MARSHVILLE

PEDESTRIAN + BICYCLE MASTER PLAN

JUNE 2019

Produced by:

WSP

alta PLANNING + DESIGN

Produced for:

TOWN OF MARSHVILLE est. 1877

CRTPO charlotte regional transportation planning organization

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ACKNOWLEDGMENTS

Thanks to the local residents, business leaders, community leaders, and government staff who participated in the development of this study through meetings, events, volunteering, interviews, and review.

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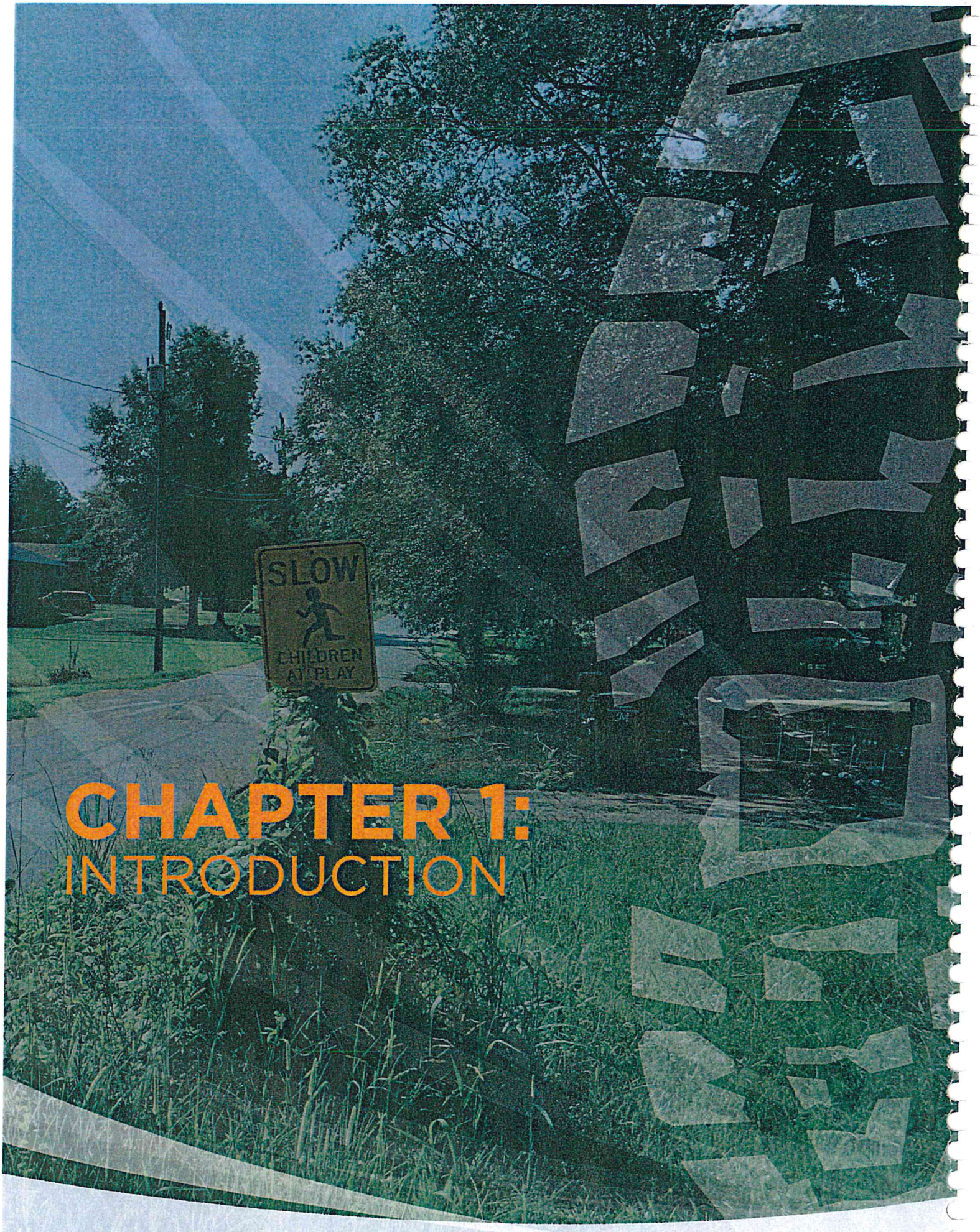
SLOW
CHILDREN
AT PLAY
NO
THRU
TRUCKS



CHAPTER 1: INTRODUCTION

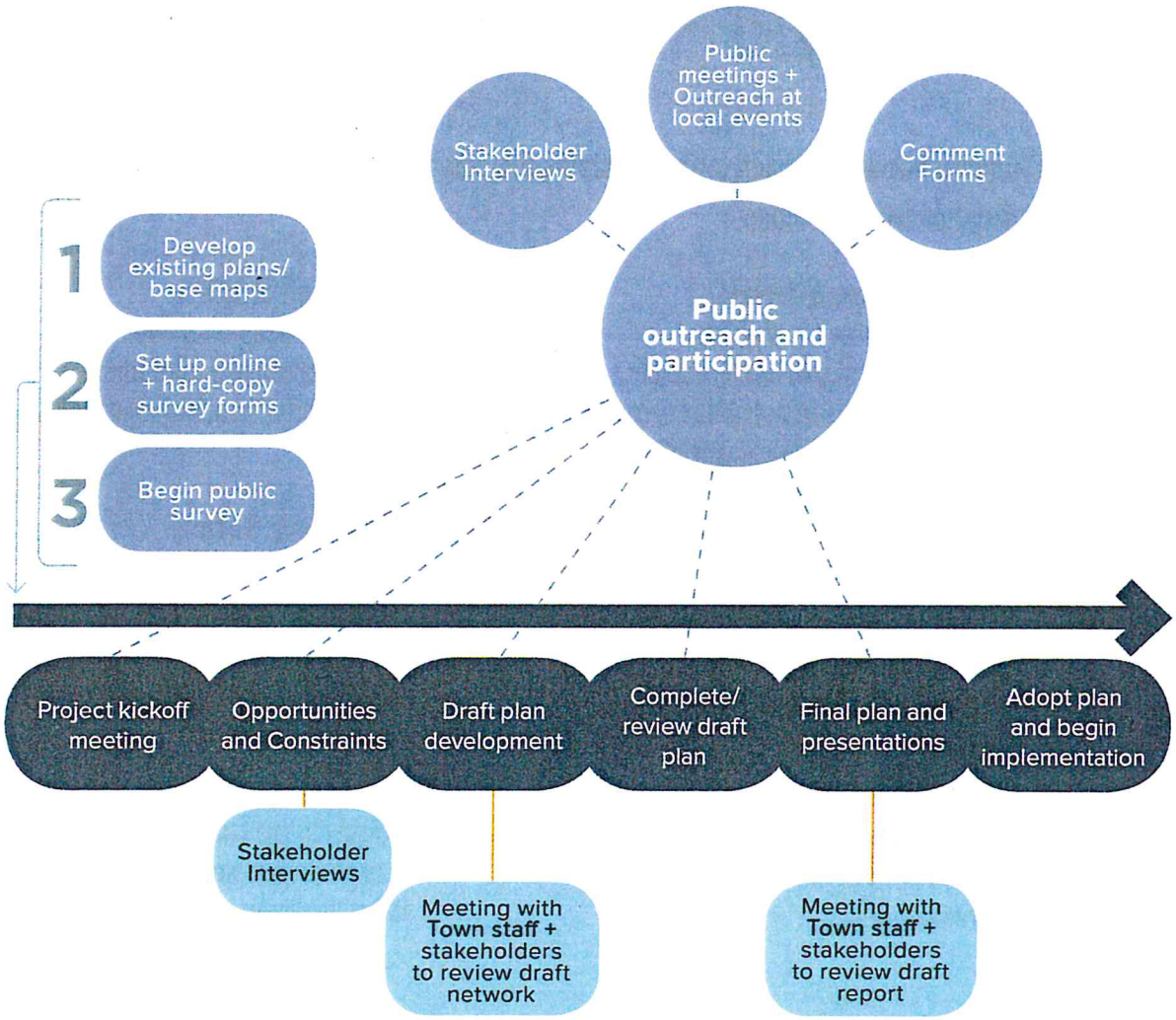
PLANNING PROCESS

The scope of this plan is to provide a **comprehensive assessment of walking and bicycling throughout the Town of Marshville**, including identifying pedestrian and bicyclist needs and deficiencies, examining optional improvements, and prioritizing implementation strategies with viable funding sources. The study area for this plan is defined by the municipal town limits.

The Marshville Pedestrian + Bicycle Master Plan builds on past efforts and creates a new vision for walking and bicycling in the town. The plan will be used by the Town of Marshville, North Carolina Department of Transportation (NCDOT), and the Charlotte Regional Transportation Planning Organization (CRTPO) to prioritize, fund, and implement high-quality infrastructure, high-impact programs, and supportive policies for walking and bicycling.

This planning effort was made possible through funding from the CRTPO and NCDOT.

The Marshville Pedestrian + Bicycle Master Plan process began in September 2018 and continued through to March 2019. The graphic below expresses the various planning activities and tasks undertaken and how they work together to form a dynamic and representative active transportation plan for the Town of Marshville.



VISION

"Marshville will be a place where a ***connected network*** of comfortable pedestrian and bicycle facilities are provided to ***all residents***; where residents can easily ***safely access*** recreational areas, schools, and other destinations on foot; and where ***pedestrian-friendly design*** is prioritized in all future roadway, recreation, and development projects."

HOW TO GET THERE

The goals outlined below build upon the vision statement, relate to key themes from local plans, and expand upon national best practices.

Enhance Connectivity
Develop a network that links destinations and neighborhoods so people of all ages and abilities can safely and conveniently get where they want to go by walking and biking.

Encourage Economic Growth
Recognize the economic benefits of walkable communities, and capitalize on increased property values.

Promote Equity
Ensure that walking infrastructure is provided in the areas with the greatest need.

Improve Health
Enhance access to active transportation and outdoor recreation for health and wellness.

Increase Safety
Address the safety of the transportation system for the most vulnerable users and aim for zero pedestrian and bicycle fatalities and serious injuries.

Increase Active Mobility
Provide active transportation choices that support healthy, safe, and walkable neighborhoods.

THE VALUE OF ACTIVE COMMUNITIES

HEALTH BENEFITS

Sidewalks, trails and multi-use paths offer safe and accessible opportunities for physical activity. People who utilize pedestrian and bicycle facilities are able to connect with places that they want or need to go.

For every **0.6 MILES WALKED** there is a **5%** **REDUCTION** IN THE LIKELIHOOD OF **OBESITY.**

Frank, 2004

Those who are physically active generally live longer and have a lower risk for heart disease, stroke, Type 2 diabetes, depression, some cancers, and obesity.

CDC, 2015

20 MINUTES WALKING OR BIKING each day is associated with a

21% LOWER RISK OF HEART FAILURE FOR MEN

and

29% LOWER RISK FOR WOMEN

Rahman, 2014 and 2015

ENVIRONMENTAL BENEFITS

Decreasing reliance on automobiles and reducing congestion by utilizing sidewalks and trails will lead to improved air quality. Trails and greenways serve as a tool for conserving open space and preserving wetlands.

IF 8% MORE CHILDREN LIVING WITHIN 2 MILES OF A SCHOOL WERE TO WALK OR BIKE TO SCHOOL, the air pollution reduced from not taking a car would be **EQUIVALENT TO REMOVING 60,000 CARS FROM THE ROAD** for one year, nationally.

Pedroso, 2008, SRTS

ECONOMIC BENEFITS

Connected walkways and trails often yield high returns on investment through economic revitalization, recreational tourism, increased property values, and small business opportunities.

BUILDING **SIDEWALK AND BICYCLE FACILITIES** CREATES **36% MORE JOBS** THAN BUILDING HIGHWAYS AND ALMOST **100% MORE JOBS** THAN PAVEMENT IMPROVEMENTS.

CEO for Cities; American Association of State Highway and Transportation Officials (AASHTO) Average Direct Jobs by Project Type (2012); Job in terms of full-time equivalents (FTE).

HOUSES IN HIGHLY **WALKABLE NEIGHBORHOODS** HAVE PROPERTY VALUES **$4,000 TO $34,000 HIGHER** THAN HOUSES IN AREAS WITH AVERAGE WALKABILITY.

Cortright, J. (2009). Walking the Walk: How Walkability Raises Housing Values in U.S Cities.

40%

OF ALL TRIPS (IN THE US) ARE TWO MILES (OR LESS)

NHTS, 2009

DRIVING 4 MILES/DAY COSTS

$847/ year

in fuel and vehicle wear and tear

AAA, 2015

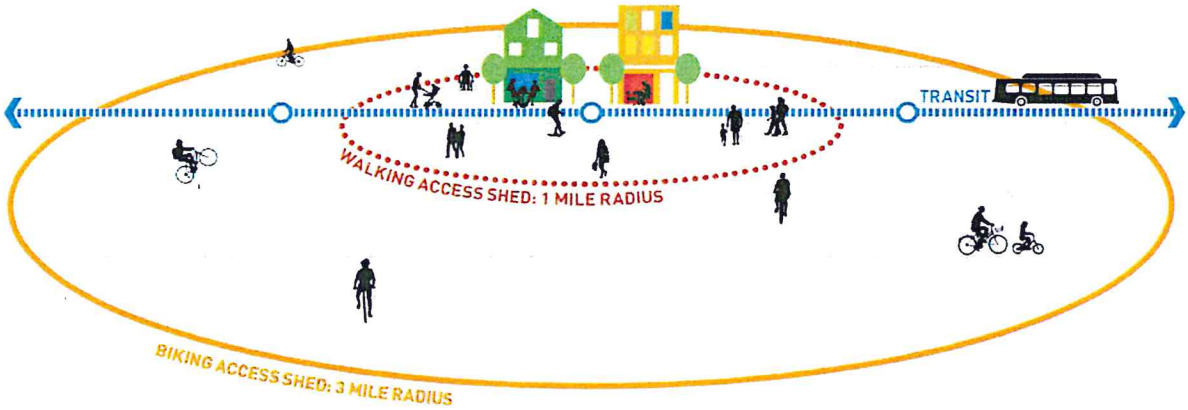
WALKING & BICYCLING **is FREE**

(except for the cost of a bike)

ACCESSIBILITY AND MOBILITY BENEFITS

Sidewalks, bikeways, and trails can be implemented at a low cost and serve as part of a multi-modal transportation system. In areas where public transit doesn't offer direct routes to employment centers, sidewalks and trails can serve as important connections between home and workplaces.

ON AVERAGE, 40% OF ALL TRIPS WE MAKE ARE FOR A DISTANCE OF **TWO MILES OR LESS**—A DISTANCE THAT CAN EASILY BE COVERED BY A 10 MINUTE BIKE RIDE OR A 30 MINUTE WALK.



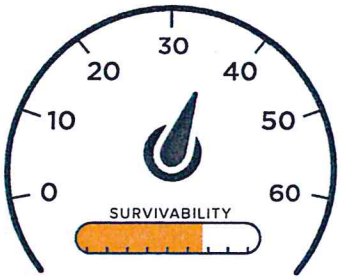
SAFETY BENEFITS

Pedestrian and bicycle treatments and traffic calming help to save lives. Additionally, natural surveillance for trails and greenways occurs through increased numbers of trail users, creating an environment where behavior on the trail is monitored by trail users themselves.

A pedestrian hit by a vehicle traveling at **25 MPH**

has a **89%** chance of survival

A pedestrian hit by a vehicle traveling at **35 MPH**



has a **68%** chance of survival

A pedestrian hit by a vehicle traveling at **45 MPH**

has a **35%** chance of survival

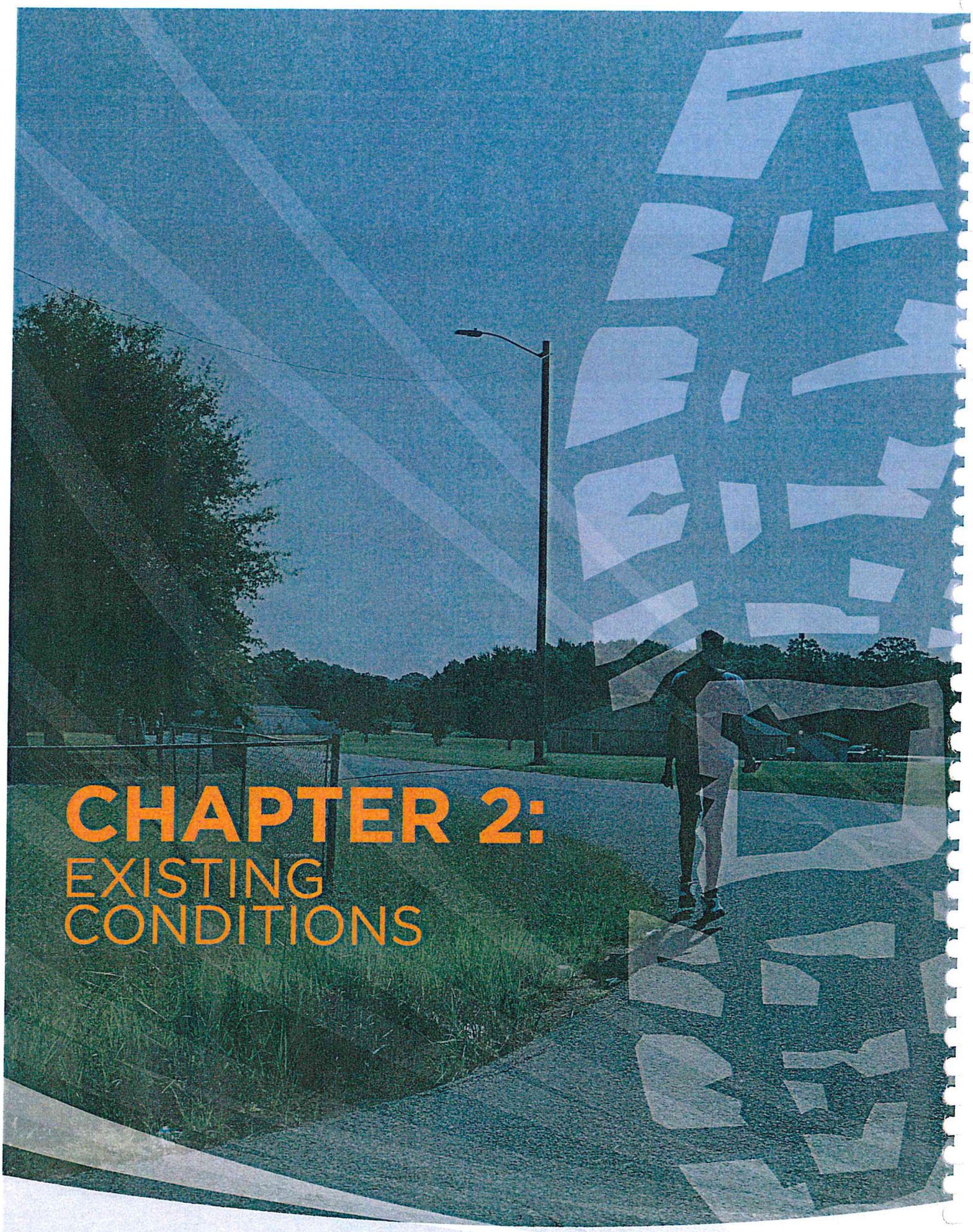
Rosén, E., & Sander, U. (2009). Pedestrian fatality risk as a function of car impact speed. Accident Analysis & Prevention, 41(3), 536-542.

"Communities designed to be walkable can **improve safety** not only for people who walk but for **all community members."**

- Surgeon General, 2015

	% DECREASE IN CRASHES
Install sidewalk to avoid walking along roadway	**65-89**
Increase enforcement to reduce speed	**70**
Install median refuge island	**56**
Add exclusive pedestrian phasing to signalized intersection	**34**

Federal Highway Administration. (2008). "Desktop reference for crash reduction factors."



CHAPTER 2:
EXISTING CONDITIONS

EXISTING CONDITIONS ANALYSIS

The consultant team performed an existing conditions analysis to better understand walking and bicycling trends and issues. The following pages feature different types of analyses that were conducted to take a closer look at current conditions in Marshville. Results of these analyses illustrate areas where improvements to safety and connectivity could be made.

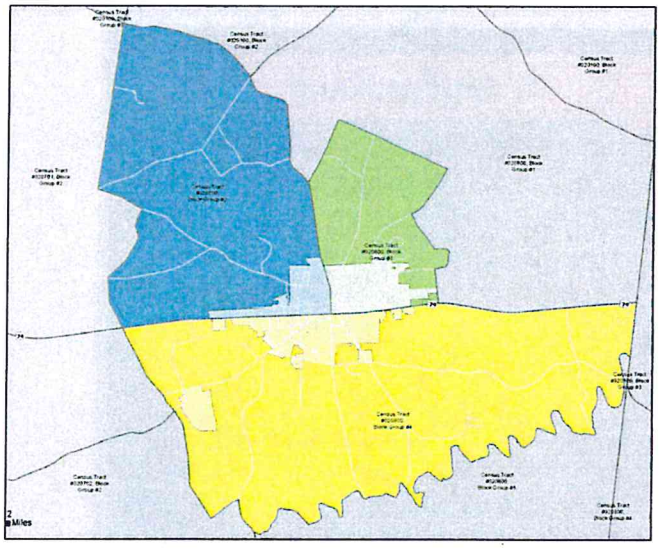
The chart below provides an overview of the analyses conducted and how they relate to existing conditions in the region.

Type of Analysis...	To Understand...
• Review of Existing Pedestrian + Bicycle Conditions	• Opportunities and barriers to pedestrian and bicycle travel
• Reaching Key Destinations: Sidewalk Gap Analysis + Pedestrian Crossing Inventory	• Sidewalk gaps and deficiencies in pedestrian safety and comfort at intersections on routes to key destinations in Marshville
• Pedestrian- + Bicycle-Involved Crashes	• Where pedestrian- and bicycle-involved crashes are occurring and any trends or patterns related to where the crashes occur
• Equity Analysis	• Where there are concentrations of higher need populations
• Road Ownership	• The responsible agency who oversees maintenance and improvements to Right-of-Way.

EQUITY ANALYSIS

Transportation facilities are essential components in creating communities of opportunity and reducing the disproportionate economic and health burdens on vulnerable populations. Often, traditionally vulnerable populations, such as children, older adults, people of color, people with limited English proficiency, and low-income individuals rely heavily on affordable transportation options, specifically walking, biking, and transit.

The project team conducted an equity analysis using existing demographic information from the US Census Bureau. All data was obtained from the 2015 American Community Survey 5-year estimates and analysis was conducted at the census block group level for the Town of Marshville. The three block groups that Marshville falls within also include some of the surrounding community, as shown in the reference map below.



Census Tract 020800, Block Group:

- 2
- 3
- 4
- All Other Block Groups
- Marshville Town Limits

The analysis scored the study area using the following economic and demographic indicators:

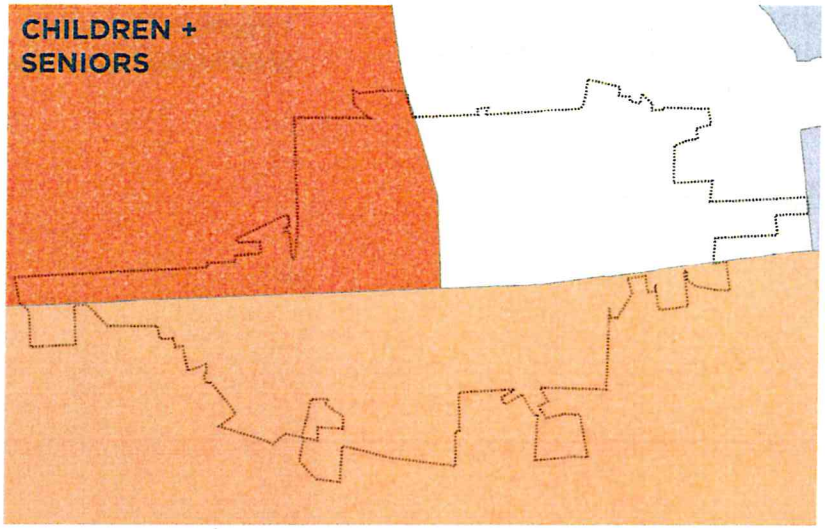
- **Age:** Individuals under the age of 18 and over the age of 65
- **Educational Attainment:** Population with no high school diploma or equivalent
- **Income:** Individuals of working age who are living at or below 200% of the Federal Poverty Level (FPL)
- **Limited English Speaking Households:** Percentage of households that identify as not speaking English well or at all
- **Race:** Percentage of the population that identifies as non-white

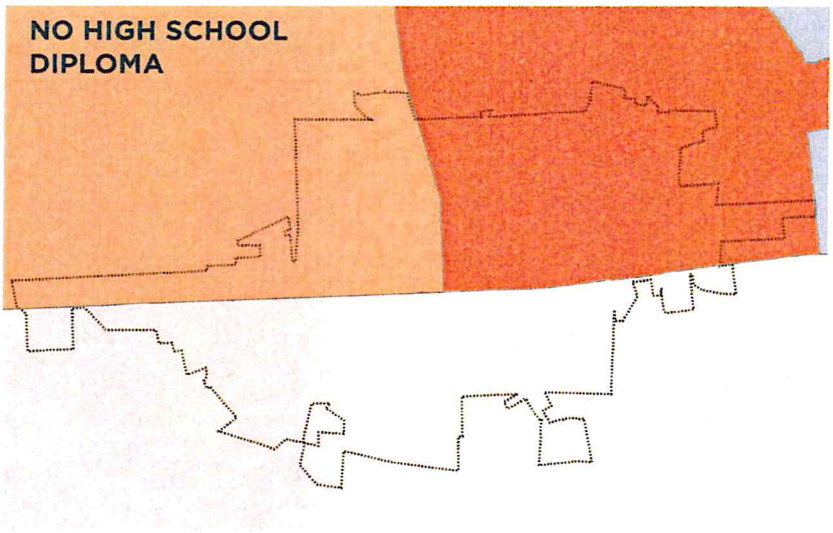
DEMOGRAPHIC SUMMARY FOR THE TOWN OF MARSHVILLE:

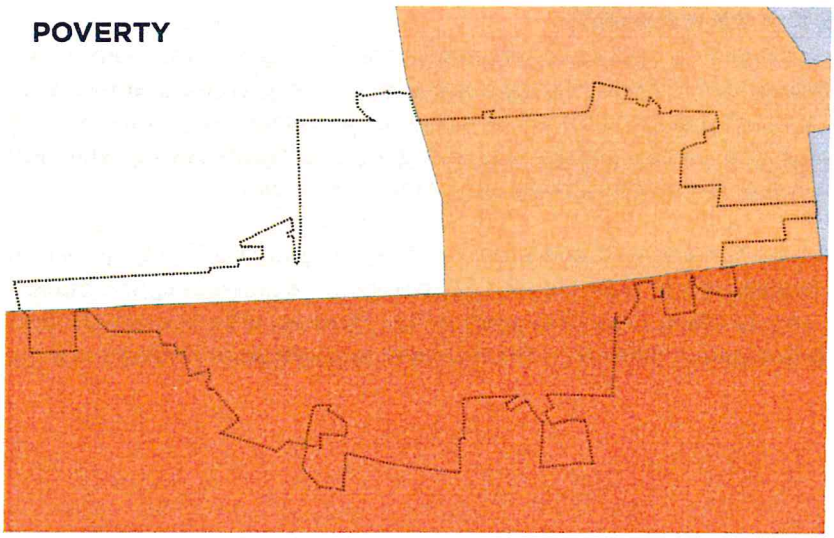
- **23% Children under 18 years**
- **13% Seniors**
- **37% Children + Seniors**
- **21% No GED**
- **16% Below Poverty Level**
- **52% Minority**
- **1.4% Limited English Speaking Households**

CONCENTRATION OF VULNERABLE POPULATIONS

- High
- Medium
- Low
- Marshville Town Limits

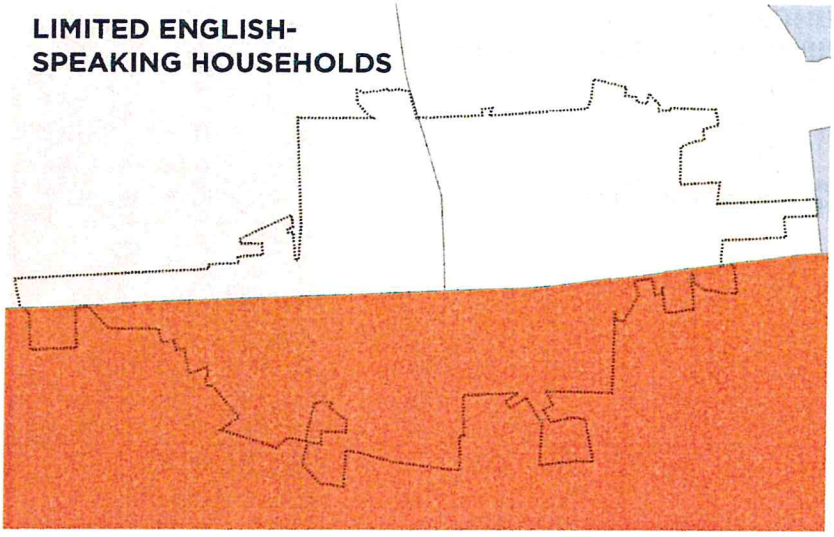


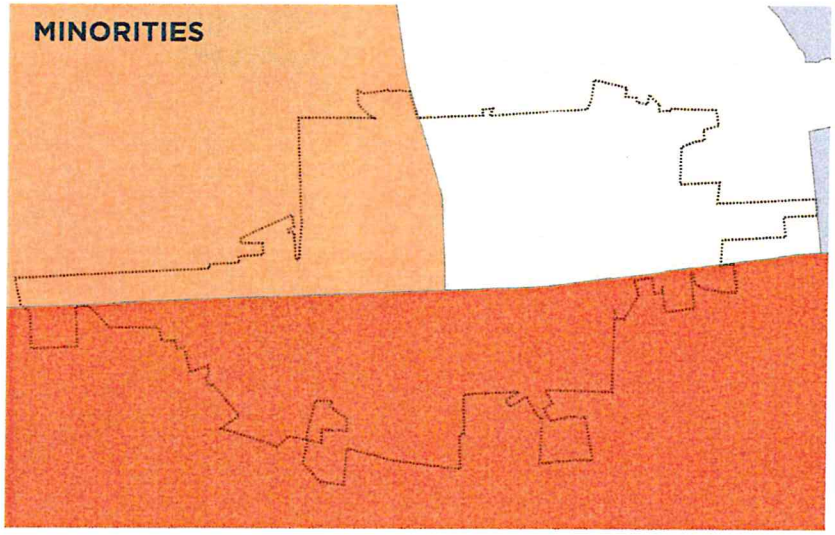




CONCENTRATION OF VULNERABLE POPULATIONS

- High
- Medium
- Low
- Marshville Town Limits



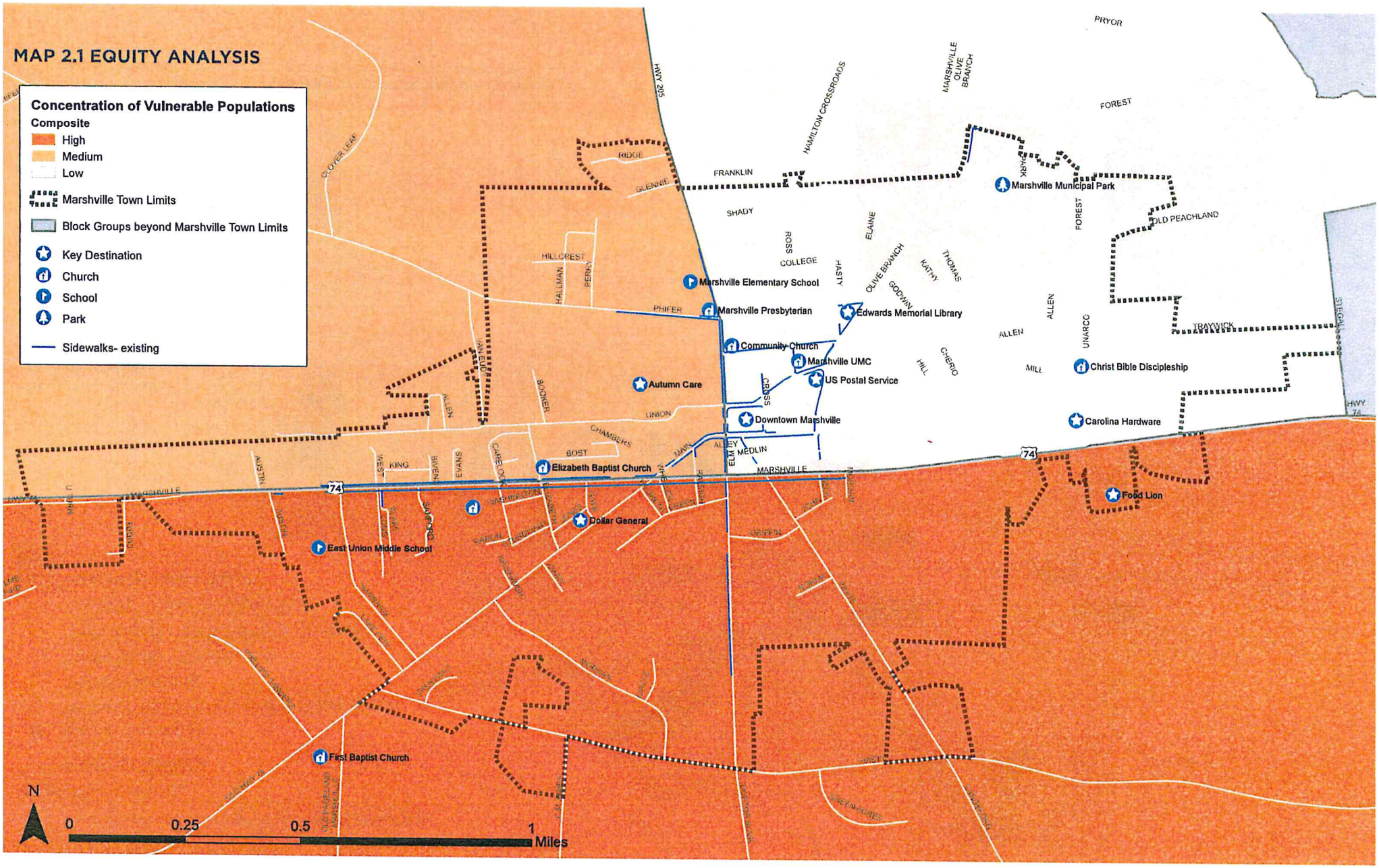


KEY TAKEAWAY

The different categories of vulnerable populations are distributed unevenly across the town, although the distribution of minorities does track with older and younger populations. A higher concentration of low-income households also lines up with a higher concentration of households with limited English proficiency. A composite map on the following page reveals a general concentration of vulnerable populations south of the US 74 corridor, and in the northwest quadrant of the town.

