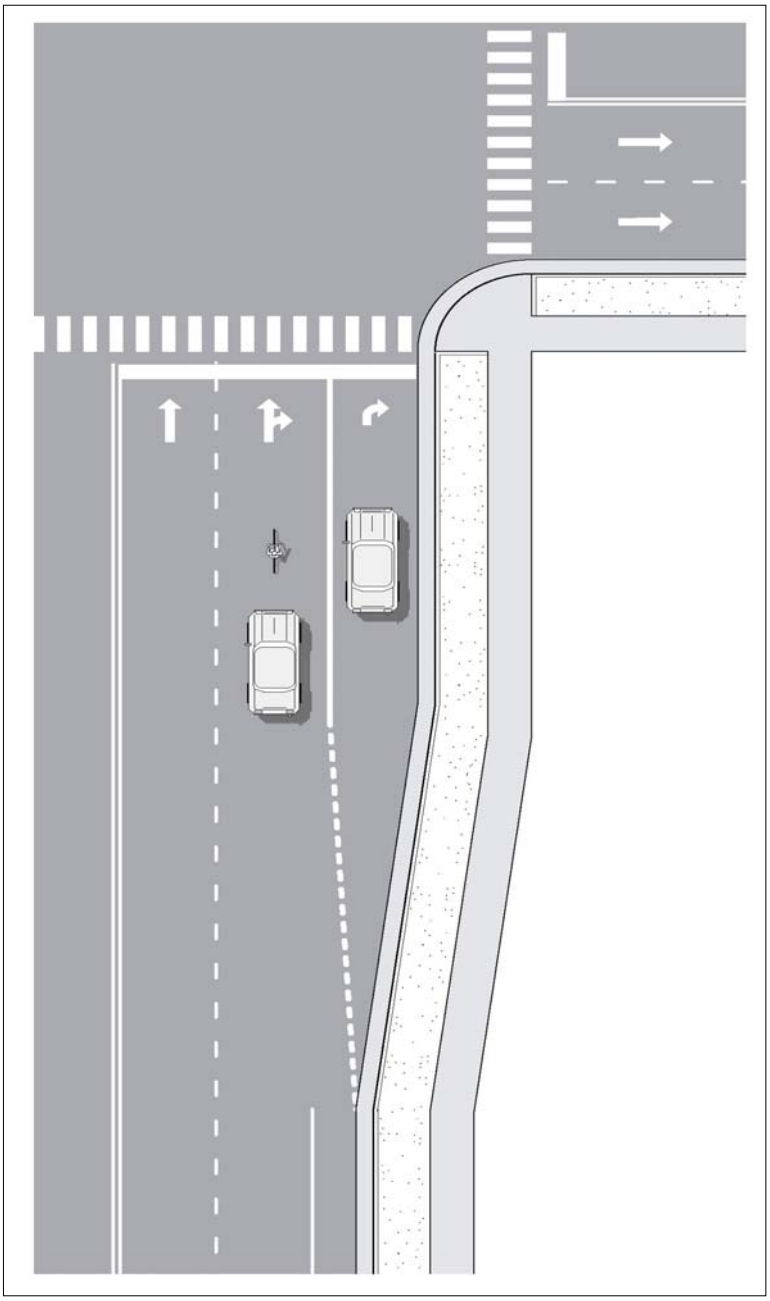
This strategy allows the conflict to occur in advance of the multiple conflicts that typically occur at the intersection itself. In addition, this approach maintains the rules of the road, since through-cyclists proceed to the left of right-turning motorists.

The bike lane stripe should 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. Solid bike lane markings should 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 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.

D. INTERSECTIONS WITH DUAL RIGHT-TURN LANES



Intersections with a right-turn lane and a shared right/through lane present particular difficulties 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 should be avoided where possible, and justified by a thorough traffic study.

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 right/through lane should be 14 feet wide. Signage alerting bicyclists to the approaching lane configuration is warranted. See Figure 11.

Figure 11: Bike lanes at dual right turn lanes.

E. T-INTERSECTIONS

At T-intersections, left and right-turn bike lanes should be provided 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 should be striped through the intersection, except at crosswalks.

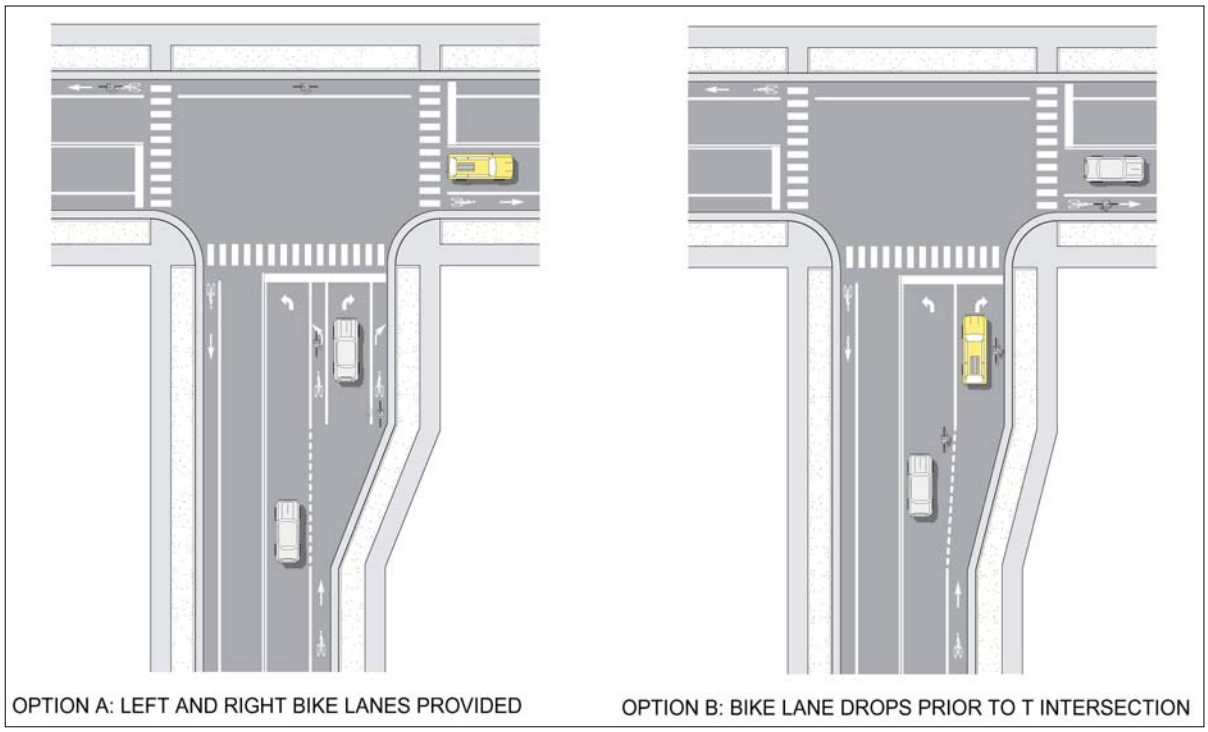


Figure 12: T-intersections. The diagram at right illustrates the preferred design with right and left-turn bike lanes; the diagram to the left shows a 14 foot shared left turn lane, for locations where physical constraints are present.

F. 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, such intersections should be realigned with simple right-angle 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.

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.

G. 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.
- 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.

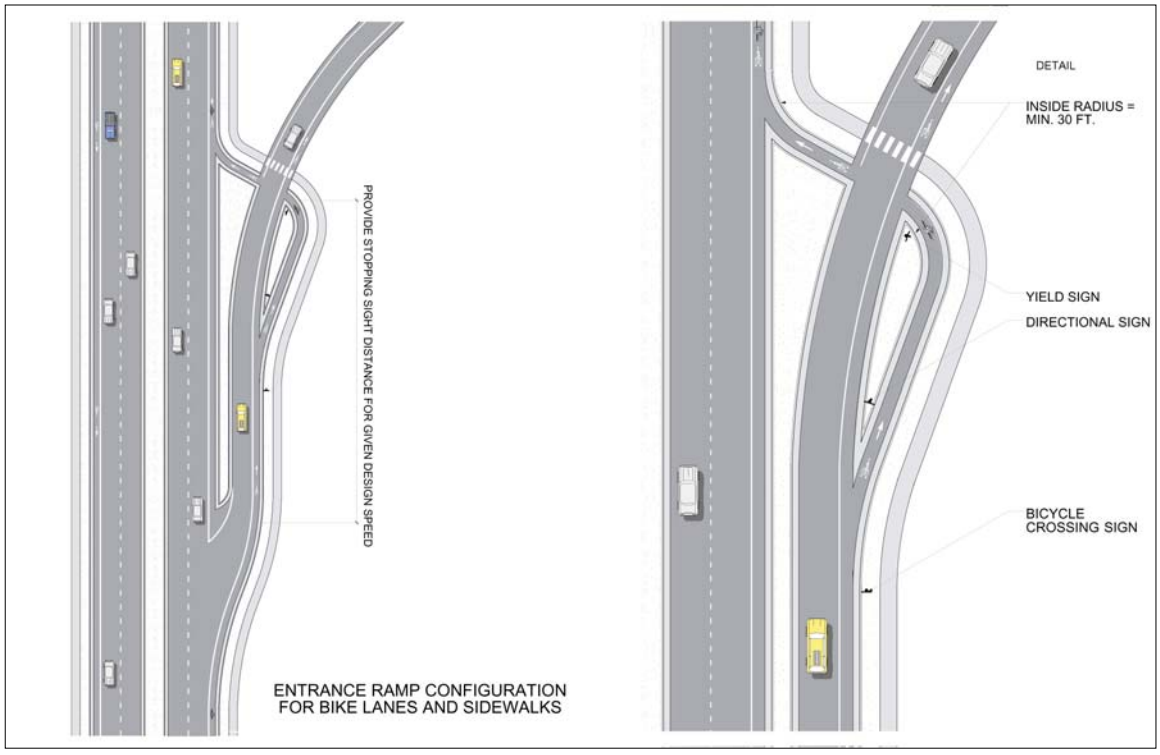


Figure 13: **Bike lanes through interchange entrance ramps. The illustration to the right shows signage details. Source: Oregon Bicycle & Pedestrian Plan**

