NASHVILLE, TENNESSEE

# DRAFT PLAN

walknbike


PUBLIC
PARKING

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MARATHON
SYLVAN ESSO
THE KILLS
ALL THEM WITCHES
SEPTEMBER 8
SEPTEMBER 14
BQ

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NASHVILLE, TENNESSEE

# EXECUTIVE SUMMARY

walk n bike

# Executive Summary

*"A world-class multi-modal transportation system is essential to a vibrant city and better quality of life." -Mayor Barry*

The WalknBike plan aims to improve walking and biking in Nashville, connecting people to opportunity on a network of high-quality, comfortable, and safe sidewalks and bikeways. Resulting from several months of extensive stakeholder and public involvement, the plan is comprehensive in nature, addressing sidewalk and bikeway infrastructure needs, programs, and policies.

## Why this Plan is Important

WalknBike serves as an update to the 2008 Strategic Plan for Sidewalks and Bikeways. Nashville's residents have expressed a strong desire for a more connected, accessible, and safe network of sidewalks and bikeways. The plan supports the land use and transportation objectives of Nashville Next and nMotion by connecting developing corridors and centers to transportation options.

A more walkable and bikeable Nashville provides benefits that will address access, health, and environmental concerns:

- **7.6%** of the Nashville households do not have access to a vehicle
- Nashville's **aging population** will need alternative transportation options
- **24.7%** of Nashville-Davidson County adults are obese

## Vision Statement:

*The Nashville bicycle and pedestrian system will be a network of high-quality, comfortable, safe sidewalks and bikeways, connecting people to opportunity. The system, inclusive to users of all ages and abilities, will promote and encourage safety, health, education, and active transportation.*

## What We Heard

Feedback for the plan was gathered through multiple avenues and outlets. The WalknBike project team sought to engage as many people as possible throughout the planning process. Types of engagement included:

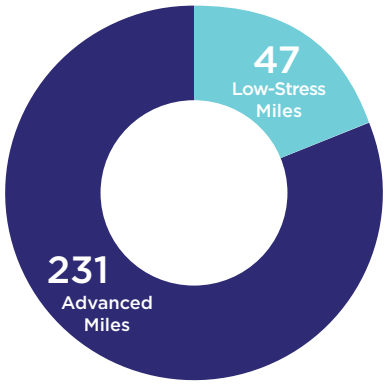
- Project website: *nashvillewalknbike.com*
- Open house in April 2016 and Jan 2017
- Two public surveys launched in spring and summer of 2016
  - The first survey garnered **1,911 responses**.
  - The second survey had **3,222 responses**.
- Online interactive maps
- Mayor's Transit Triathlon
- Pop-up events across Davidson County
- Social media campaign
- Community meetings

## Existing Bikeway Network

Metro has installed 22 miles of buffered bike lanes and 2.5 miles of separated bike lanes since 2013.

Nashville residents reported being most comfortable on separated, low-stress bikeways, such as 11th Avenue separated bike lanes. Lack of connectivity, intersection treatments, and major pikes act as barriers to comfortable bike travel.

- Nashville has **278 miles** of existing bikeways.
- The majority of existing facilities, **231 miles**, are bikeways for experienced cyclists.

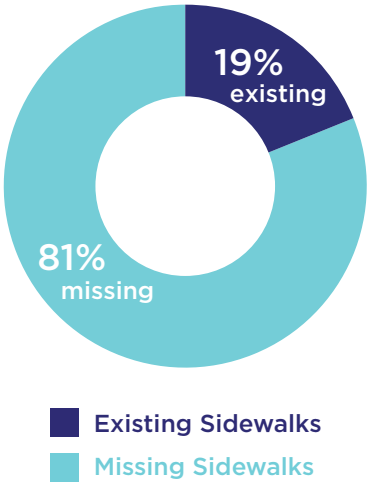



## Existing Sidewalk Network

The Pedestrian Level of Service (PLOS) analysis showed that pedestrians will feel more comfortable walking in Nashville's core and inner neighborhoods due to greater sidewalk coverage.

Nashville ranks as the 15th most dangerous region in the US for pedestrians, based on the 2014 *Dangerous by Design* report.

- Metro is currently responsible for over **1,130 miles** of existing sidewalks and sidewalks in progress.
- There are **1,900 miles** of missing sidewalks in Nashville-Davidson County.



## Prioritization Process

The plan presents a comprehensive long-term vision for a countywide network of sidewalks and bikeways. In order to meet the significant need for sidewalks and bikeways, Metro Nashville must be strategic in its investments.

The prioritization method from the 2008 plan, known as the Pedestrian Generator Index (PGI), was updated to consider additional factors: **social equity and safety**. Therefore, the goals of the draft Priority Sidewalk Network (PSN) and Priority Bikeway Network (PBN) are to first provide for areas of need and then secondly, provide geographic distribution.

## Project List Development

The updated prioritization process is just one component of the overall project development process. Metro staff will implement the three-step process (described to the right) in order to develop a 5-year work program of prospective projects.

Ultimately, the ranking of priority projects in the draft plan is a **high-level, planning-scale evaluation of countywide needs.** This represents a start toward determining a project list that will consist of a full, transparent Metro-wide coordination process.

### Step 1: Constructability Audit

Review project feasibility by accounting for right-of-way (ROW) impacts, environmental constraints, design considerations, and a more detailed cost analysis.

### Step 2: Coordination Effort

Evaluate potential conflicts with other Metro-adopted priorities, community and modal plans, potential private-development investments, and other stakeholders.

### Step 3: Collaboration Process

Involve input from individual project stakeholders to understand their concerns and priorities. Stakeholders could include elected officials, property owners, business leaders, and advocacy groups.

## Priority Bikeway Network (PBN)

Four main criteria were used to plan the priority bikeway network:

- **Roadway Characteristics**
- **Bicycle Demand**
- **Constructability**
- **Public Input**

The Priority Bikeway Network focuses on low-stress facilities, which are facilities that would be comfortable and perceived to be safe for people of all ages and skill levels. Other network recommendations include bikeways that are suitable for experienced cyclists.

While there is need for bikeways throughout Nashville, the PBN focuses on the urban core where the demand and need for a connected network is the greatest.

## Bikeway Network Implementation

Full implementation of the PBN will cost approximately $41 million. The updated prioritization process was used to develop a five-year project list. Based on planning-level cost estimates, the table below shows how many years it would take to complete the priority low-stress bikeway network depending on the amount of annual funding.

### Bikeway Funding Scenarios:

| Annual Funding Allocation | Years to Complete Priority Low-Stress Bikeway Network |
|---|---|
| $1,000,000 | 41 years |
| $4.000.000 | 10 years |
| $8,000,000 | 5 years |

### Examples of Low-Stress Bikeways

*Bollard Protected Bikeway (Major Separated Bikeway)*


*Buffered Bike Lane (Minor Separated Bikeway)*

# Priority Sidewalk Network (PSN)

**New Sidewalk Needs**
Proposed sidewalk segments that scored high in the prioritization process are grouped into 4 categories:

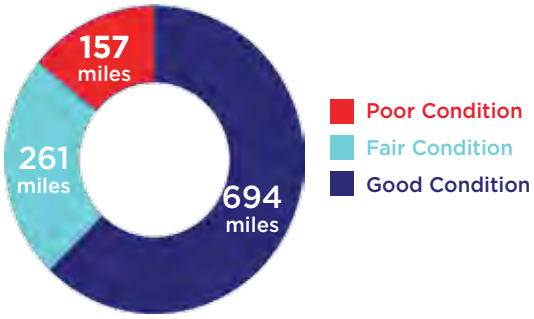
- **Destination + Transit Access**
- **School Connections**
- **Vision Zero (Safety Focus)**
- **Sidewalk Gaps**

Several of the top scoring projects are along priority corridors for High Capacity Transit as identified in the ongoing transit plan update. These sidewalks are not included in the priority sidewalk network and project list since they will be included in transit corridor projects.

The total mileage of the Priority Sidewalk Network is 91 miles. The PSN will serve as the foundation for the development of the 5-year Strategic Project List.

**Sidewalk Repair Needs**
A prioritization process was developed for sidewalk repair needs based on a sidewalk condition inventory. ADA requests and compliance will remain a priority of Metro.

### Condition of Existing Sidewalks:




# Sidewalk Network Implementation

Since 2003, Nashville has built more than 300 miles of sidewalks. Even with these additional miles of sidewalks, Nashville still has significant need for more sidewalks. Full implementation of the PSN will cost $550 million. The table below shows how many years it would take to complete the priority sidewalk network depending on how much funding is allocated each year for building sidewalks.

### New Sidewalk Funding Scenarios:

| Annual Funding Allocation | Years to Complete Priority Sidewalk Network |
|---|---|
| $15,000,000 | 35 years |
| $30.000.000 | 20 years |
| $110,000,000 | 5 years |

### Sidewalk Repair Funding Scenarios:

| Annual Funding Allocation | Years to Complete "Poor" and "Fair" Needs |
|---|---|
| $5,000,000 | 47 years |
| $15.000.000 | 16 years |
| $47,000,000 | 5 years |

## Recommendations

As part of a comprehensive approach to creating a more bike-friendly and pedestrian-friendly environment, Nashville must also implement policies and programs that support walking and biking and that enhance safety for pedestrians and cyclists. Chapter 6 covers recommendations that fall under four categories:

- **Policies**
- **Programs**
- **Design**
- **Implementation**

These recommendations were developed with input from the WalknBike steering committee members. Each recommendation is designed as its own standalone cutsheet with background information, action steps for various agencies in Nashville, and case studies.

## Strategic Implementation

The WalknBike plan does not set funding allocations. Instead, the plan develops a prioritization process to **guide investment in areas with the most need.** The Mayor's Office and Metro Council develop the annual budget program. In order to meet funding needs, creative funding sources and innovative design solutions must be explored.

WalknBike sets mode share goals for walking and biking by examining the commute mode share of Nashville's four aspirational cities - **Austin, Denver, Minneapolis, and Seattle.**

## Additional Priorities

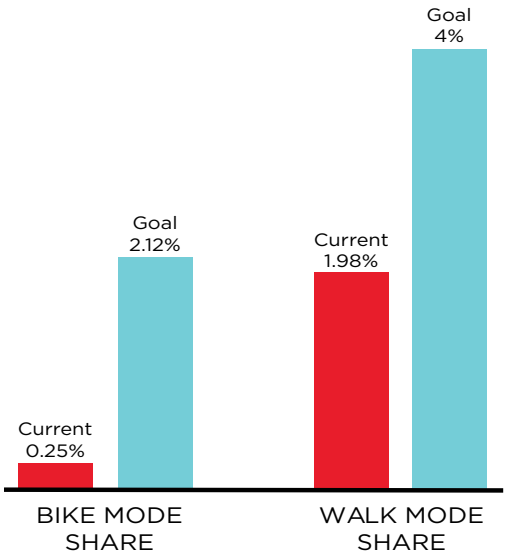
While implementing the priority sidewalk and bikeway networks and ensuring facilities are accessible is a key priority, WalknBike recommends two additional programs to increase safety for all users and promote innovation:

### VISION ZERO

Address projects that improve safety for all users and increase bicycle and pedestrian comfort.

### LIVING LAB

Pilot projects to test and develop innovative and low-cost design alternatives.



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CHAPTER 1

# THE VISION

# Introduction

Americans increasingly demand walkable, bikable cities, and Nashville residents are no different. Providing quality, walkable places and transportation options is key to Nashville's ability to attract and retain people, enhance its local and tourism economy, provide healthy, active living options, and maintain a high quality of life.

WalknBike, the 2016-17 Nashville/ Davidson County Strategic Plan for Sidewalks and Bikeways, is an update to the 2008 Strategic Plan. The 2008 Plan provided a blueprint for making Nashville and Davidson County more walkable and bikable and included a means to prioritize sidewalk projects across the large Metro region. Since 2008, Metro Nashville has taken significant strides to providing more choice in walking and bicycling transportation and recreation. However, there remains the strong public desire to continue expanding an accessible, connected, and safe pedestrian and bicycle network that will accommodate all users. The biggest challenge is overcoming gaps in the network that are a result of decades of suburban sprawl that only sought to accommodate automobiles.

| 2003 | TODAY |
|---|---|
| DAVIDSON COUNTY HAD... | DAVIDSON COUNTY HAS... |
| 727 miles of sidewalks | 1,100 miles of sidewalks |
| — AND — | — AND — |
| 10 miles of bikeways | 250 miles of bikeways |

Meanwhile, since the 2008 plan, much has changed nationally in the realm of active transportation including best practices in design, opening up a wider toolbox of bicycle and pedestrian treatments. Some of the innovative facilities that Metro Nashville now constructs were not even invented in 2008. Metro Nashville has put these new tools to use with the addition of such features as the Davidson Street and Riverfront Park cycle tracks, Broadway pedestrian scrambles/diagonal crossings, bike boxes, bicycle share, and iconic greenway bridges across the Cumberland River. This Plan incorporates the most current and innovative design practices into an updated, recommended bikeway and sidewalk network that expands on what Nashville has already accomplished.

*Clockwise from top right: Davidson Street cycle track, Cumberland River pedestrian bridge, 1st Street bikeway with bike share station, Lower Broadway pedestrian scramble, 11th Avenue separated bikeway.*

The WalknBike Plan continues the momentum of Metro achievement and follows right behind the 2015 NashvilleNext Plan, Metro's comprehensive plan, that identifies the expansion of walking and bicycling options as one of the most pressing needs for Nashville. Metro leadership has shown commitment to making Nashville a more walkable and bikable city with the 2010 Complete Streets policy and the updated May 2016 Executive Order formalizing a 'Complete and Green Streets' policy, guiding Metro departments on the construction and maintenance of public streets to improve environmental quality and enable safe access for people of all ages and abilities, regardless of their mode of transportation.

The WalknBike Plan is the next step for Metro Nashville to assess its progress, understand current need, identify best practices, and continue making progress towards becoming a world-class multi-modal city. **This plan leads Nashville boldly into a new era where people of all ages and abilities can comfortably travel on foot or by bike.**

# Plan Purpose

At the start of the WalknBike planning process, Mayor Megan Barry stated:

***"Planning for, building, and maintaining great sidewalks and bikeways are imperative for a healthy, active, safe and vibrant community."***

The purpose of the WalknBike Plan is to provide a framework for meeting the imperative of improving the bicycling and walking environments throughout the city and county. The actions and investments identified in the plan will advance the vision through new bicycle and pedestrian infrastructure; maintenance; bicycle parking spaces and other end-of-trip facilities; and programs to enhance safety for all roadway users and encourage more people to walk and bike.

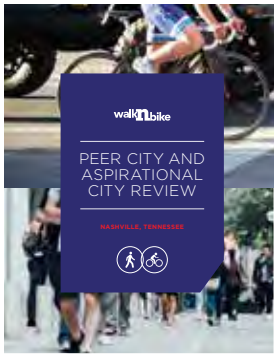
Historically, Nashville's bicycle facilities have mostly served people comfortable riding in or near traffic, which is a relatively small subset of the population. A central focus and purpose of this plan is to design and implement both bicycle and pedestrian facilities and programs that are safe and appropriate for people of all ages and abilities.

# Planning Process

The WalknBike planning process was a one-year process conducted from March 2016 through March 2017. The planning process was open and participatory with thousands of Metro residents participating. The project began with the formation of a Steering Committee formed of Metro staff, local stakeholders, and active citizen volunteers. The committee guided the planning process and was broken into four subcommittees that focused on individual topics: Design Practices, Outreach and Education, Policy and Enforcement, and Prioritization. These subcommittees studied existing conditions surrounding these topics and generated key recommendations that are set forth in this Plan.

An initial public launch of the project occurred with a formal public meeting at the Downtown Library, a project website and first opinion survey. Input from the public and committee led to the development of the project vision and set the tone for the planning process. The project team sought public input throughout the planning process through regular website updates, email blasts, social media, community meetings, and pop-up input sessions. In addition, the WalknBike team coordinated with nMotion (Transit Plan) and Plan to Play (Parks and Greenways Plan) to receive public input through planned events.

A series of targeted, community meetings and pop-up, intercept input sessions were conducted during the release of the second survey with a goal of reaching underserved communities and understanding how Nashville residents believe projects should be prioritized. Another round of public engagement and meetings occurred with the release of the Draft Plan to receive feedback.




The project team developed a State of Practice report to thoroughly identify existing conditions in Nashville for walking and bicycling and conducted a peer city and aspirational city review to understand current best practices around the United States. This analysis fed into the work of the subcommittees and established a baseline for the recommendations of the Plan.

The recommendations of this Plan incorporate public input, Steering Committee guidance, technical analysis, and the peer city report.

The result of the planning process is the WalknBike plan which is a comprehensive document that addresses walking and bicycling infrastructure, policies, and programs. The plan's focus is on an implementation strategy that begins to accomplish the vision set forth at the start of this study.