This high need area to the south of US 74 is much more rural and is almost exclusively residential. The only sidewalk south of US 74 is along Elm Street. Providing safe pedestrian crossings of US 74 and connecting facilities to key destinations south of US 74—East Union Middle School, Dollar General, and Food Lion—should be prioritized to provide more equitable distribution of facilities to the areas with the most need.

MAP 2.1 EQUITY ANALYSIS



MAP 2.2 EXISTING CONDITIONS: OPPORTUNITIES + BARRIERS

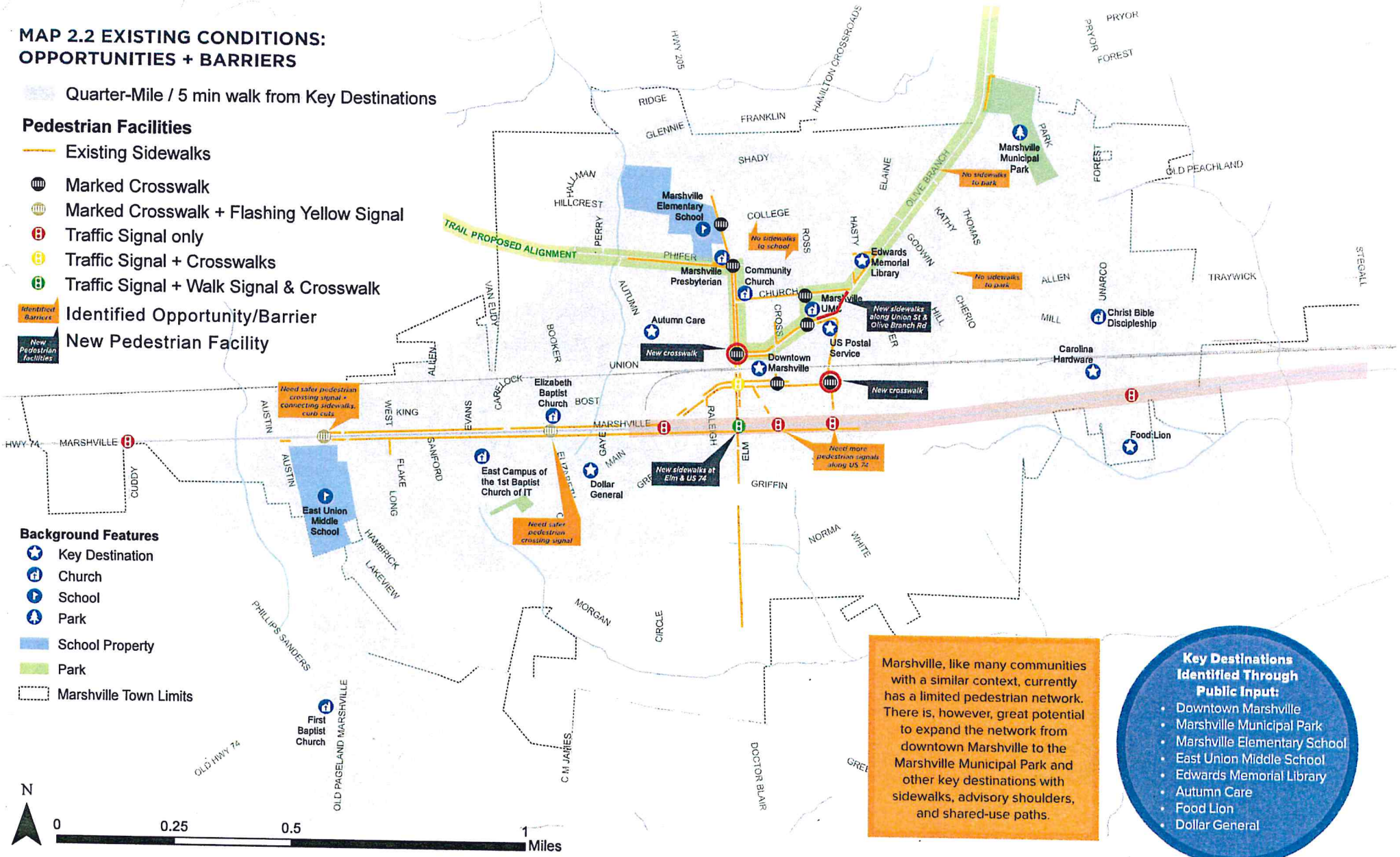
Quarter-Mile / 5 min walk from Key Destinations

Pedestrian Facilities

- Existing Sidewalks
- Marked Crosswalk
- Marked Crosswalk + Flashing Yellow Signal
- Traffic Signal only
- Traffic Signal + Crosswalks
- Traffic Signal + Walk Signal & Crosswalk
- Identified Opportunity/Barrier
- New Pedestrian Facility

Background Features

- Key Destination
- Church
- School
- Park
- School Property
- Park
- Marshville Town Limits



Marshville, like many communities with a similar context, currently has a limited pedestrian network. There is, however, great potential to expand the network from downtown Marshville to the Marshville Municipal Park and other key destinations with sidewalks, advisory shoulders, and shared-use paths.

Key Destinations Identified Through Public Input:

- Downtown Marshville
- Marshville Municipal Park
- Marshville Elementary School
- East Union Middle School
- Edwards Memorial Library
- Autumn Care
- Food Lion
- Dollar General

WALKING + BIKING IN MARSHVILLE TODAY...

OPPORTUNITIES

Marshville provides many opportunities for new or improved pedestrian facilities. **Low traffic volumes on many neighborhood streets** would allow for the implementation of on-street pavement markings (see pages 83-85 for details and design guidelines) that designate space for walkers and bicyclists with minimal cost and impact on communities. Marshville residents are interested in improved access to the Marshville Municipal Park and Food Lion on the east side of town, and there are opportunities with wider right-of-ways (3) and town-owned property that could be repurposed for pedestrian facilities. **Rail lines, utility corridors, and riparian zones also provide excellent greenway potential** (4).

1) Park Drive- opportunity for pedestrian lane connection to the park

2) College Street- opportunity for on-street pedestrian facilities to connect to elementary school

3) Wide right-of-way along E Main Street can accommodate sidewalks to connect downtown toward Food Lion

4) W Union Street- opportunity for on-street pedestrian facilities or shared-use path connection on north side to Autumn Care and Elizabeth Avenue

WALKING + BIKING IN MARSHVILLE TODAY...

CHALLENGES

The existing sidewalk network has inadequate coverage/connectivity beyond the downtown area. Most roads outside of this area, encompassed by Church Street, Olive Branch Road, Main Street, and Elm Street, do not have sidewalks. The commercial corridors of Main Street and US Highway 74 have the most complete sidewalk sections, but are notably **lacking connections to surrounding destinations and safe crossing treatments at intersections** (1). Suburban auto-oriented development patterns typically weren't designed with the pedestrian in mind so **distances and connectivity between businesses present challenges** to pedestrians that are difficult to overcome (2). Intersections and facilities lack proper safety, ADA, and comfort treatments (3). Sidewalks with **no landscaped buffer** between roadway traffic provide little comfort for pedestrians along major traffic routes (4).

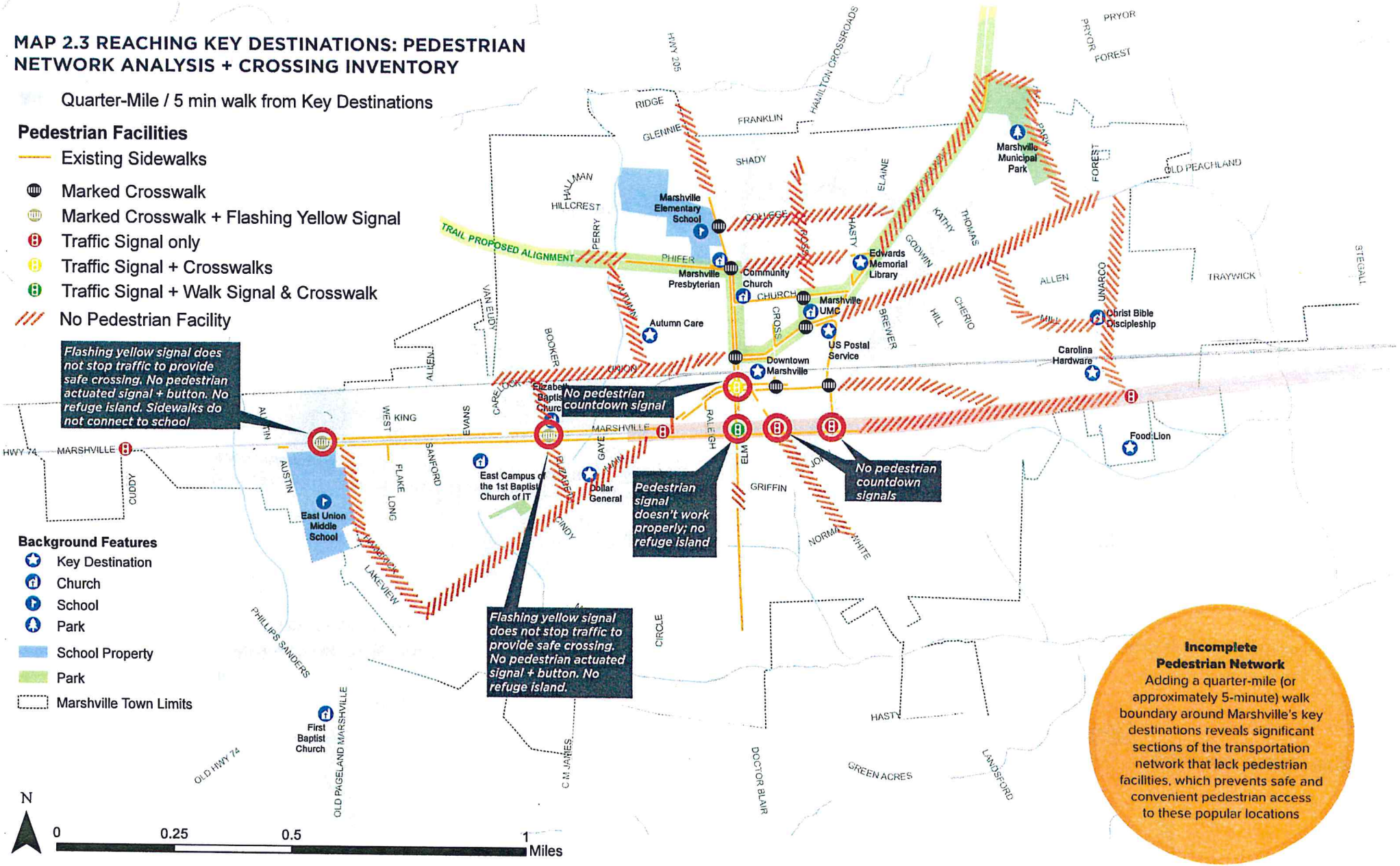
1) Crosswalk across US Highway 74 near middle school lacks sidewalk connections and any pedestrian-activation button

2) Looking west on north side of US Highway 74, showing a lack of pedestrian connectivity between businesses along the corridor

3) Looking north on N Elm Street, showing ADA compliance issues including a lack of curb ramps, tactile warning strips, and minimum sidewalk width around obstructions (utility poles)

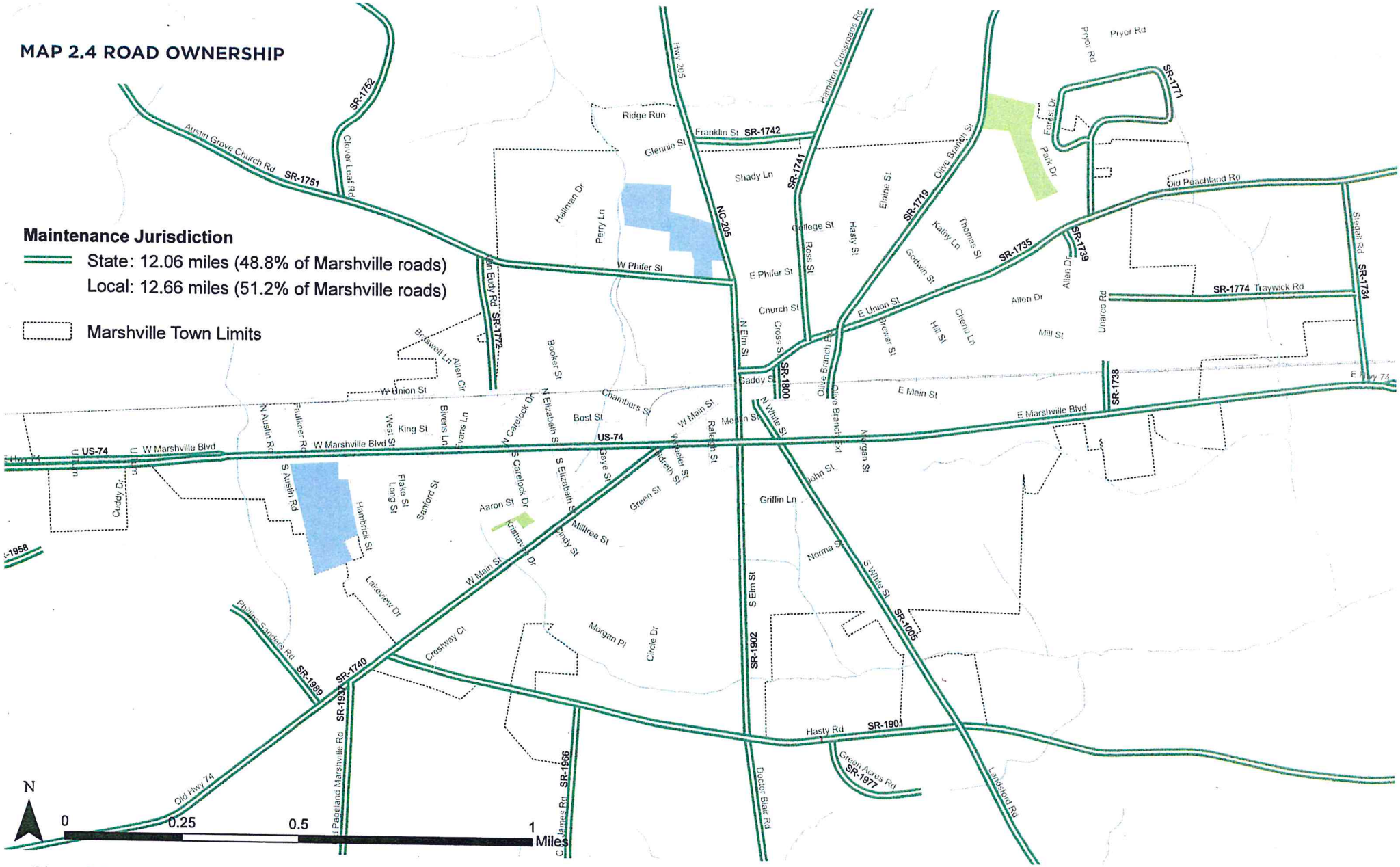
4) Looking north on N Elm Street in front of elementary school, showing no buffer between sidewalk and road

MAP 2.3 REACHING KEY DESTINATIONS: PEDESTRIAN NETWORK ANALYSIS + CROSSING INVENTORY



Incomplete Pedestrian Network
Adding a quarter-mile (or approximately 5-minute) walk boundary around Marshville's key destinations reveals significant sections of the transportation network that lack pedestrian facilities, which prevents safe and convenient pedestrian access to these popular locations

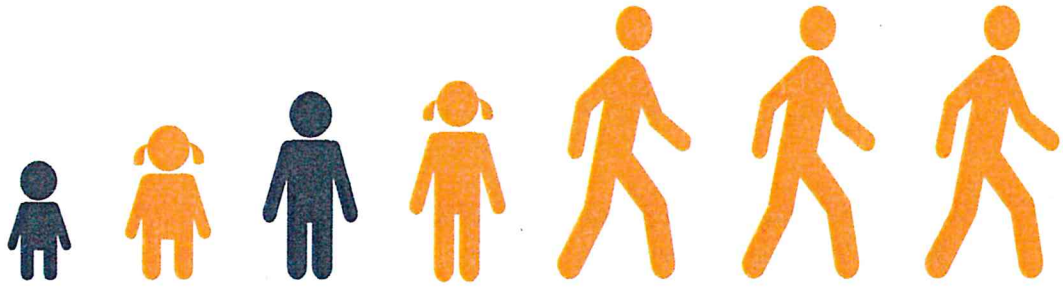
MAP 2.4 ROAD OWNERSHIP



COLLISION ANALYSIS

Analysis of pedestrian- and bicyclist-involved collisions revealed nine collisions in Marshville, and the immediate surrounding area, between 2007 and 2015. Below is a summary of this analysis. Refer to page 21 for a map that depicts the locations of these collisions.

PEDESTRIAN-INVOLVED COLLISIONS



3 y.o.
Not injured
*0-5 mph**

8 y.o.
Injured
31-35 mph

12 y.o.
Not injured
*21-25 mph**

15 y.o.
Injured
41-45 mph

38 y.o.
Injured
Unknown speed

50 y.o.
Injured
51-55 mph

60 y.o.
Injured
0-5 mph
(parking lot)

Note: The two* ***non-injuries* *were collisions where the vehicular speeds were below 25 MPH*

BICYCLIST-INVOLVED COLLISIONS

17 y.o.
White Male

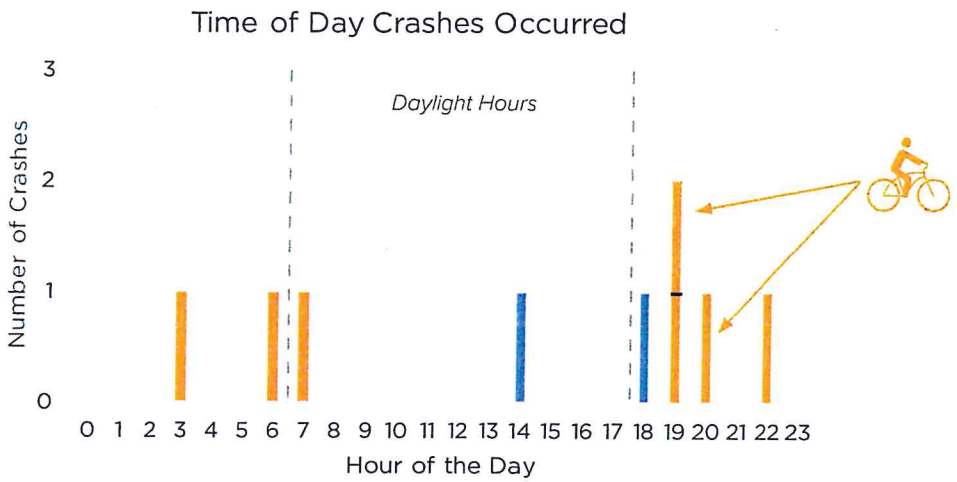
Possible Injury

16-20 mph
8pm, dark

58 y.o.
Black Male

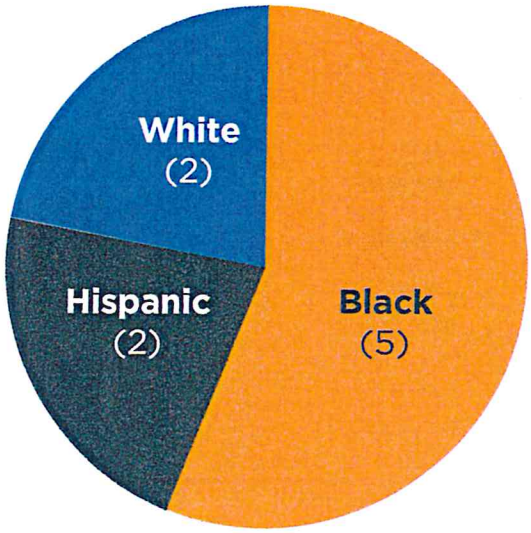
Evident Injury

41-45 mph
7pm, daylight



- *9 total crashes (2 bicyclists, 7 pedestrian)*
- *Most crashes occurred in daylight hours.*
- *All crashes involved pedestrian, except where otherwise indicated.*
- *Only two crashes did not result in injury and are shown in blue.*
- *Both bicyclist-involved crashes occurred in the evening.*

Race of Victims of Pedestrian- and Bicyclist-Involved Collisions (Total=9)



MAP 2.5 PEDESTRIAN- AND BICYCLIST-INVOLVED COLLISIONS

Pedestrian-Involved Collisions (2007-2015)

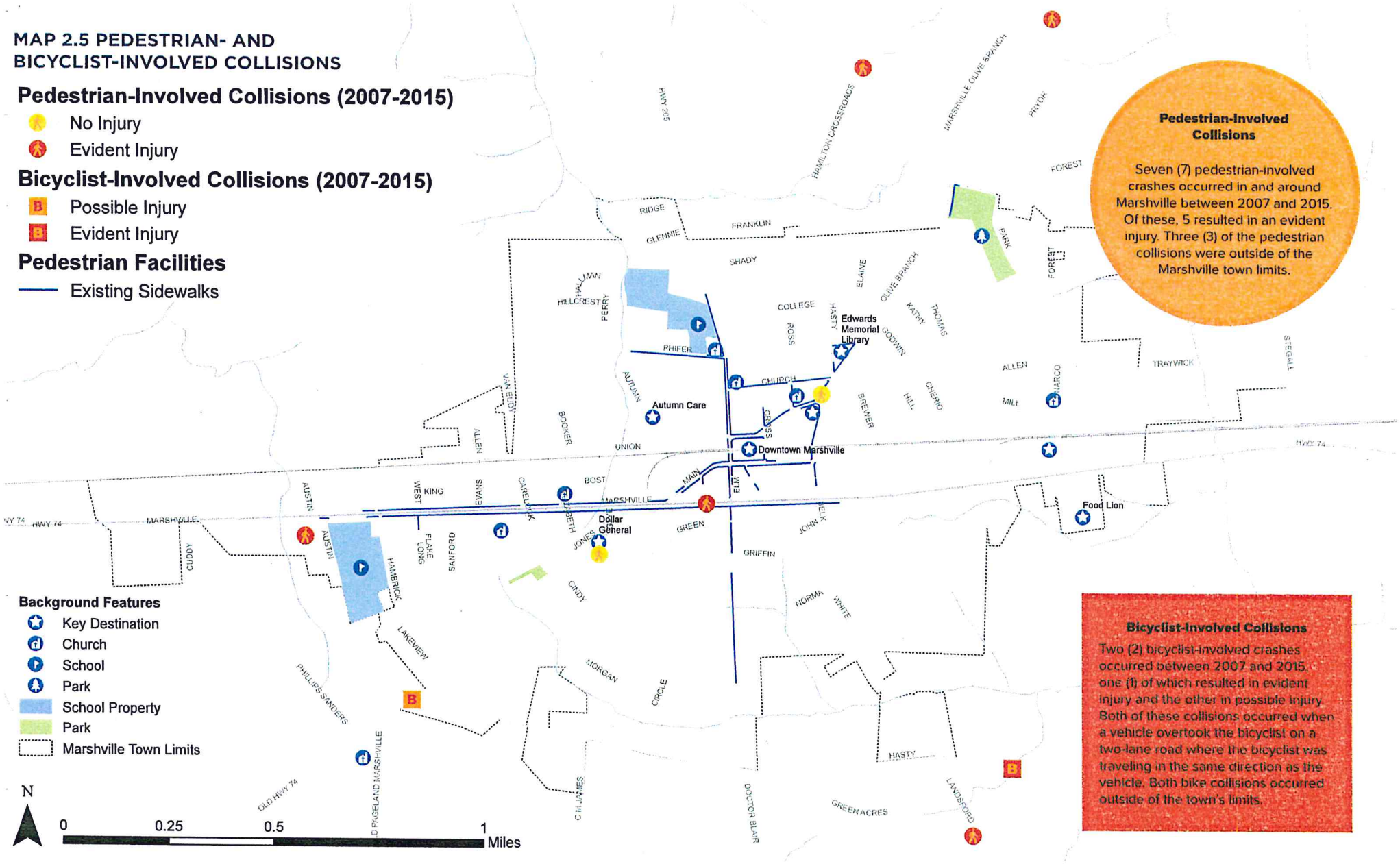
- No Injury
- Evident Injury

Bicyclist-Involved Collisions (2007-2015)

- Possible Injury
- Evident Injury

Pedestrian Facilities

- Existing Sidewalks



Background Features

- Key Destination
- Church
- School
- Park
- School Property
- Park
- Marshville Town Limits

N

0 0.25 0.5 1 Miles

Pedestrian-Involved Collisions

Seven (7) pedestrian-involved crashes occurred in and around Marshville between 2007 and 2015. Of these, 5 resulted in an evident injury. Three (3) of the pedestrian collisions were outside of the Marshville town limits.

Bicyclist-Involved Collisions

Two (2) bicyclist-involved crashes occurred between 2007 and 2015, one (1) of which resulted in evident injury and the other in possible injury. Both of these collisions occurred when a vehicle overtook the bicyclist on a two-lane road where the bicyclist was traveling in the same direction as the vehicle. Both bike collisions occurred outside of the town's limits.

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PREVIOUS PLAN REVIEW

MARSHVILLE PEDESTRIAN PLAN (2010)

The Marshville Pedestrian Plan of 2010 was the town's first foray into pedestrian planning. Many of its recommendations are still relevant today. The expansive recommended sidewalk network in that plan has yet to be realized, other than a few short segments. Since the adoption of the plan in 2010, new sidewalks have been installed along Union Street, between Ross Street and Olive Branch Road, and along Olive Branch Road, between Union Street and Church Street. Short sections of sidewalks have also been added at the intersection of Elm Street and US 74, filling critical gaps in this highly-walked corridor. In addition, some segments of existing sidewalks have been repaved in the downtown area in recent years. Other than these few improvements, the sidewalk network remains virtually the same as in 2010.

The 2010 Plan focused its recommendations on two "pedestrian-oriented development districts" representing half-mile-radius areas around downtown Marshville and East Union Middle School. This plan takes a broader approach and identifies top eight destinations, and recommends a strategy of prioritizing the expansion of the sidewalk network to facilitate safer and more comfortable pedestrian access to these destinations. The 2010 Plan also makes the important argument that emphasis should be given to improving pedestrian access for children to popular destinations, including schools, the library, and the park. These are among the top eight destinations identified in this current plan.

Finally, the 2010 Plan identifies US 74 as the primary barrier to walkability in Marshville. This assessment has been corroborated in this current study, through survey results, field analysis, and public comments.

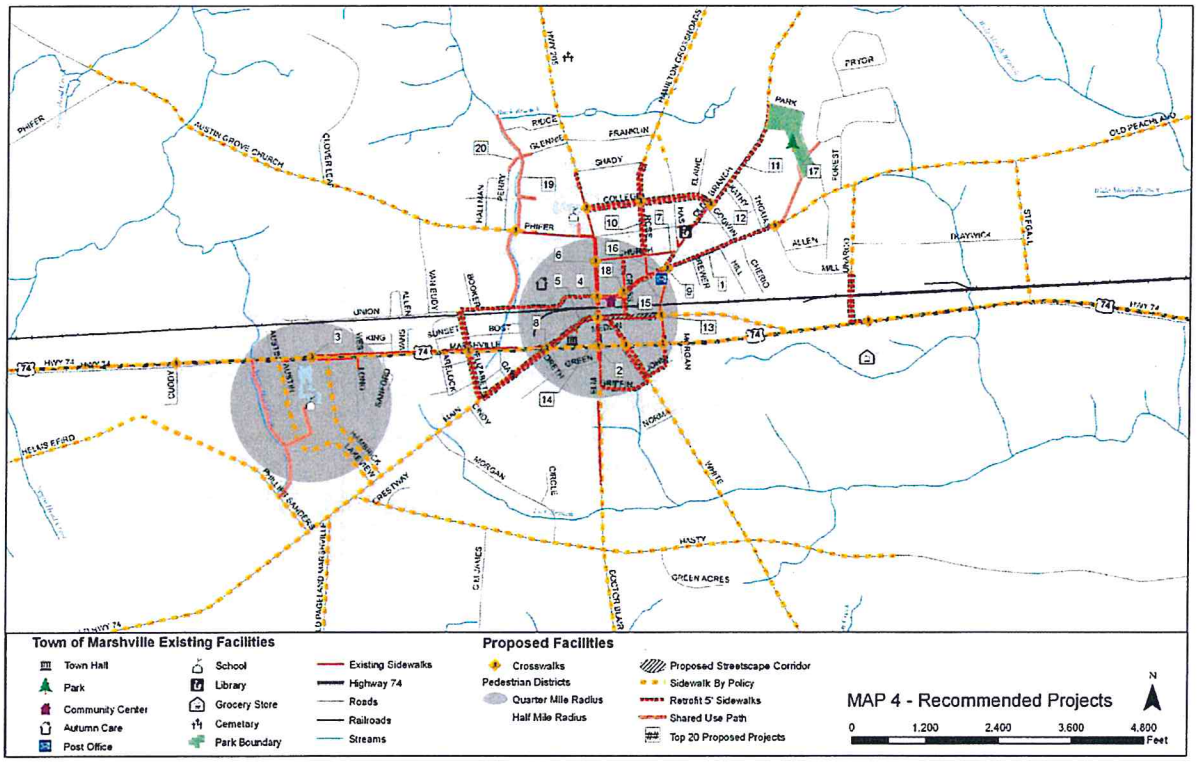


Figure 2.1. A map of proposed pedestrian facilities from the Marshville Pedestrian Plan of 2010.

PREVIOUS PLAN REVIEW

Table 2.1 Status of Pedestrian Facility Recommendations from 2010 Pedestrian Plan

Rank	Description of Improvement	Roadway/Location	Status/Details
1	Sidewalk	E. Union St. from Olive Branch Rd. to Allen Dr.	Not yet implemented
2	Crosswalks, Median refuge Island, Countdown Signals	US Highway 74 @ Elm St.	Partially Complete/Need to implement median refuge island.
3	Crosswalks, Median refuge Island, Countdown Signals	US Highway 74 @ East Union Middle School	Not yet implemented
4	Crosswalks and Countdown Signals	Main Street @ Elm St.	Partially Complete/Need to add countdown signals
5	Streetscape Project	Main St. from US Highway 74 to Olive Branch Rd.	Incomplete /Sidewalks have been recently updated
6	Crosswalks at Intersection	N. Elm St. @ Church St.	Not yet implemented
7	Sidewalk	Olive Branch Rd. from E. Church St. to E. Union St.	Completed
8	Crosswalks, Median refuge Island, Countdown Signals	US Highway 74 @ Main St.	Not yet implemented
9	Crosswalks at Intersection	E. Union St. @ Olive Branch Rd.	Not yet implemented
10	Sidewalk	Ross St. from Shady Ln. to E. Church St.	Not yet implemented
11	Sidewalk	Olive Branch Rd. from Park Dr. to College St./ Godwin St.	Incomplete
12	Sidewalk	Olive Branch Rd. from College St./ Godwin St. to E. Phifer St.	Not yet implemented
13	Crosswalks at Intersection	Main St. @ Olive Branch Rd.	Completed
14	Sidewalk- fill in gaps and remove barriers	Elm St. from E. Medlin St. to Green St.	Completed
15	Sidewalk	South side of E. Union St. from Cross St. to Post Office	Not yet implemented
16	Sidewalk	North side of E. Union St. from Ross St. to Olive Branch Rd.	Completed
17	Paved Upland Shared-Use Path	Private Property from Park Dr. to Forest Dr.	Not yet implemented
18	Crosswalks at Intersection	Union St. @ Elm St.	Completed
19	Paved Lowland Shared-Use Path	Buck Branch Creek from Ridge Run to W. Phifer St.	Not yet implemented
20	Paved Upland Shared-Use Path with Bridge	Connector from Perry Ln. to Glennie St.	Not yet implemented

PREVIOUS PLAN REVIEW

TOWN OF MARSHVILLE - US 74 CORRIDOR STUDY (2018)

This study, which was completed during the course of this Marshville Pedestrian + Bicycle Master Plan, outlines recommendations for improving the traffic and safety performance of the US 74 corridor within Marshville. Traffic flow recommendations include signal timing, access management, and intersection improvements.