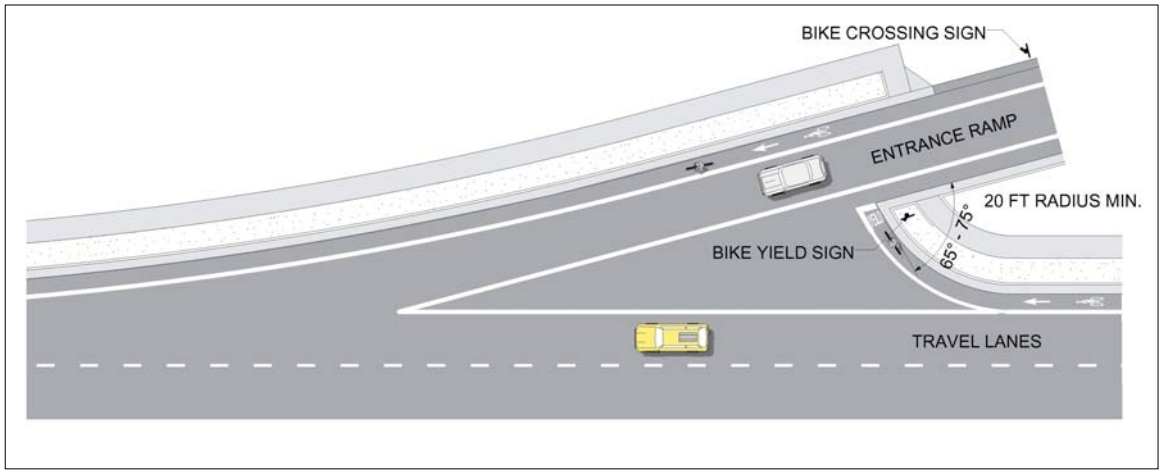


Figure 14: Bike lane through a right-lane merge lane. Source: Oregon Bicycle & Pedestrian Plan

H. 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, the timing of the traffic signal cycle should accommodate bicyclists.

H.1. SIGNAL TIMING

Traffic signal clearance intervals should 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 2.5 seconds.

H.2. DETECTION

Traffic detectors for traffic-actuated signals should be set to detect bicycles. Quadrupole and diagonal quadrupole loop detectors generally provide for bicycle detection. Standard loops are not recommended, since it is difficult to adjust them to detect bicycles. See Figure 15.

Detectors must be located 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 where she can be detected by a detector loop. Such intersections should include a pavement marking, as shown in Figure 16, to indicate to bicyclists where they should position themselves in order to activate the signal detector.

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; and
- the cyclist can access the pushbutton while remaining in the appropriate position for her desired path of travel through the intersection, including left turns and through movements.

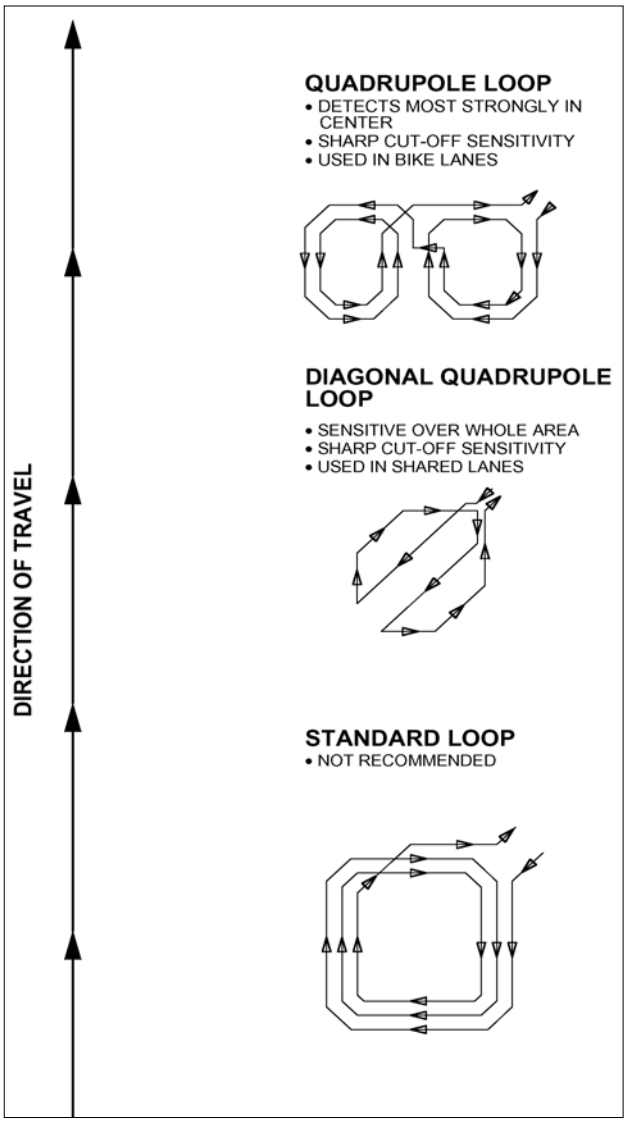


Figure 15: Detector loops for bicycle facilities

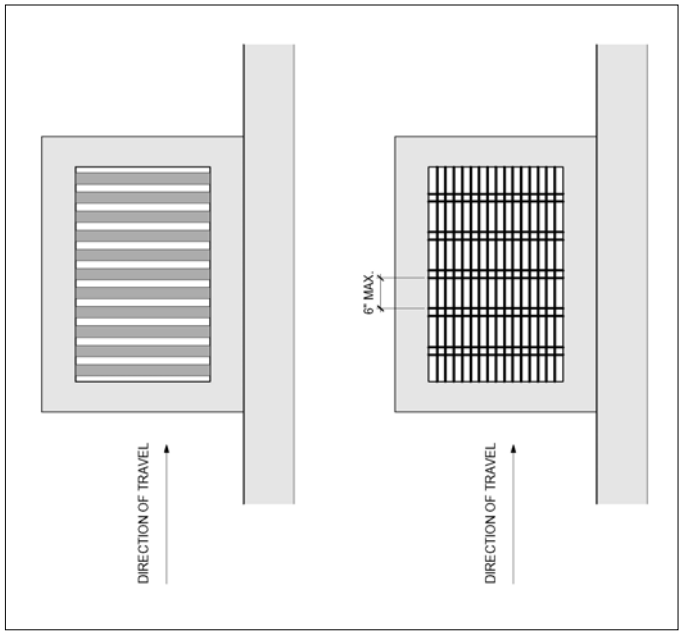
Figure 16: **Pavement marking to indicate location of detector loops**

SECTION FOUR:
SPECIAL CONDITIONS & OTHER DESIGN CONSIDERATIONS

A. 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 and his bike. 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 should be bicycle-safe and hydraulically efficient, as shown in Figure 17. Where hazardous grates exist, a priority should be made of replacing all of them, placing a priority 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.



When resurfacing any street, regardless of whether or not it has been identified for bicycle facilities, grate height should be raised to be flush with the new pavement surface. If this is not possible, pavement should taper into the grate so that an abrupt edge is not present.

Figure 17: Bicycle compatible storm grates

B. 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. Dangerous holes and bumps can force a bicyclist to weave into the path of motor vehicle travel. Pavement should be laid and maintained in a manner than ensures a smooth pavement surface.

C. AT-GRADE RAILROAD CROSSINGS

Railroad crossings can present a significant hazard to bicyclists if not properly designed. The channel between the flange and pavement can catch a bicycle tire and throw the cyclist. Minimizing bicycle hazards involves consideration of three design issues: angle of crossings, flangeway width, and surface smoothness.

C.1. ANGLE OF CROSSING

Bikeways should cross railroad tracks as close to a right angle as possible, as shown in Figure 18. No bikeway should cross a railroad track at less than forty-five degrees. If right-of-way width permits, the crossing angle can be improved by re-aligning the bicycle facility as it approaches the tracks. Pavement striping and markings should orient the cyclist to the safest crossing angle.