# Vision Statement & Goals

## Vision Statement:

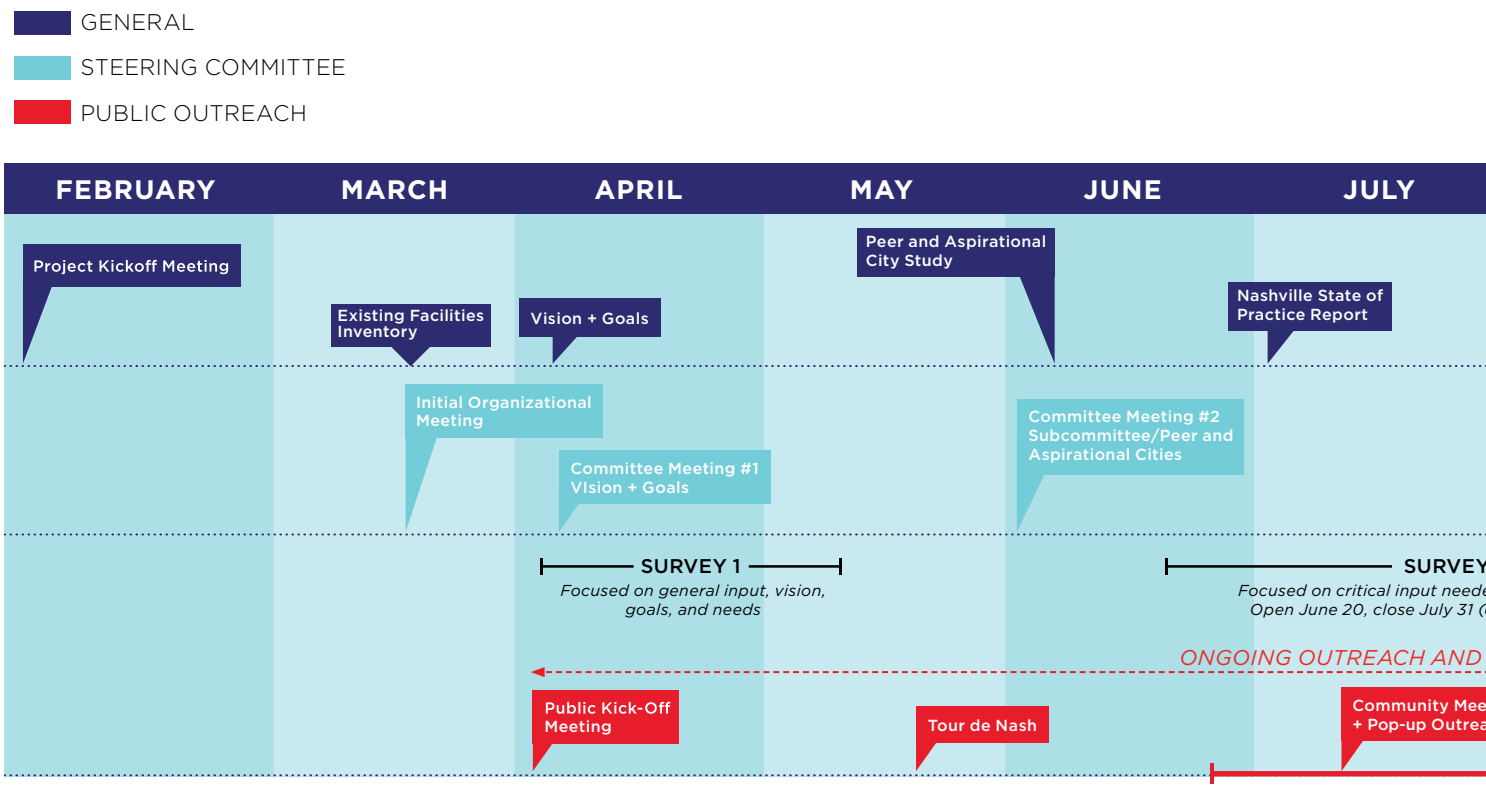
The Nashville bicycle and pedestrian system will be a network of high-quality, comfortable, safe sidewalks and bikeways, connecting people to opportunity. The system, inclusive to users of all ages and abilities, will promote and encourage safety, health, education, and active transportation.

## Goals:

| | |
|---|---|
| **Access & Equity** – Walking and biking will be accessible to all Nashville/ Davidson County residents regardless of age, ability, background, and income. | **Objective:** Improve conditions for walking and biking in areas of highest need and where people are most likely to walk and bike |
| **Network Connectivity** – Walking and biking will seamlessly integrate with other modes of transportation, such as transit, and connect people to where they live, work, play, and learn. | **Objective:** Close the gaps where key connections to bikeways or walkways are needed |
| **Safety** – Walking and biking will be a safe and comfortable activity for everyone. Metro Nashville will continue progressing towards its goal of zero traffic fatalities and strive to minimize safety concerns for the city's most vulnerable users. | **Objective:** Implement education and encouragement programs, enforcement strategies, and safety countermeasures to prevent pedestrian and bike collisions |
| **Collaboration** – Metro Nashville will strive to strengthen existing partnerships and to build new and innovative ones to advance its vision for walking and biking. | **Objective:** Partner with local organizations to offer a greater number of programs focused on walking and biking |
| **National Recognition** - Metro Nashville will strengthen its commitment to making biking and walking a safe and convenient option for users of all ages and abilities. | **Objective:** Attain designation as "Silver Level Bicycle Friendly Community" and "Silver Level Walk Friendly Community" |

## Means of Achieving the Vision:

During this planning process, the Steering Committee was broken into four subcommittees to address the topics of design practices, outreach and education, policy and enforcement, and prioritization. The peer city report and this Plan use these four topics as a framework for accomplishing the vision of this Plan.



## Design Practices

- The recommended network of bicycle and pedestrian treatments for Nashville and Davidson County
- The toolbox of bicycle and pedestrian facility design

## Outreach and Education

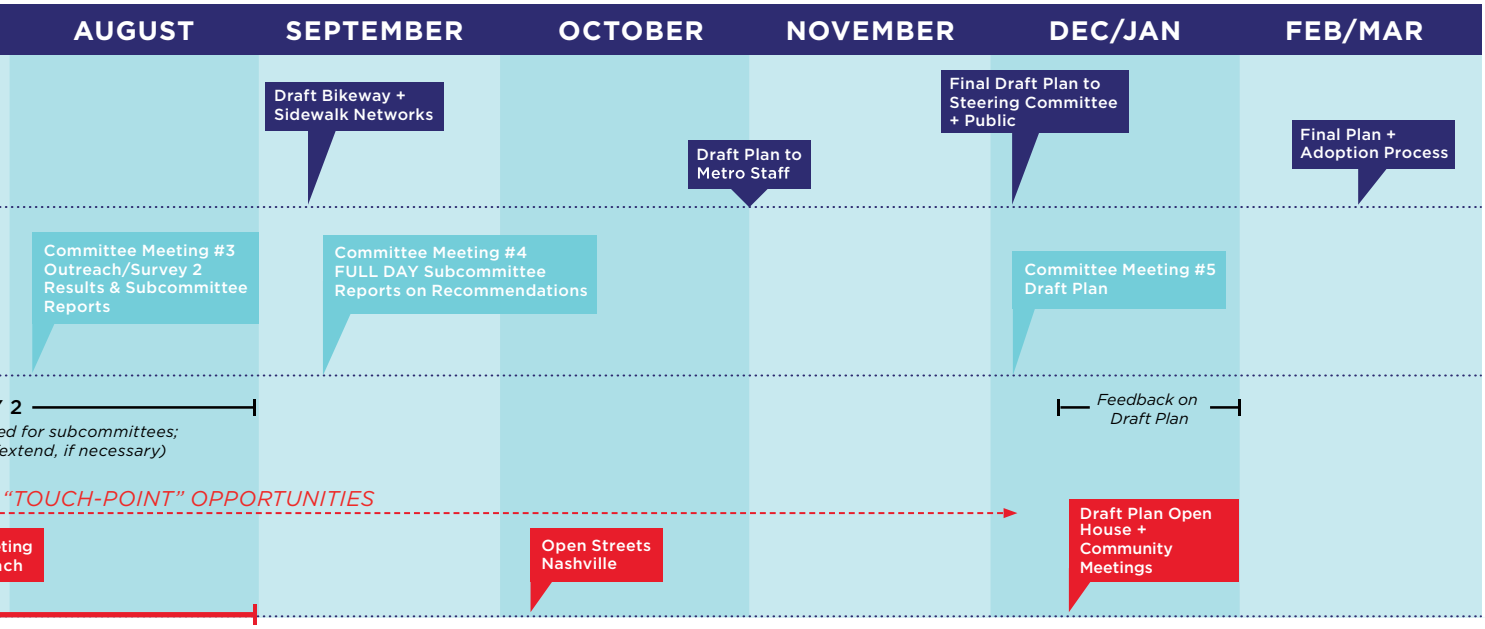
- Public outreach effort during this planning process to reach as many Davidson County residents as possible
- Outreach and education program toolbox

## Policy and Enforcement

- The policies that shape the growth, development, and reconstruction projects of Metropolitan Nashville and how they impact bicycling and walking
- The enforcement programs to ensure that traffic laws are being followed

## Prioritization

- The methodology for determining priority projects with limited funds and a lengthy project list

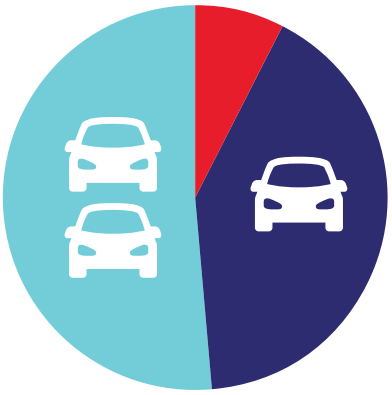


# Why this Plan is Important

There are numerous reasons why the development of this Plan is important. A more walkable and bikeable Nashville provides economic, health, environmental, quality of life, and safety benefits to a city where demographic and social trends highlight the increasing need for walkability and bikability. A brief summary of these reasons is provided below.

### Because a large portion of the population depends upon walking and biking.

Many Nashvillians do not have access to a vehicle and are dependent upon walking, biking, and transit to reach their destinations. Furthermore, many residents are too young to drive; are incapable due to age, illness, or disability; are unable or unwilling to afford the costs of owning and operating a car; or for other reasons are simply unfit or unwilling to drive.

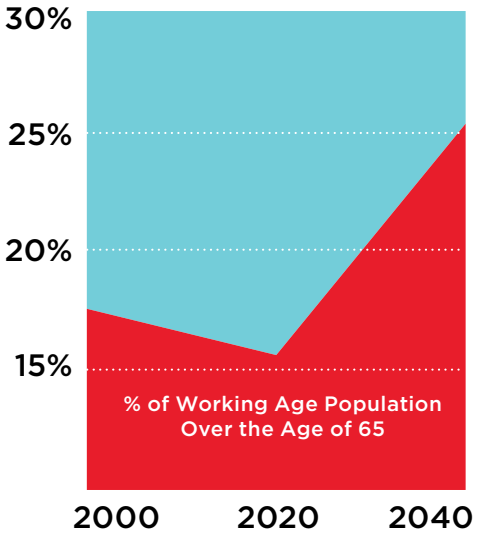


**7.6%** No Vehicle
**41.1%** One Vehicle
**51.2%** Two or More Vehicles

Nashville-Davidson County 2010-2014 American Community Survey (ACS)

### Because Nashville's aging population will need more transportation choices in the future.

The aging, baby boomer population (52 to 70 years old in 2016) is a quickly growing segment of Nashville residents. As these older adults begin to drive less, their access to independent mobility will be greatly influenced by how well our streets and transportation networks accommodate pedestrians, and impaired pedestrians in particular.



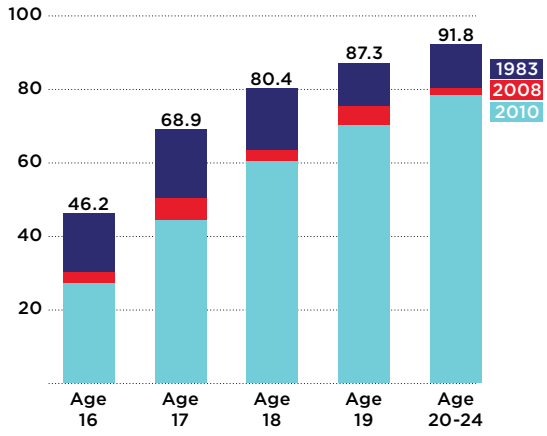

US Census (2000, 2020), Woods & Poole Economics, Inc projection (2040)

## Because our younger generations are driving less and wanting more transportation choice.

Recent studies have noted trends revealing that Millennials – those born between 1981 and 2001 – are part of a generation of declining car ownership (1). A number of factors contribute to this decline, including the recent trends toward urban living and the desire to stay connected to social media and other technologies that are not conducive to driving.

- According to the National Household Travel Survey, from 2001 to 2009, the annual number of vehicle miles traveled by young people (16- to 34-year-olds) decreased from 10,300 to 7,900 miles per capita—a drop of 23 percent (2).
- According to the Federal Highway Administration, from 2000 to 2010, the share of 16- to 34-year-olds without a driver's license increased from 21 percent to 26 percent (3).

**Percentage of Age Group with Driver's License**




University of Michigan Transportation Research Institute (2012)

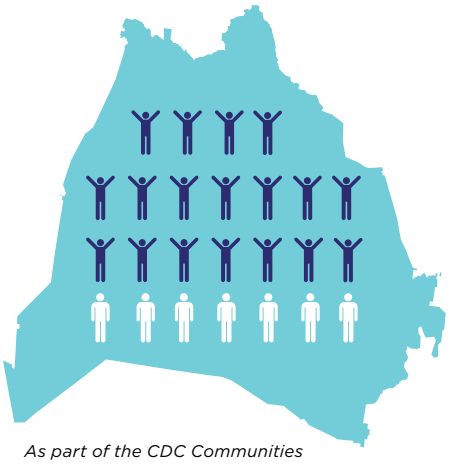
## Because Nashville's residents need more active living choices and programs to address the state and local obesity issue.

Lack of physical activity is associated with increased risk of many health problems, particularly obesity, diabetes, and heart disease (4). It is also the third-highest cause of preventable death in the US, behind only tobacco use and poor nutrition (5). Studies show that improving the built environment to provide more walking and bicycling options help people meet recommended physical activity levels (6).

**THE ADULT OBESITY RATE IS 24.7%** with an additional 37.4% of Davidson County adults being overweight.

Source: Community *Profile: Nashville/Davidson County, Tennessee; Centers for Disease Control and Prevention, Division of Community Health*

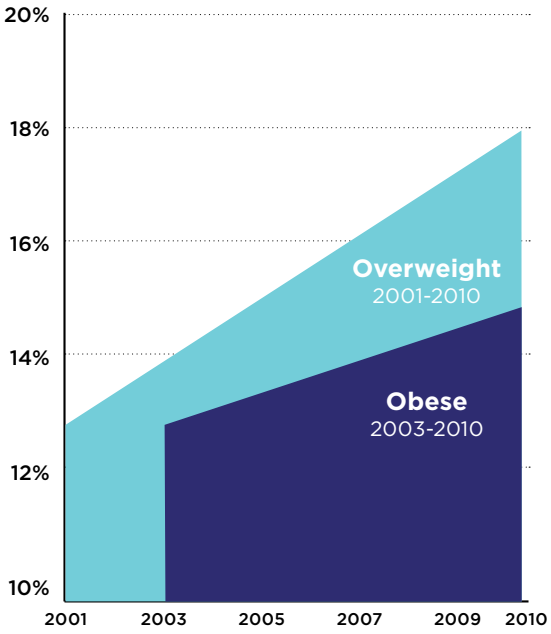
**In a Nashville/Davidson County study, 26.7% of adults reported no physical activity in the last 30 days.**



*As part of the CDC Communities Putting Prevention to Work program, a 2013 analysis highlighted the results of a Nashville/Davidson County study aimed at learning about lifestyle and physical activity.*

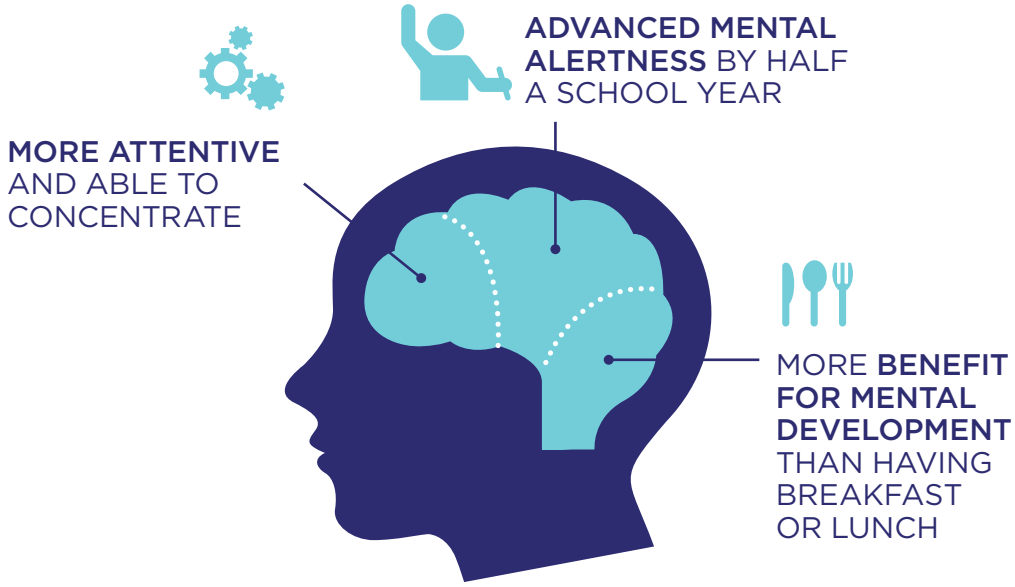
Source: Community *Profile: Nashville/Davidson County, Tennessee; Centers for Disease Control and Prevention, Division of Community Health*