Relevance to this plan:
Pedestrian and streetscape improvements are included in the plan that are designed to improve pedestrian safety and comfort along the corridor. These recommendations include:

1. Complete sidewalks along both sides of US 74 except in the industrial area.
2. Sidewalks should be separated by a minimum 5-foot grass verge from the roadway.
3. Sidewalks should be a minimum of 6 feet in width.
4. Sidewalks adjacent to retail uses in the Town Center section should be 12 feet wide, if possible.
5. Pedestrian lighting is recommended for the Town Center and Residential character areas.
6. Add pedestrian crossings, both painted and signalized, at intersections along the corridor.
7. Medium to large trees should be planted along the corridor where utilities will allow. Small trees should be planted all along the corridor as well.
8. Improvements in access management, such as driveway consolidation, should be done in coordination with the various streetscape improvements recommended for sidewalks and tree plantings.

Below is a graphic from the US 74 Corridor Study depicting the existing and proposed cross-sections for the Town Center character area. The proposed treatment includes adding a 12-foot sidepath on the north side, and a 6-foot sidewalk on the south side, both of which would be separated from vehicular traffic by a grass buffer. The dimensions of the vehicular travel lanes are not specified in the graphic or report, but the 70-foot roadway width could be configured to include 11-12-foot travel lanes and a 6-10-foot median refuge island to facilitate safer pedestrian crossings.

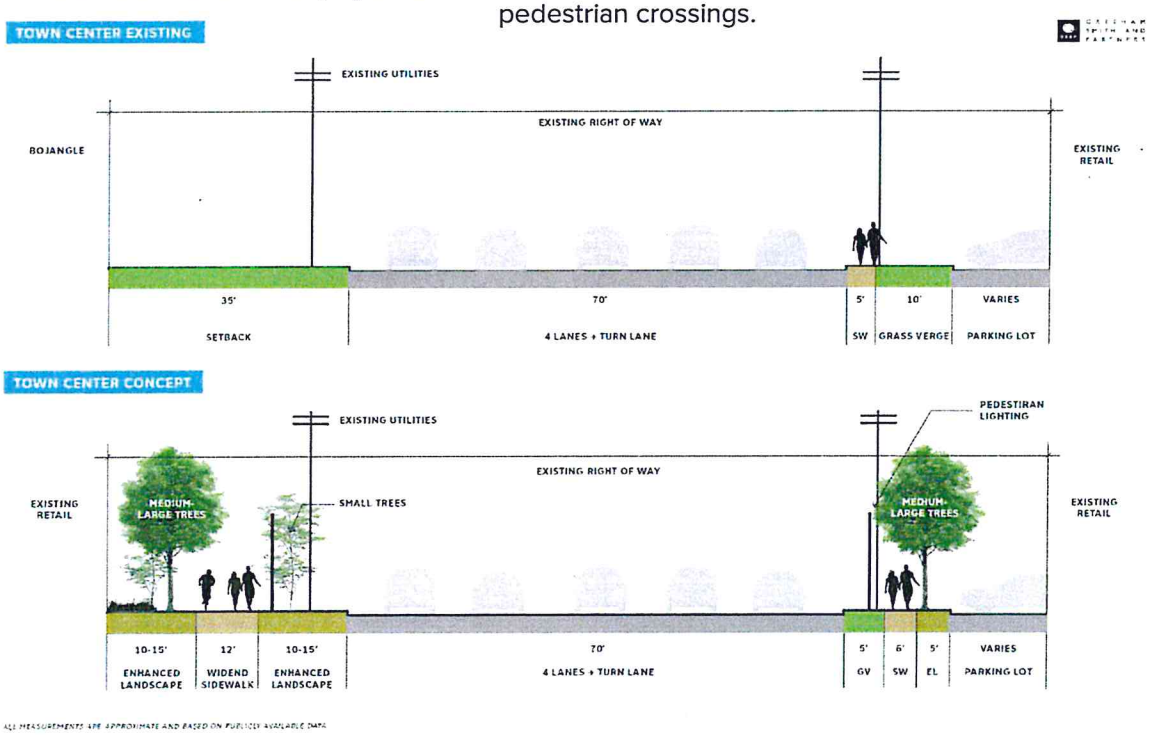


Figure 2.2. Cross-sections of existing and proposed conditions along US 74 in the Town Center character area in Marshville. The proposed section recommends a 12-foot sidepath on the north sidewalk a 6-foot sidewalk on the south side.

PREVIOUS PLAN REVIEW

UNION COUNTY MULTIMODAL TRANSPORTATION PLAN (2014)

This plan is a companion to the Union County 2025 Comprehensive Plan Update, and together their aim is to identify a sustainable land use and transportation strategies for the growing communities of Union County. The Multimodal Plan provides a vision for how to anticipate the transportation infrastructure for highway, pedestrian, bicycle, and public transit travel modes.

Relevance to this plan:
The plan includes recommendations for pedestrian and bicycle facilities in Marshville. It recommends priority greenway projects that follow the Carolina Thread Trail (CTT) alignment (see summary of the Carolina Thread Trail Master Plan on page 28); as well as on-road pedestrian and bicycle facilities along the major corridors in town. The maps shown below depict recommendations for sidewalks along US 74, from Elm Street west toward Wingate, and along N. Elm Street, from US 74 north to the town limits. In addition, three-foot shoulders are recommended along W. Main Street/Old Highway 74, from US 74 westward, and along White Street, from US 74 southward. Three-foot shoulders are also recommended along N. Elm Street, Phifer Street, and Olive Branch Road, although these recommendations are outside of the Marshville town limits. These 3-foot shoulders are indicated as serving both bicycle and pedestrian travel needs. Finally, shared lanes are also recommended as bicycle facilities along N. Elm Street.

In addition to recommendations, the plan includes an analysis of bicycle- and pedestrian-involved collisions in the county. Two relevant findings from this analysis are:

- "The US 74 corridor and some of its cross-streets stands out strongly as a place where both cycling and especially pedestrian crashes occur with regularity"
- "Downtown areas as well as some school areas were locations where crashes happened more often than other locations"

These findings suggest that particular attention needs to be given to pedestrian and bicycling infrastructure along US 74, in downtown Marshville, and near Marshville Elementary and East Union Middle School.

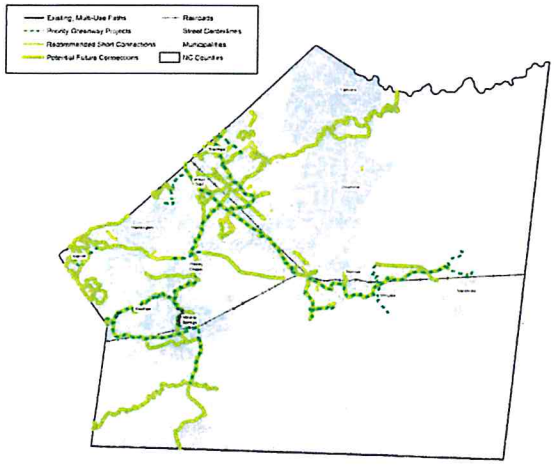
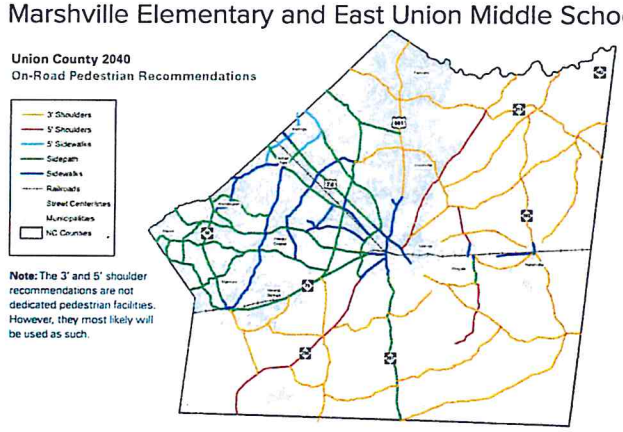


Figure 2.3. Map of Off-Road Pedestrian and Bicycle Recommendations from the Union County Multimodal Transportation Plan



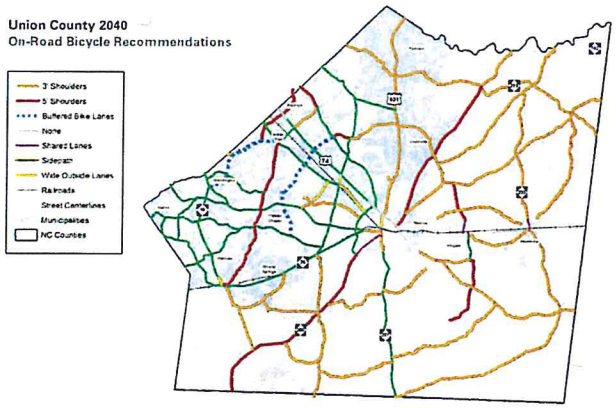


Figure 2.4. Map of On-Road Pedestrian and Bicycle Recommendations from the Union County Multimodal Transportation Plan

PREVIOUS PLAN REVIEW

UNION COUNTY COMPREHENSIVE TRANSPORTATION PLAN (2012)

The Union County Comprehensive Transportation Plan (CTP) uses the Carolina Thread Trail Master Plan as the basis for its bicycle recommendations, which consist of the greenway facilities and no on-road facilities. The CTP uses the Marshville Pedestrian Plan of 2010 as its source for its pedestrian recommendations.

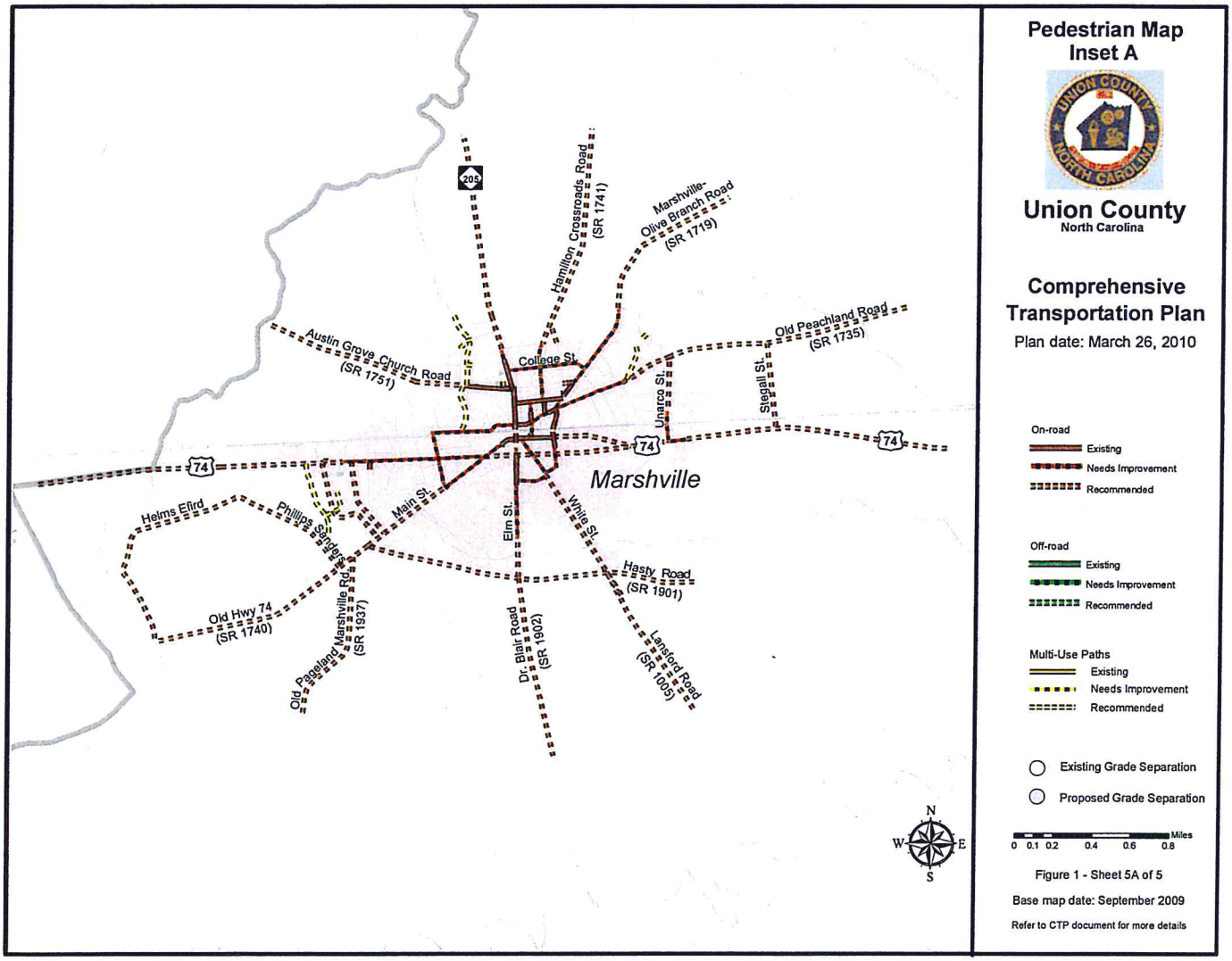


Figure 2.5. Map of pedestrian facility recommendations from the Union County Comprehensive Transportation Plan

PREVIOUS PLAN REVIEW

CAROLINA THREAD TRAIL MASTER PLAN FOR UNION COUNTY AND PARTICIPATING MUNICIPALITIES (2011)

The goal of this plan is to create 1.5 to 3.0 miles of greenway each year in Union County and to provide an estimate of the costs of construction and financial resources. Another stated goal of the plan was, to have the Carolina Thread Trail Master Plan, which describes a trail system interconnected among 15 counties of the Piedmont Region, adopted by the local constituent governments.

Relevance to this plan:
This plan calls for the alignment of the CTT to traverse Marshville. The portion through Marshville is planned as planned only as following the roadway right-of-way. It is labeled as Section D in the map below from the Union County Proposed Carolina Thread Trail Master Plan, and it follows the route described below:

- From Ansonville Road in Wingate, it takes a right turn onto Phifer Road, then a right turn onto Austin Grove Church Road, which then turns into Phifer Street as it enters into the Marshville town limits. From there it proceeds to Elm Street, taking a right, then a left onto Union Street, to Olive Branch Street, connecting to Legacy Development. Then it takes a right onto Old Lawyers Road, ending at the Anson County line.

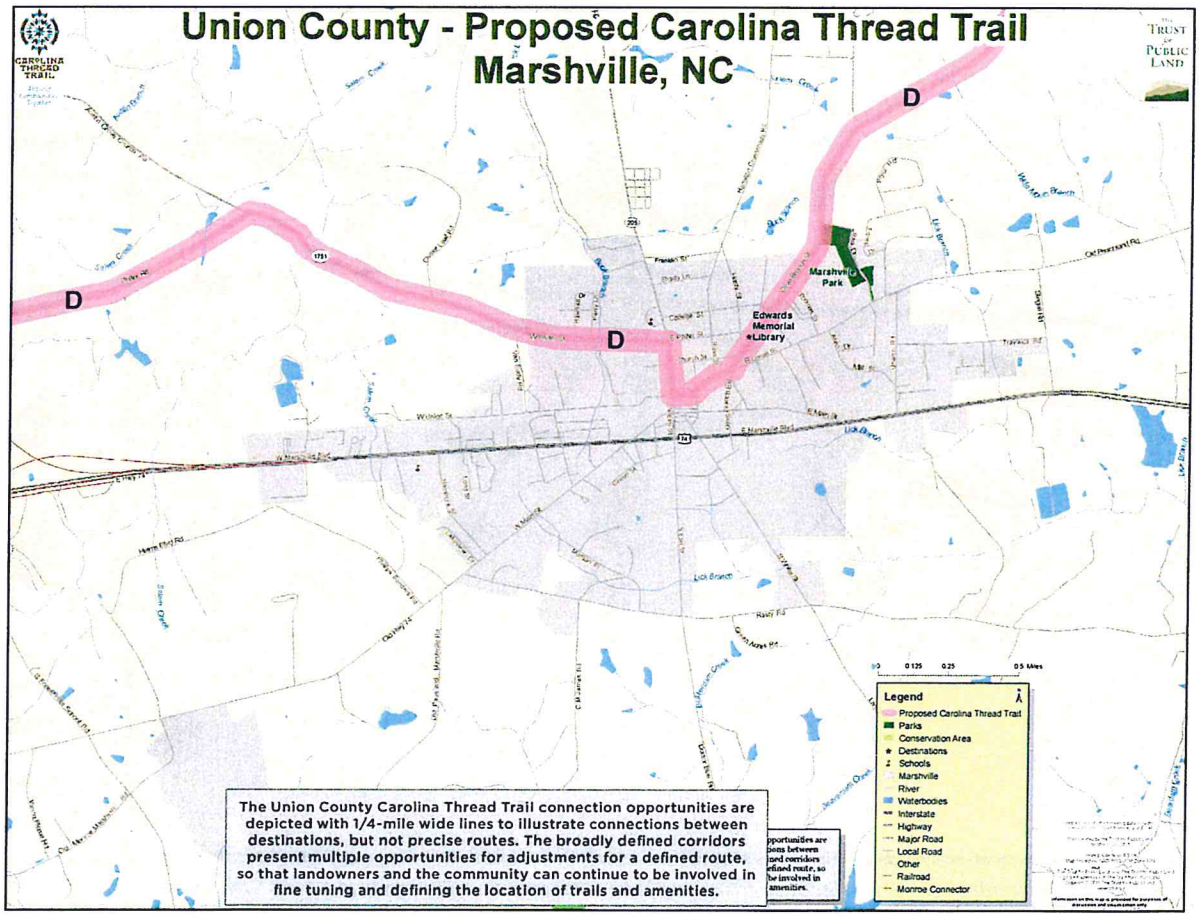


Figure 2.6. Map of the proposed alignment for Carolina Thread Trail through Marshville

PREVIOUS PLAN REVIEW

MARSHVILLE COMPREHENSIVE TRANSPORTATION PLAN (2010)

This plan does not include any bicycle or pedestrian elements or network maps; however, it does include design guidelines for bicycle facilities referenced from the North Carolina Department of Transportation (NCDOT) Bicycle Facilities Guide (see Figures 2.7-2.10, below).

Relevance to this plan:

The guidance for bicycle facilities should guide the creation of more dedicated bicycle facilities in Marshville.

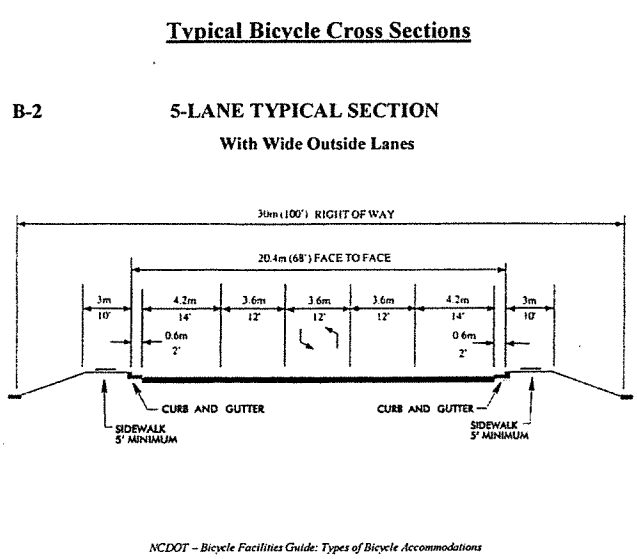


Figure 2.7. Cross-section depicting design guides for typical 4-lane and 5-lane highways, such as US 74, with wide outside lanes to accommodate bicycle traffic.

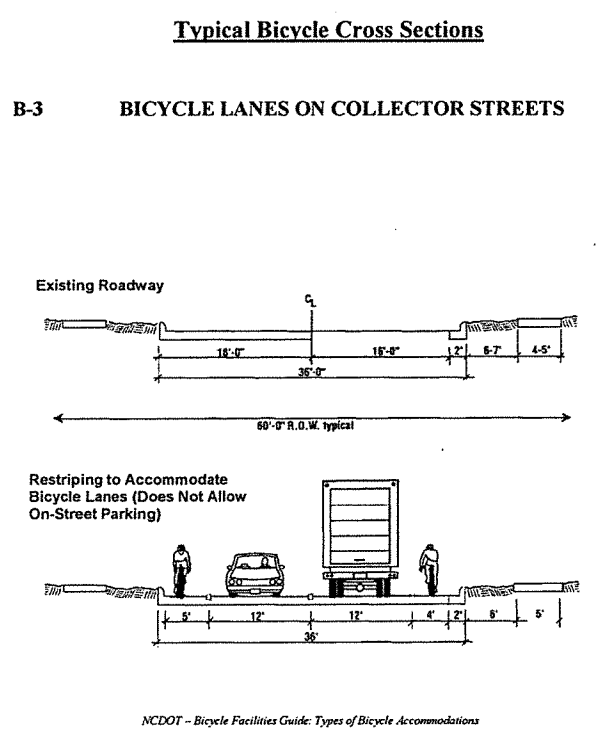


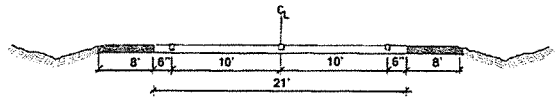
Figure 2.8. Cross-section depicting design guide for accommodating bike lanes within the existing right-of-way of 2-lane collector streets.

PREVIOUS PLAN REVIEW

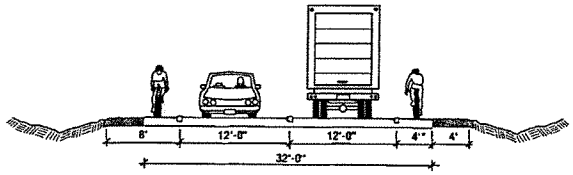
Typical Bicycle Cross Sections

B-4 WIDE PAVED SHOULDERS

Existing Roadway



Roadway Retrofitted with 4-Ft Paved Shoulders



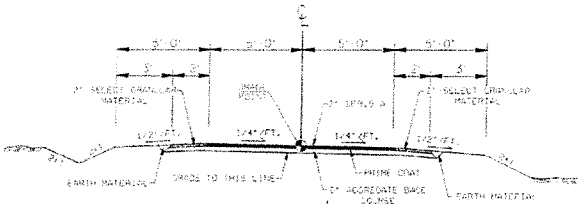
* If speeds are higher than 40 mph, shoulder widths greater than 4' are recommended.

CD- Bicycle Facilities Guide: Types of Bicycle Accommodations

Figure 2.9. Cross-section depicting design guide for paving wide shoulders within the existing right-of-way on local 2-lane roads to accommodate bicycle traffic.

Typical Bicycle Cross Sections

B-5 RECOMMENDED TYPICAL SECTION OF 10-FT ASPHALT PATHWAY
With 2-Ft Select Material Shoulder



NCDOT - Bicycle Facilities Guide: Types of Bicycle Accommodations

Figure 2.10. Cross-section depicting design guide for multi-use paths for both bicyclists and pedestrians.

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CHAPTER 3:
PUBLIC ENGAGEMENT

PUBLIC ENGAGEMENT OVERVIEW

This study began in August 2018. A kick-off open house was held on August 23, 2018, at Marshville Community Center (118 E. Union Street) in conjunction with an open house for the US 74 Corridor Study that was nearing completion. The first open house introduced the public to the purpose of the study and identified issues and opportunities.

Additionally, the public engagement plan consisted of a public input survey that was available online, at the kick-off open house, and at Town Hall, from August until November 2018. Key stakeholder interviews were conducted in September 2018, both in person and via phone with representatives from the Marshville Police Department, schools, the Parks and Recreation Department, and Main Street business owners.

The second open house, held on December 6, 2018, presented preliminary recommendations and priorities, and it provided an opportunity to gather feedback from the public on those recommendations and priorities.

The map on page 35 highlights the corridors that were identified through public engagement that are most in need of pedestrian facilities to connect to popular destinations.

PUBLIC ENGAGEMENT RESULTS

The community had the opportunity to provide input on where improvements should be prioritized via the public survey and by marking maps at the open houses and stakeholder interviews. One of the public input boards that were used to gather feedback is shown below, and the synthesis of that input is shown in Map 3.1 on the facing page.

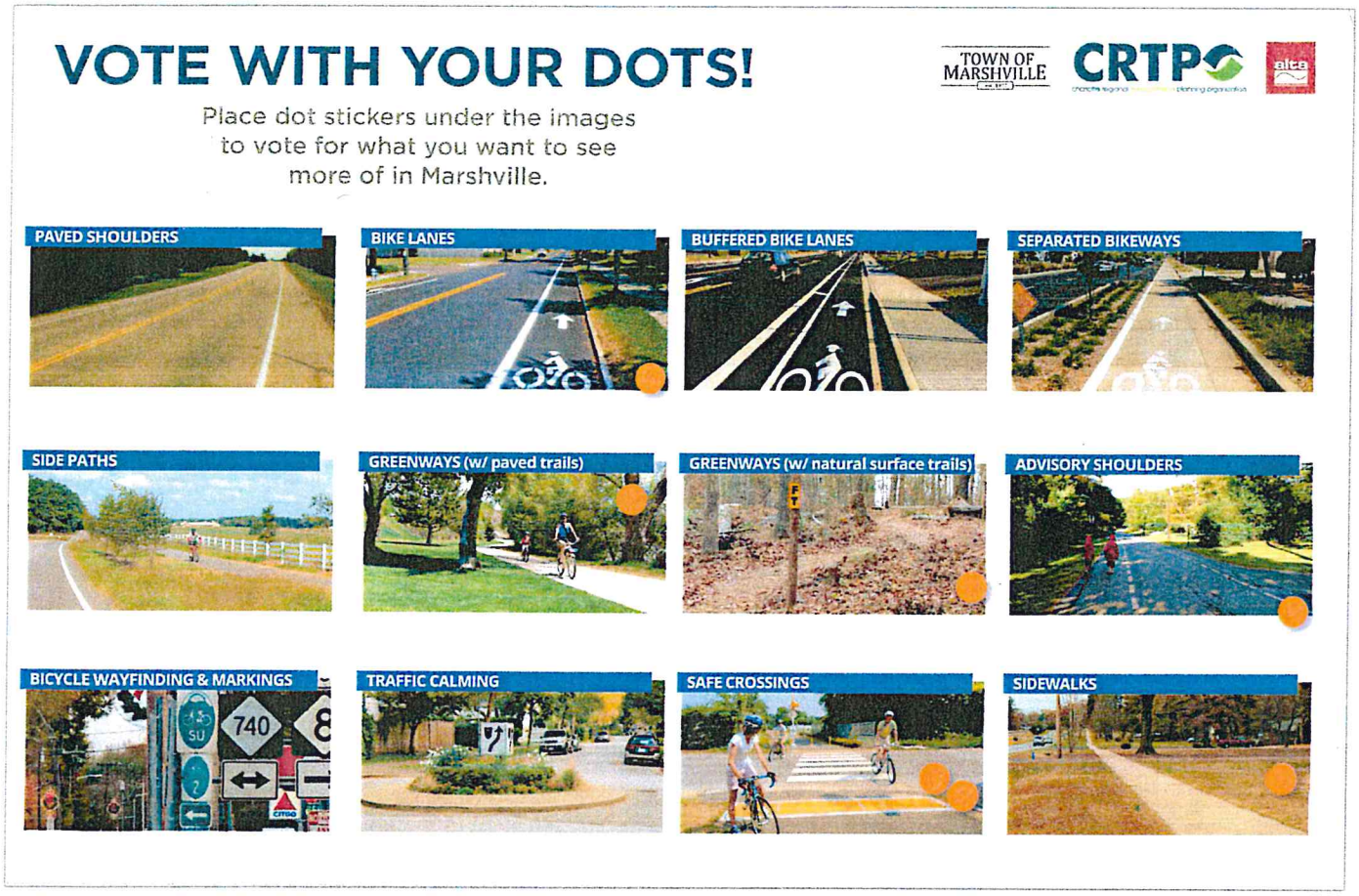
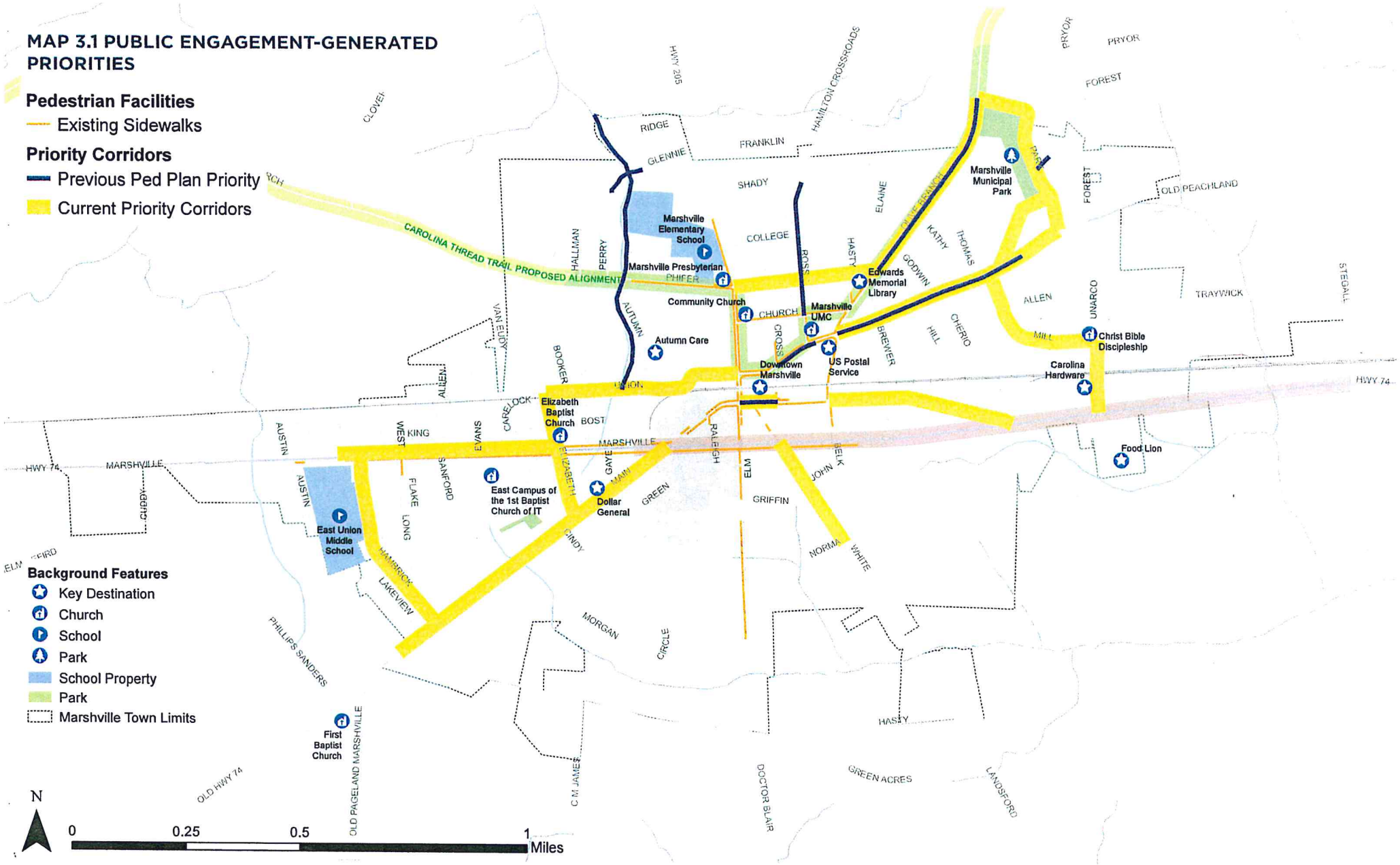


Figure 3.1. Public input board, where the public was given the opportunity to vote on their preferences for pedestrian and bicycle facilities. Votes received during public engagement are shown with orange dots, above.

MAP 3.1 PUBLIC ENGAGEMENT-GENERATED PRIORITIES



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SURVEY RESPONSES

50 responses

How would you rate WALKING conditions in Marshville?

FAIR 62%

3% said Excellent
35% said Poor

50 responses

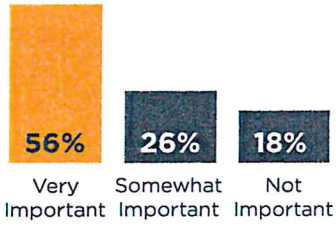
How would you rate BIKING conditions in Marshville?

POOR 57%

40% said Fair
3% said Excellent

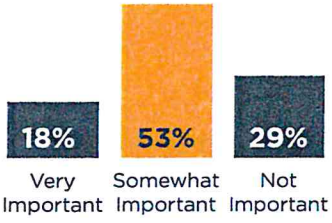
50 responses

How important to you is improving WALKING conditions in Marshville?



50 responses

How important to you is improving BIKING conditions in Marshville?



50 responses

When WALKING in Marshville, what is (or would be) the primary purpose of your trip?

#1 Exercise

#2 Recreation

#3 To enjoy nature

#4 Socialize

50 responses

When BIKING in Marshville, what is (or would be) the primary purpose of your trip?