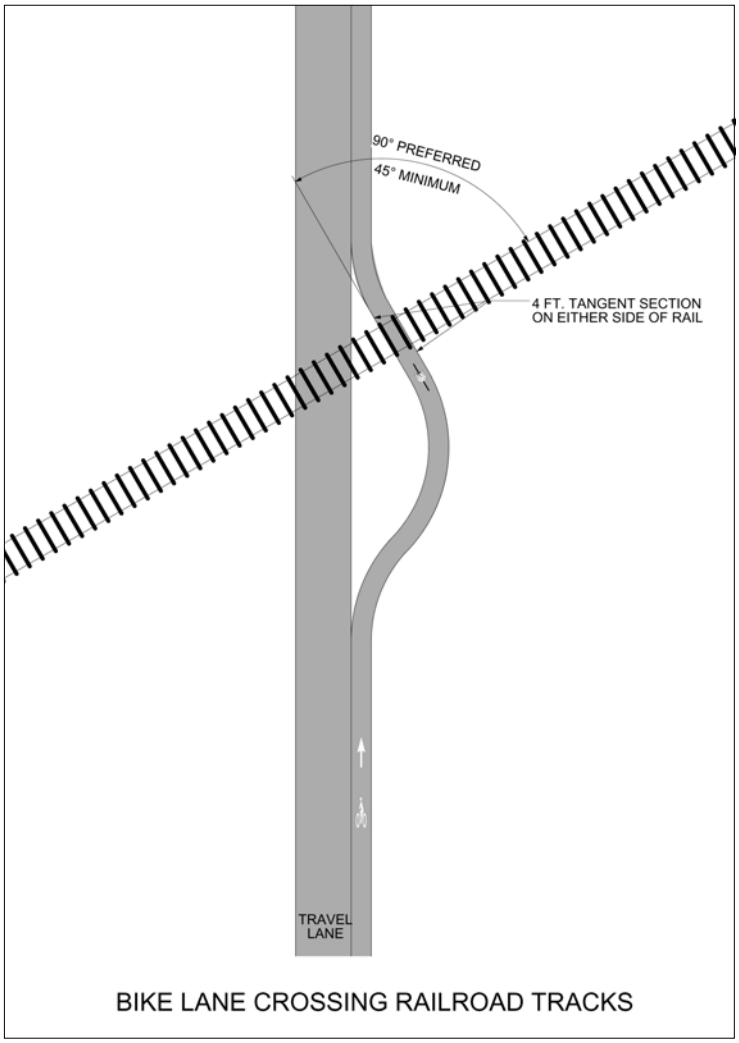


Figure 18: Bicycle facilities can be re-aligned to provide a railroad crossing of 90 to 45 degrees

C.2. FLANGEWAY WIDTH

The open area between the rail itself and the adjoining pavement should be as narrow as possible. Rubberized or concrete flangeway fillers can be installed to minimize the gap, as shown in Figure 19.

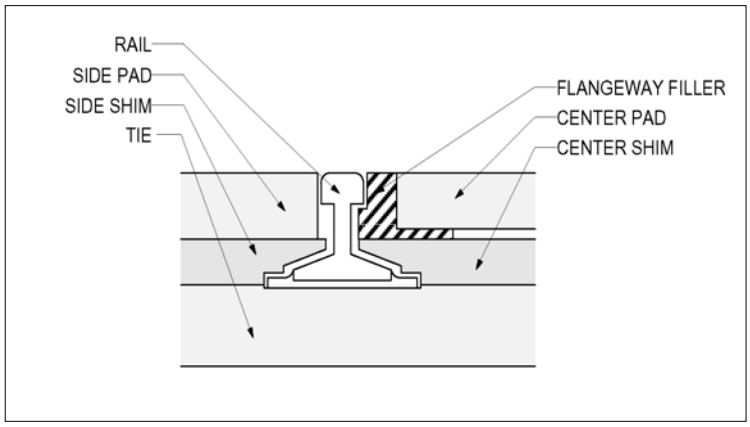


Figure 19: Railroad crossing detail

C.3. SMOOTHNESS OF SURFACE

The roadway surface and the top of the rails should be at the same height. Broad, rubberized, railway crossing mats or concrete panels are more stable than asphalt at crossings. Over time, asphalt is likely to migrate upward and develop a ridge next to the rails. Heavy timbers are not long-lived and can be slippery when wet.

C.4. SIGNS

Advance warning signs and pavement markings should be installed in advance of a railroad crossing, in accordance with the MUTCD.

D. RUMBLE STRIPS

Due to bicycle tire size and suspension (usually the lack thereof), bicycling on rumble strips is extremely unpleasant and can be dangerous. Rumble strips should not be placed in a bicycle lane. On shouldered bike lanes, rumble strips should not be placed within at least the right-most four feet of the paved shoulder. On bikeways with wide outside lanes, rumble strips should be located beyond the edge stripe.

E. 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 critical in maintaining the continuity of a bikeway network.

Bicycle-safe decking and expansion joints should be used on all bridge decks. The width of new bridges should equal 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, the design of new bridges should assume that bicycles will be present, and include enough width to stripe for bike lanes immediately or in the future.

F. CONSTRUCTION ZONES

Like motor vehicles, bicycle movement should be maintained through construction zones. Temporary lane restrictions, detours, and other traffic control measures instituted during construction should be designed to accommodate non-motorized travelers whenever possible, especially on routes where these modes are normally encountered.

F.1. GENERAL PRINCIPLES

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, bicyclists should be routed to share a conventional travel lane. On longer projects, a temporary bicycle lane or wide outside lane should be provided.

In urban areas, bicyclists should not 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, a reasonable detour should be identified and signed.

F.2. SPECIFIC DESIGN CONSIDERATIONS

- 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 should have a vertical edge no thicker than one inch. Plates thicker than one inch should have an asphalt lip to minimize hazards to bicycles.

- The placement of advance construction signs should obstruct neither the bicyclist's nor the pedestrian's path of travel.

- Information regarding construction and route changes should be communicated to the public through the local media and official websites. Project managers should also notify and consult with affected groups, such as university officials, neighborhood groups, or bike clubs.

G. TRAFFIC CALMING

Traffic calming involves the introduction of physical elements into the streetscape that encourage appropriate motor vehicle speeds and can also, if desired, encourage through-motorists to select a different route. Traffic calming is used to improve neighborhood livability by reducing negative impacts of traffic, and to enhance the environment for non-motorized travel modes. Typically, traffic calming devices are installed on local and collector streets.

Speed humps, pedestrian bulbs, chokers, neckdowns, chicanes, and traffic circles are among the types of devices installed for traffic calming purposes. Although most of

these devices are of benefit to bicyclists, care must be taken to ensure that the specifics of their design and application do not create new bicycle safety problems.

G.1. SPEED HUMPS

Speed humps should generally be constructed with a longitudinal length of 14 to 22 feet, with a crown height of 3 to 4 inches. When used in a series, humps should be placed 300 to 600 feet apart.

G.2. CURBED MEDIANS

Curbed medians with refuges provide safety for bicyclists and pedestrians crossing multi-lane roadways. Medians designed for bicycle crossings should be no less than six feet wide; a ten-foot-wide median will accommodate a bicycle with a trailer or multiple bicyclists, and should be the standard for trail crossings.
See Figure 5.

If a refuge is intended for bicycle use it should be placed on alignment with the bicycle path of travel on either side of the intersection.

The refuge should be either ramped, or flush with the roadway surface.

G.3. PEDESTRIAN BULBS, CHOKERS, CHICANES & NECKDOWNS

Pedestrian bulbs and some other traffic calming devices decrease curb-to-curb width in order to slow traffic, as shown in Figure 8. The design of these features should not require bicyclists to weave into adjacent traffic, or force drivers to "squeeze" bicyclists while driving through the intersection. The following guidelines will ensure that traffic will be slowed without creating safety problems for cyclists.

- On low volume, low speed streets without a centerline stripe, no special pedestrian bulb design considerations are generally necessary.
- At bulbs when bike lanes are present, the conventional travel lane should not be less than ten feet wide and the bike lane should not be less than four feet wide.
- On streets with a centerline stripe, the pedestrian bulb should be placed so that twelve-foot outside lanes are maintained, or 14-foot, if WOLs are present.

G.4. TRAFFIC CIRCLES

Where traffic circles are used, they should be designed to incorporate adequate deflection on each approach to enforce appropriate entry speed for motor vehicles, and discourage motorists from trying to overtake bicyclists in the intersection.

G.5. DIVERTERS

For general traffic calming purposes, diverters should be utilized sparingly. Diverters restrict motor vehicle access, and can displace traffic onto nearby streets. When utilized, there should be a clear understanding of where traffic is likely to be diverted in order to ensure that traffic problems are not unintentionally shifted to another location.

Where used, diverters should incorporate a bicycle cut-through, or gap, not less than five feet wide (to accommodate bicycle trailers) and not greater than six feet wide (which could attract through-attempts by motorists). A pavement marking identifying the gap can help guide cyclists, as shown in Figure 20.