**The percentage of Davidson County teenagers who are overweight or obese has increased dramatically in the last decade.**




Source: *Centers for Disease Control Behavorial Risk Factors Surveillance Survey* (2001, 2003, 2010)

**Children who bicycle or walk to school learn better:**




Source: *Egelund Et Al. Study of over 20,000 School Children, 2012*

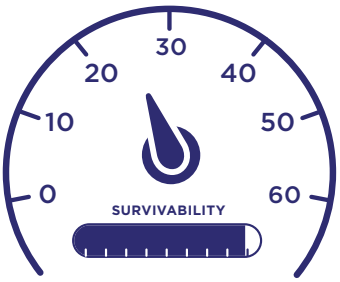
**AMONG NASHVILLE CHILDREN**

**78%** Do not engage in one hour of physical activity every day.

Source: *2015 NashvilleNext*

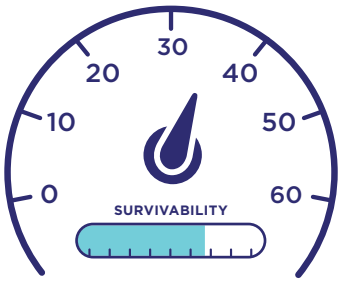
**Speed and survivability in crashes:**

A pedestrian hit by a vehicle traveling at 25 MPH




has an **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

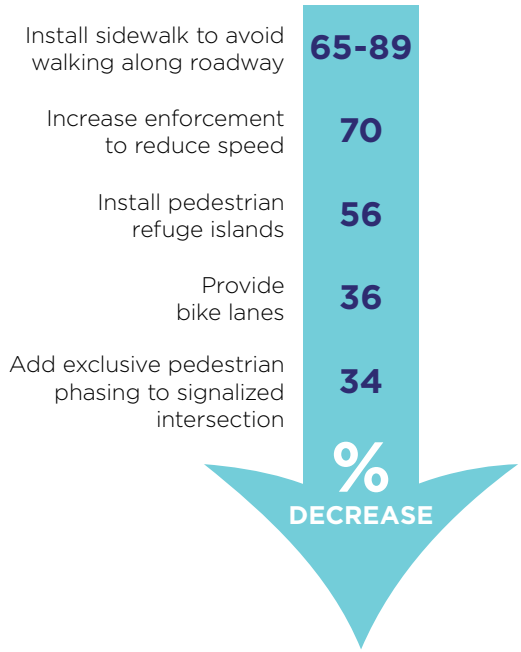

has a **35%** chance of survival

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

## Because having bikeway and sidewalk facilities reduces crashes and thus saves lives.

Between January 2010 and May 2013, 979 pedestrian crashes and 220 bicyclist crashes were reported in Davidson County (7). Studies show that installing pedestrian and bicycle facilities improves safety by reducing the risk of pedestrian-automobile and bicycle-automobile crashes. Safe places to walk and bike are especially important for non-drivers who require safe, reliable, and convenient options.

**Crash Reduction Factors**




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

## Because a more walkable and bikeable Nashville is an economically stronger Nashville.

Cities that invest in active transportation are investing in people and their quality of life. Business decisions are increasingly being made based on quality of life amenities for employees and their families. Nationally, bicycling makes up $33 billion of the US economy, funding 1.1 million jobs, and bicycle-related trips generate $47 billion nationally in tourism activity (8). More than two-thirds of Americans say that having bike lanes or paths in their community is important to them, and two-thirds of homebuyers consider the walkability of an area in their purchase decision (9).

**Walkable neighborhoods increase property value:**

HOUSES IN HIGHLY WALKABLE NEIGHBORHOODS HAVE PROPERTY VALUES

**$4,000 TO $34,000 HIGHER**

THAN HOUSES IN AREAS WITH AVERAGE WALKABILITY.

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

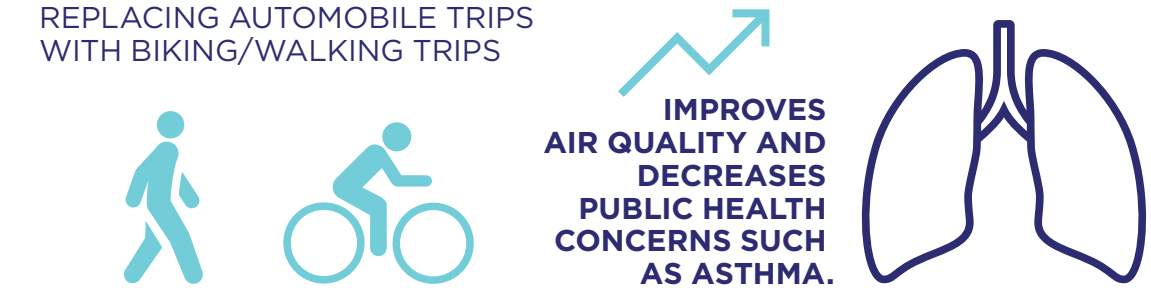
**Bikeable business districts increase sales:**

*New York City installed the* FIRST PROTECTED BIKE LANES *in the US on 8th and 9th Avenues in Manhattan in 1997 and by so doing brought more people to these streets.*

AS A RESULT, 9TH AVENUE HAD A **49% INCREASE IN RETAIL SALES** AT LOCALLY BASED BUSINESSES COMPARED TO A 3% INCREASE ACROSS MANHATTAN AS A WHOLE.

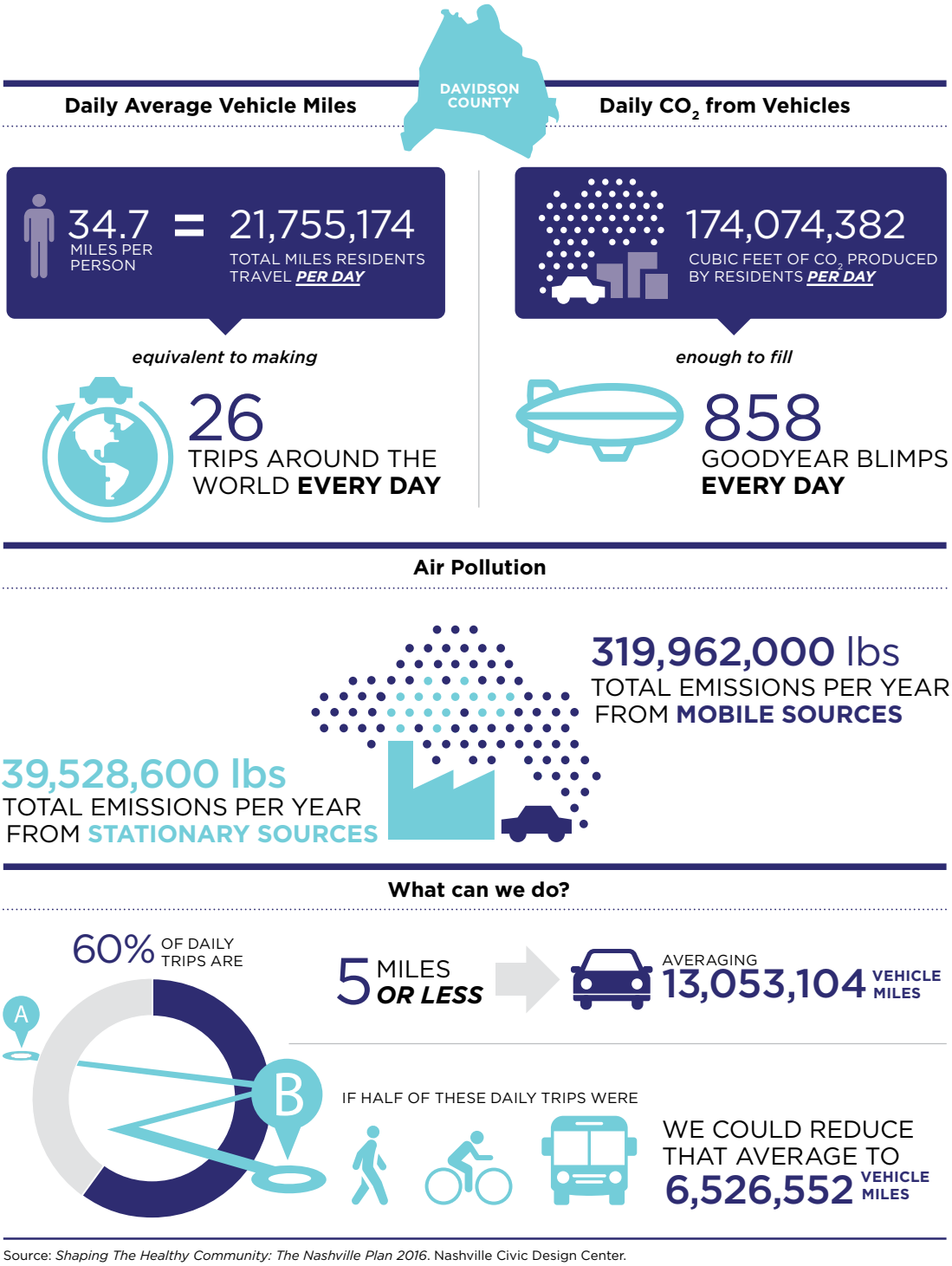
Source: *New York City Department of Transportation (2012). Measuring the Street: New Metrics for 21stCentury Streets.*

**Air Quality**




## Because more walking and biking trips in place of automobile trips means less air pollution.

As of 2003, 27% of US greenhouse gas emissions were attributed to the transportation sector and personal vehicles accounted for 62% of all transportation emissions (10). Replacing automobile trips with biking/walking trips improves air quality and decreases public health concerns such as asthma.



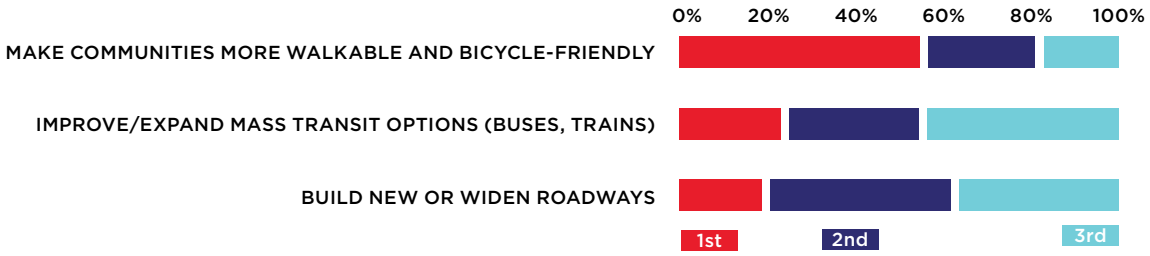

Source: *Shaping The Healthy Community: The Nashville Plan 2016*. Nashville Civic Design Center.

## Because Nashville residents simply want more bikeways and sidewalks.

The demand for more sidewalks and bikeways is made clear in the hundreds of requests made to Metro Public Works each year. Expanding walking, biking and transit and creating walkable centers were also two of the five most pressing issues defined by NashvilleNext. Safety was also highlighted during the development of nMotion and mostly related to one's ability to walk to bus stops and cross streets.

When asked what would be the top priority for improving transportation in Middle Tennessee, the choice was making communities more walkable and bikable; this ranked higher than transit and building new roadways.

**Nashville Residents Want to...**




Source: 2015 NashvilleNext

*"Biking in Nashville should be protected – so my kids can wobble on the way to the park, but make it there safely."*

**- NASHVILLE RESIDENT**

## Chapter 1 Sources


1. "The Future Isn't What It Used To Be: Changing Trends and Their Implications for Transport Planning." Victoria Transport Policy Institute. Page 6. 27 December 2012.
2. 2011 National Household Travel Survey. USDOT Federal Highway Administration.
3. Federal Highway Administration, Highway Statistics 2010—Table DL-20, September 2011.
4. North Carolina Department of Health and Human Services, Physical Activity and Nutrition Branch.Eat Smart, Move More NC: The Obesity Epidemic in North Carolina. Retrieved from: www.eatsmartmovemorenc.com/ObesityInNC/ObesityInNC.html.
5. Mokdad, A., Marks, J., Stroup, D., & Gerberding, J. (2000). Actual Causes of Death in the United States. 2000. Journal of the American Medical Association 291: 1238 – 1245.
6. Robert Wood Johnson Foundation. Active Transportation: Making the Link from Transportation to Physical Activity and Obesity. Active Living Research. Research Brief; 2009. Available at http://www.activelivingresearch.org/ files/ALR_Brief_ActiveTransportation.pdf.
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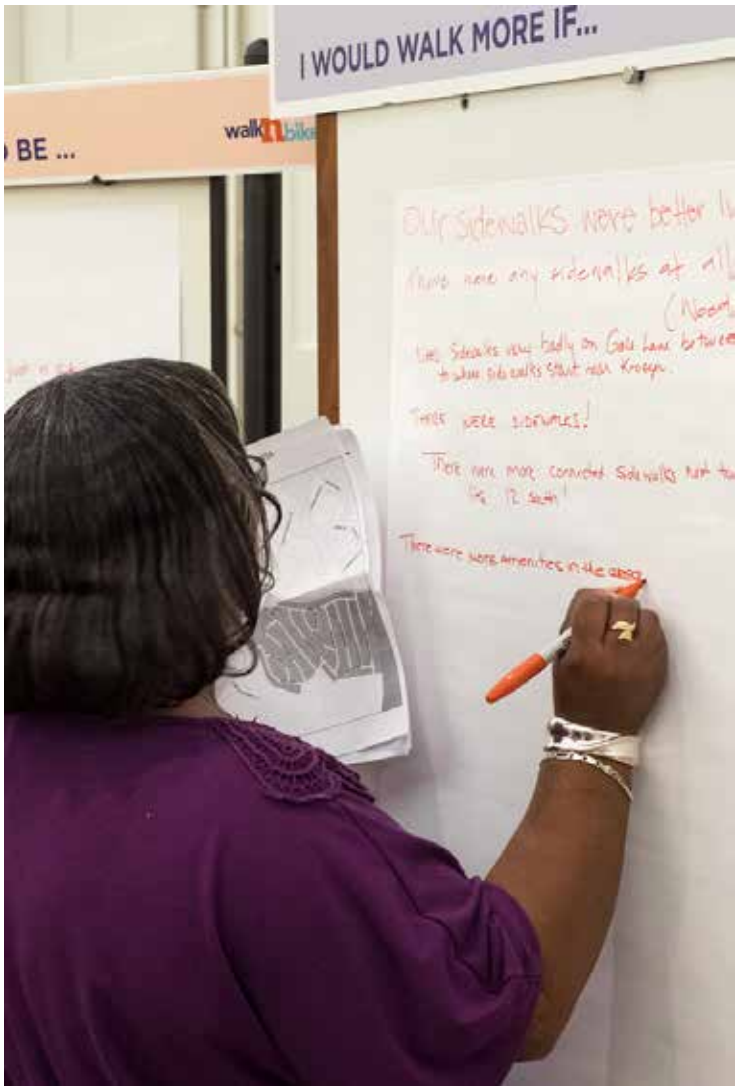
9. Bureau of Transportation Statistics. (2010). Transportation Statistics Annual Report. Retrieved from http://www.bts.gov/publications/transportation_statistics_annual_report/2010/.
10. Office of Transportation and Air Quality, Environmental Protection Agency. (2006). Greenhouse GasEmissions from the U.S. Transportation Sector: 1990-2003. Report number EPA 420 R 06 003.

CHAPTER 2

# WHAT WE'VE HEARD

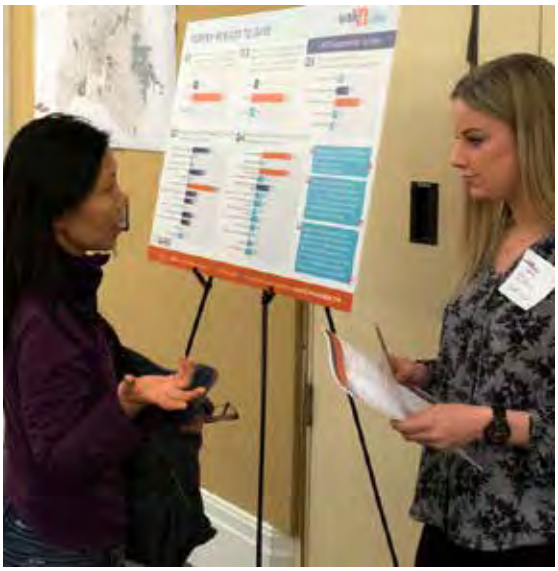
# Public Input

Public input was an integral component of this plan and was gathered through multiple avenues and outlets. This plan will not only affect those who reside in Nashville but also those who work, own businesses, play, and enjoy leisure activities in the city. Feedback from the public guided where investments should be prioritized. A full summary of public outreach can be found in Appendix X.




## Listening

The WalkNBike project team sought to listen to Nashville and Davidson County residents throughout the planning process. Residents were able to communicate their desires for this project through public meeting exercises, small group discussion, stakeholder meetings, and conversation.



## Reaching Out

The WalkNBike project team set a goal to reach as many Nashville residents as possible and to hear from diverse communities across Davidson County. To do this, the team conducted pop-up events where community members were already present in their everyday activities. In addition, more formal public meetings and stakeholder meetings were advertised for the entire public.

# Project Website

The public engagement process started in March 2016 with the launch of the project's website, www.nashvillewalknbike.com.