#1 I do not bike

#2 Exercise

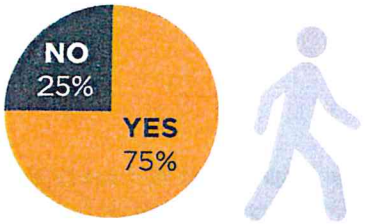
#3 Recreation

#4 Transportation/ Socialize

SURVEY RESPONSES, continued

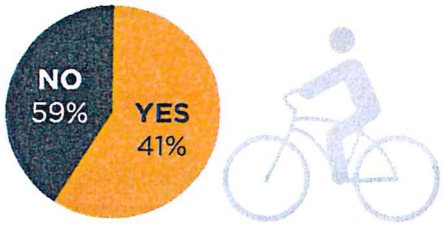
50 responses

Would you WALK more often if there were more sidewalks in Marshville?



50 responses

Would you BIKE more often if there were more bike facilities in Marshville?



50 responses

Most Important goals and outcomes of the Marshville Pedestrian + Bicycle Master Plan

1 Safer Conditions for Walking

2 More Choices for recreation and exercise

3 Increased overall quality of life/livability

4 Safer conditions for bicycling

78 responses

What is your relationship to Marshville?

79% I live here

41% I own property here

26% I work here

9% I visit here

SURVEY RESPONSES, continued

50 responses

What destinations would you most desire to reach by walking?

- **Downtown Marshville**
- **Marshville Municipal Park**
- **Edwards Memorial Library**
- **Food Lion**
- **Dollar General**
- **Marshville Elementary School**
- **East Union Middle School**

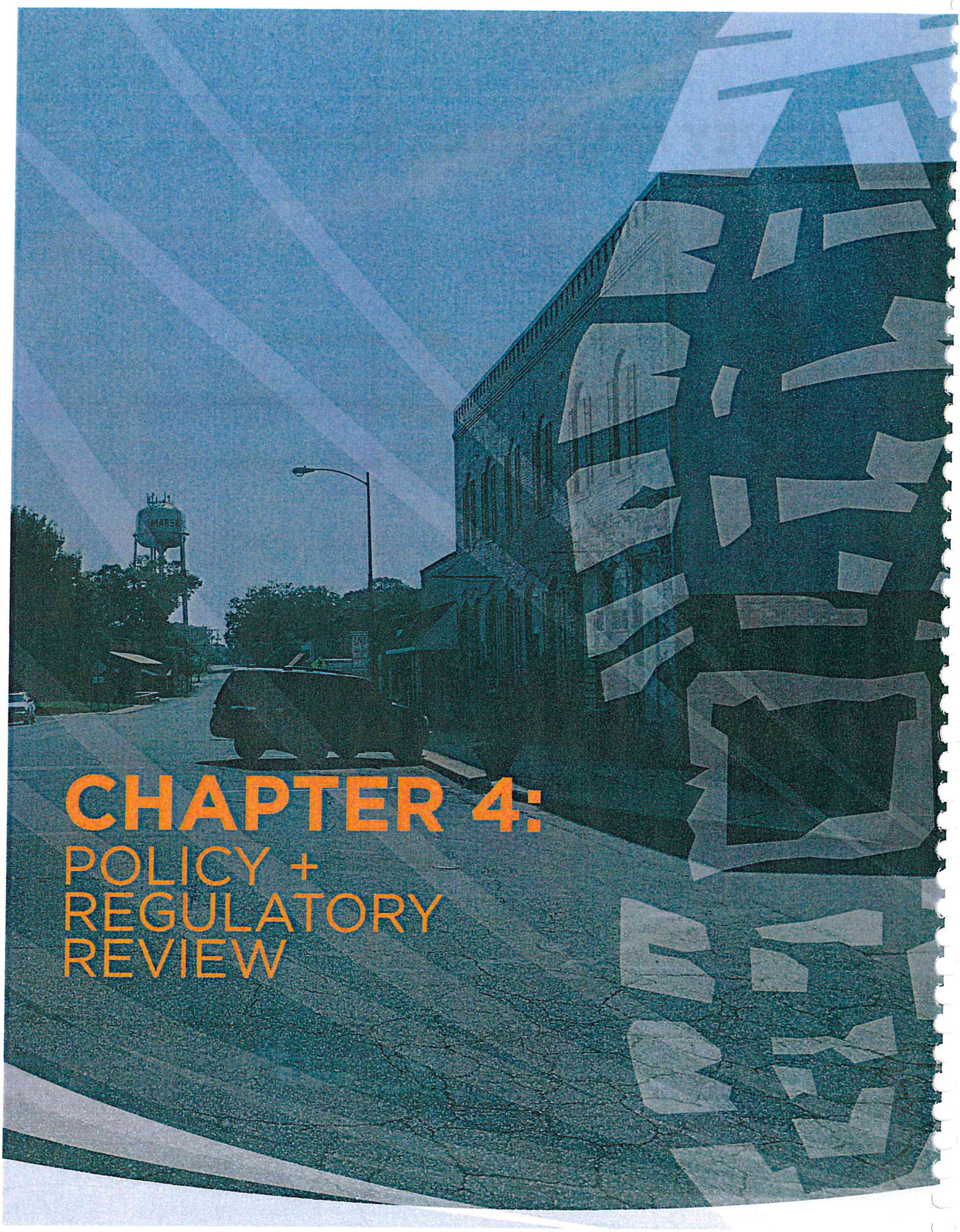
73 responses

What do you think are the factors that most discourage bicycling or walking in Marshville?

64%
Lack of sidewalks, bicycle lanes, or trails

64%
Heavy/fast motor vehicle traffic

39%
Unsafe street crossings



CHAPTER 4:
POLICY + REGULATORY REVIEW

OVERVIEW

One of the most cost-effective implementation strategies for Marshville is to establish land use and transportation policies and development regulations that promote walkable new development and, programs, and capital projects that promote walking and biking. As part of a comprehensive approach to developing recommendations for a more walkable and bikeable town, the project team reviewed Marshville's zoning and subdivision standards to identify general issues impacting the pedestrian and bikeway environment. Following is a review of Marshville's existing development regulations to identify opportunities for improvement that can be applied throughout the town. The project team identified appropriate model regulatory and policy language from around North Carolina and the U.S. for elements including pedestrian and bikeway facilities, connectivity, Complete Streets (streets designed for all users), and bicycle parking to provide methods for Marshville to maximize pedestrian and bikeway improvements in conjunction with new development, redevelopment, and corridor improvement projects.

The recommendations below are organized into major categories of "Complete Streets and Greenways", "Pedestrian-oriented Urban Design Elements", and "Connectivity." All of the major categories are interrelated, but based on the existing conditions analysis, and the goals of this plan, the following key recommendations from the table below should be implemented first.

PRIORITY POLICY AND REGULATORY ACTION STEPS:

1. Update the Pedestrian Network Plan to include new facility recommendations.
2. Update development regulations and engineering standards to include and reflect best practices for pedestrian, bikeway, and greenway design.
3. Develop a policy that requires all projects (Town, North Carolina Department of Transportation (NCDOT), and regional) to take into account the recommendations of this plan to ensure that capital projects include recommended pedestrian and bicycle treatments.

Current state of crossing at East Union Middle School

Table 4.1 - Development Ordinance Review

Topic/Strategies	Comments/Recommendations	
	Unified Development Ordinance	General Recommendations
1. Complete Streets and Greenways		
1.1. Implement Complete Streets Policy A complete streets policy allows cities and towns to work towards creating a street network that encourages pedestrian and bicycle travel and provides safe and comfortable roadways for all users.	Good *Section 13.1 General* *Streets in Marshville should be inviting public space and integral components of community design. A hierarchical street network should accommodate a variety of uses, including bicycle, pedestrian, motor-vehicle and transit routes. All streets should connect to help create a comprehensive network that enables the free movement of automobiles, bicyclists, and pedestrians. In order for this street network to be safe for motorists and pedestrians, design elements must consistently be applied to calm automobile traffic.* *Section 13.6 Street Design* *Designs should permit comfortable use of the street by motorists, pedestrians, and bicyclists. The location of streets as shown in the Town Plan shall govern the level of service and design of streets. Pavement widths, design speeds, and the number of motor travel lanes should be minimized to enhance safety for motorists and non-motorists alike. The specific design of any given street must consider the building types as shown in Article 9 which have frontage and the relationship of the street to the overall town street network.* NCDOT's *Complete Streets Planning and Design Guidelines* will apply to all NCDOT-maintained streets in the City. The NCDOT guidelines also provide excellent guidance for locally maintained streets and street networks and complete streets planning and design processes, which can be applied in Marshville.	In addition to the very thorough NCDOT *Complete Streets Planning and Design Guidelines*, Smart Growth America provides great resources for designing streets that cater to all users, including a best practices guide co-authored with APA. Dunn, NC has one of the best complete street policy statements of any community in NC. *Zoning Ordinance Sec. 22-352. Circulation and connectivity. (a) Purpose and intent. The purpose of this section is to support the creation of a highly connected transportation system with the city in order to provide choices for drivers, bicyclists, and pedestrians; promote walking and bicycling; connect neighborhoods to each other and to local destinations such as schools, parks, and shopping centers; reduce vehicle miles of travel and travel times; increase effectiveness of municipal service delivery, and free up arterial capacity to better serve regional long distance travel needs.*
1.2 Develop Complete Street Design Guidelines for a variety of contexts and all street/roadway user groups The subsections below include recommendations for pedestrian-related elements of Complete Streets and complete pedestrian and greenway networks. Sidewalks, greenways, and streetscape amenities such as street trees and lighting are some of the most fundamental elements of Complete Streets for pedestrians and greenway users. Access management, multi-modal level of service assessments, and traffic calming are also critical for developing complete street networks for walking through the development review and capital project implementation process.	Good. See section 1.3 below.	The NCDOT Complete Street Guidelines include recommendations on complete street design elements for pedestrians and greenway users. Marshville could adopt and endorse the NCDOT guidelines and other national guidelines, including the NACTO Urban Street Design Guide: http://nacto.org/publication/urban-street-design-guide/ The design guidelines should be integrated into Marshville's development regulations. See examples from the *Charlotte Urban Street Design Guidelines*: http://charmeck.org/city/charlotte/transportation/plansprojects/pages/urban%20street%20design%20guidelines.aspx
1.3. Require pedestrian accommodations, including by roadway type Pedestrian facilities should be determined based on street types and land uses of a given roadway corridor.	Marshville has very good sidewalk requirements that are generally based on street type and/or land use context. *Section 13.6-1 Street trees and sidewalks are required on both sides of public streets except rural roads, lanes, alleys, and the undeveloped edge of neighborhood parkways except that sidewalks on one side of the road directly abutting residential lots of less than 1.2 acres may be permitted in the Agricultural District (AG) to protect water quality. The street tree planting strip shall be a minimum of 8' in width and sidewalks shall be a minimum of 5'-0" in width unless otherwise provided. On commercial streets, sidewalks should be a minimum of 6'-0" in width. A 12'minimum width sidewalk with tree grates or cut-outs is required on Main and Union Street segments illustrated by the Town Plan in the Main Street District (MS). Generally, canopy trees shall be planted at a spacing not to exceed 40' on center. Where overhead utility lines preclude the use of canopy trees, small maturing trees may be substituted, planted 30' on center.* *Section 13.6-5 Cul-de-sacs shall have a minimum 5' pedestrian access easement, and should have paved pedestrian connections, where practicable to encourage pedestrian access connectivity.*	The Town should consider revising its ADA ramp detail in the *Technical Standards and Specifications Manual* to include a perpendicular curb ramp specification, which are preferred by the US Access Board's ADA Standards (see Chapter 4, Ramps and Curb Ramps).

Table 4.1 - Development Ordinance Review

Topic/Strategies	Comments/Recommendations	
	Unified Development Ordinance	General Recommendations
1. Complete Streets and Greenways (continued)		
1.4. Require designated bikeways (bike lanes, shoulders, greenways, etc) during new development or redevelopment	None required. Needs improvement.	The design guidance should also be integrated and incorporated into the town's *Technical Standards and Specifications Manual*. See Chapter 4 of the NCDOT *Complete Streets Planning and Design Guidelines* for guidance. Also, see: Chapters 6 of Wake Forest, NC UDO for recommendations for bikeways and greenways, esp. Sections 6.8.2, 6.9, 6.10. http://www.wakeforestnc.gov/udo.aspx Chapter 7 of the Wilson, NC UDO regarding greenways. http://www.wilsonnc.org/wp-content/uploads/2014/12/CH-7-Parks-Open-Space.pdf
1.5. Require dedication, reservation or development of greenways	Needs improvement *Section 21.2-2 Land designated as future open space.* *Regardless of the requirements and exemptions of this subsection, any portion of the site of the proposed development that is designated as future open space or greenway in the "Town Plan 2035 –Land Use and Comprehensive Master Plan" adopted by the Town of Marshville, as amended from time to time, shall be reserved for open space. This area may be counted toward the total amount of open space required for the development.*	Marshville's policy requiring the dedication of land that is designated as a greenway in the Town Plan 2035 is a good start; however, the Town Plan 2035 does not designate any space specifically for greenways other than a general call for greenway trails along creek tributaries. Therefore the policy should be updated to require the dedication of land for greenways as designated in this plan or other adopted plans. *See requirements in Wake Forest, NC UDO, Section 6.8.2 Greenways. "When required by Wake Forest Open Space & Greenways Plan or the Wake Forest Transportation Plan, greenways and multi-use paths shall be provided according to the provisions (that follow in the section cited above)."* *http://www.wakeforestnc.gov/udo.aspx*
1.6. Require new sidewalks, greenways, etc., to connect to existing facilities	None required. Needs improvement	Connectivity of facilities is critical for walking and biking conditions. New development should be required to connect to or extend existing bicycle and pedestrian facilities. See the following for examples: • Achdale, NC: *Standards for Greenways: Greenways and connectors shall be planned following the designated circulation system shown on the Pedestrian Network Plan. Greenway stubs must extend to the neighboring property line. Developments that adjoin future greenways must provide a connection trail to the said greenways.* • Chapters 6 of Wake Forest, NC UDO for recommendations for bikeways and greenways, esp. Sections 6.5.3, 6.8.2, 6.9, 6.10. http://www.wakeforestnc.gov/udo.aspx • Chapter 7 of the Wilson, NC UDO regarding greenways. http://www.wilsonnc.org/wp-content/uploads/2014/12/CH-7-Parks-Open-Space.pdf • New Hanover County, NC's EDZD Zoning District provides points for new developments that connect to the existing bikeway network and key destinations and provides a good definition of the bikeway network. (Section 54.1-14 and following.)
1.7. Adopt traffic calming programs, policies, and standards Traffic calming on local streets increases safety and comfort for all roadway users, including pedestrians and cyclists. It also increases neighborhood livability.	Good. *Section 13.3 Intersections* *Segments of straight streets should be interrupted by intersections designed to:* *13.3-1 Reduce Speed. Disperse traffic flow and reduce speeds, thereby eliminating the creation of de facto collector streets with high speed, high volume traffic; and* *13.3-2 Terminate Vistas. Terminate vistas with a landmark such as a significant natural feature, a building, a small park, or other public space.* *Other traffic calming measures such as neck-downs, chicanes, mid-block diverters, intersection diverters, curb bulbs, serial hill crests, and related devices will be considered on a case by case basis, based on safety and appropriateness in the proposed location.*	FHWA has developed a comprehensive Traffic Calming ePrimer. The Town of Huntersville has a good Traffic Calming Policy. See also the NACTO Urban Bikeway Design Guide section on Bicycle Boulevards.

Table 4.1 - Development Ordinance Review

Topic/Strategies	Comments/Recommendations	
	Unified Development Ordinance	General Recommendations
1. Complete Streets and Greenways (continued)		
1.8. Develop an access management program or policy Limiting turning movements on major roadways and requiring cross-access between adjacent parcels of land, including commercial developments, is a great tool for reducing the amount of traffic and turning movements on major roads while increasing safety and connectivity for pedestrians, bicycles, and cars.	Adequate *Section 9.2-2 Detached House Lot Type* *4.b. Parking areas on adjacent mixed use lots shall be connected whenever practical.* *Section 9.5-2 Civic Building Lot Type.* *8. Parking areas on adjacent lots shall be connected with vehicular and pedestrian connections wherever practical.* *Section 9.6-2 Shop-front Lot Type.* *6. Parking areas on adjacent lots shall be connected with vehicular and pedestrian connections wherever practical.* *Section 9.7-2 Urban Workplace Lot Type.* *6. Parking areas on adjacent lots shall be connected with vehicular and pedestrian connections wherever practical.* *Section 9.8-2 Highway Lot Type Standards.* *6. Parking areas on adjacent lots shall be connected with vehicular and pedestrian connections wherever practical.* The US 74 Corridor Study also calls for access management along US 74 in the form of 2-foot medians in the center lane that will limit left turns to signalized intersections.	The NCDOT *Complete Streets Planning and Design Guidelines* provides recommended "Access Density" guidelines (See Chapter 4, page 61 and 62 and following). These guidelines could be the basis for regulatory updates to the municipal codes.
2. Pedestrian-Oriented Urban Design Elements		
2.1 Require Planting Strips and Street Trees	Very Good. *11.6-3 Street Trees.* *Street trees are required along all street frontages for all new developments.* *(D.) Street trees shall be planted in the planting strip within the public right-of-way. In the Main Street (MS) District, the trees may be placed in tree pits with grates that are a minimum of sixteen (16) square feet.*	When planted in a planting strip between the sidewalk and the curb, street trees provide a buffer between the pedestrian zone and the street. In addition to their value for improving the air quality, water quality, and beauty of a community, street trees can also help slow traffic and improve comfort for pedestrians. Trees add visual interest to streets and narrow the street's visual corridor, which may cause drivers to slow down. See NCDOT Complete Streets Planning and Design Guidelines (Chapter 4) for context-based pedestrian and "green" zone recommendations: http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf See also, Town of Wendell UDO Chapter 8, especially section 8.8, Street Trees: http://files.wendell.gethifi.com/departments/planning/zoning/udo-unified-development-ordinance/Chapter_8_-_amended_092611.pdf
2.2 Require Pedestrian-Scale Street Lighting	Good *13.2-7 Street Lights. Be illuminated by street lights located on at least one side and at all intersections, with exception of rural roads, lanes, alleys, and the undeveloped edge of neighborhood parkways. Street lights along streets shall be located in a planting strip as per standards set forth in the Town of Marshville Technical Standards and Specifications Manual. Maximum spacing of street light fixtures shall be 120 linear feet measured along the street centerline. The maximum height of street light fixtures shall be 14 feet in residential areas. Street light fixtures shall not produce direct light into adjacent properties at a height above 6 vertical feet at the building setback line of residential districts. Street lights within mixed use districts shall not produce a direct light into adjacent properties at a height above 16 vertical feet at the building setback line. Street lights within non-residential districts shall not produce a direct light into adjacent residential properties at a height above 6 vertical feet at the property line. Residential streets shall utilize the Open Traditional design on a 12' black finished type "A" fiberglass pole.* The US 74 Corridor Study recommends pedestrian-scaled lighting for the Town Center and Residential character areas.	Pedestrian-scale lighting along streets and at intersections is one of the most important tools for pedestrian crash prevention. Marshville should consider adding additional specific policies to require appropriate pedestrian-scaled lighting for the Town Center and Residential character areas. See Town of Wendell UDO, Sections 11.10 and 11.11 for pedestrian-scaled lighting requirements by zoning district and for lighting requirements for greenways and walkways: http://files.wendell.gethifi.com/departments/planning/zoning/udo-unified-development-ordinance/Chapter_11_-_amended_071410.pdf

Table 4.1 - Development Ordinance Review

Topic/Strategies	Comments/Recommendations	
	Unified Development Ordinance	General Recommendations
2. Pedestrian-Oriented Urban Design Elements (continued)		
2.3. Adopt bicycle parking requirements	Very Good *Section 12.8 Bicycle Parking* *All non-residential uses, except agricultural and agricultural based businesses, and all multi-family residential uses, including condos and townhomes with shared parking, shall include bicycle parking spaces in the amount, at a minimum, equal to 5% of the parking provided for automobiles. This area may be a designated parking space within the parking lot near the building or an area outside the parking lot adjacent to the building. The bike parking area must include a bike rack with provisions for locking bikes.* *Section 12.12 Off-Street Parking Requirements and Bicycle Incentive* *While on-street parking can contribute substantially to everyday parking needs, sufficient off-street parking must also be provided to serve the particular needs of the building(s). The following minimum and maximum requirements for off-street parking are set forth to ensure the provision of adequate off-street parking while preventing the development of parking areas that are under used. Minimum required parking spaces can be reduced by twelve percent (12%) where fully enclosed bicycle lockers are provided on a one-for-one exchange ratio, except for single family detached dwellings.*	These are very good requirements for a town of this size, but some elements are lacking that could be considered including: • requirements based on land use types (e.g., 5% may be adequate for retail, but may be inadequate for a school or park) • requirements for covered/secured bike parking for employees, students, residents of Marshville, and other long-term parking needs.
3. Connectivity Requirements		
3.1. Revise block size requirements *"[A] Good [street] network provides more direct (shorter) routes for bicyclists and pedestrians to gain access to the thoroughfares and to the land uses along them (or allows them to avoid the thoroughfare altogether). Likewise, good connections can also allow short-range, local (motor) vehicular traffic more direct routes and access, resulting in less traffic and congestion on the thoroughfares. This can, in turn, help make the thoroughfare itself function as a better, more complete street. For all of these reasons, a complete local street network should generally provide for multiple points of access, short block lengths, and as many connections as possible."* (NCDOT Complete Streets Planning and Design Guidelines, p 59)	Very Good *Section 13.4 Blocks* *Street blocks defined by public streets are the fundamental design elements of traditional neighborhoods. The location of streets as shown in the Town Plan shall govern block size design. In urban conditions, any dimension of a block may range from 250 to 500 linear feet between cross streets. In major subdivisions the dimension of blocks may not exceed 800 linear feet between cross streets. Within subdivisions with average lots exceeding one acre in size, the blocks may be up to 1500 feet. The block pattern should continue to establish the development pattern at the project edge. Where a longer block will reduce the number of railroad grade crossings, major stream crossings, or where longer blocks will result in an arrangement of street connections, lots and public space more consistent with this Article and Article 11 of this ordinance, the Technical Review Committee may authorize greater block lengths at the time of subdivision preliminary plat review and approval.*	In areas with blocks as long as 800 feet or greater, a pedestrian and/or bicycle path of 6-8 feet in width should be required, with an easement of 15-20 feet wide. See the example table on page 59 of the NCDOT *Complete Streets Planning and Design Guidelines* for a context-based approach to block size. See City of Charlotte Subdivision Ordinance, Section 20-23 for example of connectivity requirements and block standards: http://ww.charmeck.org/Planning/Subdivision/SubdivisionOrdinanceCity.pdf

Table 4.1 - Development Ordinance Review

Topic/Strategies	Comments/Recommendations	
	Unified Development Ordinance	General Recommendations
3. Connectivity Requirements (continued)		
3.2. Connectivity Requirements- Limit dead end streets or cul-de-sacs *"[A] Good [street] network provides more direct (shorter) routes for bicyclists and pedestrians to gain access to the thoroughfares and to the land uses along them (or allows them to avoid the thoroughfare altogether). Likewise, good connections can also allow short-range, local [motor] vehicular traffic more direct routes and access, resulting in less traffic and congestion on the thoroughfares. This can, in turn, help make the thoroughfare itself function as a better, more complete street. For all of these reasons, a complete local street network should generally provide for multiple points of access, short block lengths, and as many connections as possible." (NCDOT Complete Streets Planning and Design Guidelines, p 59)* Dead end streets or cul-de-sacs, while good at limiting motor vehicular traffic in an area, are a severe hindrance for pedestrian and bicycle connectivity and overall neighborhood accessibility, including for emergency access and other services.	Good *Section 13. Street Standards* *Subsection 2-1 Interconnect. Interconnect within a development and with adjoining development. Cul-de- sacs shall be allowed only where topographical and/or lot line configurations offer no practical alternatives for connections or through traffic. The location of streets as shown in the Town Plan shall govern connectivity designs. Street stubs shall be provided within developments adjacent to open land to provide for future connections except where environmentally sensitive areas such as wetlands, creeks, steep slopes and conservation areas are vulnerable to harmful impacts by the extension of the street.* *Section 16.2 Subdivision Standards.* *(A.) Cul-de-Sacs. Cul-de-sacs or other dead end streets designed to be permanently closed are strongly discouraged and can only be used when it is not feasible to connect to an existing or future street. Cul-de-sacs shall not exceed 400 feet in length and shall be provided at the closed end with a right-of-way radius and a turnaround radius meeting or exceeding the standards set forth in the Town of Marshville Technical Standards and Specifications Manual. The Technical Review Committee may grant modifications to these requirements on a case by case basis, with the justification stated in writing on the final plat.* *Section 8.5-1 Traditional Neighborhood Development Overlay (TNDO)* *(2.) Streets, Alleys and Blocks:* *(a.) Public streets shall provide access to all tracts and lots.* *(b.) Streets and alleys shall, wherever practicable, terminate at other streets within the neighborhood and connect to existing and projected streets outside the development.* *(c.) Cul-de-sacs shall not exceed 250 feet in length, must be accessed from a street providing internal or external connectivity, shall be permanently terminated by a vehicular turnaround, and are permitted only where topography makes a street connection impracticable. In most instances, a "close" or "eyebrow" is preferred to a cul-de-sac.*	See notes above regarding Block Size. Requiring connectivity or cross-access between adjacent developments is a great tool for reducing the amount of traffic on major roads while increasing connectivity for pedestrians, bicycles, service vehicles, and neighborhood access. For good model language, see City of Wilson, NC UDO, Section 6.4: Connectivity: http://www.wilsonnc.org/wp-content/uploads/2014/12/CH-6-Infrastructure-Standards.pdf Or City of Wake Forest, NC UDO, Section 6.5, Connectivity: http://www.wakeforestnc.gov/udo.aspx Both codes above also provide requirements for when bicycle/pedestrian connections between parcels, public open space, and between cul-de-sacs is required. See also the excellent Major & Collector Street Plan: Implementing Complete Streets for Nashville/Davidson County, TN. Make the maximum length for cul-de-sacs 150 feet where development densities are 3 dwellings per unit area (dua) or greater to limit the distance that a person biking or walking would have to travel along a cul-de-sac. Consider requiring other traffic calming/traffic diversion measures that allow for connectivity and improve the pedestrian and biking environment such as street trees, narrow street width standards, traditional traffic calming devices, emergency and/or bike/ped connections only between streets and T intersections. For good model language, see City of Wilson, NC UDO, Section 6.4: Connectivity: http://www.wilsonnc.org/wp-content/uploads/2014/12/CH-6-Infrastructure-Standards.pdf Or City of Wake Forest, NC UDO, Section 6.5, Connectivity: http://www.wakeforestnc.gov/udo.aspx

4. Resources

The following documents were referenced for this policy and regulatory review. Other references for best practices are listed below.

Town of Marshville Development Ordinance (2016)
Town of Marshville Technical Standards and Specifications Manual (2016)
Town of Marshville Town Plan 2035: Land Use & Comprehensive Master Plan (2016)
Town of Marshville US 74 Corridor Study (2018)

REFERENCED DOCUMENTS AND RESOURCES:

1. NCDOT Complete Streets Planning and Design Guidelines (July 2012): http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf
2. NCDOT Traditional Neighborhood Development (TND) Guidelines: https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Traditional%20Neighborhood%20Development%20Manual.pdf
3. City of Wilson, NC UDO: https://www.wilsonnc.org/development-services/unified-development-ordinance/
4. Town of Wendell, NC UDO: http://www.townofwendell.com/departments/planning/development/zoning/udo-unified-development-ordinance
5. City of Wake Forest, NC UDO: http://www.wakeforestnc.gov/udo.aspx
6. Town of Davidson, NC Planning Ordinance, https://www.ci.davidson.nc.us/1006/Planning-Ordinance
7. Association of Pedestrian and Bicycle Professionals' Bicycle Parking Guidelines. (www.apbp.org)
8. Making Neighborhoods More Walkable and Bikeable, ChangeLab Solutions: http://changelabsolutions.org/sites/default/files/MoveThisWay_FINAL-20130905.pdf
9. Getting the Wheels Rolling: A Guide to Using Policy to Create Bicycle Friendly Communities, ChangeLab Solutions http://changelabsolutions.org/bike-policies
10. Public Art: Citizen-Initiated Projects: https://www.raleighnc.gov/parks/content/Arts/Articles/CitizenInitiatedArt.html
11. NCDOT - North Carolina Public Art on the Right of Way Policy: https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/North%20Carolina%20Public%20Art%20on%20the%20Right%20of%20Way%20Policy.pdf
12. Charlotte Paint the Pavement Project Guide: http://www.charlottenc.gov/civicinnovation/placemaking/Documents/PaintthePavement_with%20Attachments.pdf
13. Chapel Hill Artist-Designed Crosswalk Program: http://www.townofchapelhill.org/home/showdocument?id=28401

CROSSWALK POLICY

High visibility crosswalks are a type of treatment typically used to alert drivers and improve the safety and visibility of pedestrians. Marshville should adopt a policy that requires intersections to have high-visibility crosswalks whenever it is feasible to do so. This is especially applicable on streets with a high volume of cars, such as Elm Street (see images below that show the intersection of Elm Street and Main Street). Other applications may also include midblock crossings at pedestrian attractors such as cluster mailboxes or park entrances. It should be noted that many streets in Marshville, including Elm Street and US 74, fall under the jurisdiction of the state, so coordination with NCDOT would be required.

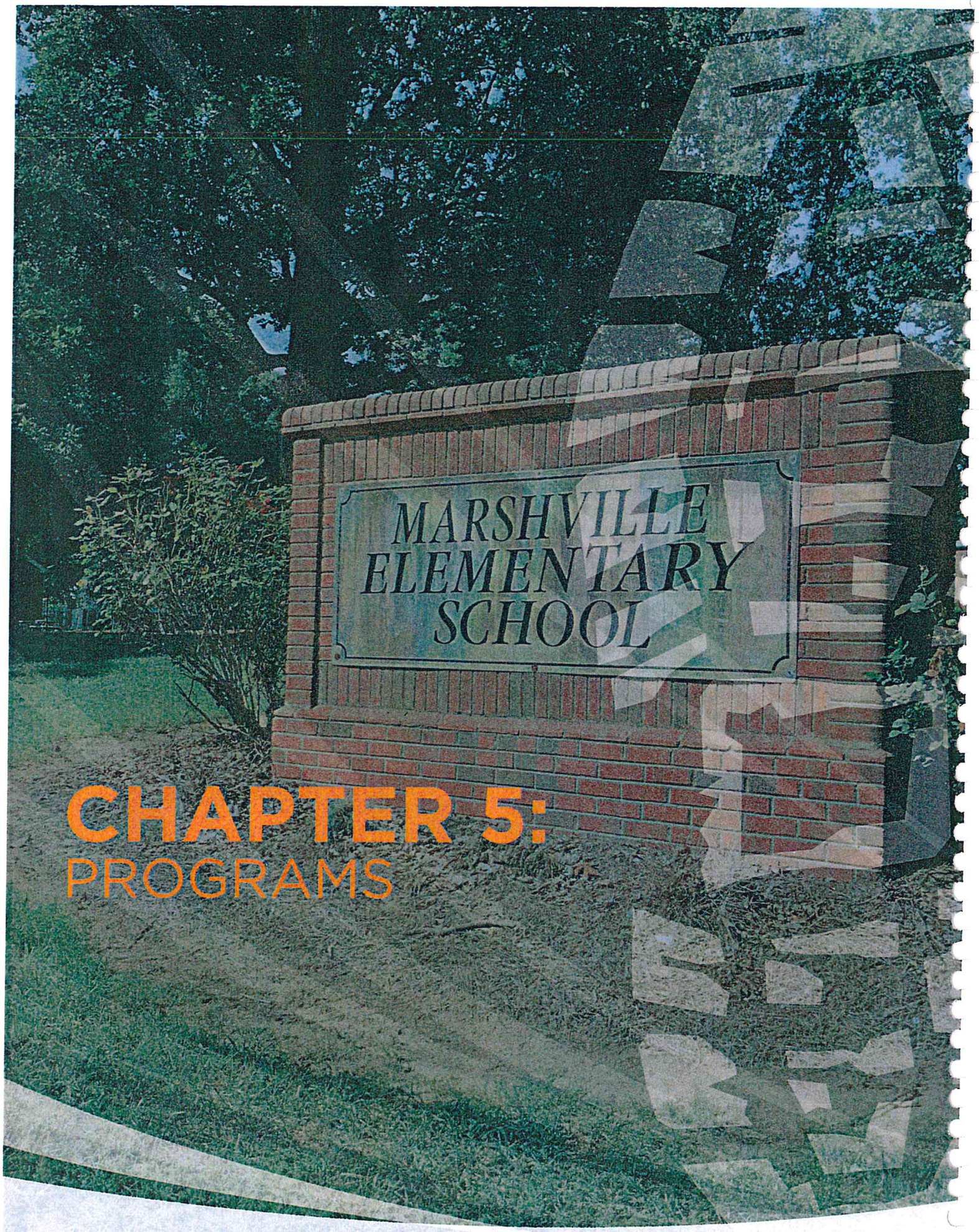
Some cities in North Carolina, and around the country, have developed policies, programs, and design standards that allow for the commission of public art on public right-of-way. These projects are often citizen-initiated and are usually located on low-volume roadways, either in neighborhoods or pedestrian-oriented commercial streets. These community beautification programs can be beneficial for placemaking, economic development, and pedestrian safety.