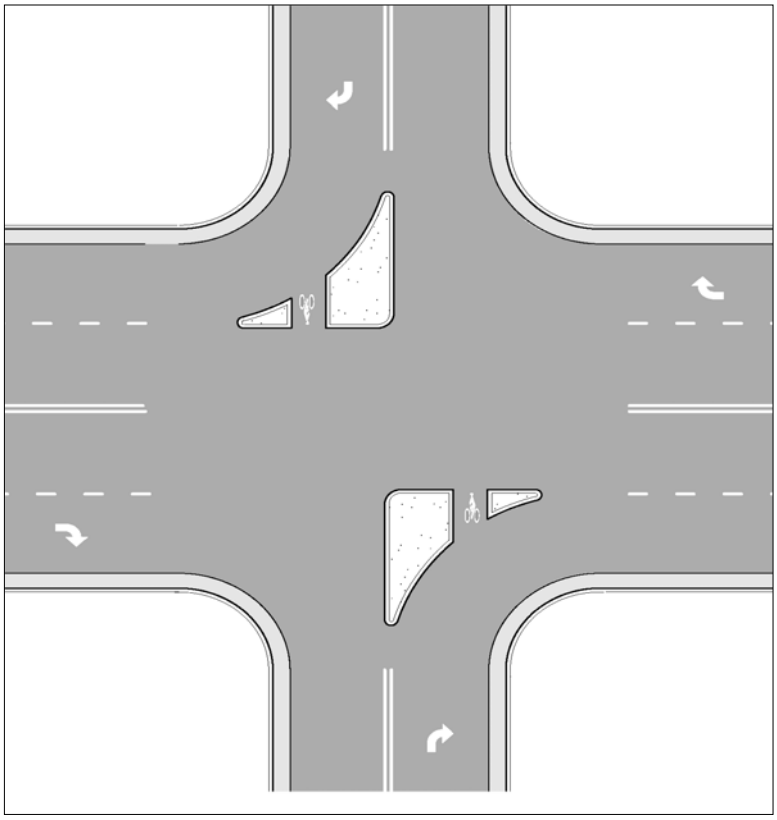


Figure 20: Diverter with cut-through for bicycles

H. DESIGN PRACTICES TO BE AVOIDED

H.1. SIDEWALK BIKEWAYS

Through an ordinance or other measure, adult and older youth bicyclists should be discouraged from riding on sidewalks. 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 great 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, 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 all other roadway users.

All roadway users are safer when bicycles are considered vehicles, and when bicycle facilities are designed accordingly.

(Parents may want to allow their young children to bicycle on sidewalks under the following conditions:
- The sidewalks are on low-volume, low-speed, streets.
- Typical roadway drivers are alert to neighborhood activities along the street.
- Children are bicycling at speeds comparable to an adult walking travel speed.
- Children are wearing helmets and have been taught fundamental bicycling rules and skills.)

H.2. 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 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 results in awkward and dangerous movements when transitioning back to standard bike lanes.

H.3. 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, they should be installed on the motorist's side of the stripe, and have a beveled front edge. Pavement reflectors used between travel lanes should be dropped fifty feet in advance of intersections, where bicyclists may be merging left into the appropriate lane for their movement.

H.4. 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 21.

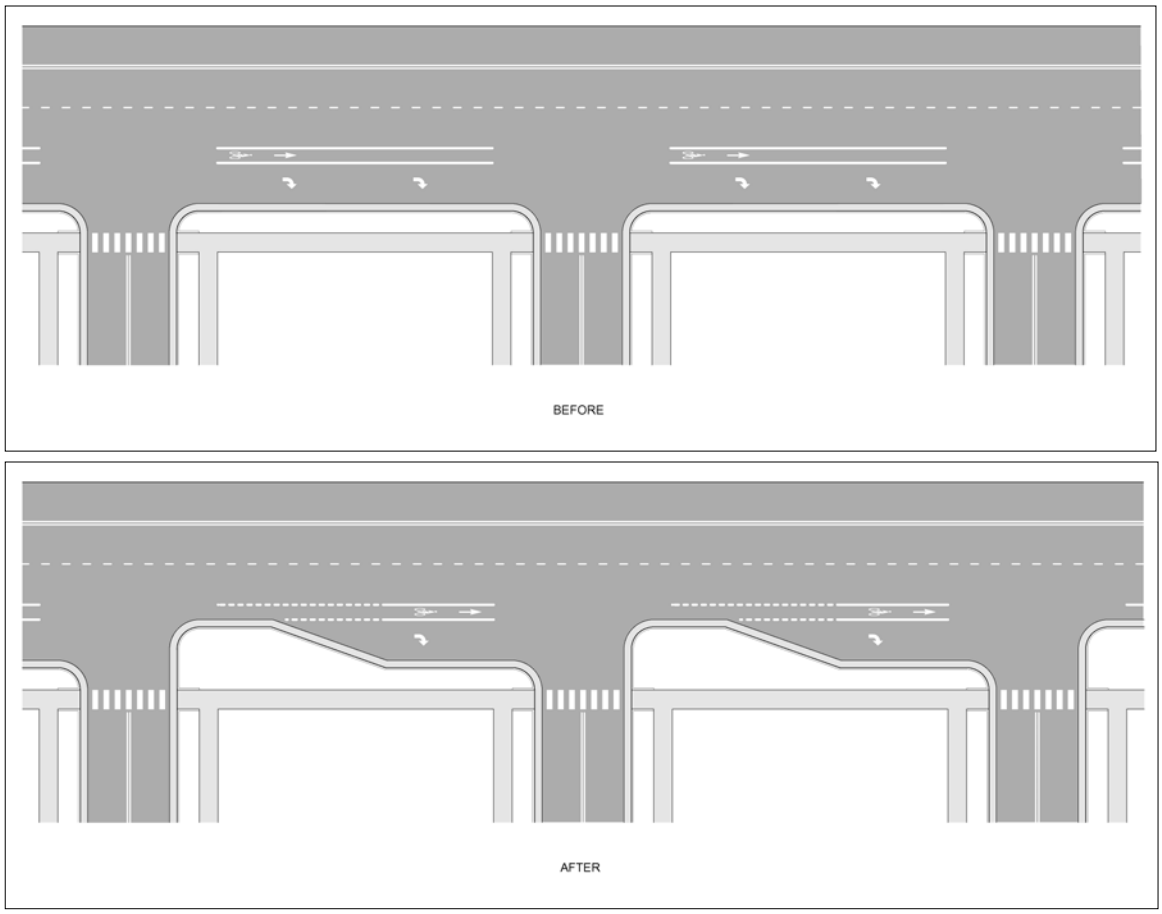


Figure 21: The design shown at top results in continuous merging conflicts. The design shown at bottom manages access to intersections and increases safety.

H.5. 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, all gravel entranceways should be required to be paved back fifteen feet, as shown in Figure 22.

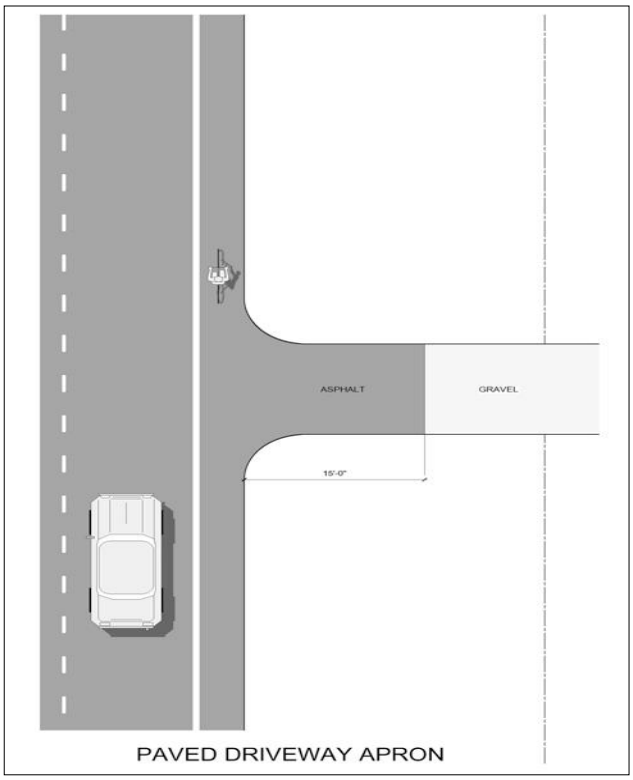


Figure 22: **A paved apron at driveways and alleys keeps gravel from spilling onto the bikeway**

SECTION FIVE: SIGNS & MARKINGS

A. 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 failure 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 Manual on Uniform Traffic Control Devices (MUTCD), published in June 2001, provide fairly thorough guidance on bikeway signage, sign placement, and pavement markings. Signs are illustrated in Figure 23. 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 bicycle-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.

B. BIKEWAY SIGNAGE GUIDELINES

B.1. OFF-STREET PATHS (Greenways)

When paths are adjacent to or cross roadways, signs should be located so as to be visible only to trail users; not to motorists.

Sign W11-1 should be placed on roadways in advance of where an off-street path crosses a roadway. Generally, it is not necessary to use this sign where on-street bike facilities cross other roadways.