This website, which was updated regularly, featured information about the plan, toolkits with outreach materials, meeting updates, and links to tools for the public to provide their thoughts and feedback.

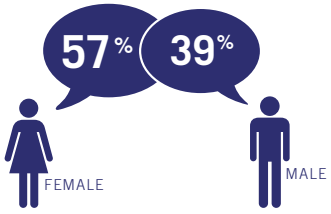
# Public Surveys

Two separate online surveys were used to gather feedback. The first survey was launched in March 2016 shortly after the project kicked off. The focus of the survey was to gather input about barriers and attitudes towards walking and biking in Nashville. A total of 1,904 respondents completed the first survey.

The second online survey focused on prioritizing investments in sidewalks and bikeways. Survey questions asked about values, key destinations, areas for investment, and how to allocate funding. The second survey garnered even more responses than the first one. A total of 3,222 respondents completed the survey.

# SURVEY 1

**1,911** Total number of survey respondents




## WHERE DO RESPONDENTS LIVE?

**37215** (11.4%)

**37209** (10.2%)

**37205** (10.1%)

**37212** (9.6%)

**37204** (8%)

## WALKING IN NASHVILLE

**84% DISAGREED THAT WALKING IN NASHVILLE IS A SAFE, CONVENIENT, AND PRACTICAL WAY** TO GET FROM ONE PLACE TO ANOTHER

## BIKING IN NASHVILLE

**78% DISAGREED THAT BIKING IN NASHVILLE IS A SAFE, CONVENIENT, AND PRACTICAL WAY** TO GET FROM ONE PLACE TO ANOTHER

## WHAT PREVENTS YOU FROM WALKING MORE?

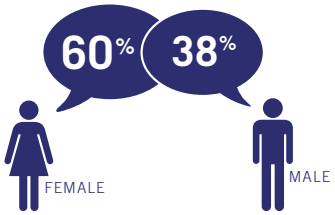
- Lack of Sidewalks (83%)
- Roads and Sidewalks Don't Feel Safe (48%)
- Sidewalks in Poor Condition (41%)
- Not Enough Time/ Destinations Too Far (32%)
- Lack of Sidewalk Connections to Bus Stops (29%)
- Lack of Pedestrian Amenities (29%)

## WHAT PREVENTS YOU FROM BIKING MORE?

- Roads Don't Feel Safe (70%)
- Lack if Dedicated Bike Space (68%)
- Bike Paths in Poor Condition (34%)

# SURVEY 2

**3,222** Total number of survey respondents




## WHERE DO RESPONDENTS LIVE?

**37215** (14%)

**37205** (9.1%)

37209 (7.6%)

37206 (7.1%)

37211 (7%)

## PRIMARY USES OF THE EXISTING...

### Sidewalk Network

| HEALTH | TO TRANSIT STATIONS | RECREATION |
|---|---|---|
| 93% | 93% | 91% |

### Bikeway Network

| RECREATION | COMMUTING (WORK OR SCHOOL) | HEALTH |
|---|---|---|
| 55% | 54% | 51% |

## IF YOU HAD $10 TO SPEND EACH YEAR, HOW WOULD YOU ALLOCATE IT AMONG...

### Sidewalk Projects

| | |
|---|---|
| Major Streets | $3.10 |
| Minor Streets | $2.80 |
| Residential Streets | $3.40 |
| Intersections | $1.90 |

### Bikeway Projects

| | |
|---|---|
| Major Streets | $3.80 |
| Minor Streets | $3.10 |
| Residential Streets | $2.40 |
| Intersections | $2.00 |

## PUBLIC SURVEY RESPONDENTS' TOP PRIORITIES TO INFLUENCE LOCATION OF IMPROVEMENTS

**Safety**
(2,547 Votes)

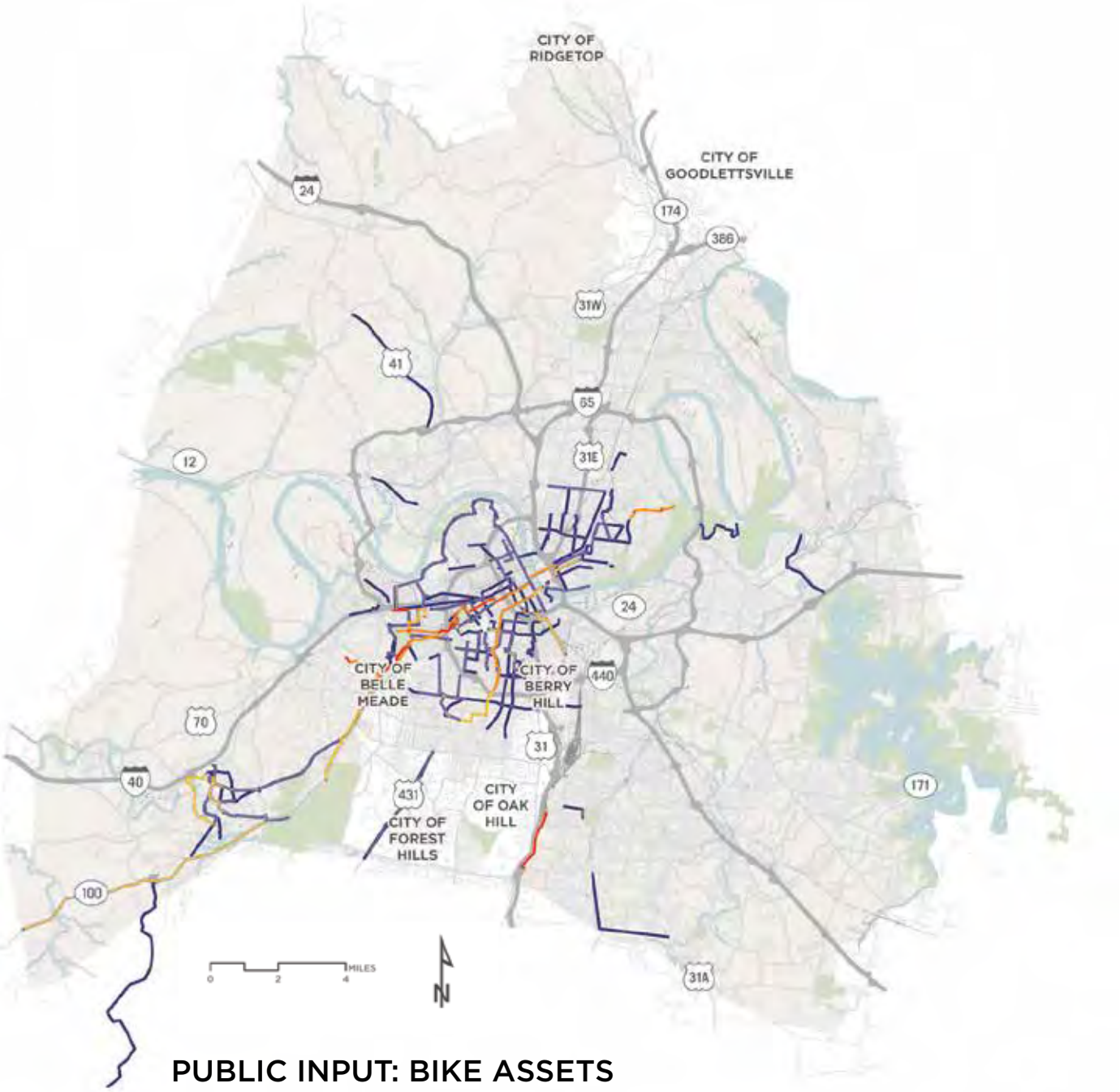
**Connectivity**
(1,817 Votes)

**Equity and Need**
(1,192 Votes)

# Online + Community Maps

An interactive mapping tool was developed to solicit comments about important Davidson County destinations, desire lines, and needed improvements. The tool was used to gather countywide input without requiring participants to travel to a specific location. The project team also brought large base maps of the county to each community meeting for participants to draw and add comments that were later added to the online mapping tool.

Both the online tool and the community meeting mapping sessions provided essential public input into the sidewalk and bikeway network development and development process. The following series of maps highlight the input that was received through these mapping exercises.




## PUBLIC INPUT: BIKE ASSETS

### PUBLIC SUPPORT

"Route I like and currently use as a bicyclist"

- Highest Support
- Lowest Support


## PUBLIC INPUT: BIKE NEEDS

"Route that could be improved for bicyclists" or "Barrier to bicycling"

- Highest Support
- Lowest Support

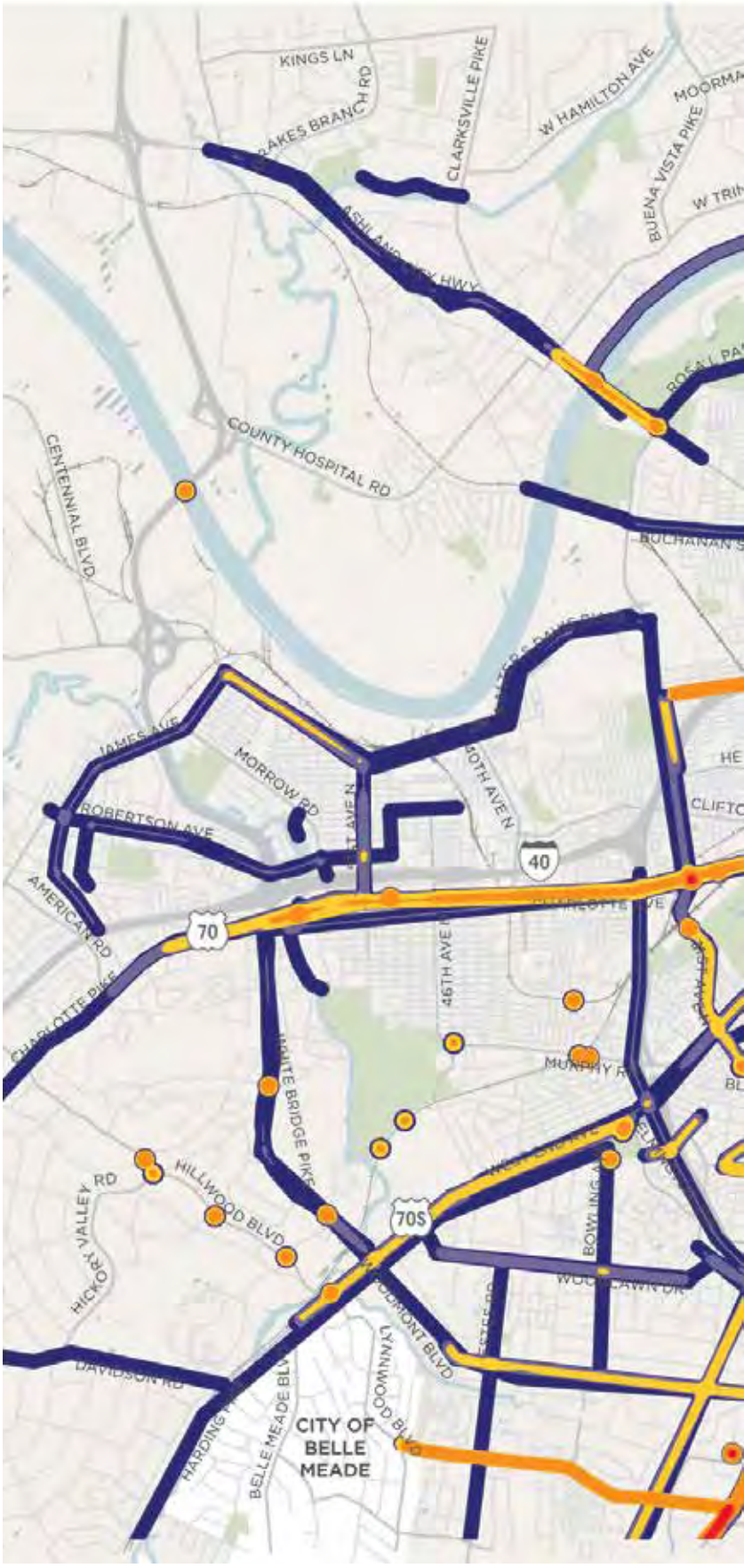
# PUBLIC INPUT: BIKE NEEDS

"Route that could be improved for bicyclists" or "Barrier to bicycling"

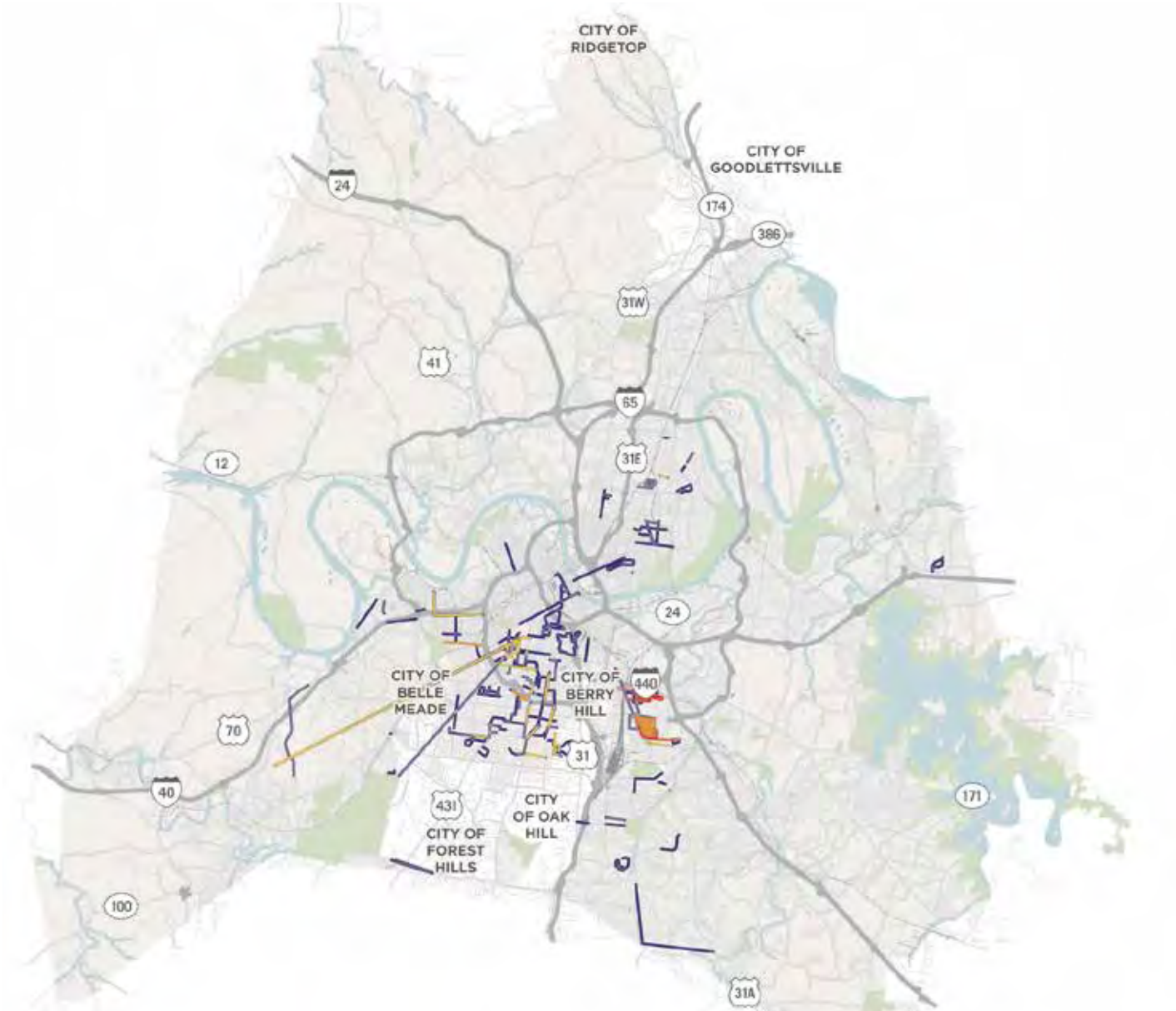
Highest Support

Lowest Support

00 .5 1 MILES




WHITES CREEK PIKE
DICKERSON PIKE
JONES AVE
HART LN
STRATFORD AVE
MCGAVOCK PIKE
E TRINITY LN
31W
LISCHEY AVE
31E
BRICK CHURCH PIKE
DOUGLAS AVE
65
41
CLEVELAND ST
EASTLAND AVE
PRESTON DR
RIVERSIDE DR
MCFERRIN AVE
JEFFERSON ST
JAMES ROBERTSON PKWY
WOODLAND ST
SHELBY AVE
DAVIDSON ST
LEBANON PIKE
FESSLERS LN
SPENCE LN
ELM HILL PIKE
MASSMAN DR
PATRICIA DR
31
431
WEDGEWOOD AVE
31A
POLK AVE
FOSTER AVE
ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
MURFREESBORO PIKE
E THOMPSON LN
440
CITY OF BERRY HILL
THOMPSON LN
CURREY RD
CITY OF OAK HILL



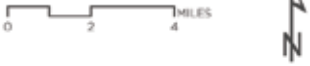

# PUBLIC INPUT: PEDESTRIAN ASSETS

## PUBLIC SUPPORT

"Route I like and currently use as a pedestrian"

Highest Support

Lowest Support




## PUBLIC INPUT: PEDESTRIAN NEEDS

"Route that could be improved for pedestrians" or "Barrier to walking"