Policies and design standards directly targeting intersections should also be enacted to ensure a standardized approach to curb cuts, landscaping, ADA compliance, and connection to existing networks or places where future facilities may connect. Intersection design can influence a person's willingness to walk, their safety while waiting and crossing a street, and overall traffic control at the intersection.

Photo above: Painted sidewalk and crosswalk at 9th and Brevard in Charlotte, NC.

Top photo: Street level view of the intersection at Elm Street and Main Street

Photo above: Aerial view of Elm Street and Main Street

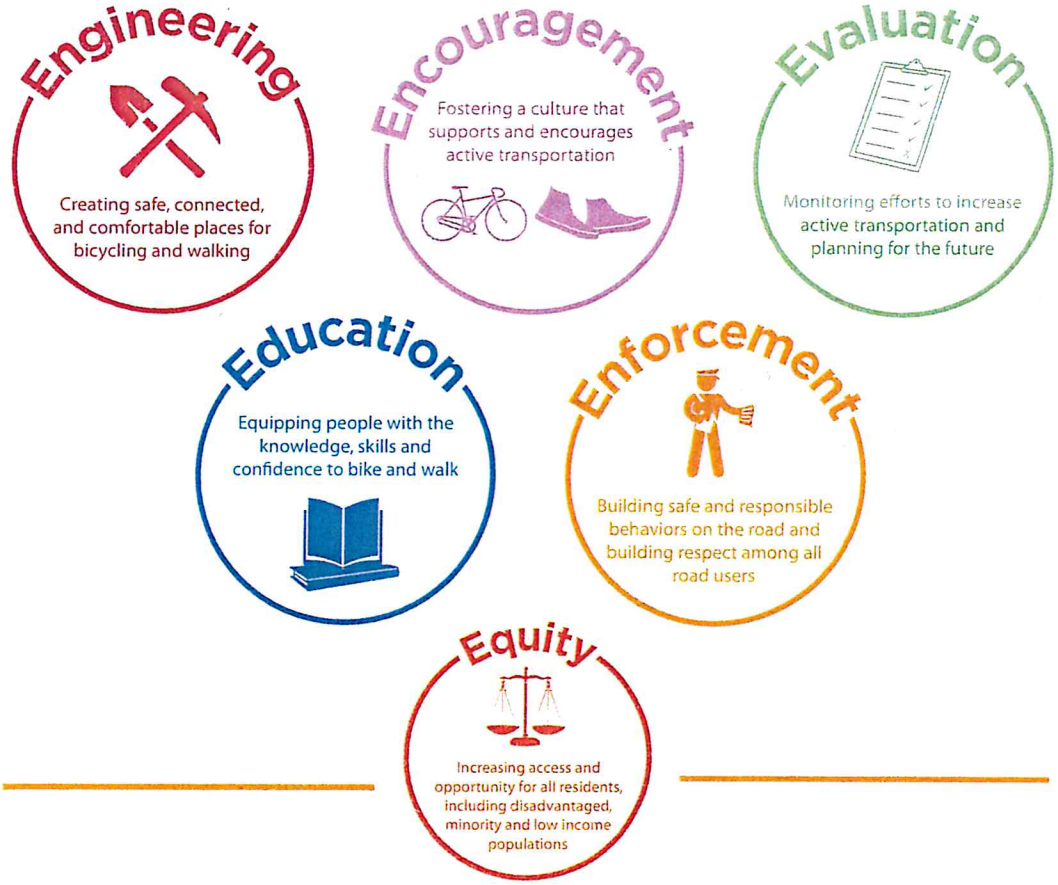


CHAPTER 5:
PROGRAMS

OVERVIEW

Infrastructure alone doesn't create and foster a pedestrian- and bike- friendly community. The ideal goal is to develop a culture of safe and enjoyable walking and biking built on comprehensive actions and initiatives by diverse groups of people. A model used to describe this comprehensive approach is called the 6 E's: Engineering, Education, Encouragement, Enforcement, Evaluation, and Equity (see diagram below). Equity is added here as the 6th E to ensure a focus on all communities and the most vulnerable populations.

The programmatic strategies in this chapter aim to improve safety, increase access to walking and biking, and encourage community and economic development. The actions will increase the visibility of people who walk and bike, communicate that all road users are expected to look out for each other no matter how they travel, create safer streets, and develop a common understanding of traffic safety.



POTENTIAL PARTNERS + STAKEHOLDERS

Existing and potential partners for Marshville pedestrian and bicycle programs described in this chapter include:

UNION COUNTY PUBLIC SCHOOLS

Union County Public Schools is an important partner for creating safe pedestrian and bicycling environments and programming for schools. Safe Routes to School programming is a vital component of successful pedestrian and bicycling plans so partnering with the school district, as well as individual member schools, is important to creating programs that are appropriate and coordinated with schools' curricula.

MARSHVILLE PARKS & RECREATION

The Parks & Recreation Department can be an important partner for creating educational and encouragement programs for walking and biking in Marshville.

MARSHVILLE POLICE DEPARTMENT

The Marshville Police Department is a key partner for creating an enforcement campaign that encourages safe driving practices and pedestrian and bicycling activity. Enforcement campaigns can reduce speeding in pedestrian and bicycling zones, encourage proper yielding to pedestrians in crosswalks, and generally promote a sense of respect for all travelers regardless of whether one drives, walks, or bikes in Marshville.

MARSHVILLE SMALL TOWN MAIN STREET BUSINESSES

This group of businesses in Marshville's historic downtown have already been instrumental in improving the sidewalks in downtown, and they will be important partners in continuing that momentum to create a more walkable, vibrant business district.

UNION COUNTY CHAMBER OF COMMERCE

The Chamber of Commerce is a key partner for creating relationships with local businesses and community leaders. These relationships can help support the town's pedestrian and bicycling programming.

PROGRAM TOOLKIT

WATCH FOR ME, NC

Watch for Me, NC is an awareness campaign aimed at reducing the number of bicyclists and pedestrians hit and injured in crashes with vehicles. Piloted in the Triangle area, Raleigh was one of the first cities to launch the campaign in 2013. The campaign includes education during the months of October and November, and has been followed by targeted enforcement efforts by police departments. Communities across North Carolina are encouraged to apply to implement the program on an annual basis.

For more information, visit:
http://watchformenc.org/

- **Why Implement?** Residents expressed concern over high speed corridors and the failure of motor vehicle drivers yielding to pedestrians in crosswalks. Enforcement efforts, when combined with education messaging, can often improve pedestrian and bicyclist safety awareness.

LET'S GO NC!

Let's Go NC!, a Pedestrian and Bicycle Safety Skills Program for Healthy, Active Children, is an all-in-one educational package of lesson plans, materials, activities and instructional videos that encourages children in grades K-5 to learn about and practice fundamental skills that build safe habits.

This program was developed for the North Carolina Department of Transportation (NCDOT) Division of Bicycle and Pedestrian Transportation and Safe Routes to School Program by North Carolina State University's Institute for Transportation Research and Education. The curriculum aligns with North Carolina Essential Standards and is endorsed by the North Carolina Department of Public Instruction.

All lesson plans and materials are available for free online at https://www.ncdot.gov/initiatives-policies/safety/lets-go-nc/Pages/default.aspx.

- **Why Implement?** This package provides key guidance and materials to assist instructors in teaching bicycle and pedestrian safety to children at a young age.

SAFE ROUTES TO SCHOOL (SRTS)

Safe Routes to School (SRTS) Programs make walking and bicycling to school more accessible to children and encourage more children to walk and bicycle to school. This typically involves examining conditions around public schools and providing programs to improve bicycle/pedestrian safety, accessibility and use.

ACTIVE ROUTES TO SCHOOL
A North Carolina Safe Routes to School Project

North Carolina's Safe Routes to School program is managed by the NCDOT Division of Bicycle and Pedestrian Transportation. It sponsors activities at the local level through a partnership with the North Carolina Division of Public Health to support the Active Routes to School Project. Safe Routes to School infrastructure projects are eligible to compete for funding through North Carolina's Strategic Transportation Investment (STI) program and other sources of funding for bike and pedestrian projects. For more information, visit: www.ncdot.gov/bikeped

SafeRoutes
National Center for Safe Routes to School

Marshville has a SRTS Action Plan from 2011 that includes detailed programmatic and facility recommendations. Facility recommendations and some programs have been integrated into this plan but the full suite of programs should be re-evaluated by the applicable partners.

- **Why Implement?** Children are one of the most vulnerable users of the pedestrian and bicycling network. Improving safe and efficient access to school can have several benefits (health, environment, education, etc).

WALKING SCHOOL BUS

Walking School Buses and Bike Trains allow students to walk or bicycle to school as a group, often with an adult volunteer. These could be daily, weekly, or monthly events. These programs encourage walking in school aged children as well as the adult chaperones. Schools in North Carolina that have walking school buses include Olive Chapel Elementary in Apex and Langston Farms Elementary in eastern North Carolina. For more information, visit www.walkingschoolbus.org

Volunteers can teach children safe pedestrian practices while walking to school.

- **Why Implement?** This group program encourages more walking and biking to school and community fellowship through volunteering.

SCHOOL SAFETY PATROL PROGRAMS

School Safety Patrol Programs across the United States have been responsible for decreased pedestrian/vehicle collisions. The American Automobile Association (AAA), municipalities, and schools have sponsored these important safety programs in the past, and should be continued by Marshville's schools. AAA Carolinas' contact phone number is 704-569-7883. They can provide pertinent information in reference to ordering supplies and starting up the program at Marshville's schools.

For more information, visit:
https://schoolsafetypatrol.aaa.com/

- **Why Implement?** Student safety patrol officers promote safety during arrival and dismissal times. The officers also model safe behavior that not only teaches younger students proper safety protocols, but also reinforces such behavior in the officers themselves.

NC SCHOOL CROSSING GUARD TRAINING PROGRAM

As traffic continues to increase on North Carolina's streets and highways, concern has grown over the safety of children as they walk to and from school. At the same time, health agencies, alarmed at the increase in obesity and inactivity among children, are encouraging parents and communities to get their children walking and biking to school. In response, the NCDOT Division of Bicycle and Pedestrian Transportation decided to establish a consistent training program for law enforcement officers responsible for school crossing guards. According to the office of the North Carolina Attorney General, school crossing guards may be considered traffic control officers when proper training is provided as specified in GS 20-114.1.

For more information, visit:
https://connect.ncdot.gov/projects/BikePed/Documents/NCSRTS_CrossingGuard.pdf

- **Why Implement?** Crossing guards help enforce safe behavior amongst student walkers, bikers, and adult driving behavior around the schools. They can also provide the adult supervision that is necessary to support a student safety patrol program (see above).

WALK AT SCHOOL PROGRAMS

Through this program, children are given the opportunity and are encouraged to increase how much they walk during school hours through competitions, prizes, goal setting, and other activities. This type of program is especially important for schools that do not have good walking or biking routes, or if students live too far to walk or ride bikes.

Best Practice Programs:

- Tigers on the Prowl is a popular walking program at Davidson Elementary School in Davidson, NC.
- WalkBike to School also provides examples and resources.
- **Why Implement?** Programs to encourage safe walking practices and physical activity during the school day is an equitable way to ensure all students benefit from Safe Routes to School programming.

WAYFINDING SIGNAGE

Wayfinding signage helps orient pedestrians and bicyclists to key destinations and provides distances as well as approximate walking and bicycling times to those destinations. Investing in a permanent wayfinding signage program is an important step in creating a more welcoming and accessible pedestrian and bicycling environment.

Walk [Your City] is an organization that works with communities to implement encouragement signs to highlight key destinations. Photo from program in Raleigh, NC.

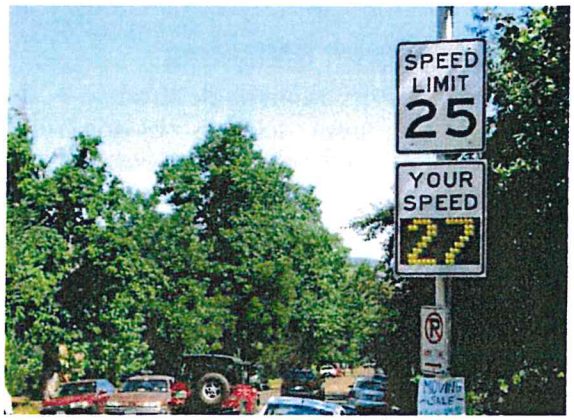
As an interim step towards that goal, creating a temporary wayfinding signage system can be a cost-effective and fast way to promote walking and bicycling in the near term. Clearly marking routes and loops with signs that specify distances and times to key destinations helps people say "Yes!" to walking and biking. With the help of high school art students and teachers to design the signs, this can be a great way to engage the community and build a culture around walking and biking.

- **Why Implement?** Signage improves the visitor experience and enjoyment by providing clear, accurate and quality information.

SPEED FEEDBACK SIGNS

A speed feedback sign can be used to display the approaching vehicle speeds and the posted speed limits on roadways. Newer speed feedback signs record speed data which jurisdictions can use to evaluate roadway conditions. These feedback loops remind drivers to obey the speed limit and can be used in areas where traffic calming is needed to create a safe pedestrian and bicycling environment.

- **Why Implement?** These interactive signs increase speed limit compliance and pedestrian and bicycling comfort level along high volume corridors.



Speed feedback signs can be an effective and low cost tactic to reduce speed along corridors with high pedestrian activity.

ENFORCEMENT

These programs can cover a wide range of focuses including crosswalk stings, speeding, distracted driving, and distracted walking/bicycling. Increasing the presence/enforcement at back-to-school times and/or daylight savings is also advised.

Flashing beacons help improve vehicle compliance with yielding to pedestrians in the crosswalk. This Rectangular Rapid Flashing Beacon (RRFB) is installed in Davidson, NC near a school and busy shopping center.

Best Practice Programs:

- Greenville, NC participated in a distracted driving research project, neighborhood speed watch program, installed speed feedback signs, and increased law enforcement before and after school.
- Volunteers in Arizona conducted a Neighborhood Speed Watch routine detection event which assisted law enforcement efforts, putting serial speeders on notice and bringing down average speeds.

- **Why Implement?** Enforcement of all traffic laws will improve safety for all users, especially the most vulnerable users, the pedestrian and bicyclist.

OPEN STREET EVENTS

Open street events are periodic street "openings" (i.e., "open" to users besides just cars; usually on Sundays) that create a temporary park that is open to the public for walking, bicycling, dancing, hula hooping, roller-skating, etc. Open street events promote health by creating a safe and attractive space for physical activity and social contact, and are cost-effective compared to the cost of building new parks for the same purpose.

This Plan encourages the Town of Marshville to continue hosting annual open street events, including the annual Randy Travis Music Festival (formerly the Boll Weevil Jamboree). The Town may choose a two-block section of street, with the intention of growing the street length of the event over time as it grows in popularity. Care should be taken to consult business owners and residents in advance about street events that may affect customer and neighborhood access.

- **Why Implement?** Open street events activate community stakeholders around an annual event to promote pedestrian and bicycling safety and Marshville livability.

The Randy Travis Music Festival attracts residents and visitors to Marshville each year.

WALK FRIENDLY COMMUNITY DESIGNATION

Walk Friendly Community (WFC) assessments recognize existing successes in communities that promote walking, and provide a framework for communities trying to achieve higher walking rates. The program incorporates assessments in their score card that help a community gauge where they are excelling and where they are falling short.

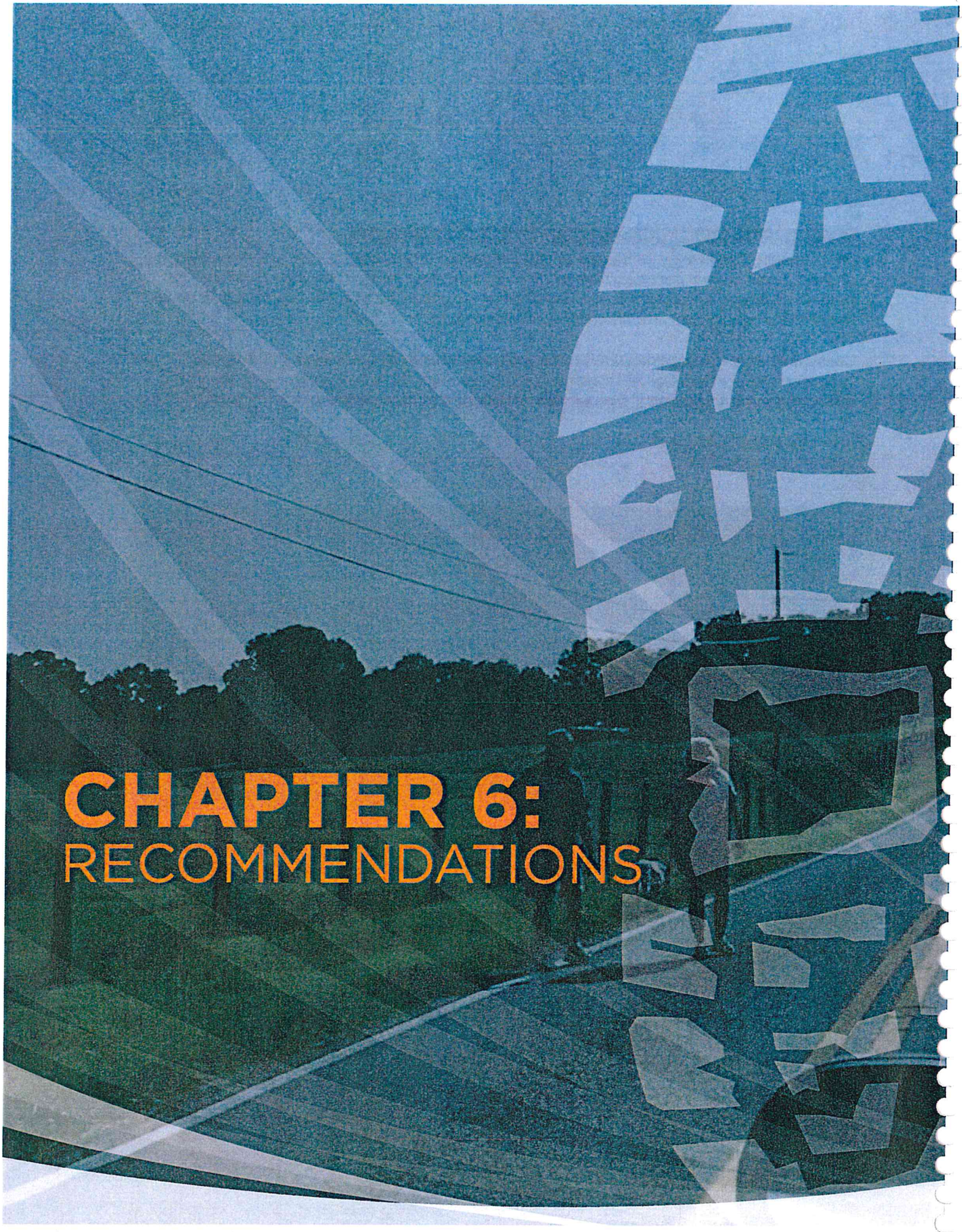
Communities seeking status as WFC must make relevant advances in each of the Six E's. Implementation of this plan will position Marshville to apply for walk-friendly status as early as 2019 or once progress of the plan recommendations have been achieved.

For more information, visit:
http://walkfriendly.org/

WALK-FRIENDLY COMMUNITIES

The Walk Friendly Community (WFC) program is a national initiative led by the Pedestrian and Bicycle Information Center (PBIC) intended to encourage communities to improve their local walking environments.

- Review best practices and existing designated WFCs at: walkfriendly.org
- Download the WFC assessment tool at: http://walkfriendly.org/wp-content/uploads/2017/03/WFC_Assessment_Tool.pdf
- Submit the application on-line by either June 15 or December 15



CHAPTER 6: RECOMMENDATIONS

INTRODUCTION

Developing the pedestrian, bicycle, and shared use path recommendations was a multi-step process involving ongoing dialogue with various stakeholders. Network recommendations were informed by both quantitative findings and a qualitative understanding of the Town of Marshville.

The following sections detail priority recommendations for Marshville. **The intent of these recommendations is to present a framework for improving access for active travel modes, with an emphasis on pedestrians, ensuring accessibility and mobility for pedestrians and bicyclists of all ages and abilities.** Improvements focus on making walking and biking safer and a more enjoyable experience for residents and visitors. To achieve such a vision, the recommendations are organized as follows:

CHAPTER OVERVIEW

This chapter provides the necessary steps and guidance for delivering the recommendations of this Plan and is organized into the following sections:

Identifying Project Types ..... page 60

Identifying Priorities ..... page 62

Intersection Improvement Recommendations ..... page 65

Sidewalk Recommendations ..... page 73

Shared-Use Path Recommendations ..... page 79

On-Street Pedestrian Facility Recommendations ..... page 85

- Pedestrian Lane ..... page 89
- Paved Shoulders ..... page 90
- Advisory Shoulders ..... page 91
- Festival Street ..... page 92

Bicycle Facility Recommendations ..... page 93

IDENTIFYING PROJECT TYPES

INTERSECTION IMPROVEMENTS

For Marshville streets to meet the needs and demands of everyone using them, intersections—both large and small—need to function as safely and efficiently as possible. They also make traffic movement more intuitive, seamless, and predictable for those passing through. Refer to pages 69-71 for intersection design guidance and crossing treatment selection criteria.

SIDEWALKS

Sidewalks provide dedicated space intended for use by pedestrians that is safe, comfortable, and accessible to all. Sidewalks are physically separated from the roadway by a curb or unpaved buffer space. Refer to pages 77-78 for design guidance.

SHARED USE PATHS

Shared use paths—both sidepaths (along roadways) and greenways—provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. Shared use paths can provide a low-stress experience for a variety of users using the network for transportation or recreation. Refer to pages 83-84 for design guidance.

PEDESTRIAN LANE

A pedestrian lane is an interim or temporary pedestrian facility that may be appropriate on roads with low to moderate speeds and volumes. A pedestrian lane is a designated space on the roadway for exclusive use of pedestrians. The lane may be on one or both sides of the roadway and can fill gaps between important destinations in a community. Refer to page 89 for pedestrian lane design guidelines.

ADVISORY SHOULDERS

Advisory shoulders create usable shoulders for pedestrians and bicyclists on a roadway that is otherwise too narrow to accommodate one. The shoulder is delineated by pavement marking and optional pavement color. Motorists may only enter the shoulder when no pedestrians or bicyclists are present and must overtake these users with caution due to potential oncoming traffic. Refer to page 91 for advisory shoulder design guidelines.

PAVED SHOULDERS

Paved shoulders on the edge of roadways can be enhanced to serve as a functional space for bicyclists and pedestrians to travel in the absence of other facilities with more separation. Refer to page 90 for paved shoulder design guidelines.

FESTIVAL STREET

A festival street, also known as an open street or shared space, blurs the hierarchy between vehicles and pedestrians/bicyclists by providing for flexible use within a street right-of-way. It also encourages slower traffic speeds and creates a "special place" that can be closed for temporary events and festivals. Refer to page 92 for design guidance.

SHARED LANE MARKINGS

Shared lane markings (SLMs) are the standard marking for indicating shared roadway bicycle operations. Shared lane markings improve bicyclists' visibility to motorists by indicating that bicyclists may use the lane; they also provide guidance to bicyclists regarding where to travel in the shared roadway. Refer to page 97 for design guidelines.

IDENTIFYING PRIORITIES

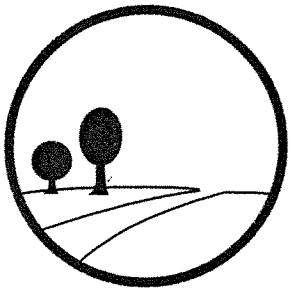
As part of the planning process, project consultants, town staff and community stakeholders identified key inputs to identify priorities. These seven factors, illustrated below, were used to develop priority corridors for near-term projects to improve walkability and bikeability in Marshville. These factors should be considered every time the Town or the North Carolina Department of Transportation (NCDOT) selects projects for implementation. Map 6.1 on the facing page shows the priority corridors highlighted in yellow. Projects that fall along these priority corridors should be considered first for near-term implementation. Detailed cut sheets for the top five priority projects identified through this process are included in Chapter 7.

CONNECTIVITY

Does this project create links between key destinations?

SAFE CROSSINGS

Does this project improve the safety, ease, and comfort of crossing a major roadway?



PARK ACCESS

Does this facility improve access to parks?

PEDESTRIANS FIRST

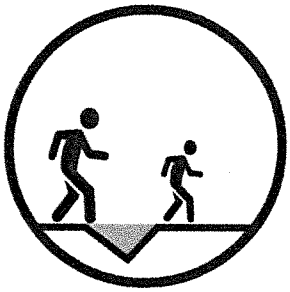
Does this project address immediate pedestrian safety needs?

EQUITY

Is this project in an area of vulnerability?

EASE OF IMPLEMENTATION/ LOW COST

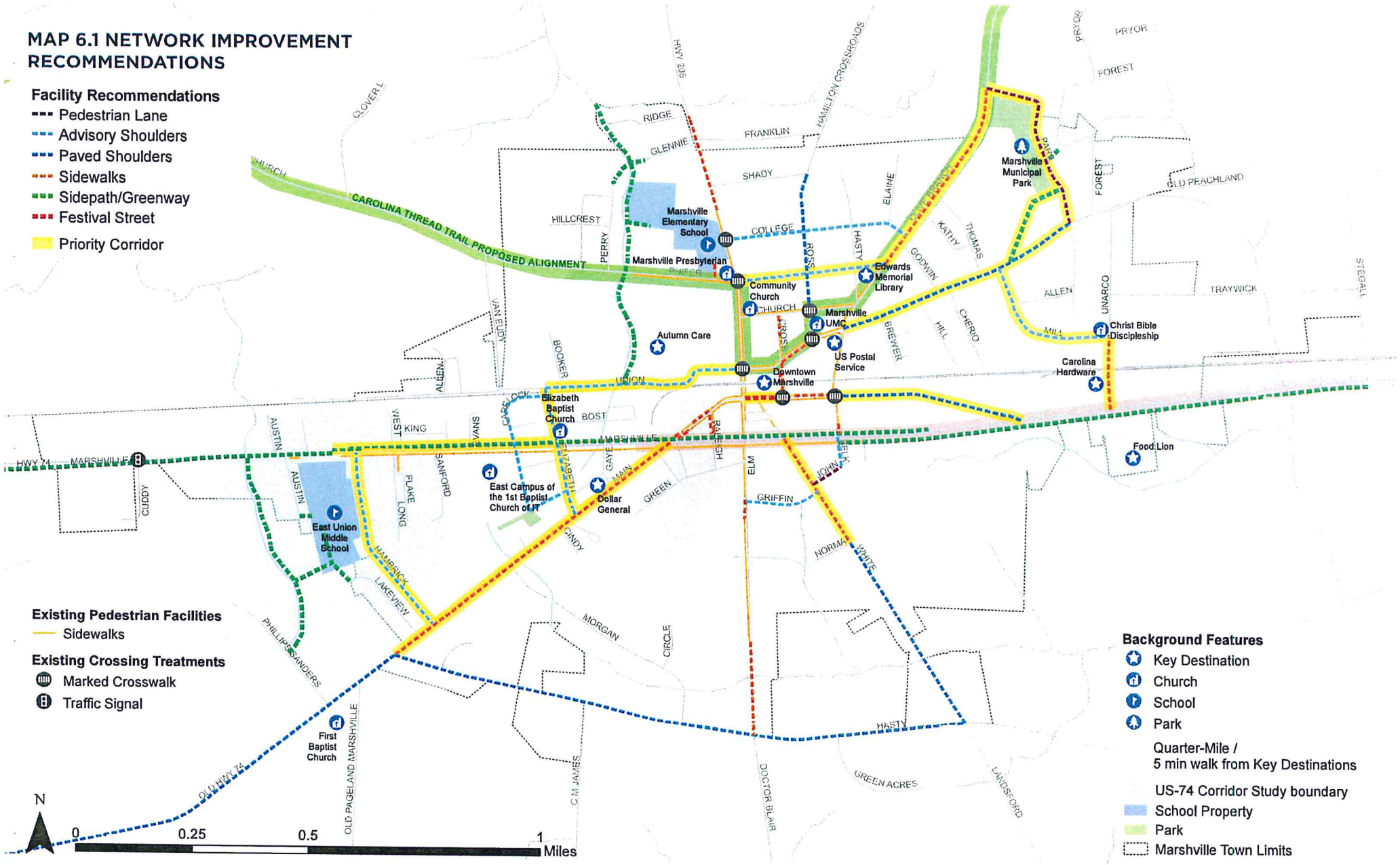
What is the cost compared to other projects?



GAP CLOSURES

Does this project close gaps between facilities?

MAP 6.1 NETWORK IMPROVEMENT RECOMMENDATIONS



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INTERSECTION IMPROVEMENT RECOMMENDATIONS

Table 6.1 Intersection Improvement Recommendations

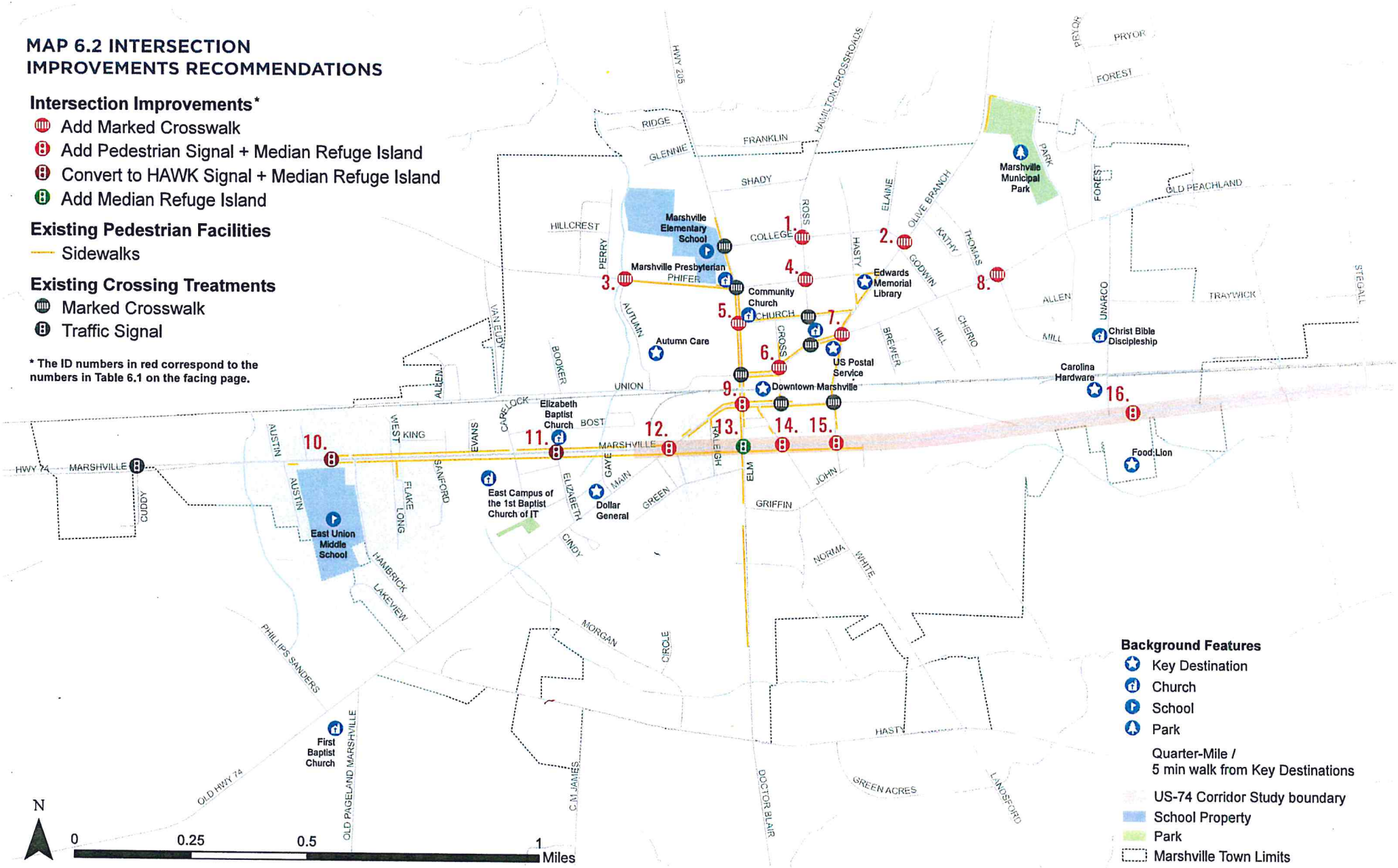
ID #	Cross Street #1	Cross Street #2	Existing Facility	Recommendation	Priority*	Cost
1.	College St.	Ross St.	None	Add marked crosswalk	N	$5,000
2.	Olive Branch Rd.	College St.	None	Add marked crosswalk	Y	$2,200
3.	Phifer St.	Autumn Dr.	None	Add marked crosswalk at proposed greenway crossing	N	$2,700
4.	Phifer St.	Ross St.	None	Add marked crosswalk	Y	$5,000
5.	Elm St.	Church St.	None	Add marked crosswalk	N	$5,000
6.	Union St.	Cross St.	None	Add marked crosswalk	N	$6,000
7.	Union St.	Olive Branch Rd.	None	Short-term: Add marked crosswalk; Long-term: Study intersection for signalization and/or redesign for reduced crossing distances	Y	$12,000
8.	Union St.	Allen Dr.	None	Add marked crosswalk	Y	$1,500
9.	Main St.	Elm St.	Traffic Signal + Marked Crosswalk	Add pedestrian countdown signal	Y	$40,000
10.	US 74	East Union Middle School entrance	Marked Crosswalk + Flashing Yellow Signal	Convert to HAWK Signal with median refuge island and warning beacon west of Austin St.	Y†	$83,400
11.	US 74	Elizabeth Ave.	Flashing Yellow Signal	Convert to HAWK Signal with median refuge island	Y†	$83,400
12	US 74	Main St.	Traffic Signal	Add marked crosswalk, pedestrian signal, and median refuge island	Y†	$59,800
13.	US 74	Elm St.	Traffic + Pedestrian Signals	Add median refuge island	Y†	$11,400
14.	US 74	White St.	Traffic Signal	Add marked crosswalk, pedestrian signal, and median refuge island	Y†	$41,400
15.	US 74	Belk St.	Traffic Signal	Add marked crosswalk, pedestrian signal, and median refuge island	Y†	$44,400
16.	US 74	Food Lion entrance	Traffic Signal	Add marked crosswalk, pedestrian signal, and median refuge island; Consider realigning traffic signal with Unarco Road and western entrance to Food Lion	Y†	$28,400
	Total			**All Intersections**		**$431,600**

Note: The ID number corresponds to the numbers on Map 6.2 on the facing page.