Figure 23: **Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage**

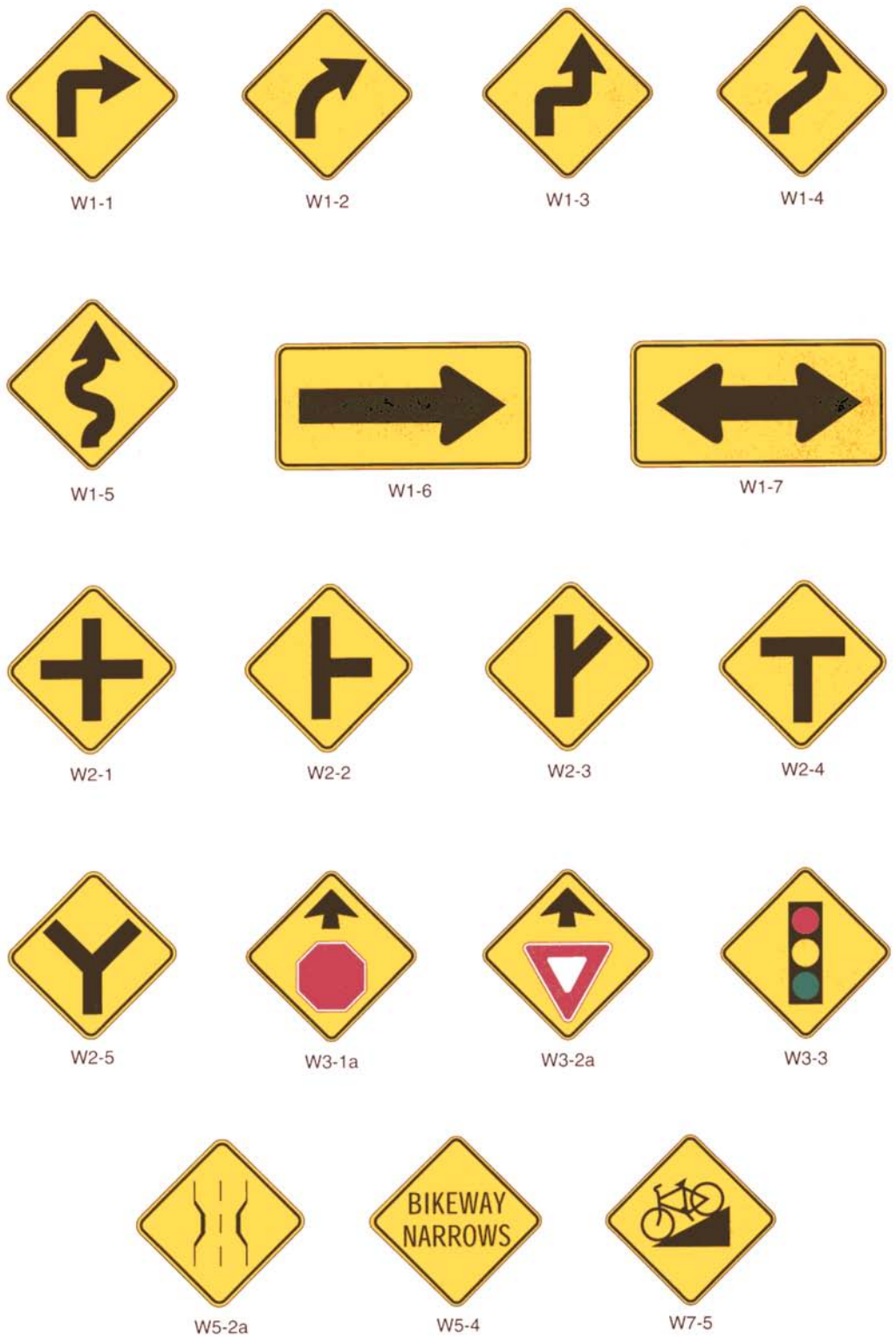


Figure 23 (cont.): **Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage**

Figure 23 (cont.): **Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage**

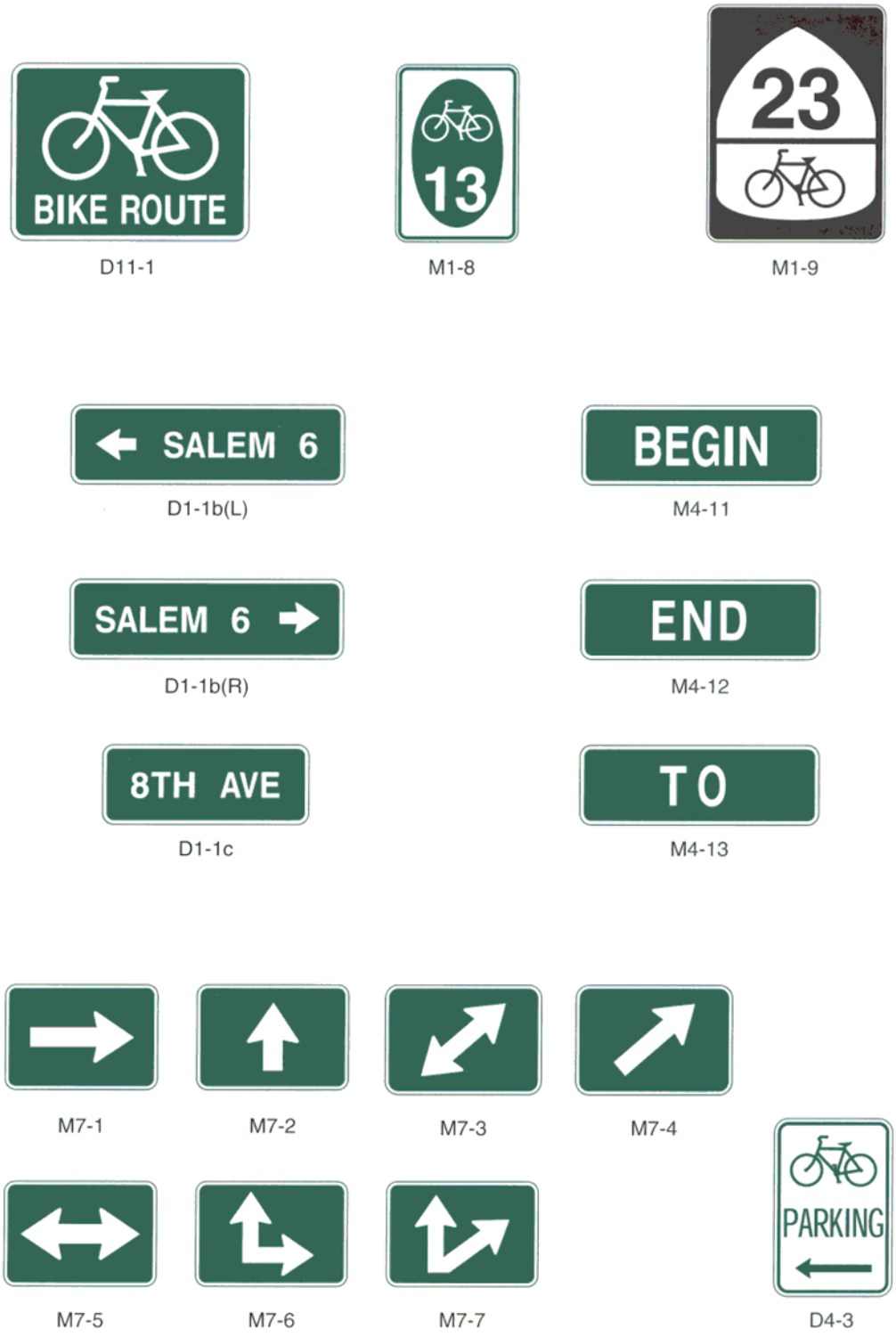


Figure 23 (cont.): **Manual on Uniform Traffic Control Devices, June 2001. Bicycle facilities signage**

B.2. BICYCLE LANES

B.2.a. BIKE LANE SIGNAGE

"Right Lane/Bike Only" (R3-17) signs should be used sparingly in cases where clarity is needed.

Bicycle route signs (D11-1, M1-8, M1-9, and all supplemental plaques), should 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, bike route signs should include information that directs bicyclists from one bike lane segment to another. For example, "Bike Route: XX Street Bikeway". Bike route signs should also be used to direct cyclists to a destination, i.e. "Bike Route: Aquarium".

"Bike Lane Ahead" (R3-16) signs should not be used. "Bike Lane Ends" (R3-16a) signs should only be used in conjunction with a "Share the Road" (W11-1/W16-1) sign.

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, a "Begin Right Turn Lane/Yield to Bikes" (R4-4) sign should be placed at the beginning of the taper.

B.2.b. BIKE LANE STRIPING & MARKINGS

At bus stops, bike lanes should use dashed lines through the area that a bus is expected to cross into the bike lane to reach the curb.

A bicycle stencil and directional arrow should be placed after every major intersection, and at intervals of not greater than 1,000 feet. (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 should be placed after 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, the parking area should be defined with pavement markings, or a solid 4-inch white stripe, which encourages motorists to park near the curb.

B.3. SHARED ROADWAYS

On shared roadways, bicycle route signs (D11-1, M1-8, M1-9, and all supplemental plaques), should always include accompanying directional or bikeway identification information. Route signs should be placed at major intersections, where the route changes streets, and at intervals of not greater than 1,000 feet.

Bike route signs should also be used to direct cyclists to a destination, i.e. “Bike Route: Aquarium”.

Shared roadways that include an outside lane of 14 feet may be identified with a shared lane pavement marking, as shown in Figure 24. When such pavement markings are used, route signage interval standards for bike lanes, rather than for shared roads, should be applied.

If on-street parking is present, the parking area should be defined with pavement markings, or a solid 4-inch white stripe, which encourages motorists to park near the curb.

Figure 24: Pavement markings for wide outside lanes

SECTION SIX:
ADDING BICYCLE FACILITIES TO EXISTING ROADS

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 existing 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 sections Eight B, C, and D for additional information regarding repaving and construction.

A. 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.

B. 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.

C. 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 such a strategy.

D. 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, bike lanes should not be 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. Furthermore, roadway safety and capacity are generally improved for both bicyclists and motorists with the removal of on-street parking.

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 as well, but to a lesser degree. Most store-front businesses rely on on-street parking for their customers. Overall community goals should be taken into consideration when evaluating the appropriateness of removing parking lanes.