Highest Support

Lowest Support

0 2 4 MILES

N

# PUBLIC INPUT: PEDESTRIAN NEEDS

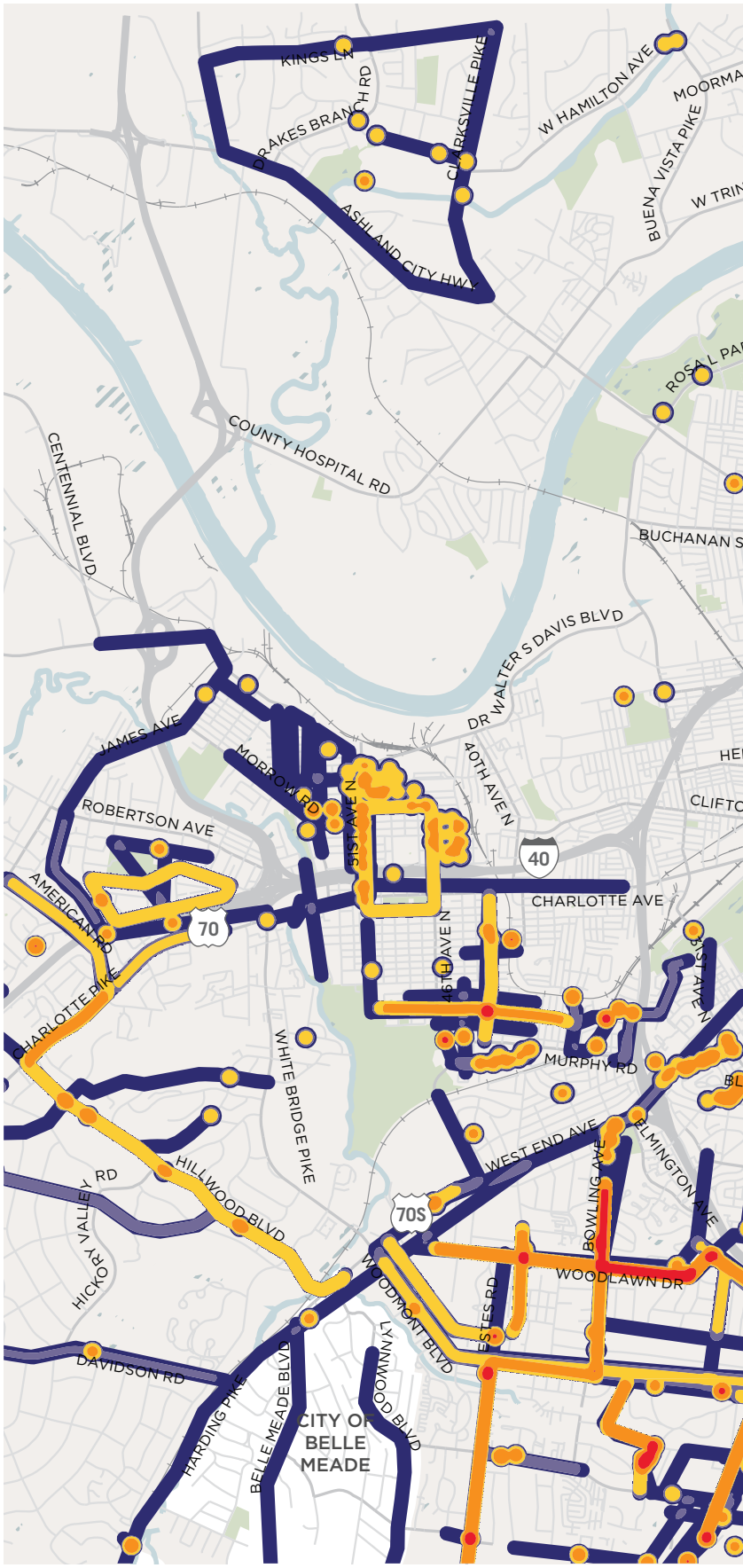
"Route that could be improved for pedestrians" or "Barrier to walking"

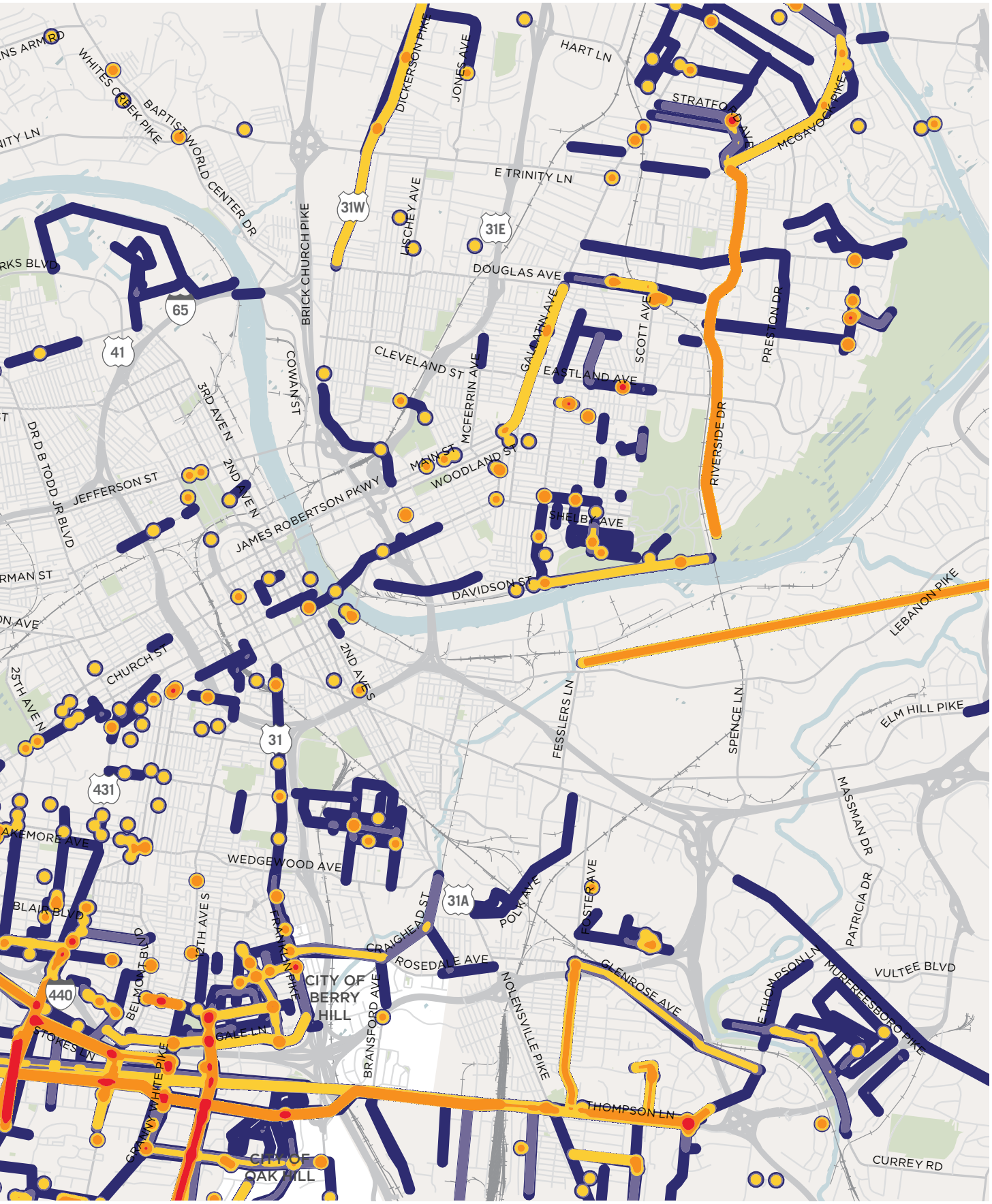
Highest Support

Lowest Support

00 .5 1 MILES

N




HART LN
DICKERSON PIKE
JONES AVE
STRATFORD AVE
MCGAVOCK PIKE
E TRINITY LN
31W
LISCHEY AVE
31E
DOUGLAS AVE
BRICK CHURCH PIKE
WHITES CREEK PIKE
BAPTIST WORLD CENTER DR
65
41
CLEVELAND ST
GALLATIN AVE
SCOTT AVE
PRESTON DR
EASTLAND AVE
MCFERRIN AVE
COWAN ST
3RD AVE N
DR D B TODD JR BLVD
JEFFERSON ST
2ND AVE N
MAIN ST
WOODLAND ST
JAMES ROBERTSON PKWY
RIVERSIDE DR
SHELBY AVE
DAVIDSON ST
LEBANON PIKE
CHURCH ST
2ND AVE S
25TH AVE N
FESSLERS LN
SPENCE LN
ELM HILL PIKE
31
431
MASSMAN DR
WEDGEWOOD AVE
31A
POLK AVE
FOSTER AVE
PATRICIA DR
CRAIGHEAD ST
ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
12TH AVE S
FRANKLIN PIKE
BELMONT BLVD
CITY OF BERRY HILL
440
GALE LN
STOKES LN
BRANSFORD AVE
NOLENSVILLE PIKE
MURFREESBORO PIKE
GRANNY WHITE PIKE
THOMPSON LN
CITY OF OAK HILL
CURREY RD


## PUBLIC INPUT: GREENWAY ACCESS

### PUBLIC INPUT

- Barrier to accessing greenway
- Bike route I take to access the greenway
- Walking route I take to access the greenway
- Paved greenway
- Unpaved greenway

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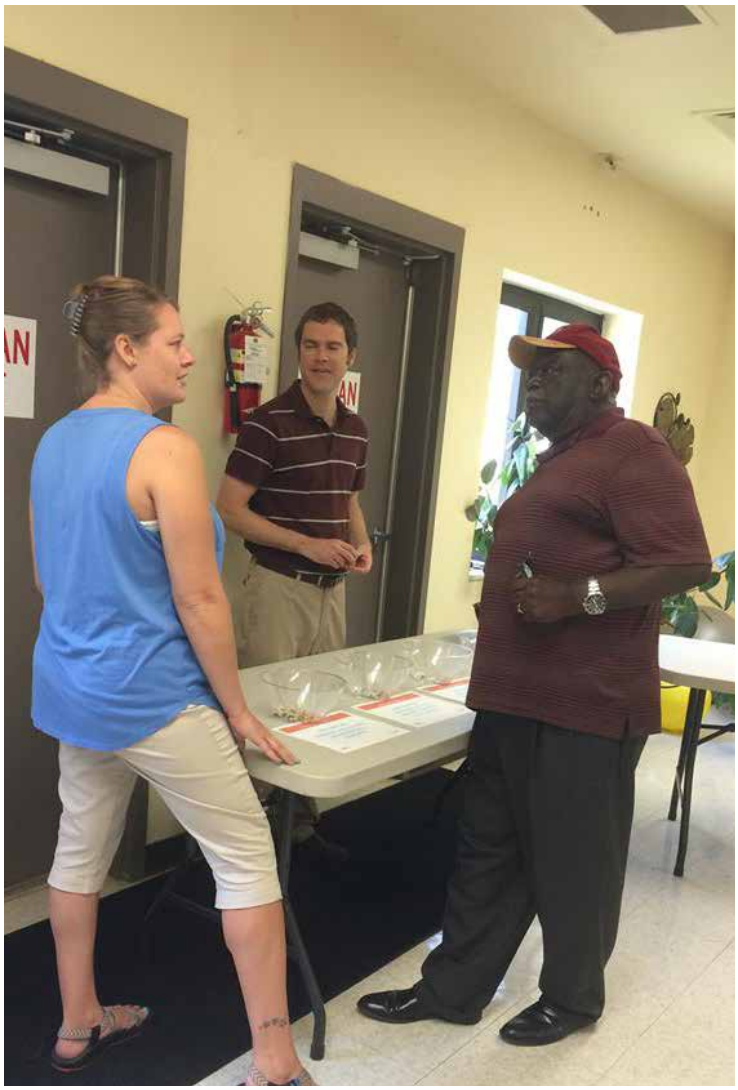


## Collaborating

The WalkNBike project team sought to collaborate with a variety of stakeholders, agencies, and the general public. This plan will only be a success through continued collaboration to accomplish the vision of this plan.

## Exploring

The WalkNBike project team, alongside Davidson County residents, explored ways to make Nashville more bicycle and pedestrian friendly. Various techniques were used including simple expression dry erase boards, voting exercises, group discussion, and formal public meetings.


# Key Themes

The project team aimed to hear from the widest possible array of Nashville stakeholder and resident voices. Key themes highlighted by the public included:

- Better connectivity of existing bike and pedestrian facilities is needed.
- Drivers should be more respectful and aware of bicyclists and pedestrians.
- Bicycling and walking should be protected, safe, fun, respected, inviting, encouraged, easy, accessible for all ages and abilities.
- Bicycling and walking are great, healthy ways to get around and, in many cases, the only way to get around for many people.

A selection of responses to public input exercises about what walking and biking is and what walking and biking should be in Nashville highlight some of the overarching viewpoints of Nashville residents.

### Biking in Nashville is...

- A great way to get around, but you have to be defensive.
- Not on a comprehensive network yet.
- Dangerous – need to clean bike lanes more often.
- Improved a lot. Already pretty safe on many routes.

### Biking in Nashville *should* be...

- **Protected – so my kids can wobble on the way to the park but make it there safely.**
- **Something that is safe where both cars and bikes observe rules of the road.**
- **Safe for everyone – young, old, skilled, unskilled.**
- **A realistic and safe alternative to driving.**

### Walking in Nashville is...

- A great way to meet people.
- Faster than driving sometimes.
- Very doable in most neighborhoods and downtown. Walking from one part of town to another is challenging.
- Nearly impossible because of the lack of safe, accessible sidewalks.

### Walking in Nashville *should* be...

- **Safe, easy, and possible for all.**
- **Respected by motorists. State law is to yield!**
- **ADA compliant.**
- **A joy.**

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# What We Heard

I would love to commute by bike but am currently too scared of some routes in Nashville. Educating drivers to watch for bikes is key.

Sidewalks in neighborhoods would help combat our obesity and declining health in Nashville. In the older neighborhoods such as Oak Hill, there are no sidewalks and we all walk in the street which is dangerous at night.

It's very frustrating for me, simply as a driver, to see other drivers use bike lanes as a turn lane. We need to educate!!

Cyclists need DEDICATED space/lanes/ division – otherwise very dangerous

All building construction underway should have mandatory sidewalks and bike paths.

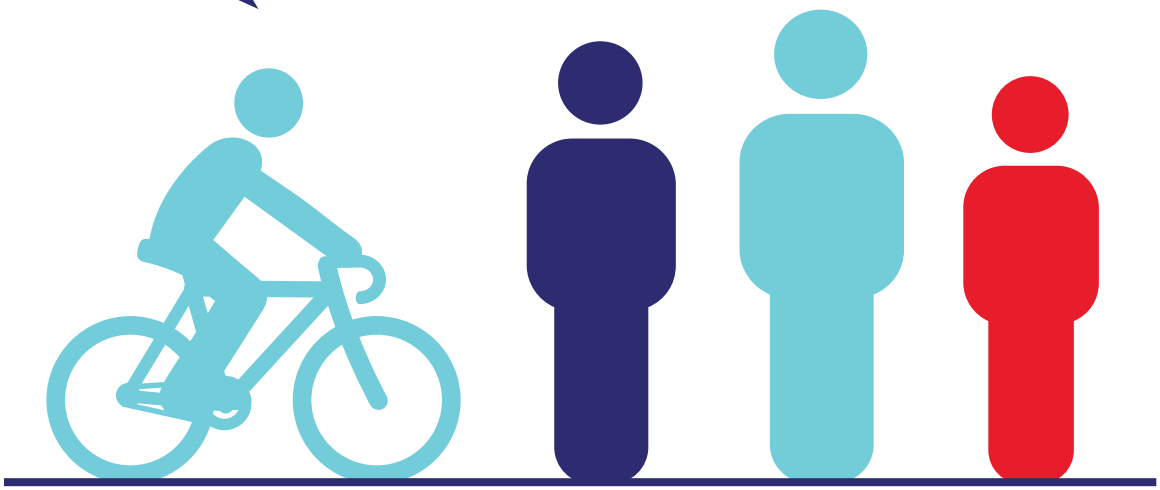
I think increasing bike access as we increase mass transit options will be critical. For example, if I can safely ride to a train station, I am more apt to use the options together. So some thought should be given to this as mass transportation continues.