* "Y' indicates projects that are along a priority corridor, as indicated in Map 6.1.

†Indicates that these are considered part of a top five priority and are detailed further in Ch 7.

MAP 6.2 INTERSECTION IMPROVEMENTS RECOMMENDATIONS



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PEDESTRIAN INTERSECTION DESIGN GUIDELINES

Attributes of pedestrian-friendly intersection design include:

- **CLEAR SPACE**: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.
- **VISIBILITY**: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians. Additionally, stamped crosswalks may pose visibility risks during low-light situations. High visibility ladder crosswalks are recommended over crossbars.
- **LEGIBILITY**: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.
- **ACCESSIBILITY**: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.
- **SEPARATION FROM TRAFFIC**: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.
- **LIGHTING**: Adequate lighting is an important aspect of visibility, legibility, and accessibility.

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

Median Refuge Islands

Marked/Raised Crosswalks

Minimizing Curb Radii

Curb Extensions

ADA Compliant Curb Ramps

PEDESTRIAN INTERSECTION DESIGN GUIDELINES, continued

Intersections are an important part of the pedestrian network. Intersections have high potential conflict between pedestrians, bicyclists, and vehicles. However, intersections can be designed to help reduce these conflicts, making them safer for all users. Based on input from the public and the existing conditions analyses, several proposed intersection improvement projects have been identified. These locations are shown on Map 6.2.

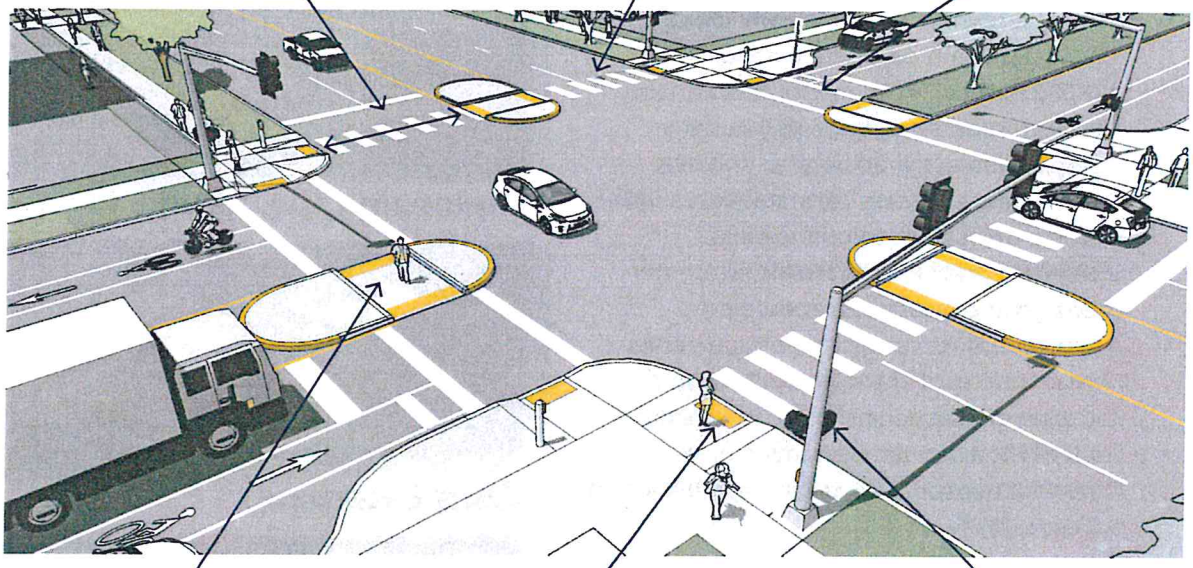
The following guidelines should be considered when designing intersection improvements for pedestrians:

The diagram below highlights best practices for pedestrian facility design at intersections.

The crosswalk should be located to align as closely as possible with the through pedestrian zone of the sidewalk corridor.

Continental markings provide additional visibility.

Parallel markings are the most basic crosswalk marking type.



Median refuge islands increase visibility and allow pedestrians to cross one direction of traffic at a time.

ADA compliant curb ramps allow all users to transition from the street to a sidewalk. Perpendicular curb ramps are preferred to diagonal curb ramps.

The use of a Leading Pedestrian Interval (LPI) to provide additional traffic-protected crossing time to pedestrians should be considered.

MEDIAN REFUGE ISLAND DESIGN GUIDELINES

Median refuge islands are located in the midpoint of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

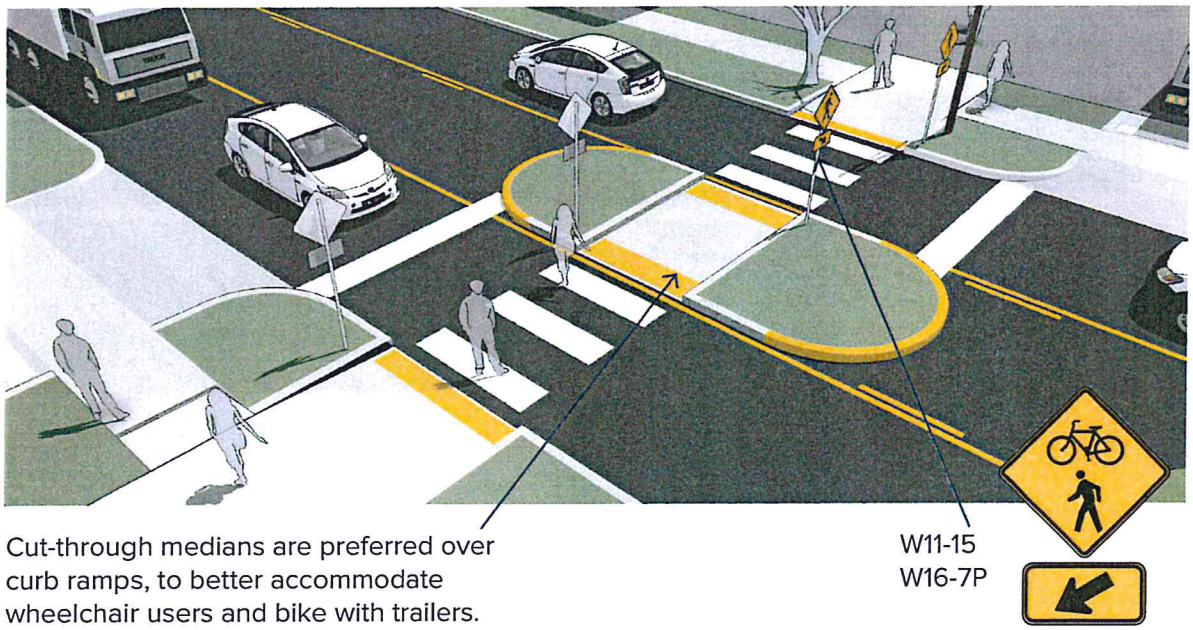
This treatment can be applied at any crossing, signalized or unsignalized, on any roadway with a left turn center lane or median that is at least 6-foot wide. The refuge island must be ADA-accessible.

A concrete median refuge should be at least 6-foot wide between travel lanes to accommodate wheelchair users and bikes with trailers, and at least 20-foot long.

If the island is to be landscaped it should be at least 8-foot wide. Landscaping should not compromise the visibility of pedestrians crossing. Shrubs and groundcover plantings should be no higher than 1-foot 6-inches.

On streets with speeds higher than 25 mph there should also be double centerline markings, reflectors, and "KEEP RIGHT" signage for vehicles. On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

For further design guidance on median refuge islands, refer to the NACTO Urban Bikeway Design Guide, available at https://nacto.org/publication/urban-street-design-guide/intersection-design-elements/crosswalks-and-crossings/pedestrian-safety-islands or the NCDOT Complete Streets Planning and Design Guidelines, available at https://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.



Cut-through medians are preferred over curb ramps, to better accommodate wheelchair users and bike with trailers.

CROSSING TREATMENT SELECTION

The specific type of treatment at a crossing may range from a simple marked crosswalk to a full traffic signal or grade separated crossing. Before a marked crosswalk is installed, appropriate selection of crossing treatments should be evaluated in an engineering study, which should consider number of lanes, **presence of a median**, distance from adjacent signalized intersections, pedestrian volumes and delays, average daily traffic (ADT), speed limit, geometry of the location, possible consolidation of crossing points, availability of street lighting, and other appropriate factors.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE
At unsignalized locations

	Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
FACILITY TYPE	2 lane	3 lane	2 lane	2 lane with Median Refuge*	3 lane	2 lane	2 lane with Median Refuge*	3 lane	4 lane	4 lane with Median Refuge*	5 lane	6 lane	6 lane with Median Refuge*
1 Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
2 Crosswalk with warning signage and yield lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
3 Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
4 Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
5 Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
6 Grade separation	X	X	EJ	EJ	EJ	X	EJ	EJ	✓	✓	✓	✓	✓
7 Median Refuge (*noted in columns)													

LEGEND	
Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X

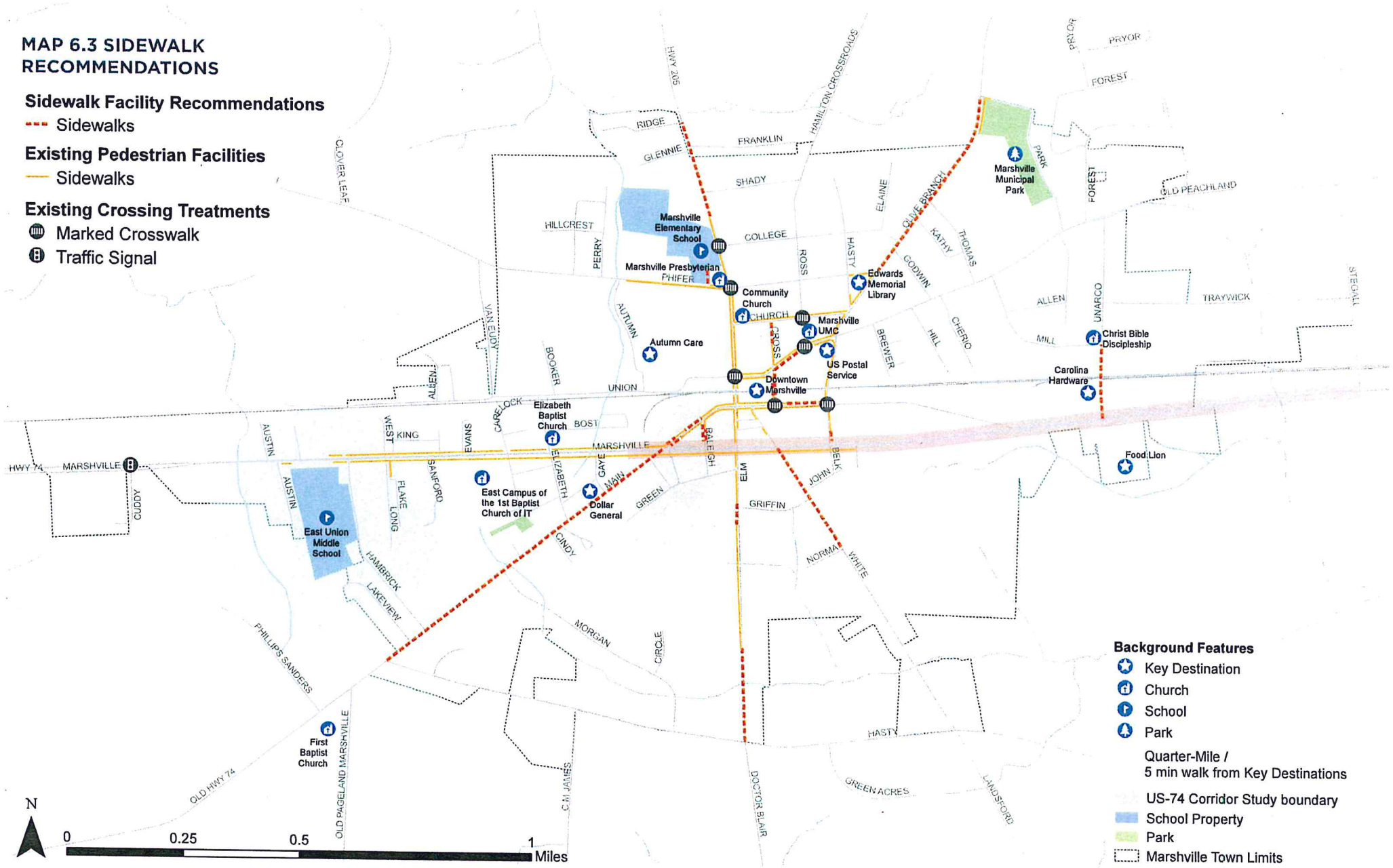
SIDEWALK RECOMMENDATIONS

Table 6.2 Sidewalk Recommendations						
Corridor	**From**	**To**	**Facility Type**	**Length (mi.)**	**Priority***	**Cost**
Cross St. (east side)	Church St.	Existing sidewalks	Sidewalk	0.04	N	$7,100
Cross St. (east side)	Union St.	Main St.	Sidewalk	0.07	N	$10,700
Cross St. (west side)	Union St.	Gaddy St.	Sidewalk	0.04	N	$5,700
Main St. (north side)	East of Cross St.	Olive Branch Rd.	Sidewalk	0.08	N	$13,100
Main St. (NW side)	Wagon Wheel	Pet Shop	Sidewalk	0.05	N	$7,200
Main St. (NW side)	US 74	Existing sidewalk	Sidewalk	0.02	N	$3,900
Main St. (SE side)	US 74	Existing sidewalk	Sidewalk	0.03	N	$4,800
Marshville Elementary School parking lot	Phifer St.	School entrance	Sidewalk	0.03	N	$4,900
N Elm St. (west side)	Existing sidewalk s of Shady Ln.	Ridge Run	Sidewalk	0.21	N	$33,300
Old Hwy 74 (S Main St.) (one side, TBD**)	Hasty Rd.	US 74	Sidewalk	0.75	Y	$119,200
Olive Branch Rd. (east side)	Existing sidewalk	US 74	Sidewalk	0.02	N	$3,500
Olive Branch Rd. (NW side)	Park Dr.	Phifer St.	Sidewalk	0.44	Y	$70,300
Raleigh St. (east side)	Bojangles property line	US 74	Sidewalk	0.028	N	$4,400
Raleigh St. (west side)	Main St.	US 74	Sidewalk	0.042	N	$6,700
S Elm St.	Existing sidewalk	Hasty Rd.	Sidewalk	0.20	N	$32,000
S Elm St. (west side)	Griffin Ln.	S to existing sidewalk	Sidewalk	0.05	N	$7,300
Unarco Rd.	Mill St.	US 74	Sidewalk	0.16	Y	$25,200
Union St. (south side)	Cross St.	Post Office	Sidewalk	0.10	N	$16,000
White St. (one side, TBD**)	US 74	Norma St.	Sidewalk	0.26	Y	$41,900
Total			**Sidewalks**	**3.75mi**		**$417,200**

* "Y' indicates projects that are along a priority corridor, as indicated in Map 6.1.

** TBD- To Be Determined: Further analysis is required to determine which side of the roadway the facility would be most appropriate for the sidewalk facility to be constructed.

MAP 6.3 SIDEWALK RECOMMENDATIONS



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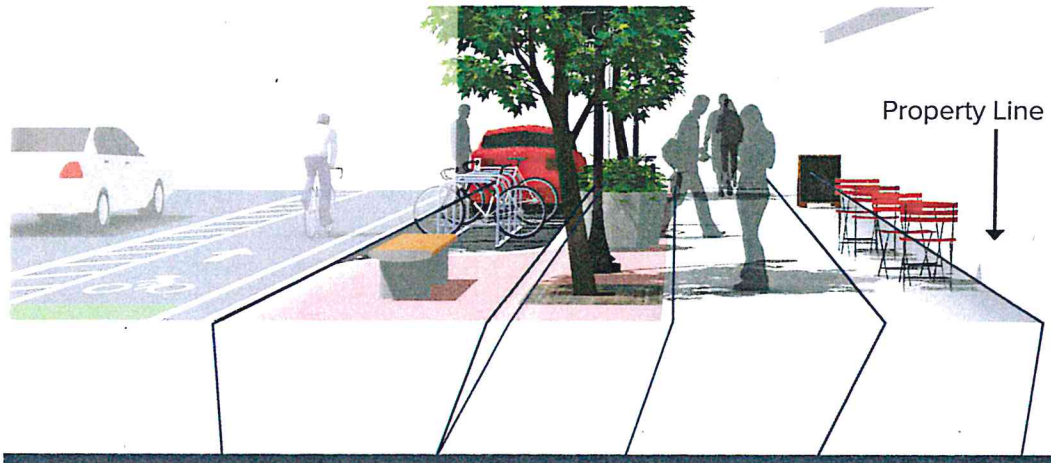
SIDEWALK DESIGN GUIDELINES

Sidewalks should contain adequate width to accommodate high volumes and different walking speeds of pedestrians. The Americans with Disabilities Act requires a 4 foot clear width in the pedestrian zone plus 5 foot passing areas every 200 feet. Recommended dimensions shown below are based on the NCDOT Complete Streets Planning and Design Guidelines. Exact dimensions should be selected in response to local context and expected/ desired pedestrian volumes.



Street Classification	Parking Lane/ Enhancement Zone	Furnishing/ Green Zone	Pedestrian Through Zone	Frontage Zone	Total Sidewalk Area
Local Streets	7 feet	4 - 8 feet	5 - 6 feet	N/A	9 - 14 feet
Commercial Areas	8 - 10 feet	6 - 8 feet	10 - 18 feet	2 - 8 feet	18- 34 feet
Arterials and Collectors	8 - 10 feet	6 - 8 feet	6 - 12 feet	2 - 4 feet	14 -24 feet

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

Total sidewalk area excludes parking dimensions

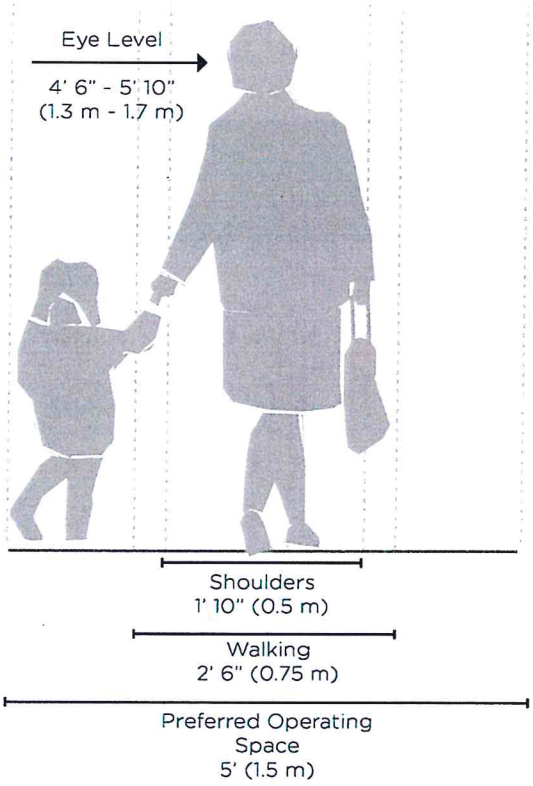
DESIGNING STREETS FOR ALL AGES

TYPES OF PEDESTRIANS

The transportation network should accommodate pedestrians with a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. Older adults walk more slowly and may require assistant devices to help with their walking stability, sight, and hearing. The table below summarizes common pedestrian characteristics for various age groups.

The Manual on Uniform Traffic Control Devices (MUTCD) recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. The transportation system should accommodate these users to the greatest extent possible.

AGE	CHARACTERISTICS
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "darting out" in roadways
	Insufficient judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind



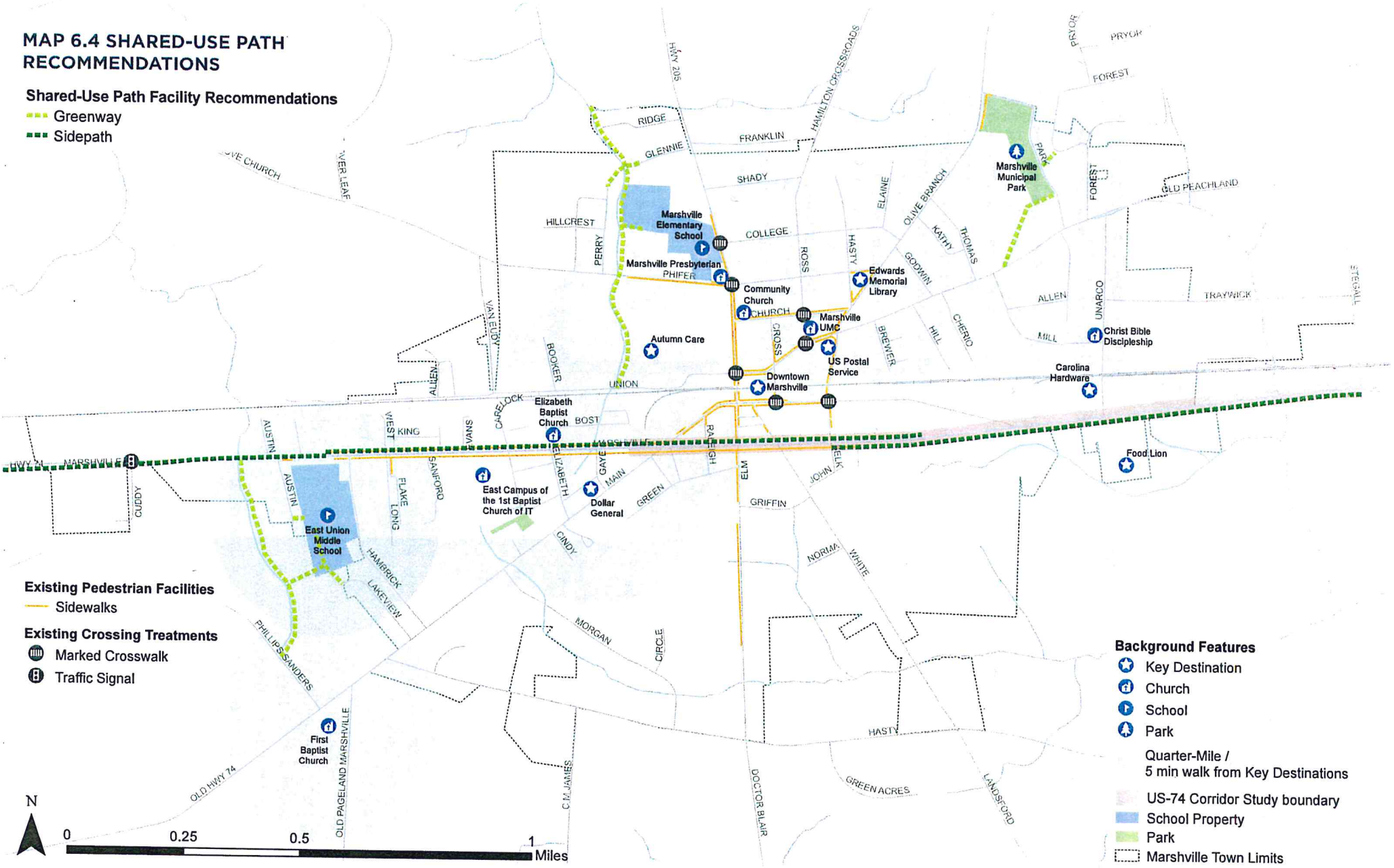
SHARED-USE PATH RECOMMENDATIONS

Table 6.3 Shared-Use Path Recommendations						
Corridor	**From**	**To**	**Facility Type**	**Length (mi.)**	**Priority***	**Cost**
Austin to East Union Connector	Austin Rd.	East Union Middle School	Greenway	0.03	N	$34,200
Buck Branch Creek	Ridge Run	Union St.	Greenway	0.64	N	$1,139,100
East Union Middle School Greenway Connector	Salem Creek	East Union Middle School	Greenway	0.17	N	$218,500
Greenway to Marshville Park	Union St.	Park Dr.	Greenway	0.21	Y	$260,400
Lakeview to East Union Connector	Lakeview Dr.	East Union Middle School	Greenway	0.05	N	$69,100
Marshville Elementary School baseball fields	Buck Branch Creek	Athletic field sidewalk	Greenway	0.05	N	$64,700
Park to Forest Connector	Park Dr.	Forest Dr	Greenway	0.04	N	$49,400
Perry to Glennie Connector	Perry Ln.	Glennie St.	Greenway	0.09	N	$117,100
Salem Creek Greenway	US 74	Phillips Sanders Rd.	Greenway	0.46	N	$580,500
US 74	Forest Hills School Rd.	Existing sidewalks near middle school	Sidepath	1.71	N	$651,100
US 74 (north side)	East Union Middle School	Elizabeth Ave.	Sidepath	0.48	Y	$184,100
US 74 (north side)	Elizabeth Ave.	First National Bank	Sidepath	0.80	Y	$305,800
US 74 (south side)	Belk St.	Stegall Rd.	Sidepath	1.15	Y	$435,700
Total			**Shared-Use Paths 5.8mi**			**$4,109,700**

* "Y' indicates projects that are along a priority corridor, as indicated in Map 6.1.

Note: Estimates for shared-use paths do not include cost of acquiring land. In the case of the Greenway to Marshville Park, the Town of Marshville already owns the property where the greenway is proposed.

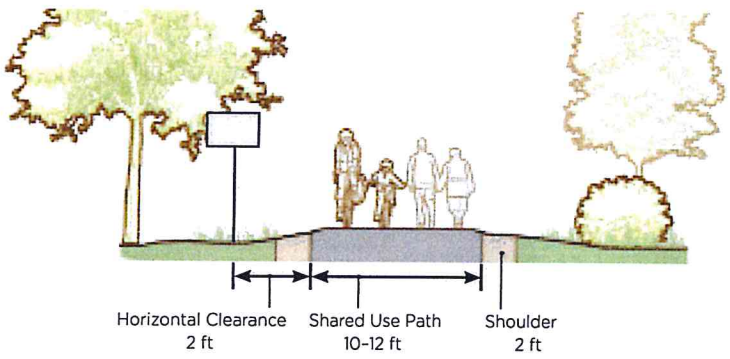
MAP 6.4 SHARED-USE PATH RECOMMENDATIONS



GREENWAY (SHARED-USE TRAIL OFF-ROAD)

A shared use trail that is off-road, also known as a greenway, provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. Greenway trails can provide a low-stress experience for a variety of users using the network for transportation or recreation.

Greenway trails follow utility corridors, railroad alignments (both active and abandoned), and stream corridors.



WIDTH

The geometric design of greenways should support the speed and volume of expected user types.

- 10 ft -12ft width is recommended in most situations and will be adequate for moderate to heavy use.
- A 2 ft shoulder should be provided on each side of the path, kept clear of vertical elements or obstructions.

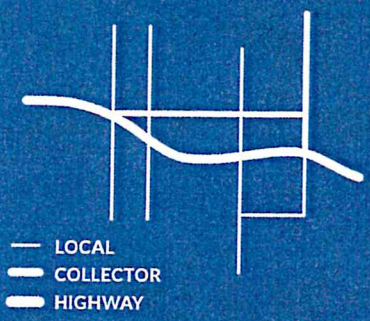
APPLICATION

SPEED AND VOLUME

Paths operating in independent corridors are fully separated from traffic. Facility provision is based on opportunity and connectivity rather than roadway context. In some cases, an independent corridor may offer similar connectivity and access to destinations as a nearby roadway.

NETWORK

Serves connections independently of the street network. May function as a network alternative road.



LAND USE

Generally appropriate outside of built-up areas, and also as a corridor connection within urban areas.

ON-STREET PEDESTRIAN FACILITY RECOMMENDATIONS

Table 6.4 On-Street Pedestrian Facility Recommendations						
Corridor	**From**	**To**	**Facility Type**	**Length (mi.)**	**Priority***	**Cost**
John St	White St	Belk St	Pedestrian lane	0.07	N	$800
Park Dr (east side)	Olive Branch Rd.	Union St.	Pedestrian lane	0.39	Y†	$4,000
Total			**Pedestrian Lane 0.46mi**			**$4,800**
Allen Dr.	Union St.	Mill St.	Advisory Shoulders	0.08	Y	$22,700††
Belk St.	US 74	John St.	Advisory Shoulders	0.06	N	$17,400††
Carelock Dr.	Elizabeth Ave.	Sturdivant St.	Advisory Shoulders	0.33	N	$7,100
College St.	Elm St.	Olive Branch Rd.	Advisory Shoulders	0.40	N	$8,400
Elizabeth Ave.	Union St.	Main St.	Advisory Shoulders	0.28	Y	$5,900
Griffin Ln.	Elm St.	White St.	Advisory Shoulders	0.16	N	$3,400
Hambrick St.	US 74	Main St.	Advisory Shoulders	0.42	Y	$8,900
Mill St.	Allen Dr.	Unarco Rd.	Advisory Shoulders	0.24	Y	$5,100
Phifer St.	Elm St.	Hasty St.	Advisory Shoulders	0.25	Y	$5,400
Sturdivant St.	Carelock Dr.	Elizabeth Ave.	Advisory Shoulders	0.10	N	$25,700††
Union St.	Elizabeth Ave.	Elm St.	Advisory Shoulders	0.44	Y†	$9,300
Total			**Advisory Shoulders 2.76mi**			**$119,300**
Hasty Rd.	Old Highway 74 (Main St.)	White St. (and beyond)	Paved Shoulders	1.25	N	$502,900††
Main St.	Olive Branch Rd.	US 74	Paved Shoulders	0.41	Y	$8,700
Old Highway 74 (Main St.)	Hasty Rd.	Marshville town limits (and beyond)	Paved Shoulders	1.47	Y	$575,600††
Ross St.	Marshville town limits	Church St.	Paved Shoulders	0.30	N	$6,300
Union St.	Olive Branch Rd.	where road narrows east of Mill St.	Paved Shoulders	0.44	Y†	$9,400
Union St.	where road narrows east of Mill St.	Park Dr.	Paved Shoulders	0.10	Y†	$27,100††
White St. (one side, TBD**)	Norma St.	Marshville town limits (and beyond)	Paved Shoulders	1.39	Y	$183,500††
Total			**Paved Shoulders 5.36mi**			**$1,313,500**
Main St.	Elm St.	Cross St.	Festival street	0.08	Y†	$718,400

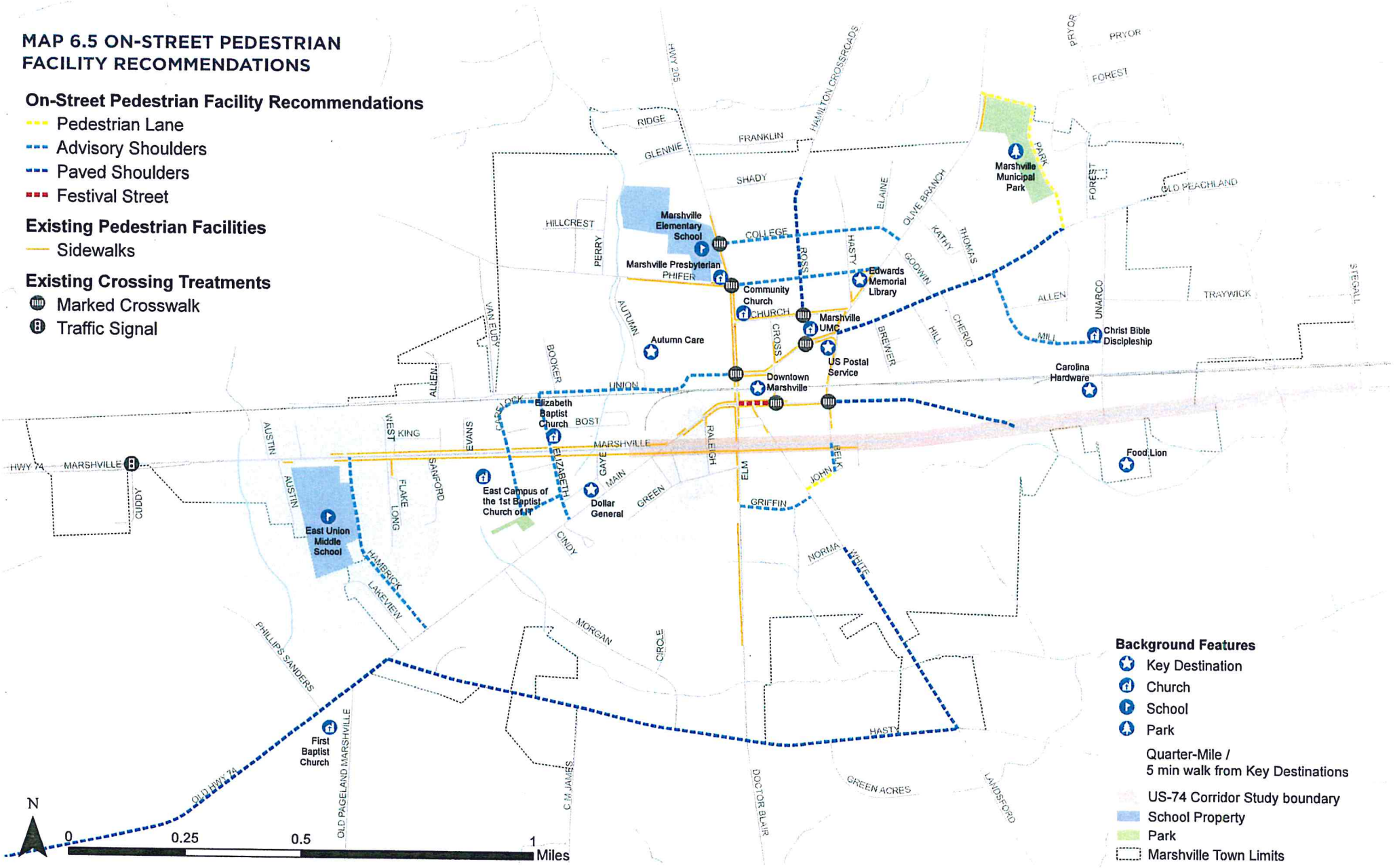
* "Y' indicates projects that are along a priority corridor, as indicated in Map 6.1.