E. WIDEN THE ROADWAY

Most roadway widening projects are undertaken to increase motor vehicle capacity or as a streetscape improvement project. Such endeavors can present good 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

SECTION SEVEN: BICYCLE PARKING GUIDELINES

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 that are 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 an easy 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).

A. 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 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 practical reaction can result in damaged street trees and parked bikes that block the flow of pedestrian traffic.

A.1. GENERAL DESIGN PRINCIPLES (See Figure 25)

Bicycle racks should:

- 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, and
- be securely anchored.

Each bicycle parking space should be at least six feet long by two feet wide. Like motorists, bicyclists need space to maneuver their vehicles into parking spaces. Accordingly, when full, a bike rack should have about five feet of clearance on at least three sides.

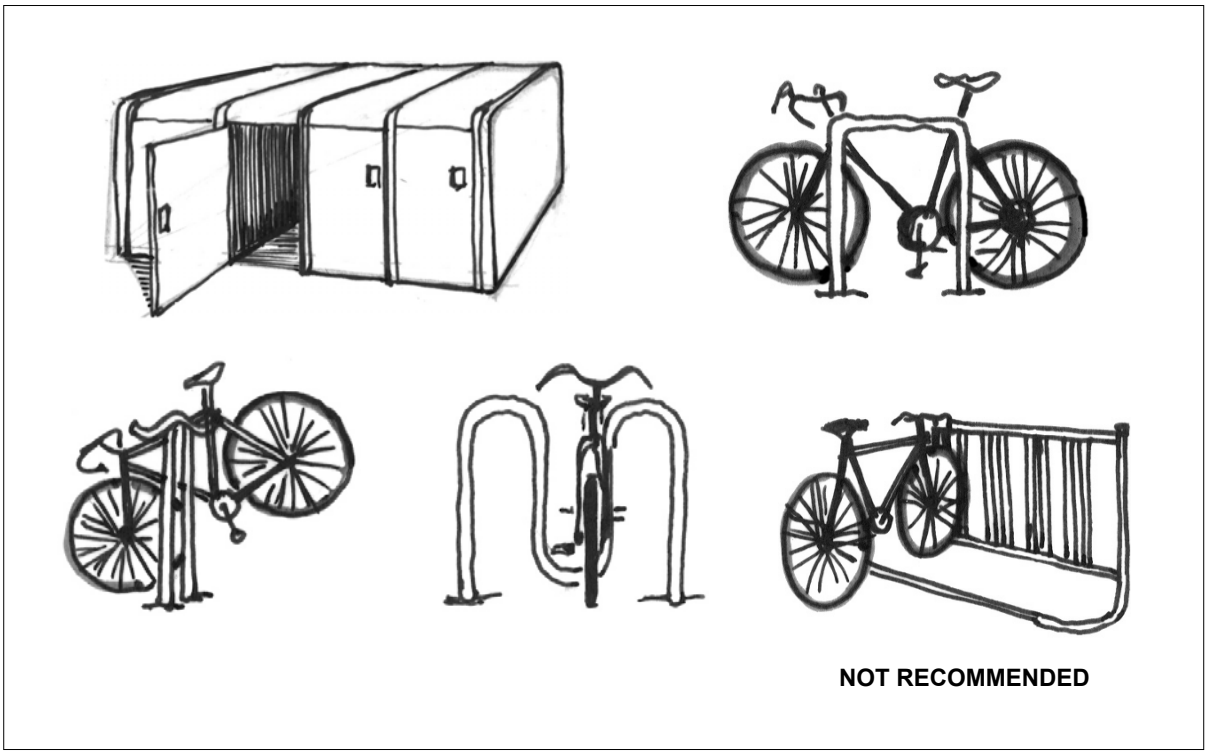


Figure 25: **Several typical bike rack and locker designs. The older style rack illustrated at the lower right corner does not permit a bike frame to be secured and is substandard.**

A.2. LOCATION

Racks should be installed in a well-lit location within fifty feet of the main entrance to a building, but not further from the entrance than the closest motor vehicle parking.

When there are many building entrances, multiple lower capacity racks should be 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.

B. 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.

B.1. GENERAL DESIGN PRINCIPLES

Commonly available bike lockers allow cyclists to secure a bicycle and accessories. 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.

B.2. 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 rights-of-way should be located within close proximity to major commuter destinations. In urban areas, a bicycle commuter is generally willing to walk a few blocks to her final destination when she knows that her vehicle is secure.

SECTION EIGHT: MAINTENANCE

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, easily puncture a bike tire.

A. 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 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 clipping, 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.

B. SURFACE REPAIRS

Bikeways should be routinely inspected for surface irregularities, potholes, ridges, cracks, and other surface problems. Government agencies should also be able to respond in a timely manner to reports from the public on specific hazards.

C. REPAVING

Repaving is a good opportunity to improve conditions for bicycling. Bike lanes can be added, shoulders widened, conventional lane widths can be adjusted, and surface hazards can be addressed.

Pavement overlays should extend across the entire roadway pavement width. In no instances should an overlay result in an abrupt edge or vertical ridge within the path of travel for cyclists.

Storm grates, manhole covers, and other such roadway features should be raised after repaving. The surface of such features should be not less than one-quarter inch from the pavement surface.

Repaving also presents a good opportunity to pave gravel driveways that connect to the roadway. Driveways should 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 22.

D. 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.

E. 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.

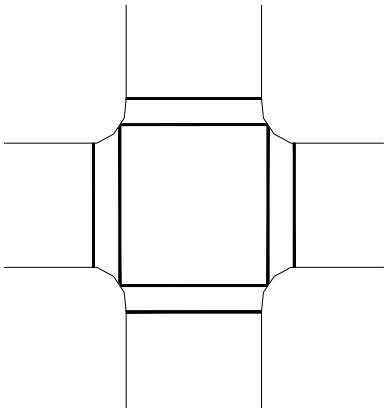
The source for several of the photographs used in this chapter is Dan Burden

SECTION NINE: PEDESTRIAN FACILITIES

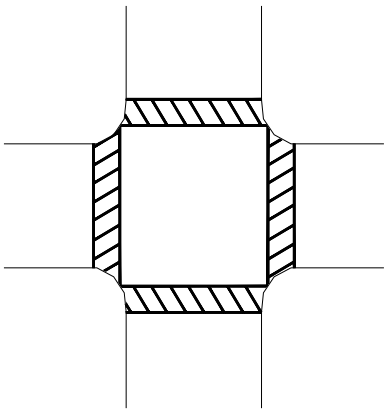
A. PEDESTRIAN CROSSWALK MARKINGS

To ensure the safety of pedestrians, it is required to give warning to drivers of a pedestrian crosswalk. The lines should stand out from the pavement and be clearly visible to all users. Pedestrians should be aware that only these designated areas are to be used for crossing.

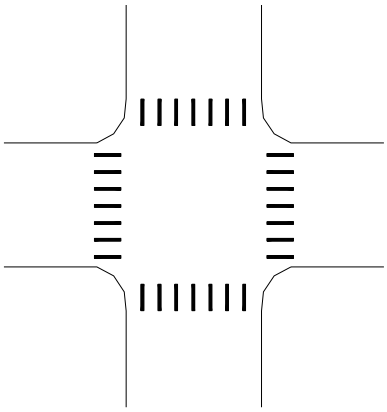
Standard crosswalk marking



Crosswalk with diagonal lines for added visibility



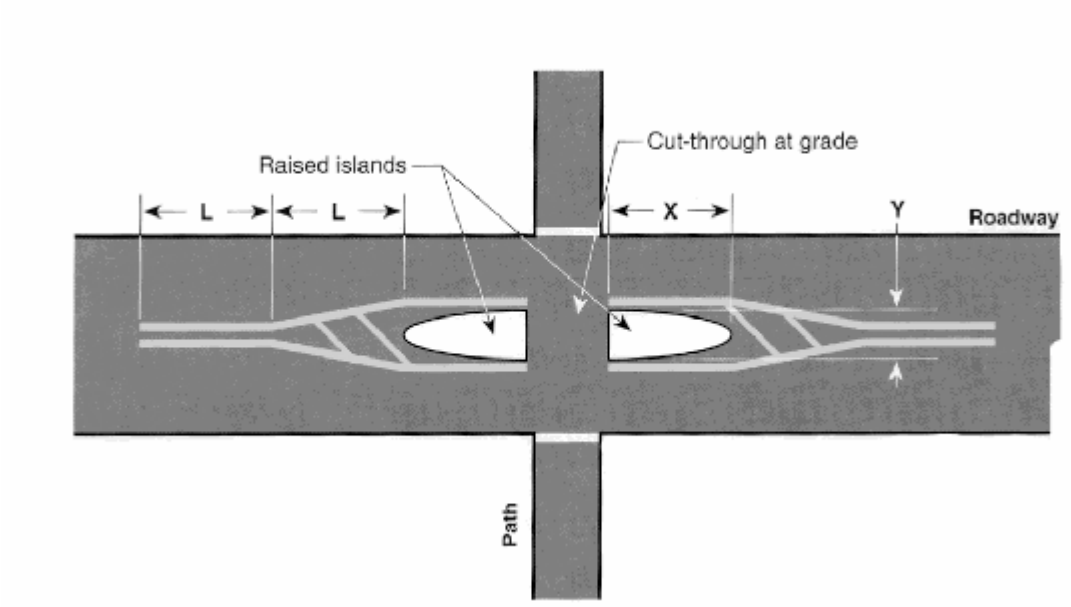
Crosswalk marking with longitudinal lines for added visibility



B. PEDESTRIAN REFUGE AREAS

Refuge areas are created to give special attention to pedestrian crosswalks and cut-throughs. They give a transition period for drivers as well as pedestrians and bicyclists.