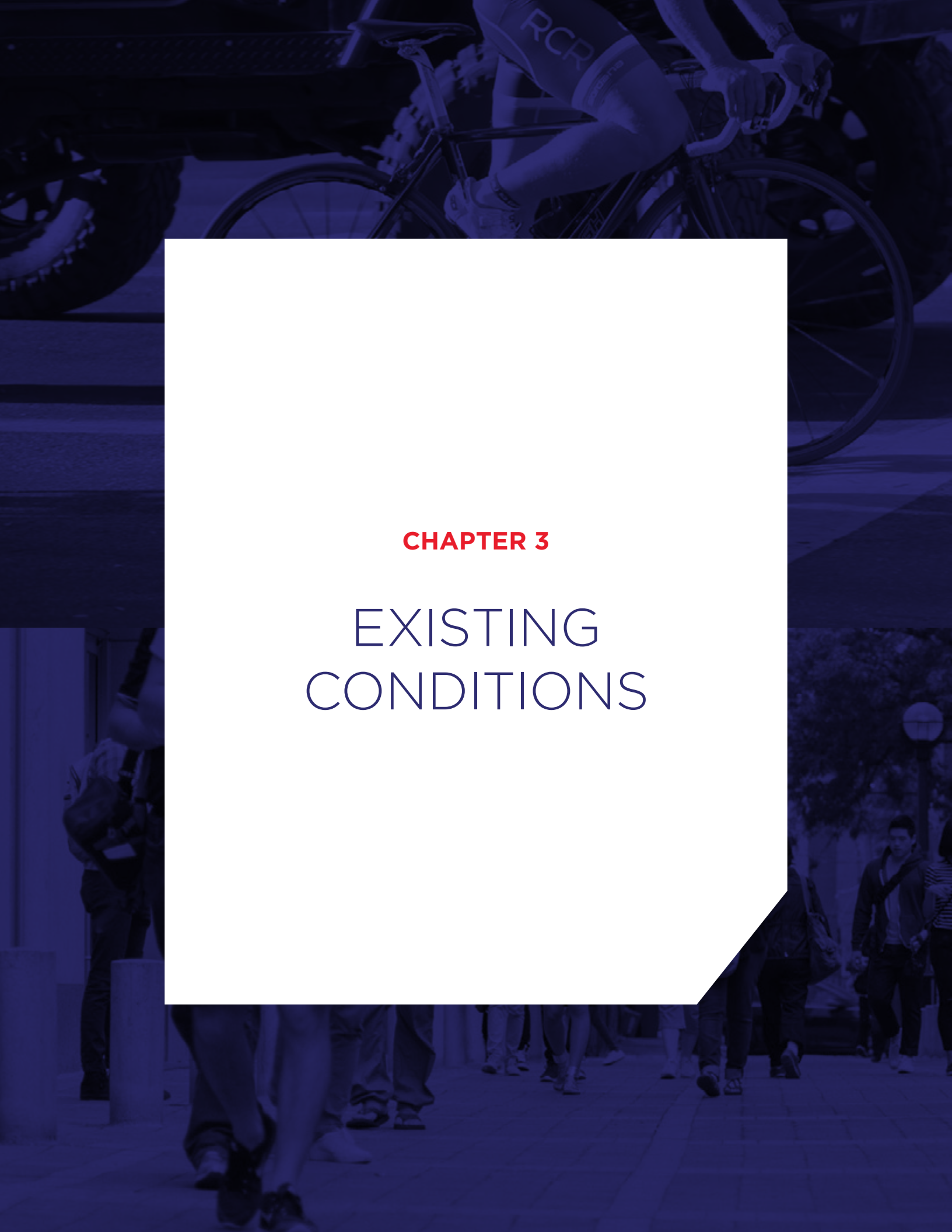
I would walk more for errands, but I live in a high traffic area and don't feel safe.

Please keep building sidewalks!!! We feel trapped without them! We want to be able to walk for exercise.

With increase in density and traffic, bikeways and walkways are essential to quality of life and safety in Nashville.

Keep up the good work! Excited at the prospect of achieving an improved, more walkable and bikeable Nashville.





CHAPTER 3

# EXISTING CONDITIONS

# Setting the Planning Context

Since the 2008 Strategic Plan for Sidewalks and Bikeways, Metro Nashville has made significant progress in making the region more walkable and bikeable. This is largely due to the expansion of the sidewalk and bikeway network. In addition, education and encouragement programs and organizations focused on making Nashville more walkable and bikeable have blossomed. However, the city's history leaves a fragmented network for walking and bicycling that will take decades to remedy. Most of Nashville's sidewalks are on streets in the oldest parts of the city, which consist of neighborhoods built prior to the adoption of more suburban-style land development patterns that were prevalent after World War II. Generally, there were no on-street bike facilities in Nashville until 2000. Like most southeastern cities, Nashville is finding ways to retrofit the environment for walking and bicycling so that the city remains competitive, attractive, and safe for its current and future residents.

This chapter outlines the existing conditions context at the outset of this plan's development. A separate, standalone 2016 "State of Practice Report" contains further information regarding the accomplishments in the Five E's: Engineering, Education, Encouragement, Enforcement, and Evaluation. The report includes a discussion of the evolution of the bicycle and pedestrian networks and timeline for accomplishments in the Five E's. It features photographs of infrastructure and programming activities. It can be found as an appendix to this report.

# Achievements Since 2008 Plan

Metro Nashville has significantly improved its bicycle and pedestrian infrastructure, programming, and policies since the 2008 Plan. The following table outlines selected action steps found throughout the 2008 update and their completion status. This plan's recommendations will include specific, updated action steps.

*Table 3-1. Selected Key Action Steps*

| Selected Key Action Steps | Status |
|---|---|
| Establish permanent Bicycle and Pedestrian Advisory Committee (BPAC) | Complete |
| Create a full-time Pedestrian & Bicycle Coordinator position for Public Works. | Complete |
| Prioritize and build sidewalk network | Ongoing |
| Implement bikeway projects in coordination with other capital projects such as the resurfacing program | Ongoing |
| Work towards Complete Streets in all roadway work | Ongoing and policy passed |
| Further educate Metro staff in multiple departments on bicycle and pedestrian planning and design issues | Ongoing |
| Routinely incorporate bicycle and pedestrian training activities for Metro Police | Ongoing |
| Pedestrian and bicycle improvements should be incorporated into all of the interchanges in the downtown interstate loop. | Not complete |
| Incorporate education and encouragement into Metro's Bicycle and Pedestrian Program.<br><br>Offer child and adult bicycle and pedestrian education opportunities | Ongoing with advocacy groups like WalkBike Nashville leading the way |
| Major arterials such as Charlotte Pike, Gallatin Pike, and others should be re-engineered | Not complete |
| Develop advertising campaign to increase public awareness of bicyclists and pedestrians | Not complete |

# Existing Conditions Analysis

An existing conditions analysis was performed to better understand bicycle and pedestrian trends and issues. The following pages feature different types of analyses that were conducted to take a closer look at current pedestrian and biking conditions in Nashville. Results of these analyses illustrate areas where improvements to safety and connectivity could be made. Memorandums of these analyses are provided as appendices to this document.

> *"I have been a resident of Nashville for thirty years! Our town is growing at an alarming rate and on its way to becoming a city. We cannot handle the volume of traffic at the current rate. It is imperative that people are encouraged to walk, bike, and use public transportation more and drive a car less."*
>
> **- NASHVILLE RESIDENT**

*Table 3-2. Chapter 3 Page References*

| Type of Analysis Conducted | In order to understand... | Page |
|---|---|---|
| Federal ADA Requirements + History of ADA in Nashville | Inventory of existing sidewalk conditions | 59-62 |
| Review of current pedestrian environment | Opportunities and barriers to pedestrian travel | 63-64 |
| Review of current bicyclist environment | Opportunities and barriers to bicyclist travel | 64-65 |
| Pedestrian and bicycle crashes | Where bicycle and pedestrian crashes are occurring and any trends/patterns related to where crashes occur | 67-74 |
| Health and equity | Where there are concentrations of higher need populations | 75-76 |
| Demand analysis | Expected pedestrian and bicyclist activity | 77-78 |
| Bicycle Level of Traffic Stress and Pedestrian Level of Service | Extent of bicyclist and pedestrian travel based on their level of comfort along the roadway network | 79-90 |
| Pedestrian and Bicyclist Suitability Analysis | Where the combined bicycle and pedestrian demand and need are greatest | 91-94 |
| Review of existing plans | Previous recommendations for improving walking and biking | 97-98 |

# Federal ADA Requirements

In 1990 Congress passed the Americans with Disabilities Act (ADA). This act prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to enjoy employment opportunities, purchase goods and services, and to participate in state and local government programs and services.

The Americans with Disabilities Act includes regulations for state and local government, businesses, and non-profit service providers, as well as ADA standards for accessible design for new construction, alteration, program accessibility, and barrier removal.

Meeting the requirement of ADA is an important part of any bicycle or pedestrian project. The United States Access Board's proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) and the 2010 ADA Standards for Accessible Design (2010 Standards) contain standards and guidance for the construction of accessible facilities.

Table 3-3 describes the types of issues that would make a sidewalk non-compliant.

*Table 3-3. Types of ADA Sidewalk Issues*

| Types of ADA Sidewalk Issues | |
|---|---|
| Exact location of sidewalk | Electric box obstructions |
| Type of material of sidewalk | Other electric obstructions |
| Width of sidewalk | Gas valve or meter obstructions |
| Total length of sidewalk | U. S. Post Office mailbox obstructions |
| Electric manhole obstructions | Private mailbox obstructions |
| Length of sidewalk under construction | Other path of travel obstructions |
| Length of damaged sidewalk | Telephone obstructions |
| Horizontal cracks greater than 1/2 inch | Telephone manhole obstructions |
| Vertical cracks greater than 1/4 inch | Telephone box obstructions |
| Cross slopes less than 2% | Other telephone obstructions |
| Cross slopes from 2% to 3% | Sign obstructions |
| Cross slopes greater than 3% | Traffic signal pole obstructions |
| Water meter obstructions | Traffic signal cabinet obstructions |
| Water hydrant obstructions | Tree obstructions |
| Water manhole obstructions | Commercial driveway obstructions |
| Other water obstructions | Residential driveway obstructions |
| Electric pole obstructions | New sidewalk ramps (ADA compliant) |
| Length of missing sidewalk (Missing sidewalk is defined as a gap between two existing sidewalks that is less than 1/4 mile in length. ) | Old sidewalk ramps (ADA non-compliant) |
| | Missing sidewalk ramps (locations where ramps are required per Metro's standards or per ADA guidelines, but have not yet been installed) |

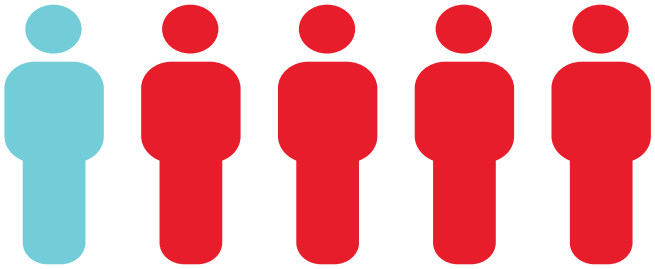
# History of ADA in Nashville

In 2002, Metro Public Works completed an extensive inventory of the existing public sidewalks in Davidson County. The purpose of this inventory was to develop a thorough sidewalk database that could be used to determine the magnitude of ADA problems for sidewalks and curb ramps.

In 2013, an updated inventory and condition assessment was conducted for the existing 1,130 miles of sidewalks.

Survey teams assess the sidewalks to identify the location, condition, and characteristics of each sidewalk. All data is recorded using mobile technology and software. The tools that are used to collect data include "Smart Tool" digital levels, measuring wheels and tape measures. All collected data is assessed on a block-by-block basis.

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



One in five American adults has a **disability.**

*Source: U.S. Census Bureau Survey of Income and Program Participation.*

# Examples of Sidewalk Obstructions:

## DAMAGED & CRACKED SIDEWALKS

Damaged sidewalk.

Damaged sidewalk.

Horizontal cracks in sidewalks create tripping hazards.

## EXCESSIVE CROSS SLOPE

Excessive cross slope.

According to ADA guidelines, the maximum acceptable cross slope for a sidewalk is 2% grade.

# Examples of Sidewalk Obstructions:

## OBSTRUCTIONS


An obstruction is considered to be any element that either reduces the width of a sidewalk below ADA guidelines or that can serve as an obstacle to a disabled person.

Obstructions, such as utility poles, may require that the obstruction be relocated outside of the sidewalk.

Numerous obstructions along a sidewalk may warrant realignment of the sidewalk or an expanded furnishings zone.

## CURB RAMPS

Sidewalk ramps should be provided at the corners of roadway intersections where sidewalks are present.

Sidewalk ramps should have a detectable warning surface that alert people with vision impairments of their approach to street crossings and hazardous drop-offs.

## PEDESTRIAN ENVIRONMENT:
# Opportunities

### SIDEWALK DESIGN

The planting strip serves as a buffer on 12th Avenue South


The sidewalk outside the Ryman Auditorium is 8 feet wide, greater than the 5 feet minimum standard

### INTERSECTIONS

Pedestrian scramble on 4th Ave in downtown

ADA compliant curb ramps and high visibility crosswalks are present at the intersection of 4th Ave and Commerce St

### PEDESTRIAN CROSSINGS

Median on Deaderick St separates the two lanes of traffic

Midblock crossing on 4th Ave

### PEDESTRIAN AMENITIES

Wayfinding in Downtown Nashville

Transit amenities on 21st Ave: bus shelter, bench, trash can, and sidewalks along the corridor

## PEDESTRIAN ENVIRONMENT:
# Constraints

### SIDEWALK CONDITION

Sidewalk on Rosedale Ave is in poor condition and poses tripping hazards

Cracks in sidewalk along 13th Ave S

### INTERSECTIONS

At Cleveland Street and Lischey Avenue, some of the crosswalk markings have faded

No pedestrian refuge at the Porter Road and Riverside Drive intersection

### LACK OF SIDEWALKS

Worn path on Glenrose Avenue

A man runs in the street due to the lack of sidewalks on Riverside Drive

### SIDEWALK OBSTRUCTIONS

Lack of pedestrian accommodations during construction along Hillsboro Pike

Lack of pedestrian accommodations during construction on Wade Avenue

## BIKEWAY CONDITIONS:
# Opportunities

BIKEWAY DESIGN

Buffered bike lane along Church Street that continues over the bridge

A cyclist rides on the protected bike lane on Old Hickory Blvd

BIKEWAY DESIGN

Wayfinding for cyclists on 24th Ave S and Blakemore Ave

Pedestrians and cyclists travel on the Seigenthaler Bridge

INTERSECTIONS

A bike box on 9th Avenue N and Church St

The separated bike lane on 28th/31st Ave connector continues through the intersection at City Blvd

AMENITIES

High demand for B-cycle as evidenced by only one bike remaining at the kiosk on Church Street

Bike parking is available outside key destinations such as the Nashville Convention Center

## BIKEWAY CONDITIONS:
# Constraints

### BIKEWAY IMPROVEMENTS

Shared lane marking on Charlotte Ave, which is a 40 mph corridor and may be a stressful corridor for bicyclists

A cyclist rides on the sidewalk on 16th Ave. A contraflow bike lane could accommodate bicyclists traveling in both directions

### BIKEWAY CONDITION

Faded bike lane marking on 12th Avenue South


Debris and trash within bike lane along Cahal Avenue

### OBSTRUCTIONS

Bike lane on Charlotte Ave is blocked off during construction

A sign is placed in the bike lane on Fairfax Ave

### AMENITIES

A bike is locked to a pole on 5th Ave N in downtown due to the of lack bike parking

Bike left outside of building on Union St due to lack of bike racks

# Bike and Pedestrian Crash Review

A crash analysis was conducted to review bicycle- and pedestrian-involved crashes over a five-year period (2010-2014) in Davidson County as reported by the Tennessee Department of Safety.

The *Dangerous by Design* (2014) report uses a Pedestrian Danger Index (PDI) to assess the relative safety of pedestrians in regions across the country. This report found that there are 1.25 pedestrian fatalities for every 100,000 residents in Nashville. Compared to its peer cities of Louisville/Jefferson County and Memphis, Nashville has a lower volume of annual crashes per 100 bike commuters.