** TBD- To Be Determined: Further analysis is required to determine which side of the roadway the facility would be most appropriate for the sidewalk facility to be constructed.

†Indicates that these are considered part of a top five priority and are detailed further in Ch 7.

††Cost includes widening pavement to accommodate facility width, otherwise within existing pavement cross-section.

MAP 6.5 ON-STREET PEDESTRIAN FACILITY RECOMMENDATIONS



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PEDESTRIAN LANE DESIGN GUIDELINES

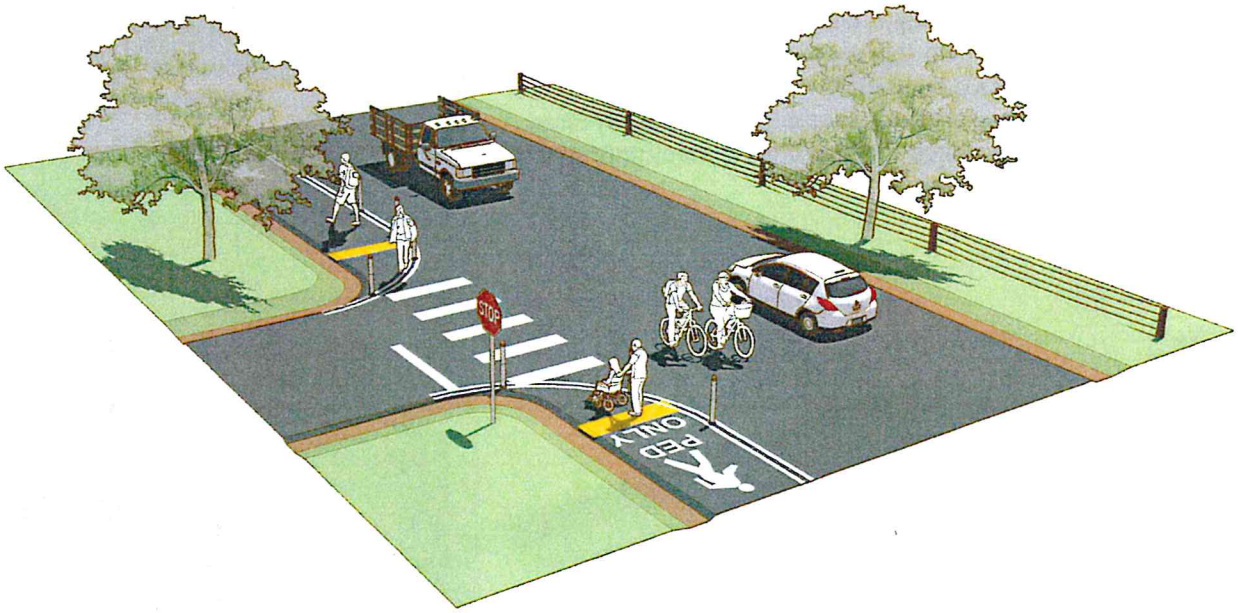
A pedestrian lane is an interim or temporary pedestrian facility that may be appropriate on roads with low to moderate speeds and volumes. A pedestrian lane is a designated space on the roadway for exclusive use of pedestrians. The lane may be on one or both sides of the roadway and can fill gaps between important destinations in a community.

A pedestrian lane may be considered to operate similarly to a sidewalk. Consult State and local vehicle code for implications in a situation where pedestrians are walking along a roadway with no sidewalk or shoulder available.

Pedestrian lanes should be designed to support and promote side-by-side walking within the lane. Because of the lack of physical separation, additional width beyond this should be included for added comfort.

The preferred width of a pedestrian lane is 8 feet (2.4 m). Five feet (1.5 m) width is the minimum to allow for side-by-side walking and maneuverability by users of mobility devices.

For further design guidance on advisory shoulders, refer to the Small Town and Rural Multimodal Networks guide, available at https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf. This report is a design resource and idea book to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities.

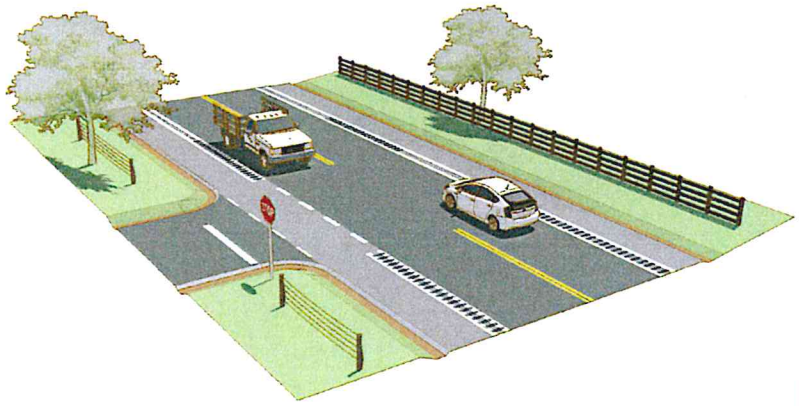


PAVED SHOULDER DESIGN GUIDELINES

Paved shoulders on the edge of roadways can be enhanced to serve as a functional space for bicyclists and pedestrians to travel in the absence of other facilities with more separation. While these are not specifically pedestrian or bicycle facilities, they can and most likely will function as such, and they are part of the Union County Multimodal Transportation Plan's on-road pedestrian and bicycle recommendations. Long term construction of sidewalks along arterial and collector roads, especially in the town limits, is desirable and should be required with future roadway improvements and new development.

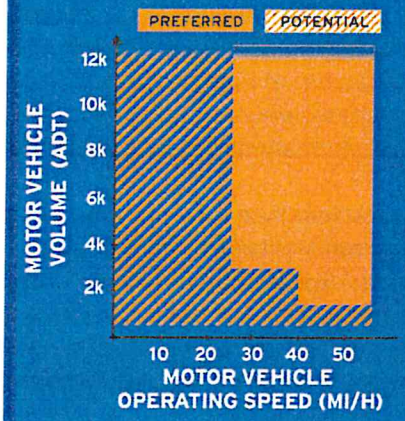
Benefits of paved shoulders include:

- Improves bicyclist experiences on roadways with higher speeds or traffic volumes.
- Provides a stable surface off the roadway for pedestrians and bicyclists to use when sidewalks are not provided.
- Reduces pedestrian "walking along roadway" crashes.
- Can reduce "bicyclist struck from behind" crashes, which represent a significant portion of rural road crashes.
- Provides advantages for all roadway users, by providing space for bicyclists, pedestrians, and motor vehicles.



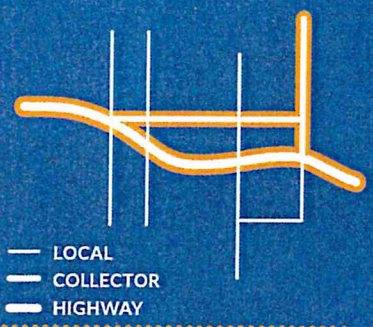
APPLICATION

SPEED AND VOLUME



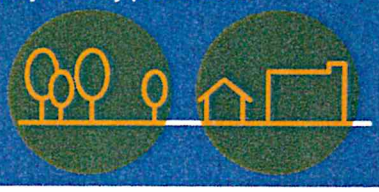
NETWORK

Serves long-distance and regional travel.



LAND USE

Appropriate outside and within built-up areas, near school zones and transit locations, and where there is expected pedestrian and bicycle activity. Walkable shoulders should be provided along both sides of county roads and highways routinely used by pedestrians.



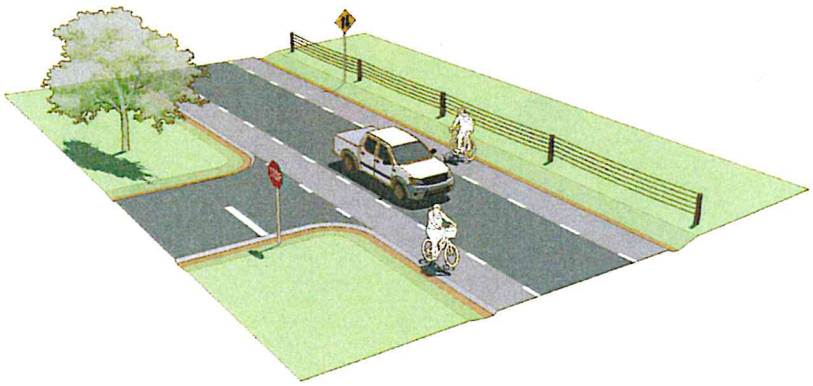
ADVISORY SHOULDER DESIGN GUIDELINES

Advisory shoulders create dedicated, usable space for pedestrians and bicyclists on a street whose right-of-way may be otherwise too narrow for sidewalks or other separated facility. The center lane functions as a two-way travel lane; vehicles may enter the advisory shoulders when no pedestrians or bicyclists are present and when passing oncoming traffic. The shoulders can be paved in contrasting materials and have dashed white lines along the edge.

This treatment is cost-efficient and can be applied without needing to widen the road. Advisory shoulders can fill gaps between important destinations in a community and may be a good interim treatment for neighborhood streets where sidewalk installation is not likely in the near term, for example: College Street, Phifer Street, W. Union Street, Elizabeth Street, among others.

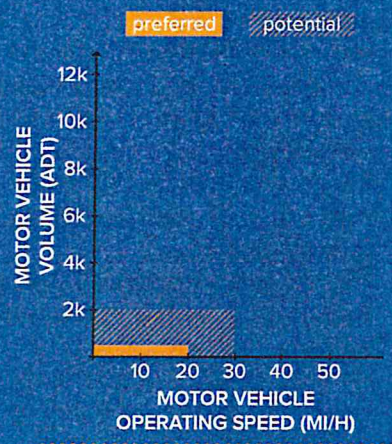
The preferred width of the advisory shoulder space is 6 ft (2.0 m). Absolute minimum width is 4 ft (1.2 m) when no curb and gutter is present.

For further design guidance on advisory shoulders, refer to the Small Town and Rural Multimodal Networks guide, available at https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf.



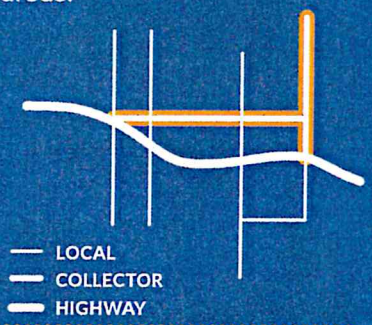
APPLICATION

SPEED AND VOLUME



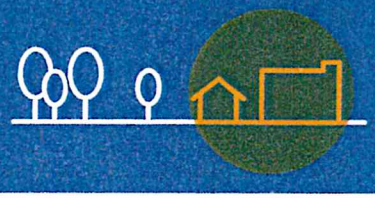
NETWORK

For use on constrained connections between built-up areas.



LAND USE

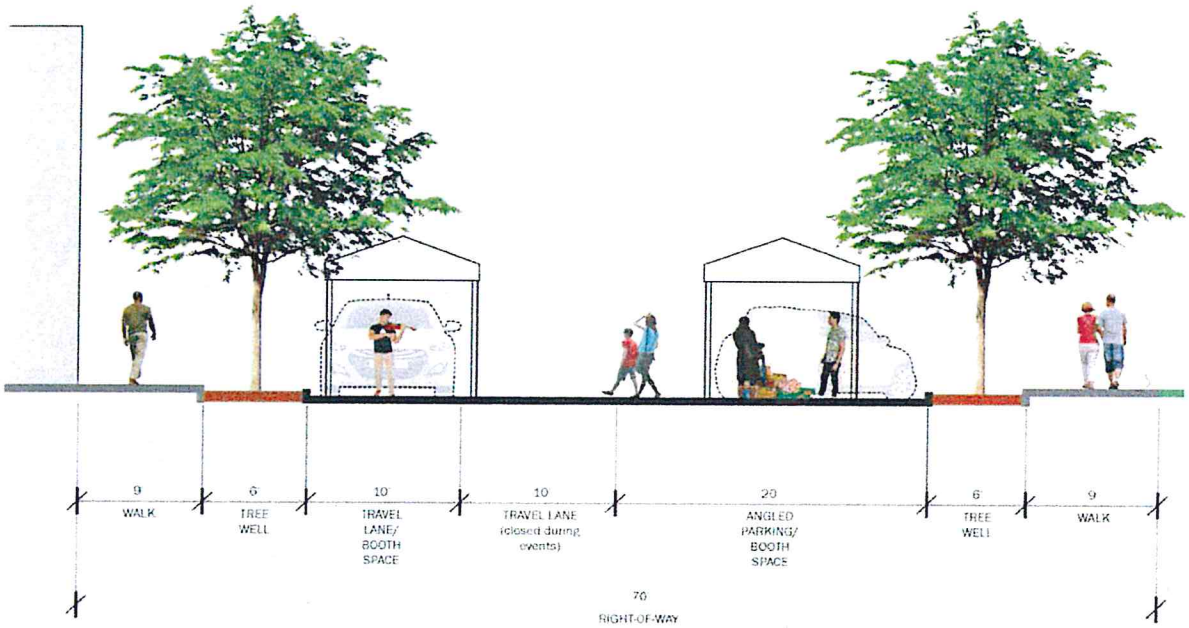
Within built up areas, with bicycle and pedestrian demand and limited available paved roadway surface.



FESTIVAL STREET DESIGN GUIDELINES

A festival street, also known as an open street or shared space, transforms a roadway from vehicular space to one that blurs and blends the hierarchy between users of the space, specifically making pedestrians and bicyclists more comfortable and welcome in the space. A festival street has the following characteristics:

- Encourages slow traffic speeds,
- Provides for flexible use within a street right-of-way, and
- Creates a "special place" that can be closed for temporary events and festivals.



BICYCLE FACILITY RECOMMENDATIONS

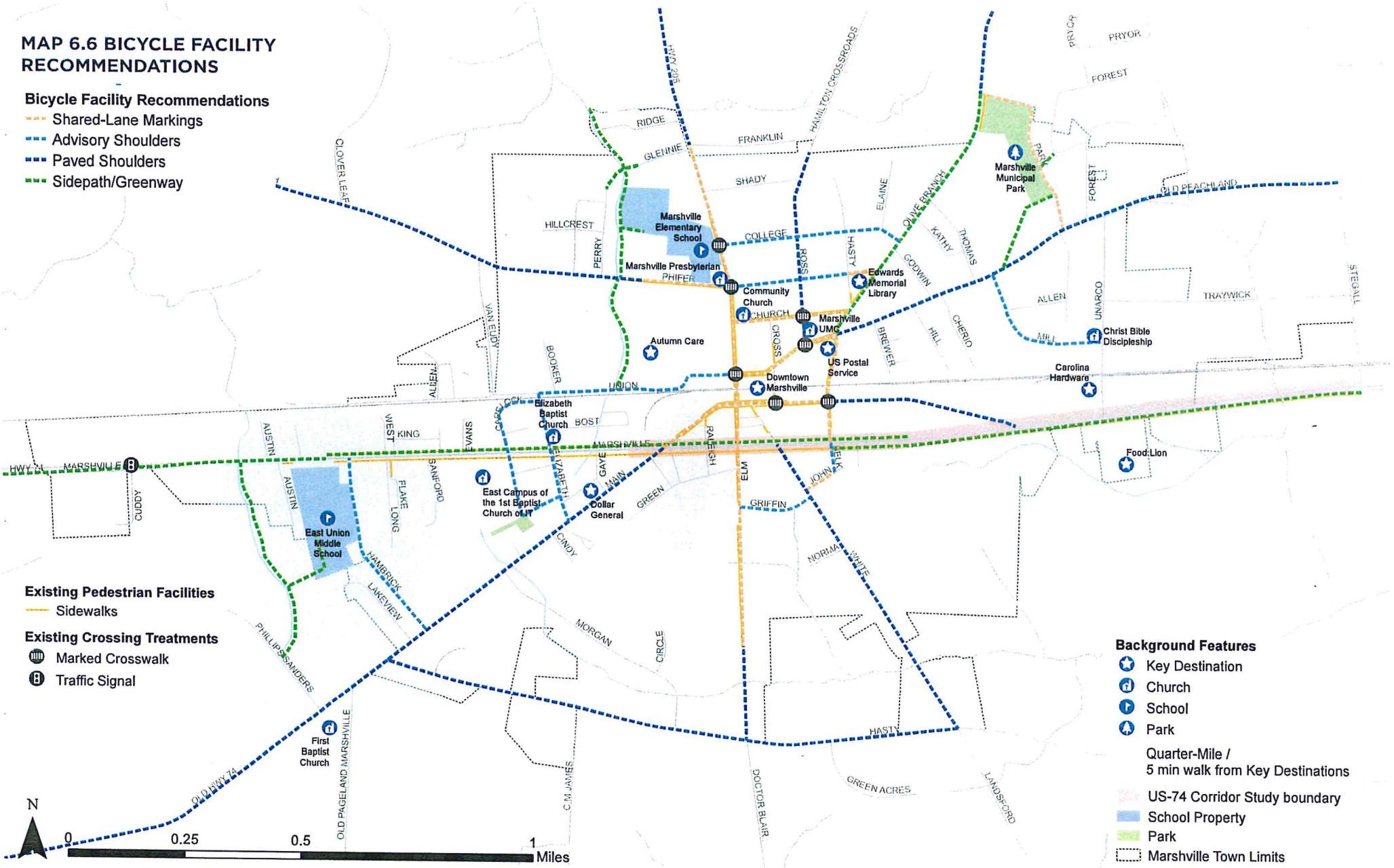
Table 6.5 Bicycle Facility Recommendations						
Corridor	**From**	**To**	**Facility Type**	**Length (mi.)**	**Priority***	**Cost**
Hasty Rd.	Old Highway 74 (Main St.)	White St.	Paved Shoulders	1.25	N	$502,900††
Main St.	Olive Branch Rd.	US 74 (eastern intersection)	Paved Shoulders	0.41	Y	$8,700
N Elm St.	Franklin St.	Marshville town limits	Paved Shoulders	1.05	N	$421,900††
Old Hwy. 74 (Main St.)	US 74	Hasty Rd.	Paved Shoulders	0.75	Y	$301,900††
Old Highway 74 (Main St.)	Hasty Rd.	Forest Hills School Rd.	Paved Shoulders	1.47	N	$591,200††
Phifer St.	Marshville town limits	where yellow centerline stripe ends	Paved Shoulders	0.31	N	$86,100††
Ross St.	Union St	Marshville town limits	Paved Shoulders	0.42	N	$8,800
S Elm St.	where the yellow centerline begins	Hasty Rd.	Paved Shoulders	0.20	N	$81,000††
Union St.	Olive Branch Rd.	where road narrows	Paved Shoulders	0.44	Y†	$9,400
Union St.	where road narrows	Stegall St.	Paved Shoulders	0.70	N	$282,400††
White St.	US 74	Hasty Rd.	Paved Shoulders	0.72	Y	$222,600††
Total			**Paved Shoulders 7.72mi**			**$2,516,900**
Church St.	Elm St.	Olive Branch Rd.	Shared Lane Markings	0.25	N	$1,200
John St.	White St.	Belk St.	Shared Lane Markings	0.07	N	$400
Main St.	US 74 (western intersection)	Olive Branch Rd.	Shared Lane Markings	0.39	Y	$1,800
N Elm St.	Franklin St.	US 74	Shared Lane Markings	0.66	N	$2,800
Olive Branch Rd.	Union St.	US 74	Shared Lane Markings	0.23	N	$1,000
Park Dr.	Olive Branch Rd.	Union St.	Shared Lane Markings	0.39	Y†	$1,800
Phifer St.	where yellow centerline ends	Elm St.	Shared Lane Markings	0.19	N	$1,000
Phifer St.	Hasty St.	Olive Branch Rd.	Shared Lane Markings	0.07	Y	$400
S Elm St.	US 74	where yellow centerline begins	Shared Lane Markings	0.43	N	$2,000
Union St.	Elm St.	Olive Branch Rd.	Shared lane markings	0.24	N	$1,200
Total			**Shared Lane Markings 2.68mi**			**$13,600**

* "Y' indicates projects that are along a priority corridor, as indicated in Map 6.1.

†Indicates that these are considered part of a top five priority and are detailed further in Ch 7.

††Cost includes widening pavement to accommodate facility width, otherwise within existing pavement cross-section.*Cost includes widening pavement to accommodate facility width, otherwise within existing pavement cross-section.

MAP 6.6 BICYCLE FACILITY RECOMMENDATIONS



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SHARED LANE MARKING DESIGN GUIDELINES

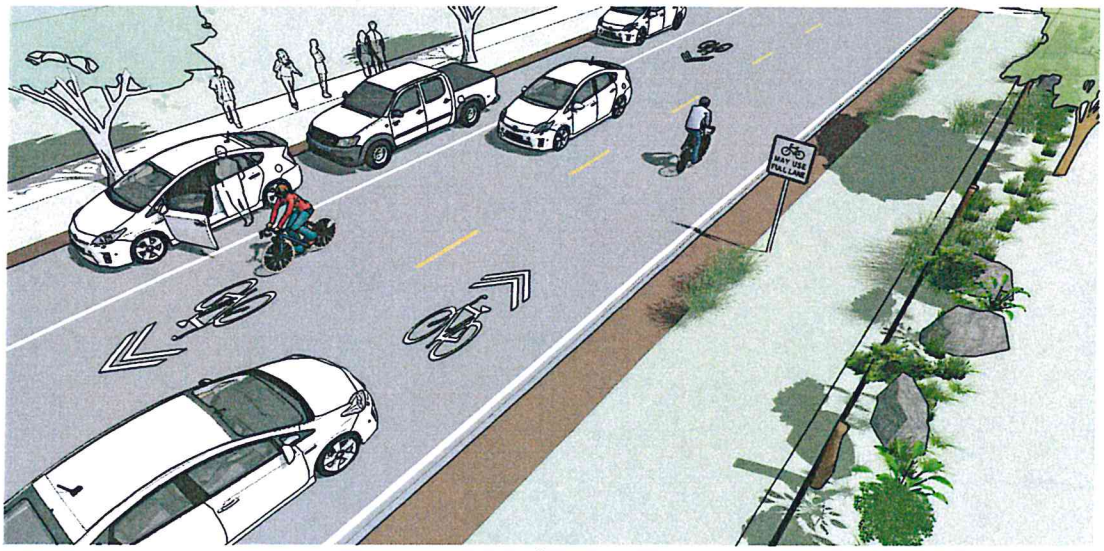
Shared Lane Markings (SLMs) are the standard marking for indicating shared roadway bicycle operations. SLMs are placed in the travel lane to encourage bicycle travel and proper positioning within the lane.

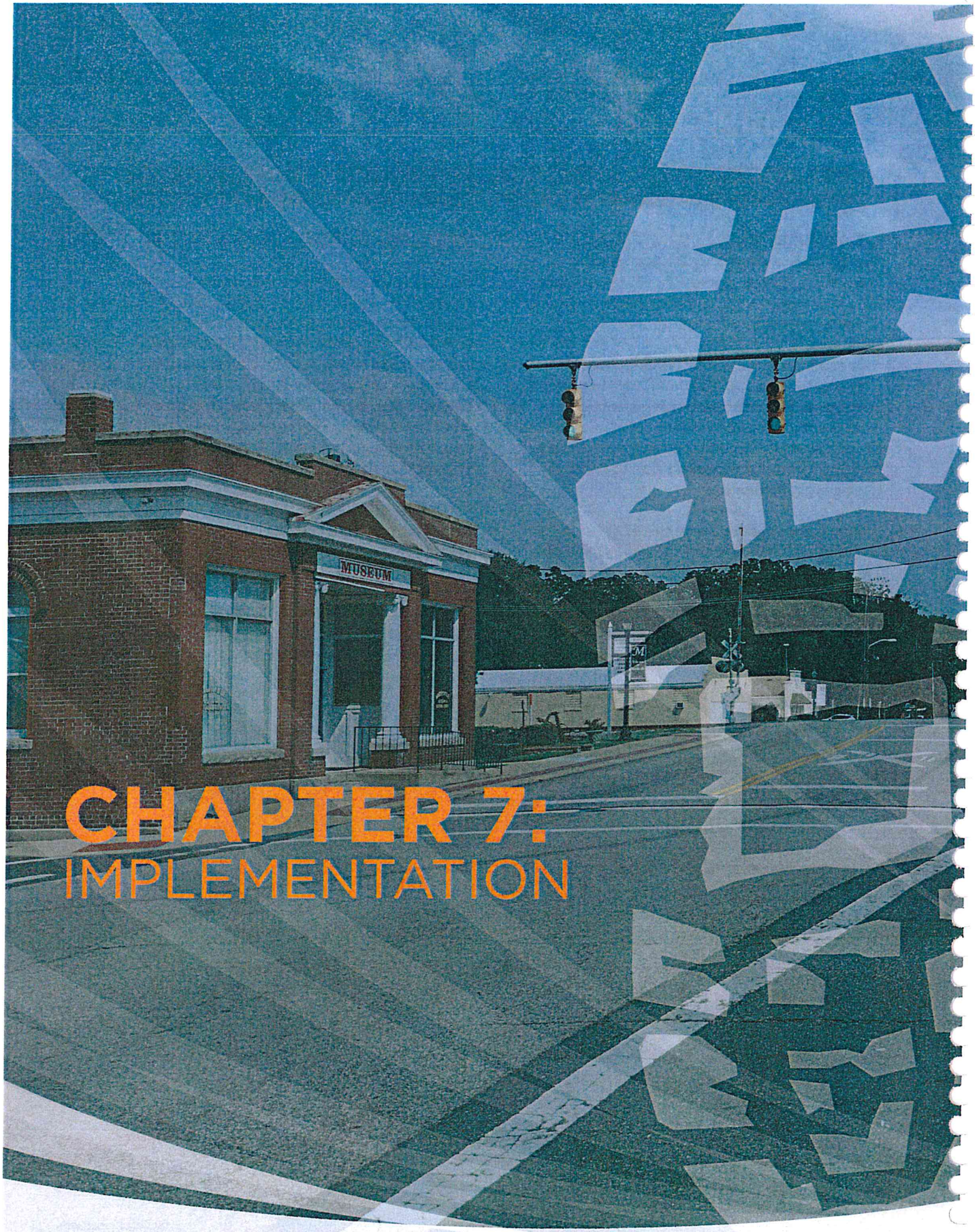
Placed in a linear pattern along a corridor (typically every 100-250 feet), SLMs make motorists more aware of the potential presence of cyclists, direct cyclists to ride in the proper direction, and remind cyclists to ride further from parked cars to avoid "dooring" collisions.

In constrained conditions, the SLMs are placed in the middle of the lane. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles. In all conditions, SLMs should be placed outside of the door zone of parked cars and used on roadways with speed limits of 35 mph or less (below 30 mph preferred).

Used to provide continuity with other bicycle facilities (usually bike lanes), SLMs may be used on higher volume roads with wide outside lanes or shoulders. On these streets, signed shared roadways are not suitable for children or casual, less experienced bicyclists. On wide outside lanes with no parking (≥14 ft), place the marking 4 feet from edge of curb to promote bicycle travel to the right of motor vehicles.

In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single-file travel. Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present. If the parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly





CHAPTER 7:
IMPLEMENTATION

OVERVIEW

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

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

CHAPTER OVERVIEW

This chapter provides the necessary steps and guidance for delivering the recommendations of this Plan and is organized into the following sections:

How to Use this Plan ..... Page 100

Funding Sources ..... Page 101

Funding Sources by Budget Size and Project Timeline ..... Page 102

Priority Project Cutsheets ..... Page 103

HOW TO USE THIS PLAN

At the heart of every successful pedestrian and bicycle plan is a coordinated effort by town staff, law enforcement, and other partners to support safe travel on foot. Everyone has a key role to play in implementing this plan.

Town of Marshville staff and elected/ appointed officials should use this report to establish programs and policies that educate, encourage, and prioritize infrastructure investments proposed throughout the town.

TOWN OF MARSHVILLE →

Town staff can use this report to document travel behaviors, existing roadway design deficiencies, and specific improvement opportunities. Coordination with the North Carolina Department of Transportation (NCDOT) will be key to implementing several recommendations. This plan provides documentation and recommendations to refer to in shaping NCDOT projects and activities.

NCDOT →

NCDOT staff, specifically within Division 10, can use this plan to get familiar with proposed priority projects that have been generated through an involved public input planning process and locally vetted. NCDOT will play an integral role in the design, construction, and maintenance of pedestrian and bicycle facilities throughout the town. During the project scoping process, the town and MPO can communicate with NCDOT personnel to affect how STIP projects are formulated and designed.

MARSHVILLE POLICE DEPARTMENT →

Marshville Police can use this plan to target enforcement efforts on identified areas with high crashes, and to complement potential education and encouragement campaigns. Police department input can also help improve the recommended programs aimed at addressing safety issues and promoting active travel. Education of Marshville Police Department about bicycling and pedestrian laws is also needed.

PEDESTRIAN + BICYCLE ADVISORY COMMITTEE →

A Pedestrian + Bicycle Advisory Committee can use this plan as a framework for coordinating the development of the policies and programs recommended for the town. They can also use the programs chapter to advocate for improvements in Marshville. An active Pedestrian + Bicycle Advisory Committee will be instrumental in implementing the plan.

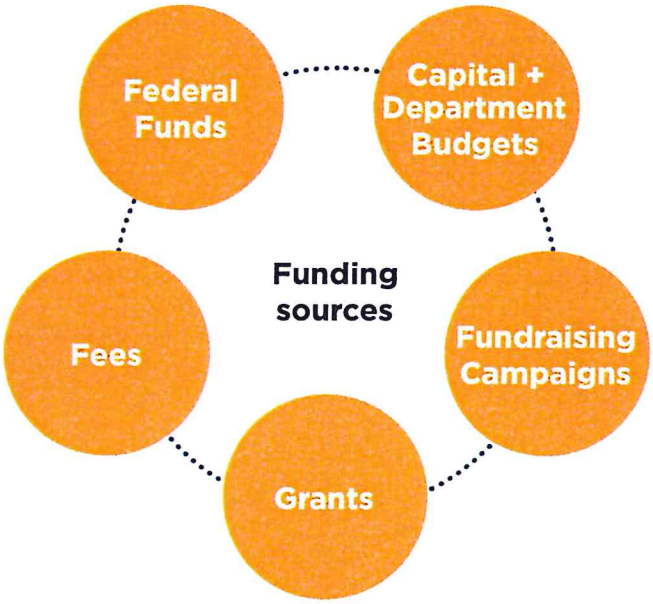
LOCAL STAKEHOLDERS →

Local stakeholders can use this plan to understand and confirm the conditions in their neighborhoods and near their organizations (if applicable) as well as become familiar with the ways in which they can support program goals. In many cases, education and encouragement programs require these dedicated volunteers. Local stakeholders can also provide input on NCDOT processes and projects.