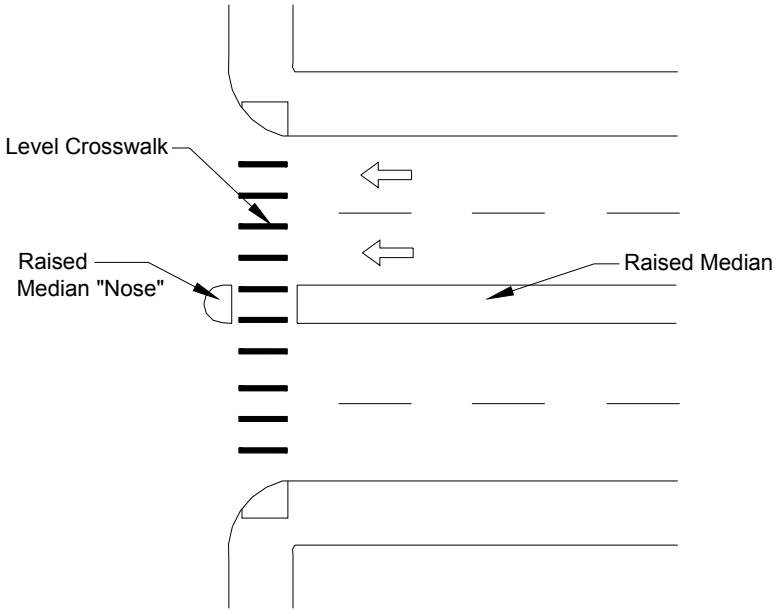
Specifications for a Created Refuge Area



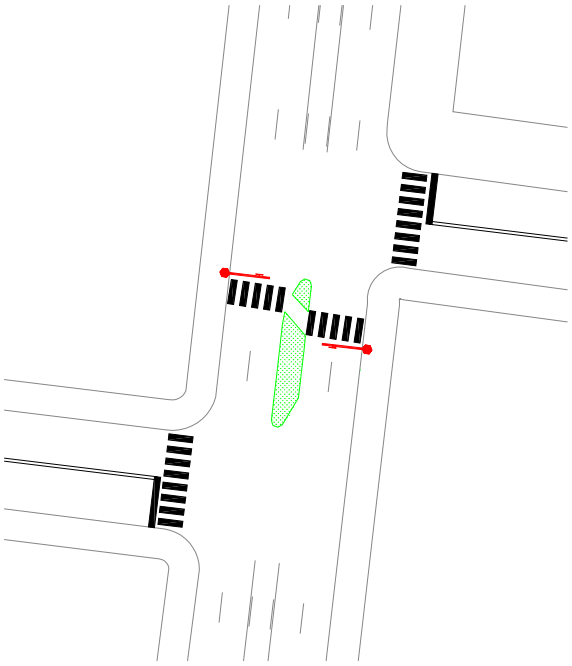
W (offset) = Y/2
Y = Length of refuge:
6 ft = poor
8 ft = satisfactory
10 ft = good

X = Length of island should be 6 ft or greater
$L = (WV^2)/60$, where V < 45 mph
L = WV, where V > 45mph

A median can give a refuge for pedestrians crossing the street. It can allow them to cross one direction of traffic at a time and increases safety for all users. Crosswalk markings are required at all locations of pedestrian crossing.



An angled median provides even more security by forcing pedestrians to face on-coming traffic as they cross the street.



APPENDIX B – DEFINITIONS

TERMS AND DEFINITIONS

AASHTO—The American Association of State Highway and Transportation Officials

ADA—The Americans with Disabilities Act

BICYCLE—Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term "bicycle" for this publication also includes three- and four-wheeled human-powered vehicles, but not tricycles for children.

BICYCLE FACILITIES—A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically designated for bicycle use.

BICYCLE LANE or BIKE LANE—A striped lane on the edge(s) of a roadway that has been designated specifically for bicyclists by means of signs and striping, usually about 4 feet in width.

BICYCLE PATH or BIKE PATH—A path, usually paved and about 12 feet in width constructed for bicycle or bicycle/pedestrian use, completely separated from motorized/vehicular traffic. See **SHARED USE PATH**

BICYCLE ROUTE or SHARED ROADWAY—A roadway, preferably with wider than normal lanes and/or low traffic volumes, that is designated for use by bicyclists via signage (there is usually no striping)

BICYCLE ROUTE SYSTEM—A system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bike routes should establish a continuous routing, but may be a combination of any and all types of bikeways.

BIKEWAY—A generic term for any road, street, path or way, which in some manner is specifically designated, for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

GENERATOR/ATTRACTOR—A park, school, recreational facility or other similar type facility that would be considered to "generate" or "attract" bicycle and/or pedestrian traffic

GROUP A CYCLIST—The more experienced and proficient bicyclists who are able to operate on the streets with heavier traffic and prefer the most direct route of travel

GROUP B CYCLIST—Bicyclists of average skill and experience

GROUP C CYCLIST—Typically children who prefer to ride on neighborhood streets with a lower traffic volume or on designated bicycle facilities

HIGHWAY—A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

RAIL-TRAIL—A shared use path, either paved or unpaved, built within the right-of-way of an existing or former railroad.

RIGHT-OF-WAY—A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

RIGHT OF WAY—The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

ROADWAY—The portion of a highway, including shoulders, intended for vehicular use.

RUMBLE STRIPS—A textured or grooved pavement sometimes used on or along shoulders of highways to alert motorists who stray onto the shoulder.

SHARED ROADWAY—A roadway that is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or road with paved shoulders.

SHARED USE PATH—A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skates, wheelchair users, joggers and other non-motorized users.

SHOULDER—The portion of a 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.

SIDEWALK—The portion of a street or highway right-of-way designed for preferential or exclusive use by pedestrians.

SIGNED SHARED ROADWAY (SIGNED BIKE ROUTE)—A shared roadway that has been designated by signing as a preferred route for bicycle use.

TRAVELED WAY—The portion of the roadway for the movement of vehicles, exclusive of shoulders.

UNPAVED PATH—Paths not surfaced with asphalt or Portland cement concrete.

APPENDIX C – FUNDING SOURCES

Congress recognized the importance of creating a balanced transportation system by passing the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. This law has helped to provide the funding, planning, and policy tools that are necessary to create communities suitable for walking and bicycling. Since being signed into law by Bill Clinton in 1998, the Transportation Equity Act of the 21st Century (TEA-21) has also incorporated bicycling and walking into the transportation mainstream and has helped communities to improve the safety and convenience of bicycling and walking for everyday travel.

In order for bicycle and pedestrian projects to be Federally funded, the projects must be "principally for transportation, rather than recreation, purposes." These projects must also follow transportation plans required of States and Metropolitan Planning Organizations. There are many funding sources for bicycle and pedestrian projects:

- National Highway System – Bicycle transportation facilities and pedestrian walkways on land adjacent to any highway on the National Highway System, including Interstate highways.
- Surface Transportation Program (STP) – Similar construction projects or nonconstruction projects such as maps, brochures, or public service announcements.
- Transportation Enhancement Activities (TEAs) – 10% of each State's annual STP funds are used for the provision of facilities, safety, and educational activities for pedestrians and bicyclists.
- Hazard Elimination and Railway-Highway Crossing Programs – Also receives 10% of each State's annual STP funds; funds are used to identify and correct locations that may produce a danger.
- Congestion Mitigation and Air Quality Improvement Program – Both construction and nonconstruction projects related to safe bicycle use.
- Recreational Trails Program – All kinds of trail projects, both motorized and nonmotorized.
- Federal Lands Highway Program – Provisions for pedestrians and bicyclists dealing with roads, highways, and parkways.
- National Scenic Byways Program – Construction of a facility along a scenic byway for pedestrians and bicyclists.
- Job Access and Reverse Commute Grants – Supports projects designed to transport welfare recipients and low-income individuals to and from employment.
- High Priority Projects and Designated Transportation Enhancement Activities – This is identified by the TEA-21 to include numerous bicycle, pedestrian, trail, and traffic calming projects in communities.
- Pedestrian Underpass and Overpass Program – Provides grade separated crossings for pedestrians on State road projects. Local government must have an adopted greenway plan that shows the greenway crossing the State roadway project. Funds for the pedestrian crossing are 80% federal and TDOT will pay the 20% match if conditions are met.

The Federal Transit Program has amendments of TEA-21 that aim to improve bicycle and pedestrian access to transit facilities and vehicles.

APPENDIX D – SELECTION CRITERIA

To select a facility to have a bike and pedestrian path, many factors must be considered. In addition to the guidelines below, the Federal Highway Administration provides some guidance for selecting bicycle facilities in their publication of Selecting Roadway Design Treatments to Accommodate Bicycles. The Cities and County should select only the facilities that meet these guidelines for the safety and pleasure of all users.

Personal Safety and Security. The possibility for isolation on shared used paths or roadways and the potential for criminal acts, theft or vandalism should be considered.

Skill Level of Users. Consideration should be given to the type of bicyclist who will be using the facility. Facilities near parks and residential areas will attract a high percentage of lower skill levels.