*By the numbers (2010-2014):*

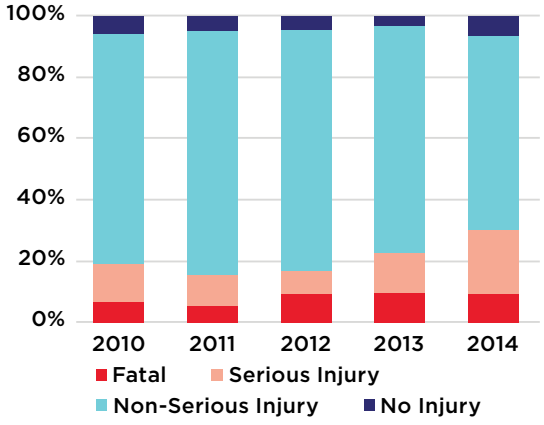
**1,110** Total crash events

**854** Pedestrian involved crashes

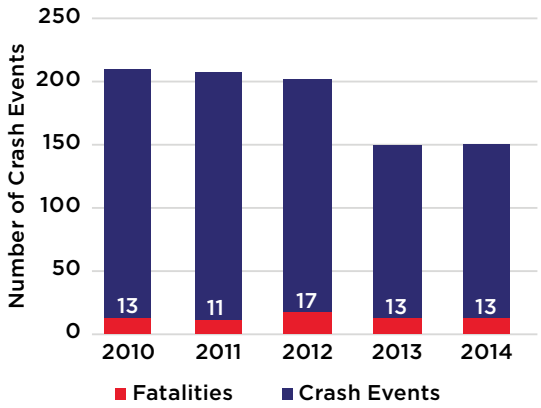
**256** Bicycle involved crashes

**15th** Nashville's ranking as the 15th most dangerous region in the U.S. for pedestrians, based on the 2014 *Dangerous by Design* report

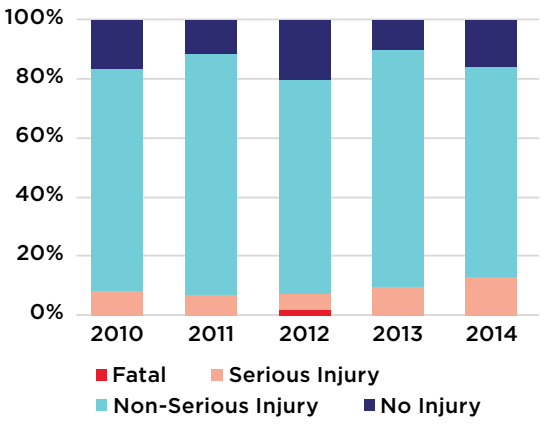
PEDESTRIAN CRASH SEVERITY



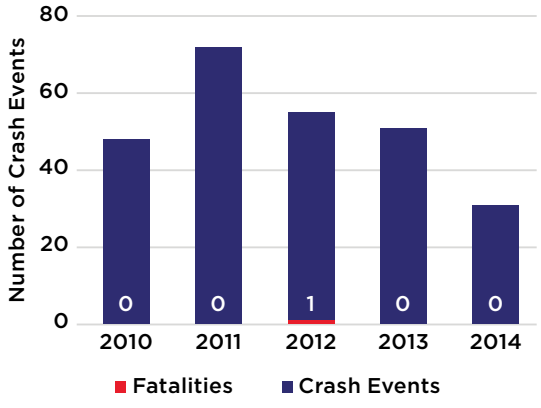

PEDESTRIAN CRASH EVENTS

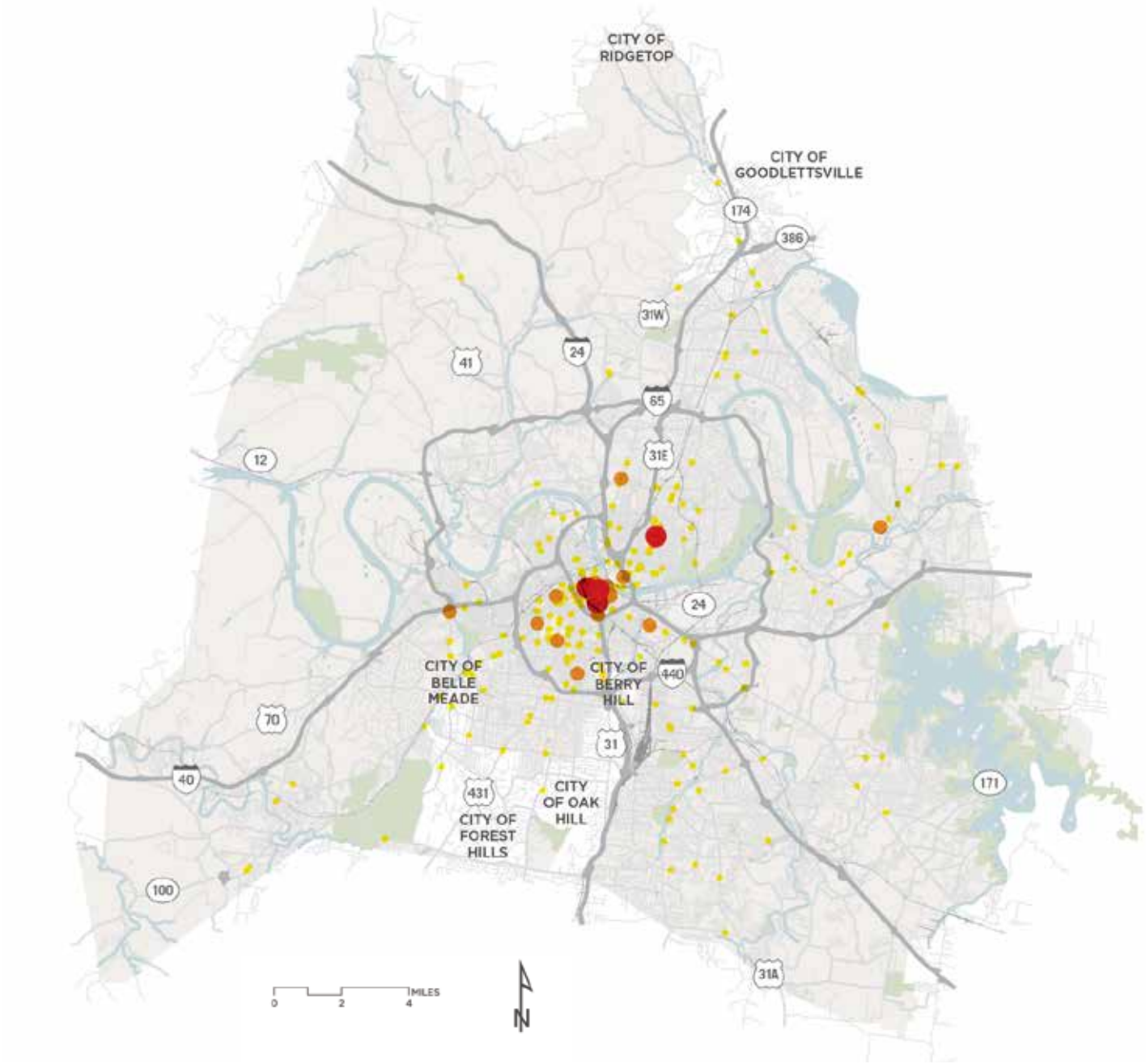



BICYCLE CRASH SEVERITY




BICYCLE CRASH EVENTS






## CRASH ANALYSIS

### BIKE CRASH FREQUENCY

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- 3

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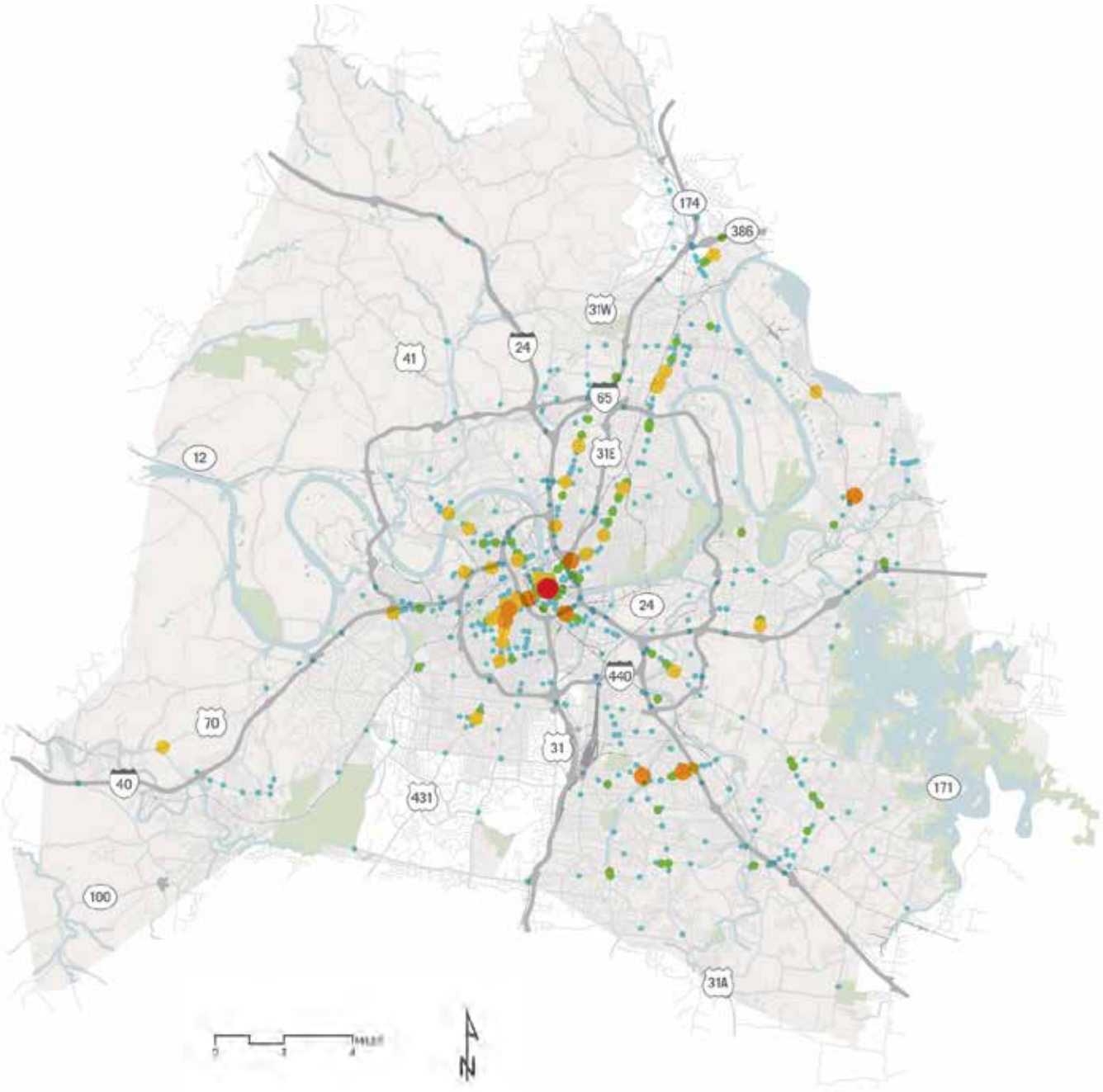


## CRASH ANALYSIS

### PEDESTRIAN CRASH FREQUENCY

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- 3-4
- 5-8
- 9-11

# CRASH ANALYSIS

## BIKE CRASH FREQUENCY

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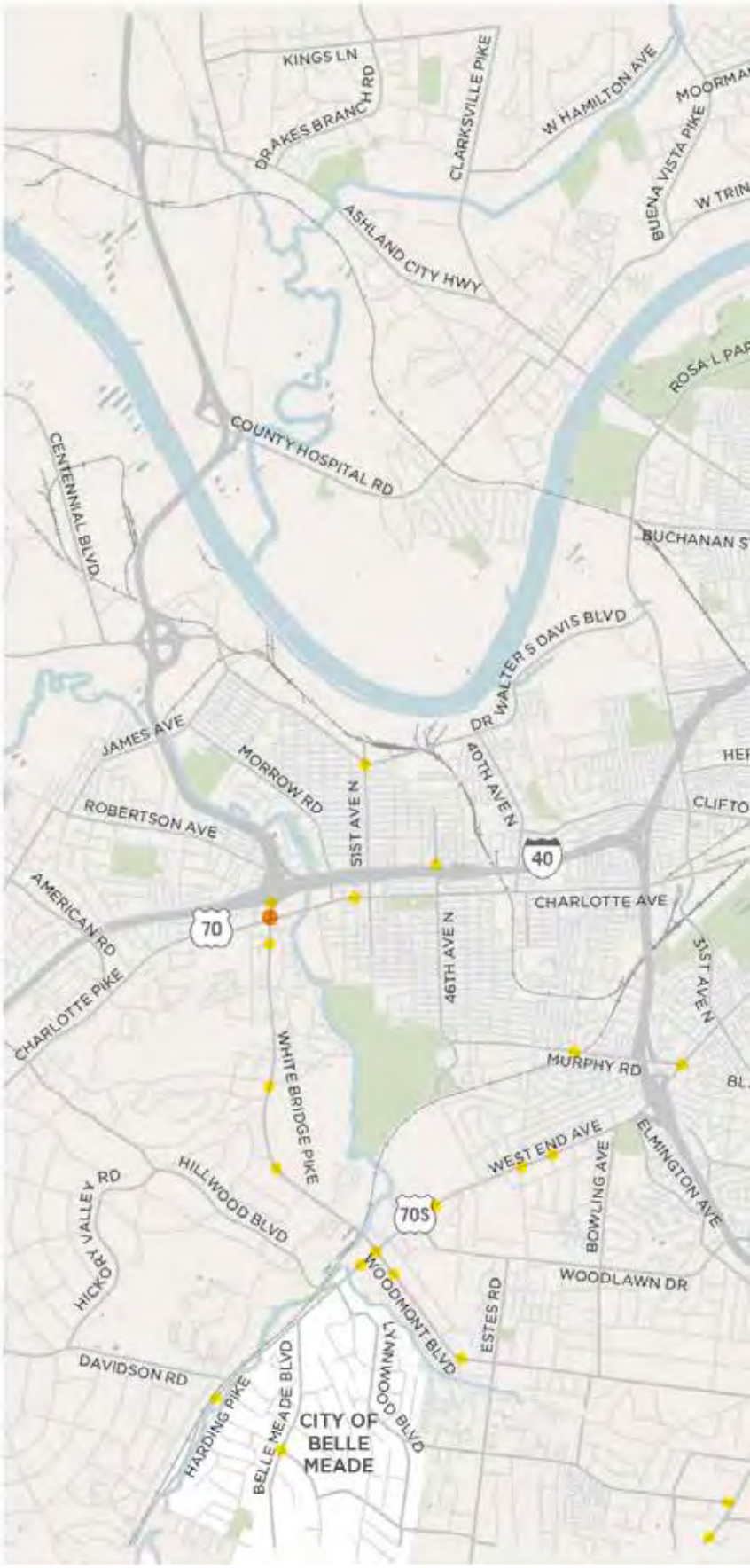

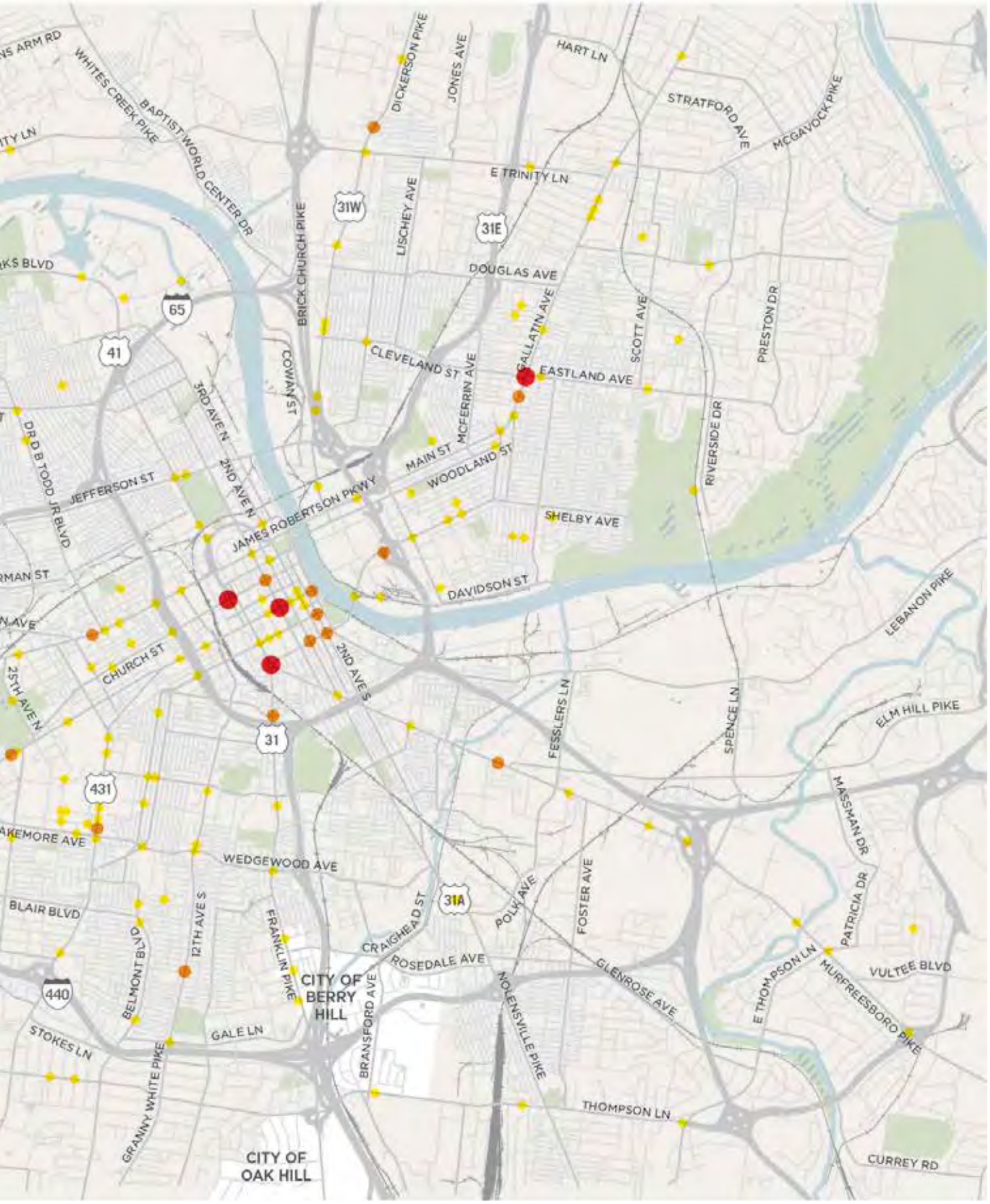
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THOMPSON LN
CITY OF OAK HILL
CURREY RD