FUNDING SOURCES

In order to achieve the goals of this plan, the Town of Marshville and the Charlotte Regional Transportation Planning Organization (CRTPO) will need to fund improvements from a variety of funding sources and partners. Funding sources will need to be opportunistic and consistent in order to implement this plan. Five primary funding sources make up the core funding strategy for this plan:

- **Federal/State Funds.** There are several federal/state funding programs that can be used for walking and bicycling projects that are administered by the NCDOT to CRTPO or local jurisdictions. Safety funds, transportation alternatives (TA), Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds, Powell Bill, and Federal Surface Transportation Program (SLX) funds are possible federal funding opportunities.
- **Capital & Department Budgets.** The Town of Marshville can use the concepts and policies presented in this Plan to implement it through regularly scheduled capital projects, such as streetscape projects, street resurfacing, or new public or private property construction.
- **Fees.** In-lieu fees or development requirements provide an opportunity to generate revenue to fund infrastructure projects, such as sidewalk, bikeway, and greenway.
- **Grants.** Competitive grants through public agencies or through private or non-profit foundations (e.g., the Carolina Thread Trail and others) can generate additional resources for projects and programs.
- **Fundraising Campaigns.** Fundraising through neighborhood groups, advocacy groups, or even crowd-funding can help generate additional resources for projects and programs.



FUNDING SOURCES BY BUDGET SIZE AND PROJECT TIMELINE

Given the constant change in funding availability at local, state, and federal levels, it is difficult to know what financial resources will be available at different time frames during the implementation of this plan. The following table highlights funding options to consider for projects of various sizes.

Small Budget - Short Term	Small Budget - Long Term	Large Budget - Short Term	Large Budget - Long Term
• Neighborhood Associations • Crowd-sourcing • Non-Profit Grants • In-lieu Fees • Infrastructure • NCDOT Division Safety Funds • Dedicated local tax sources • Local health departments • Individual donors	• Federal Transportation Funds (FAST Act programs) • HUD and EPA funds • Capital Improvement budget funds • NCDOT	• Foundation grants • Individual donors • Public-Private Partnerships (including developer requirements) • Infrastructure bonds • Dedicated local tax sources	• Federal Transportation Funds

PRIORITY PROJECT CUTSHEETS

Five top priority projects were identified from the priority corridors based on the existing conditions evaluations and feedback from the project team and the public. While these projects are prioritized, the Town still has the flexibility to implement other projects as funding and project opportunities arise.

The following pages offer detailed information on each of the selected priority projects, including individual project maps. These sheets were designed based on the types of information required by potential funding partners, and feature the following information:

- Project length
- Facility Types
- Trip Generators
- ROW needs
- Estimated Construction Costs
- Annotated Map of Project Corridor

PRIORITY PROJECT CUTSHEETS

1. US 74 Crossing Improvements ..... page 107-109
2. Striped Shoulders on E. Union Street ..... page 110-111
3. Advisory Shoulders on W. Union Street ..... page 112-113
4. Pedestrian Lane on Park Drive ..... page 114-115
5. Festival Street along Main Street ..... page 116-117

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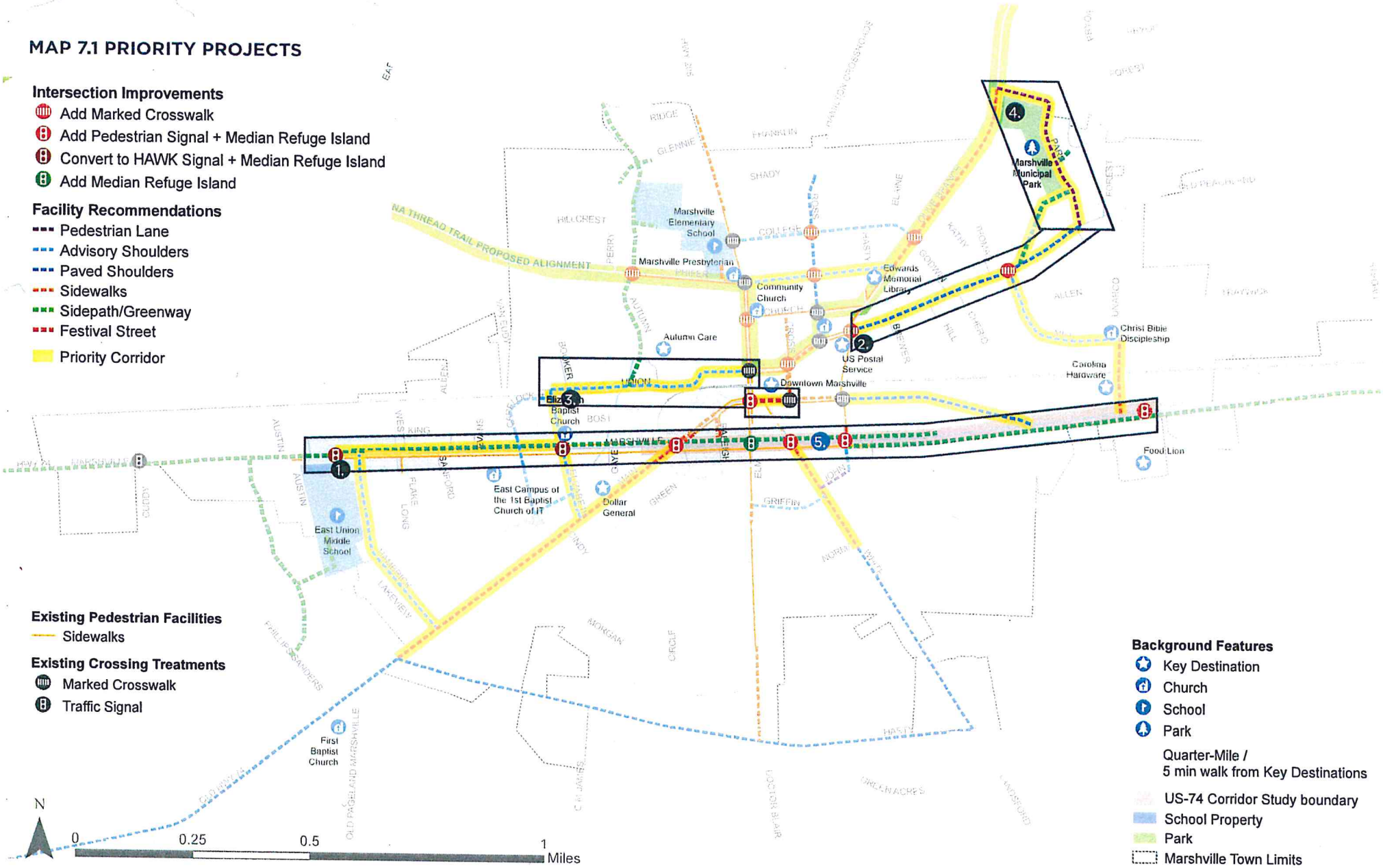
MAP 7.1 PRIORITY PROJECTS



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US 74 Crossing Improvements

This US 74 crossing improvement project will improve the safety and ease of pedestrians crossing this highway in Marshville, from the crossing at East Union Middle School to the signal at the Food Lion shopping center. These recommendations build off of recommendations of the recently completed study of the US 74 Highway in Marshville, which calls for sidewalks along the corridor, and **pedestrian signals** and **painted crosswalks** at intersections. This plan recommends that, in addition to those treatments, **median refuge islands be provided at each traffic signal and that the marked crosswalks be high-visibility markings** in order to provide the utmost visibility and comfort for pedestrians crossing this five-lane road. US 74 is maintained by NCDOT, so the recommendations for the crossing treatments will require coordination with NCDOT for approval.

PROJECT AT A GLANCE

- Project type: pedestrian signalization (4), HAWK signals (2), marked crosswalks, median refuge islands.
- 7 Locations, listed in table at right, and mapped below:

ESTIMATED CONSTRUCTION COSTS

Cross Street	Existing Conditions	Recommended Treatment	Total Cost
East Union Middle School	Marked crosswalk, flashing yellow signal	HAWK signal; median refuge; high-visibility marked crosswalk	$83,400
Elizabeth Avenue	Marked crosswalk, flashing yellow signal	HAWK signal; median refuge; high-visibility marked crosswalk	$83,400
Main Street	Traffic signal	High-visibility marked crosswalks; pedestrian signal; median refuge	$59,800
Elm Street	Traffic + Pedestrian signal	High-visibility marked crosswalks; median refuge	$11,400
White Street	Traffic signal	High-visibility marked crosswalks; pedestrian signal; median refuge	$41,400
Belk Street	Traffic signal	High-visibility marked crosswalks; pedestrian signal; median refuge	$44,400
Food Lion entrance	Traffic signal	Marked crosswalk; pedestrian signal; median refuge	$28,400
Totals	--	**2 HAWK signals; 7 median refuge islands; High-visibility crosswalks at 7 intersections; Pedestrian signals at 6 intersections**	**$352,200**

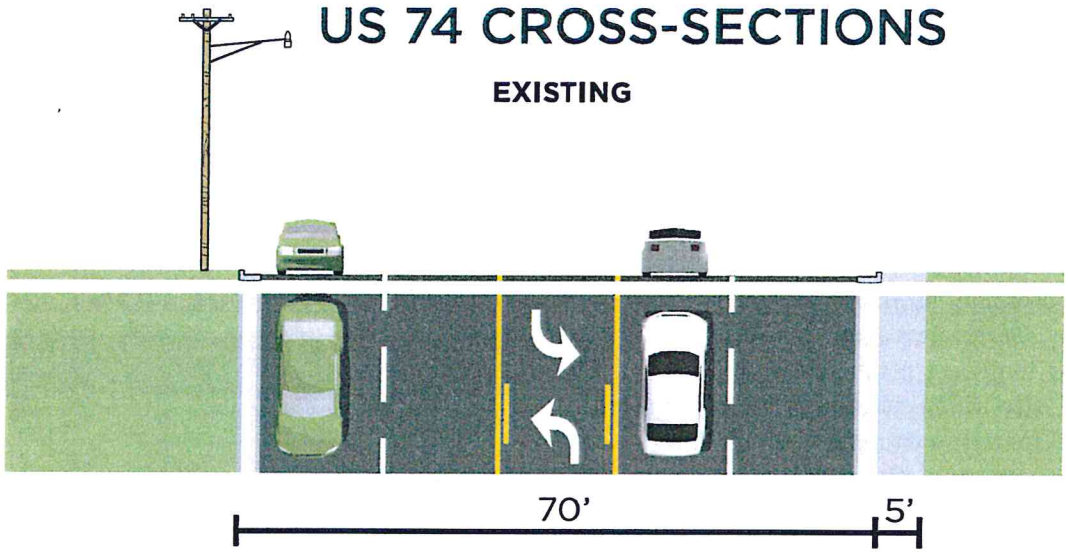
0 0.25 0.5 1 Miles

Intersection Improvements
- Add Marked Crosswalk
- Add Pedestrian Signal + Median Refuge Island
- Convert to HAWK Signal + Median Refuge Island
- Add Median Refuge Island

Priority Projects

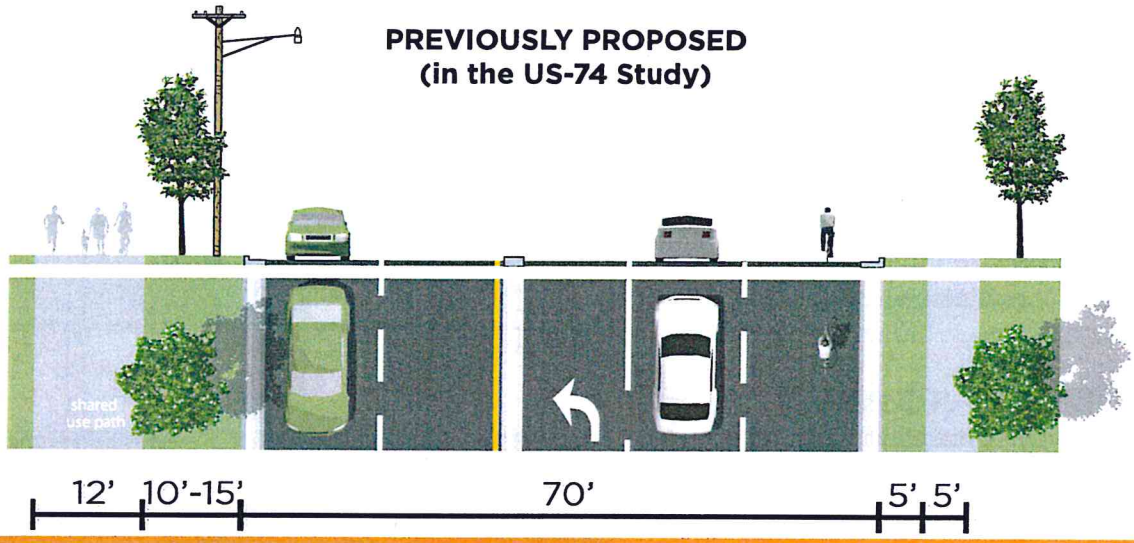
US 74 CROSS-SECTIONS

EXISTING



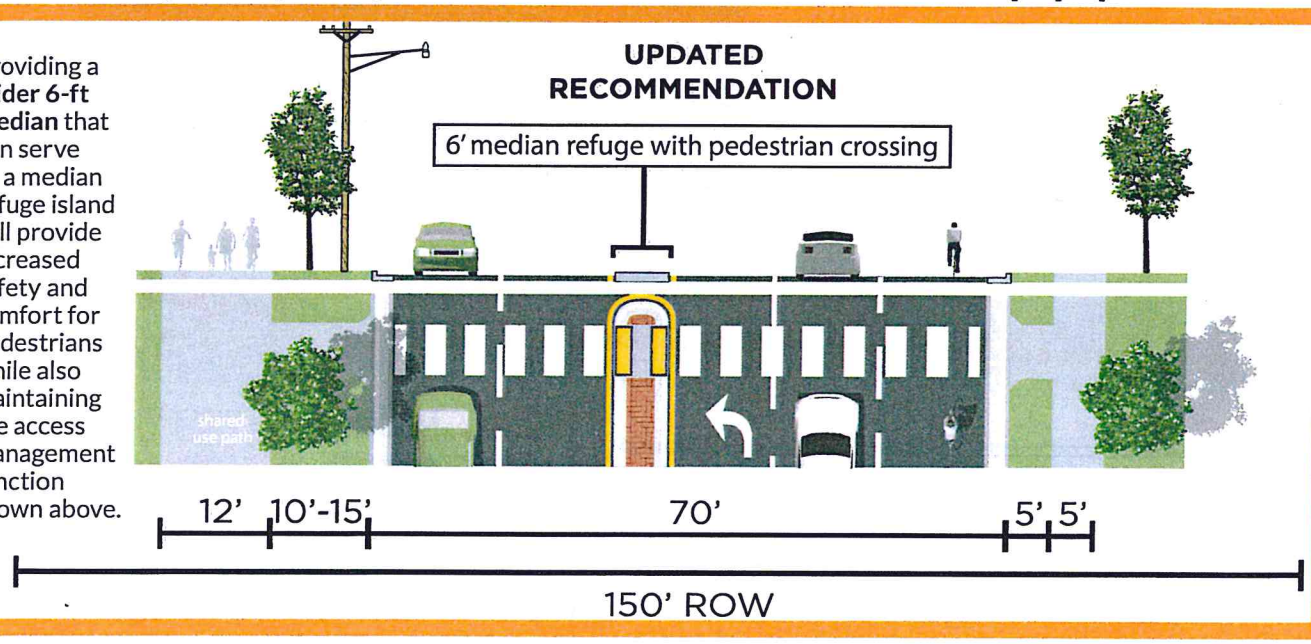
The proposed cross-section in the US 74 Corridor Study adds a **shared-use path** and **sidewalk**, and **2-ft median** to provide access management.

PREVIOUSLY PROPOSED (in the US-74 Study)



Providing a **wider 6-ft median** that can serve as a median refuge island will provide increased safety and comfort for pedestrians while also maintaining the access management function shown above.

UPDATED RECOMMENDATION



MEDIAN REFUGE ISLAND WITH HAWK SIGNALIZATION AT ELIZABETH AVENUE

Design Details

1. A **median refuge island** provides more safety and comfort while crossing this 5-lane road.
2. Wide crosswalks and curb ramps.
3. A High intensity Activated crossWalK (HAWK) signal provides pedestrian crossings at minor street intersections where a full traffic signal is not present.
4. Long term, sidewalks will be moved back and a landscaped buffer will be added to provide separation between walkers and vehicles.

This is not a design plan; precise locations and elements should be designed in accordance with engineering standards and NCDOT review.

Striped Shoulders on E. Union Street

About this Project

This project creates pedestrian and bicyclist space along E. Union Street by striping shoulders within the existing wide paved roadway. The paved surface is currently 36 feet wide, allowing for two 18-foot travel lanes. This width can be reapportioned to provide two 12-foot travel lanes and 6-foot shoulders. This allows for dedicated space for walkers and bikers and the narrowed travel lanes will have a traffic calming effect, making walking and biking a safer and more comfortable travel choice.

Just east of Allen Drive, the roadway narrows to just 20 feet. In order to provide a pedestrian and bicycle connection that reaches Park Road (and ultimately Marshville Park), Union Street would have to be widened to provide a paved shoulder facility. Alternatively, a greenway trail can be constructed within the town-owned parcel north of Union Street in order to connect to Marshville Park.

PROJECT AT A GLANCE

- Project type: roadway striping
- Length: 2,865 ft (0.54 miles)
- Trip Generators:
  - » Downtown Marshville
  - » Marshville Municipal Park
  - » Residential family houses in eastern Marshville

OPPORTUNITIES AND CONSTRAINTS

1. E. Union Street, from Olive Branch Road 36-feet wide. Currently the road is striped with two 18-foot travel lanes.
2. East of Allen Drive, the paved surface narrows to 20 feet, with two 10-foot travel lanes.
3. The town-owned parcel to the north of Union Street provides an opportunity for a greenway that could provide an off-road pedestrian and bicycle facility to Marshville Park.

ESTIMATED CONSTRUCTION COST

From Olive Branch Road to where roadway narrows:

Quantity	Item	Cost
2,344 LF	Striping	$9,400

From where roadway narrows to Park Drive:

Quantity	Item	Cost
521 LF	Striping	$2,100
521 LF	Pave 3' Shoulders	$37,600
	Subtotal	$39,700

Design Details

1. A striped 6-foot shoulder will provide shared space for pedestrians and bicyclists within the existing paved surface.
2. Narrowing the travel lane from 18 feet to 12 feet will encourage safer vehicular speeds, while still providing ample vehicular space.

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Advisory Shoulders on W. Union Street

About this Project

Similar to E. Union Street, this project uses striping to create pedestrian and bicyclist space **within the existing paved surface.** However, given that W. Union Street is only 20 feet wide, there is only room for *advisory* shoulders, which designate pedestrian and bicyclist space along the periphery, and the center lane functions as a two-way travel lane. Vehicles may enter the advisory shoulders when there are no pedestrians or bicyclists present, and while passing oncoming traffic.

This is a cost-effective application to create pedestrian and bicycle facilities without widening the road or paving separate facilities.

PROJECT AT A GLANCE

- Project type: roadway striping
- Length: 2,322 ft (0.44 miles)
- Trip Generators:
  - » Downtown Marshville
  - » Autumn Care
  - » Dollar General

ESTIMATED CONSTRUCTION COST

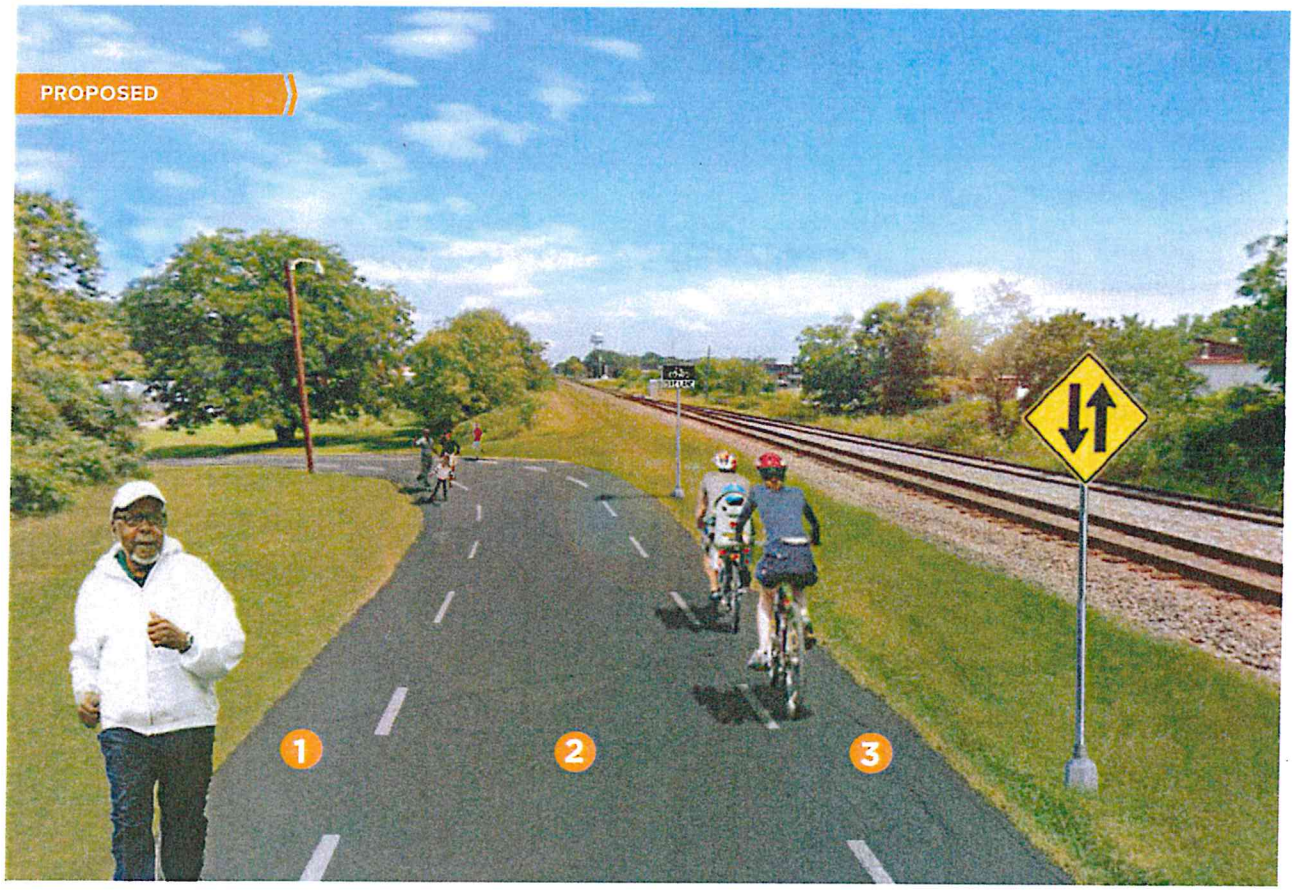
From Elm Street to Elizabeth Street:

Quantity	Item	Cost
2,322 LF	Striping	$9,300

Priority Projects

Design Details

1. The 6-foot shoulder prioritizes shared space for pedestrians and bicyclist travel within the existing paved surface of the road.
2. Motor vehicles can travel in both directions in the center lane, only encroaching into the advisory shoulders as needed to facilitate passing movements.
3. A contrasting pavement material or color can be used as an option to visually differentiate the shoulder from the roadway and discourage unnecessary encroachment.



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Pedestrian Lane on Park Drive

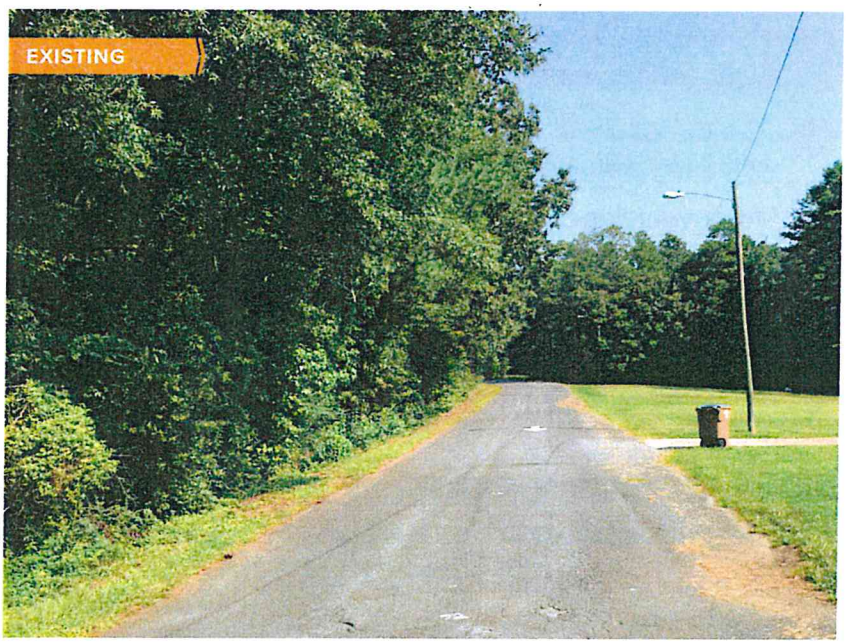
About this Project

This project converts the on-street parallel parking along Park Drive into a pedestrian lane using striping and flexible bollards.

This is another cost-effective application to create pedestrian facilities without widening the road or paving separate facilities.

PROJECT AT A GLANCE

- Project type: roadway striping
- Length: 2,056 ft (0.39 miles)
- Trip Generators:
  - » Marshville Municipal Park



ESTIMATED CONSTRUCTION COST

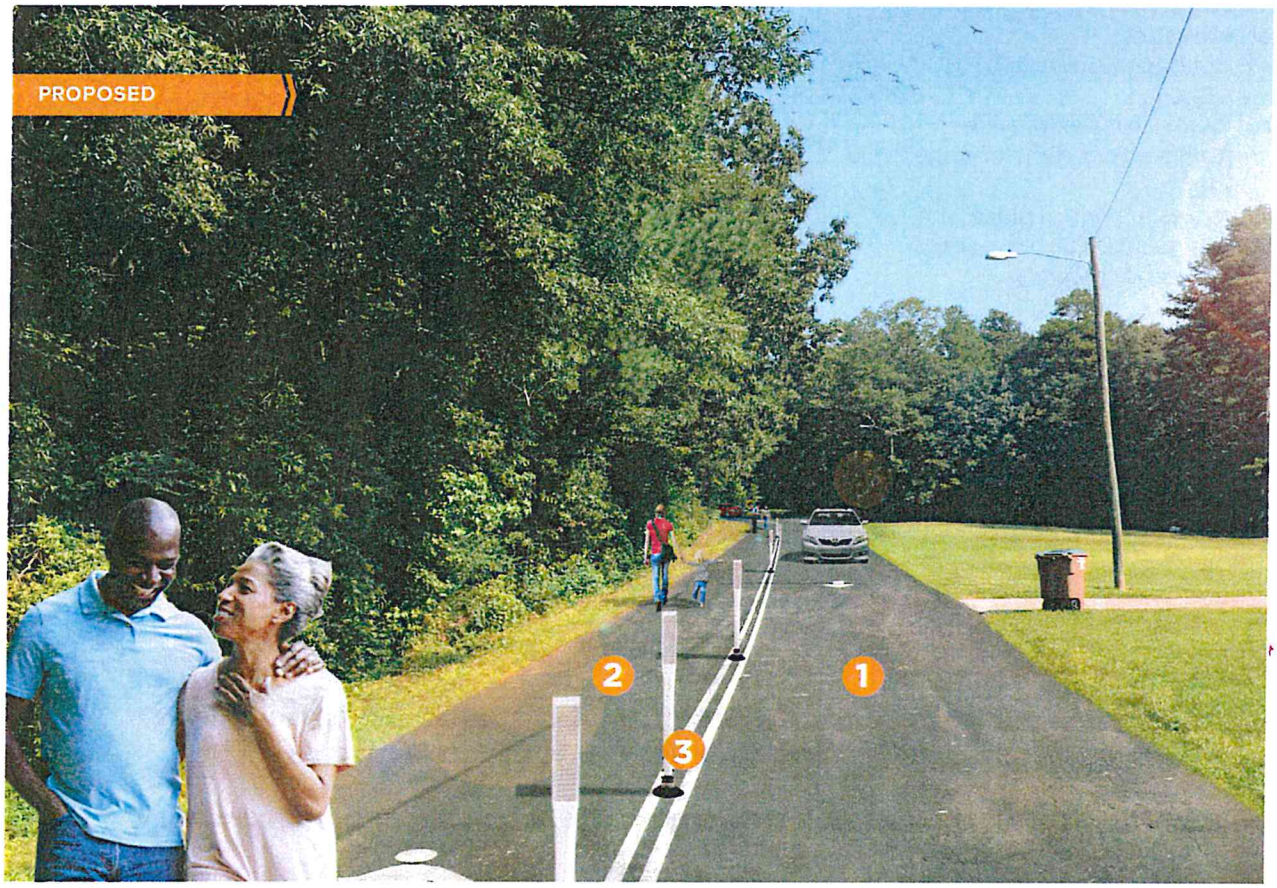
From Olive Branch Road to E. Union Street:

Quantity	Item	Cost
2,056 LF	Striping	$4,200
	Shared Lane Markings	$1,800
	Total	**$6,000**

Priority Projects

Design Details

1. The 12-foot travel lane will be shifted to the east side of the street.
2. The 8-foot pedestrian lane will be created out of the former parallel parking spaces, and shifted to the west side of the street to improve pedestrian access to the park without requiring walkers to cross the vehicular lane..
3. Vertical flexible delineator are an optional feature that can help provide visual separation between the vehicular and pedestrian lane.



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Festival Street along Main Street

About this Project

This project will transform the Main Street into a more pedestrian and bicycle friendly environment, from Elm Street to Cross Street, by blurring the hierarchy between vehicles and pedestrians and bicyclists, specifically making pedestrians and bicyclists more comfortable and welcome in the space.

A festival street has the following characteristics:

- Encourages slow traffic speeds,
- Provides for flexible use within a street right-of-way, and
- Creates a "special place" that can be closed for temporary events and festivals.

PROJECT AT A GLANCE

- Project type: festival street
- Length: 443 ft (0.08 miles)

ESTIMATED CONSTRUCTION COST

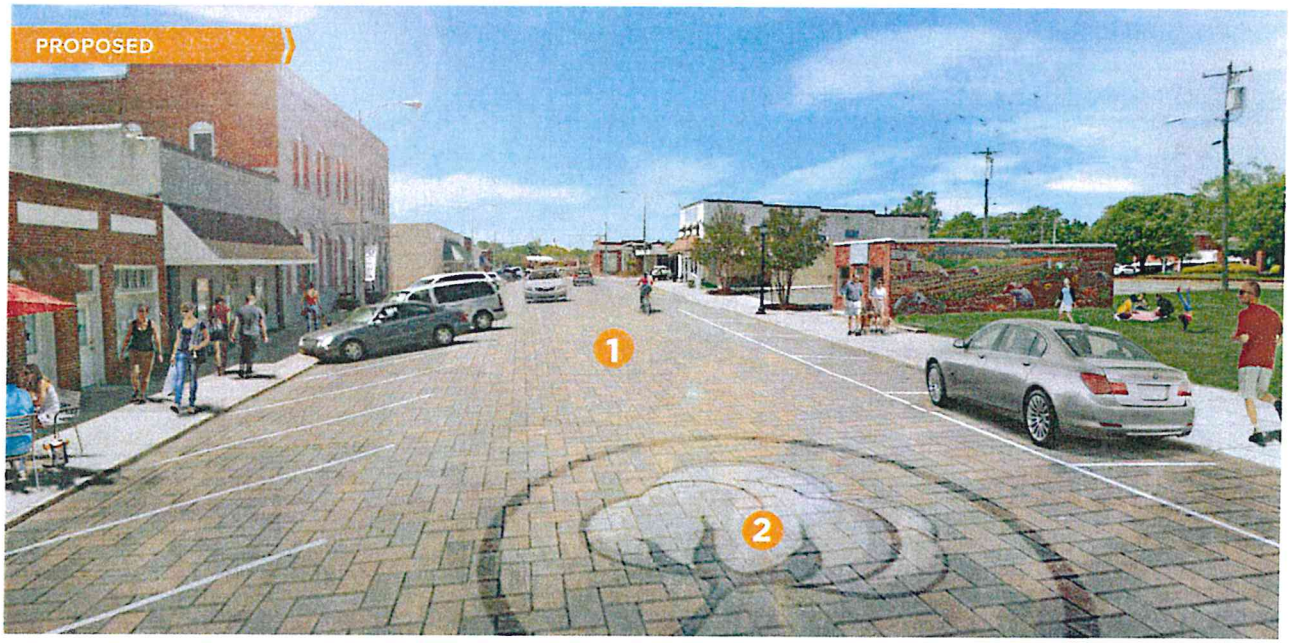
From Elm Street to Cross Street:

Quantity	Item	Cost
443 LF	Brick pavers	$720,000*

*To reduce cost, this project can be implemented in phases using lower cost elements first (e.g., painted icons, murals, etc.). In the meantime, the street can still be used as a festival street as it is already is for certain events.

Design Details

1. Brick pavers create a visual cue for the pedestrian zone that alerts drivers to their presence. The brick surface also helps serve as a traffic calming element.
2. A unique logo can be developed to help brand the space as a place for town events.
3. The street can be closed down to traffic, and the space becomes a pedestrian plaza for community activities and events.



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MARSHVILLE PEDESTRIAN & BICYCLE MASTER PLAN

Prepared for the Town of Marshville, North Carolina
Prepared by WSP and Alta Planning + Design

June 2019