Accessibility and Directness. The provision for frequent and convenient bicycle access and the ability to connect traffic generators should be considered. Access for emergency and maintenance vehicles should be adequate. Travel to and from traffic generators should be direct and convenient.

Truck and Bus Traffic. Because of their width, trucks, buses and trailers can cause problems for bicyclists. Bus stops may also cause conflicts with the bicycle route due to loading and unloading and pavement deterioration.

Barriers and Bridges. Barriers due to topography, rivers, or other impediments can cause a problem for a bicycle route. Bridges can also create problems due to narrow width and open grates. In some cases, a facility can be provided to overcome these barriers.

Aesthetics. Scenery is an important consideration along a facility, especially those that are intended for recreational use. Trees can provide a break from the wind and the sun for users.

Stops. Frequent stops in a bike route should be considered. Bicyclists have a strong desire to maintain motion, so if the route requires too many stops, it may cause the user to disregard traffic control devices.

Pavement Surface Quality. Bikeways should be free of irregularities in the pavement such as bumps, holes and cracks. Railroad crossings and drainage grates should be improved to satisfy the needs of the bicyclists.

Costs and Funding. Facility selection will normally involve a cost analysis of alternatives. The decision to implement a bikeway should be made with long-term commitment to a proper level of maintenance. Low-cost improvements should be suggested when funding is limited such as roadway improvements, bicycle parking and removal of obstructions and barriers.

APPENDIX E – RESOURCES

General Design Resources

A Policy on Geometric Design of Highways and Streets, 1994 (The Green Book). American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.

Highway Capacity Manual, Special Report 209, 1994. Transportation Research Board, Box 289, Washington, DC 20055, Phone: (202) 334-3214. Next Edition: FHWA Research Program project has identified changes to HCM related to bicycle and pedestrian design.

Manual on Uniform Traffic Control Devices, 1988. Federal Highway Administration (FHWA), Superintendent of Documents. P.O. Box 371954, Pittsburgh, PA 15250-7954. Next Edition: 2000, will incorporate changes to Part IX that will soon be subject of Notice of Proposed Rulemaking.

Flexibility in Highway Design, 1997. FHWA. HEP 30, 400 Seventh Street SW, Washington, DC 20590.

Pedestrian Facility Design Resources

Design and Safety of Pedestrian Facilities, A Recommended Practice, 1998. Institute of Transportation Engineers, 525 School Street, S.W, Suite 410, Washington, DC 20024-2729, Phone: (202) 554-8050

Pedestrian Compatible Roadways-Planning and Design Guidelines, 1995. Bicycle / Pedestrian Transportation Master Plan, Bicycle and Pedestrian Advocate, New Jersey Department of Transportation, 1035 Parkway Avenue, Trenton, NJ 08625, Phone: (609) 530-4578.

Improving Pedestrian Access to Transit: An Advocacy Handbook, 1998. Federal Transit Administration / WalkBoston. NTIS, 5285 Port Royal Road, Springfield, VA 22161.

Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, Report No. 294A, Transportation Research Board, Box 289, Washington, DC 20055, Phone: (202) 334-3214.

Pedestrian Facilities Guidebook, 1997. Washington State Department of Transportation, Bicycle and Pedestrian Program, P.O. Box 47393, Olympia, WA 98504.

Portland Pedestrian Design Guide, 1998. Portland Pedestrian Program, 1120 SW Fifth Ave, Room 802; Portland, OR 97210. (503) 823-7004.

Implementing Pedestrian Improvements at the Local Level, 1999. FHWA, HSR 20, 6300 Georgetown Pike, McLean, VA.

AASHTO Guide to the Development of Pedestrian Facilities, 2000. AASHTO. (currently under discussion)

Bicycle Facility Design Resources

Guide for the Development of Bicycle Facilities, 1999, American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.

Implementing Bicycle Improvements at the Local Level, (1998), FHWA, HSR 40, 6300 Georgetown Pike, McLean, VA.

Bicycle Facility Design Standards, 1998. City of Philadelphia Streets Department, 1401 JFK Boulevard, Philadelphia, PA 19103.

Selecting Roadway Design Treatments to Accommodate Bicyclists, 1993. FHWA, HEP 10, 400 Seventh Street SW, Washington, DC 20590.

North Carolina Bicycle Facilities Planning and Design Guidelines, 1994. North Carolina DOT, P.O. Box 25201, Raleigh, NC 27611. (919) 733-2804.

Bicycle Facility Planning, 1995. Pinsof & Musser. American Planning Association, Planning Advisory Service Report #459. American Planning Association, 122 S. Michigan Ave, Suite 1600; Chicago, IL 60603.

Florida Bicycle Facilities Planning and Design Manual, 1994. Florida DOT, Pedestrian and Bicycle Safety Office, 605 Suwannee Street, Tallahassee, FL 32399.

Evaluation of Shared-use Facilities for Bicycles and Motor Vehicles, 1996. Florida DOT, Pedestrian and Bicycle Safety Office, 605 Suwannee Street, Tallahassee, FL 32399.

Bicycle and Pedestrian Design Resources

Oregon Bicycle and Pedestrian Plan, 1995. Oregon Department of Transportation, Bicycle and Pedestrian Program, Room 210, Transportation Building, Salem, OR 97310, Phone: (503) 986-3555.

Improving Conditions for Bicyclists and Pedestrians, A Best Practices Report, 1998. FHWA, HEP 10, 400 Seventh Street SW, Washington, DC 20590.

Traffic Calming Design Resources

Traffic Calming: State of the Practice. 1999. Institute of Transportation Engineers, 525 School Street, SW, Suite 410; Washington, DC 20024.

Florida Department of Transportation's Roundabout Guide. Florida Department of Transportation 605 Suwannee St., MS-82, Tallahassee, FL 23299-0450.

National Bicycling and Walking Study. Case Study # 19, Traffic Calming and Auto-Restricted Zones and other Traffic Management Techniques-Their Effects on Bicycling and Pedestrians, Federal Highway Administration (FHWA).

Traffic Calming (1995), American Planning Association, 122 South Michigan Avenue, Chicago, IL 60603.

Traditional Neighborhood Development Street Design Guidelines, 1997. Proposed Recommended Practice, Institute of Transportation Engineers, 525 School Street, SW, Suite 410; Washington, DC 20024.

Making Streets that Work, City of Seattle, 600 Fourth Ave., 12th Floor, Seattle, WA 98104-1873, Phone: (206) 684-4000, Fax: (206) 684-5360.

Traffic Control Manual for In-Street Work, 1994. Seattle Engineering Department, City of Seattle, 600 Fourth Avenue, Seattle, WA 98104-6967, Phone: (206) 684-5108.

ADA-related Design Resources

Accessible Pedestrian Signals, 1998. U.S. Access Board 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Accessible Rights of Way: A Design Manual, 1999. FHWA/U.S. Access Board, HEPH, 400 Seventh Street SW, Washington, DC 20590.

Designing Sidewalks and Trails for Access, 1999. FHWA, HEP 10, 400 Seventh Street SW, Washington, DC 20590.

ADA Accessibility Guidelines for Buildings and Facilities, 1998 (ADAAG). U.S. Access Board, 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Uniform Federal Accessibility Standards, 1984 (UFAS), available from the U.S. Access Board, 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Universal Access to Outdoor Recreation: A Design Guide, 1993. PLAE, Inc, MIG Communications, 1802 Fifth Street, Berkeley, CA 94710. (510) 845-0953.

Trail Design Resources

Trails for the 21st Century, 1993. Rails to Trails Conservancy, 1100 17th Street NW, 10th Floor, Washington DC 20036. (202) 331-9696.

Greenways: A Guide to Planning, Design, and Development, 1993. The Conservation Fund. Island Press, 1718 Connecticut Ave NW, Suite 300; Washington, DC 20009.

Trail Intersection Design Guidelines, 1996. Florida Department of Transportation, 605 Suwannee St., MS-82, Tallahassee, FL 23299-0450.

Miscellaneous Resources

Guide for the Development of Bicycle Facilities, American Association of State Highway and Transportation Officials, 1999

Review of Planning Guidelines and Design Standards for Bicycle Facilities, Institute of Transportation Engineers, 1997

North Carolina Bicycle Facilities and Design Guidelines, North Carolina Department of Transportation, 1994

Highway Design Manual, Chapter 1000, California Department of Transportation

Manual on Uniform Traffic Control Devices (MUTCD), American Association of State Highway and Transportation Officials, Latest Edition

The Basics of Bicycling, The Bicycle Federation of America

Bicycle Facility Planning: A resource for Local Governments, American Planning Association, Planning Advisory Service Report Number 459

Design and Safety of Pedestrian Facilities, ITE Technical Council Committee 5A-5, 1994

Bicycle Transportation, A Handbook for Cycling Transportation Engineers, Second Edition, John Forester, 1994

Internet Resources

www.walkable.org

www.anericawalks.org

www.railtrails.org

www.bikesbelong.org

www.tea21.org

www.pedestraians.org

www.ite.org

www.fhwa.dot.gov

www.dot.ca.gov/hq/oppd/hdm/chapters/t1002

www.dot.ca.gov/hq/oppd/hdm/chapters/t1002.htm

www.bikeplan.com

www.trans.ci.portland.or.us/Traffic Management/

www.aashto.org

www.cycling.org

www.chainguard.org

www.bikefed.ogr