# CRASH ANALYSIS

## PEDESTRIAN CRASH FREQUENCY

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- 3-4
- 5-8
- 9-11

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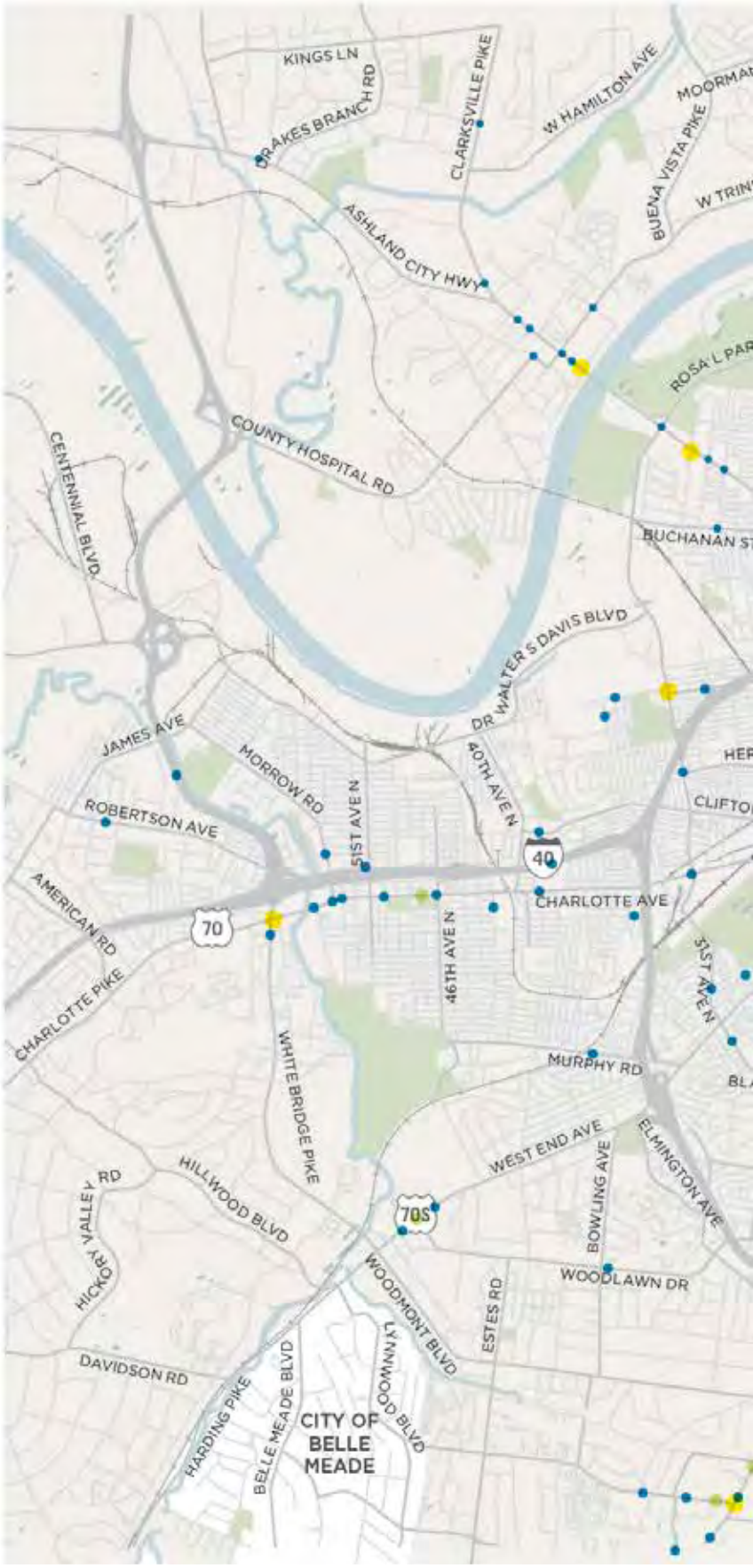

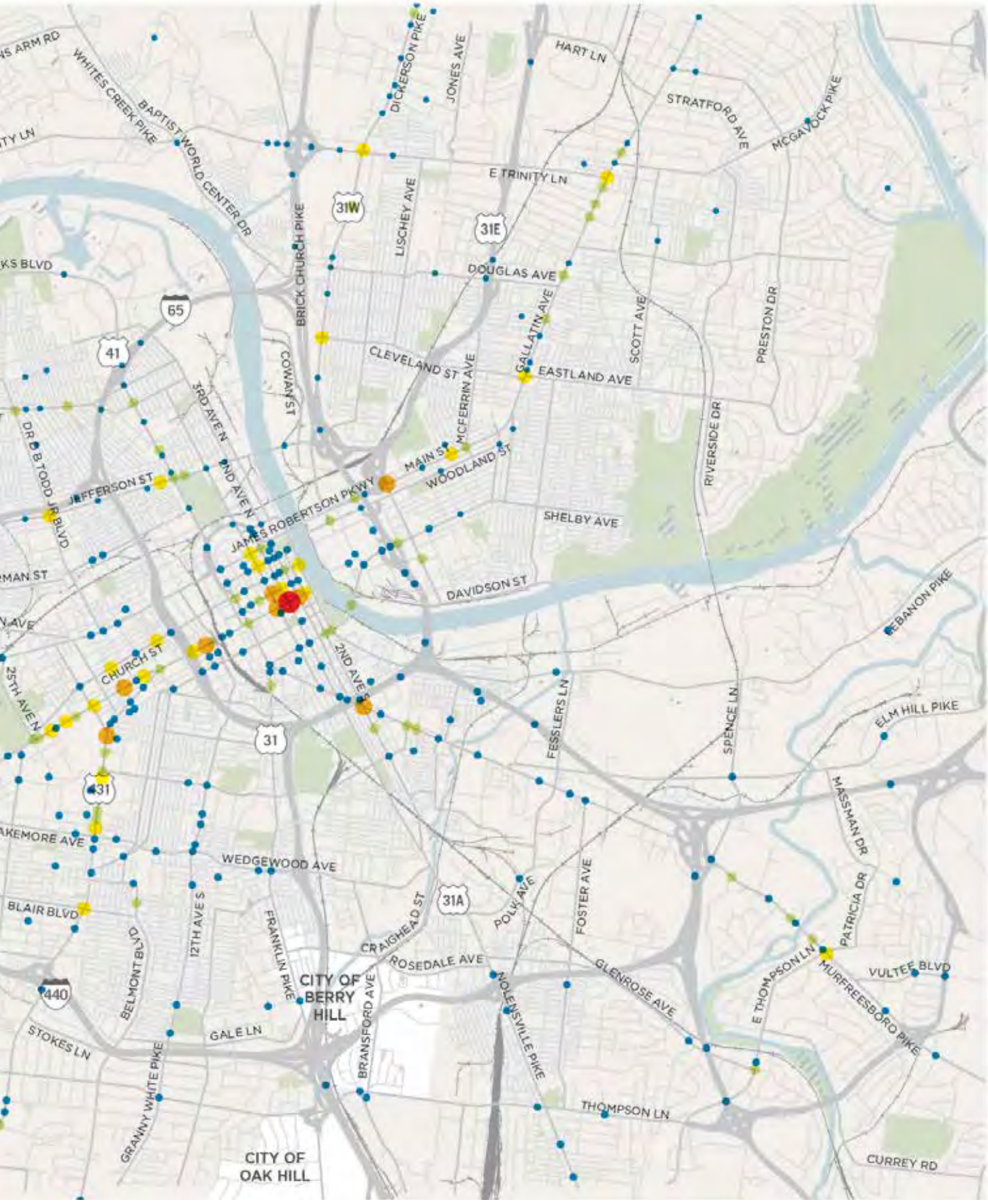
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# Health and Equity

A significant portion of the population may be more dependent on walking and bicycling as a means of transportation. As described in Chapter 1, nearly 8% of the population does not have access to a vehicle. The Nashville Area MPO conducted a health and equity analysis to understand areas where higher-need populations reside. In the 2040 Regional Transportation Plan, the MPO expressed its commitment to prioritize transportation projects that incorporate health, safety, and social equity considerations and that allow communities to grow sustainably. The analysis scored the study area using an index measuring economic and demographic factors. These factors include:

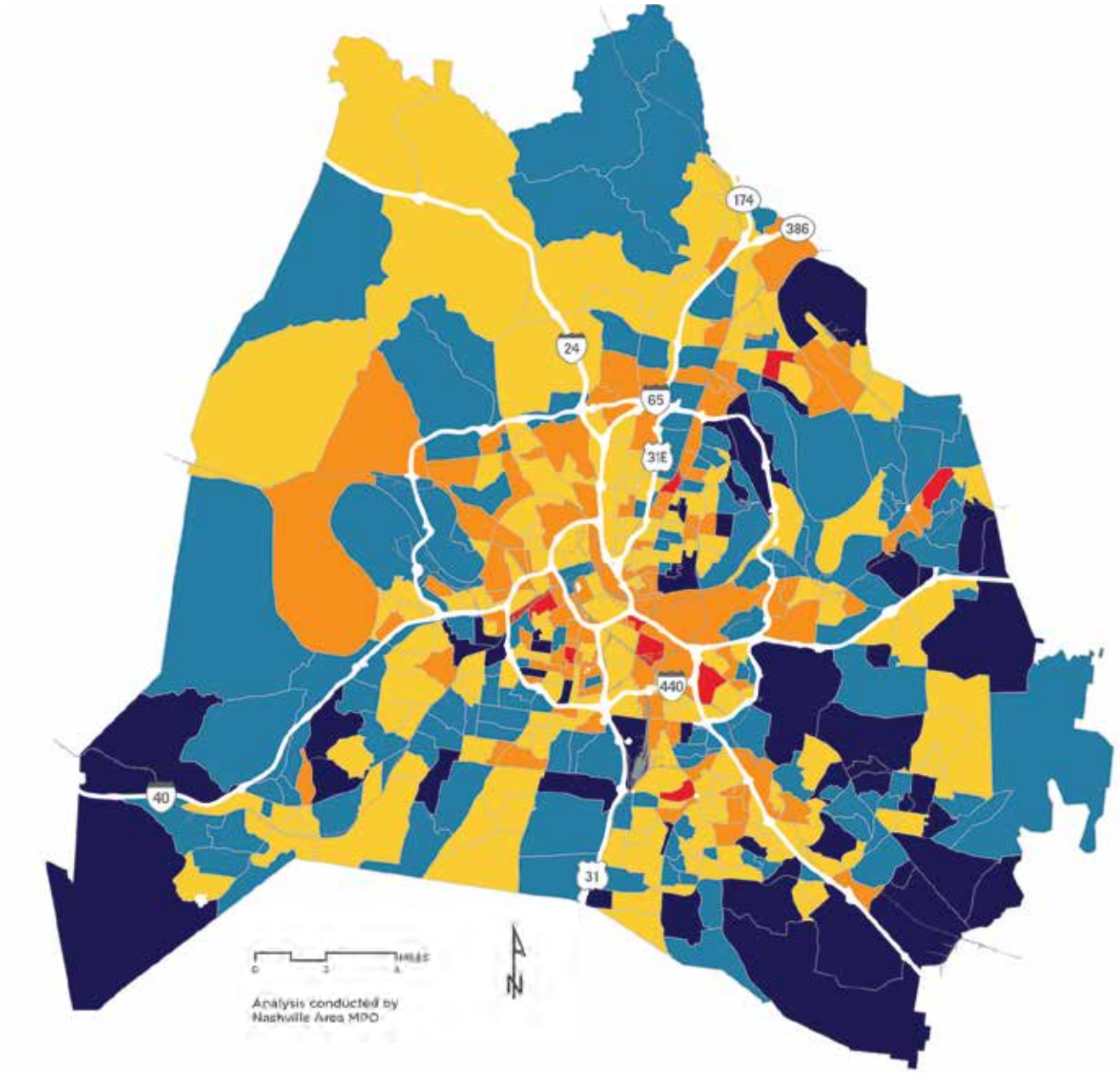
- Households in poverty
- Unemployed population
- Households without access to a vehicle
- Aging population (greater than 65 years of age)

Areas of higher need include Wedgewood-Houston, TMAG, Hermitage Ridge, and the area near Vista Apartments. Based on this analysis, the MPO decided to focus on the areas with 3 or more of the 4 attributes as priority areas for sidewalk and bikeway improvements.

The MPO also conducted the Middle Tennessee Transportation and Health Study (MTTHS) with 6,000 households to measure transportation behaviors and health attributes. Data on public health outcomes and behaviors related to transportation, physical activity, and nutrition were used to establish "Health Priority Areas". Active transportation projects in these areas were given a greater number of points when MPO staff evaluated projects. Results showed that people who are low-income, unemployed, over age 65, or do not own a car tend to have poorer health outcomes.

*"Sidewalks facilitate increase in walking and health and safety. Sidewalks are important."*

**–NASHVILLE RESIDENT**




## HEALTH PRIORITY AREAS

### 2014 MPO REGIONAL BICYCLE AND PEDESTRIAN STUDY

- 0
- 1
- 2
- 3
- 4

CATEGORIES

- Households in poverty
- Unemployed population
- Households without access to a vehicle
- Aging population (>65)

# Pedestrian and Bicyclist Demand

A non-motorized demand analysis was completed by the Nashville Area MPO as documented in the Regional Bicycle and Pedestrian Study. The demand analyzed inputs at the parcel level and was driven by eight types of trips.

**SCHOOL**
Schools are a significant source of walking and biking by populations that either can't drive because they're not old enough or are more likely to walk or bike for economic reasons.

**WORK**
Higher densities of workers translates to higher propensity for people to walk or bike.

**RECREATION**
Trails and parks are attractors and generators of walking and biking activity.

**ERRAND**
Places where people can complete errands, such as banks, are generators of walking and bicycling trips.

**SHOP**
Retail shopping areas are attractors for walking and biking.

**PARKING (CBD)**
Pedestrian or bicyclist trips are generated to and from areas where cars are parked.

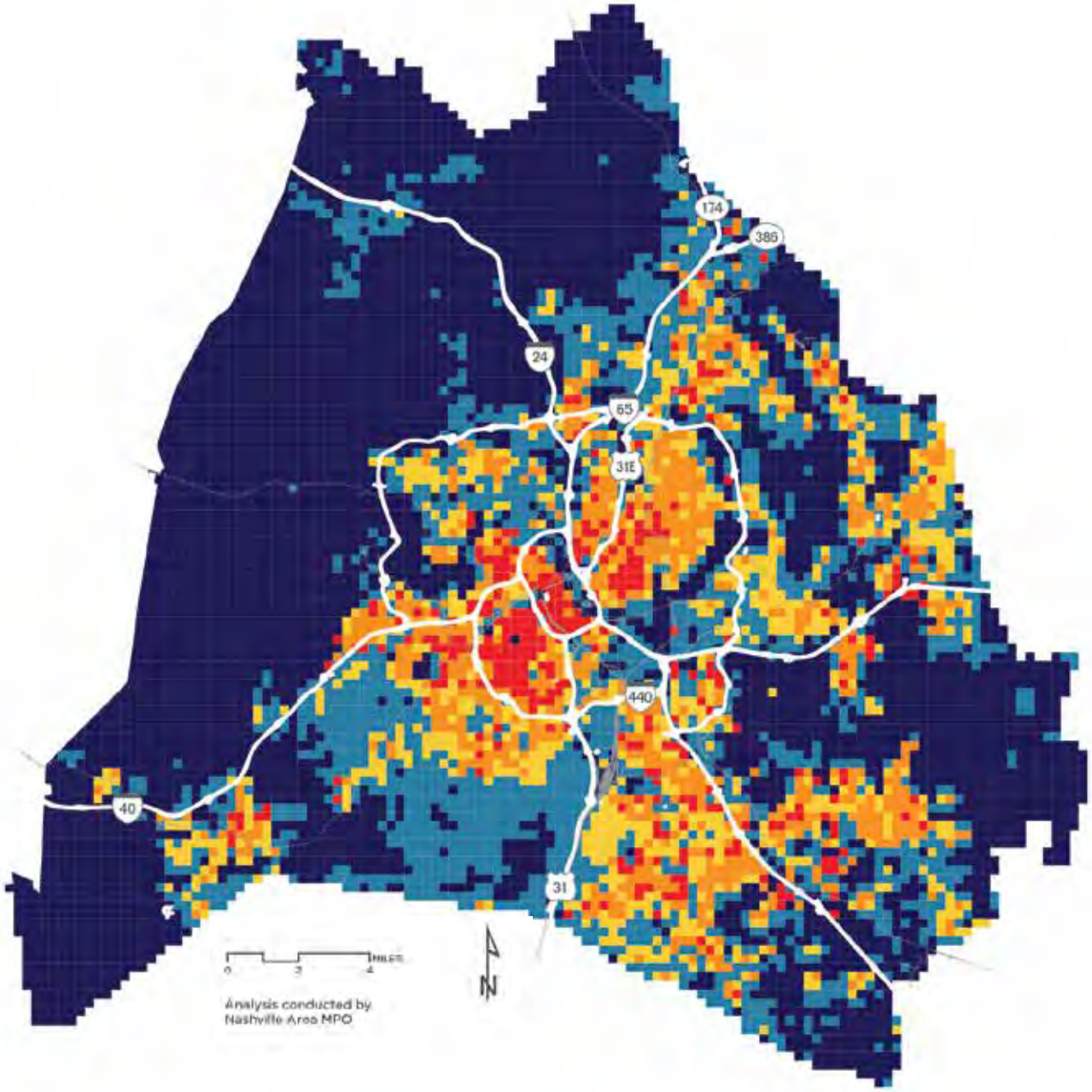
**TRANSIT (TO) + TRANSIT (FROM)**
More than three-quarters of transit trips start or end with a walking trip.

**SUMMARY OF FINDINGS**

Demand for pedestrian and bicycle trips is very high in Downtown, East Nashville, Germantown, Midtown, and other central neighborhoods as well as in nodes throughout Davidson County.

*"Connecting neighborhoods to shopping, restaurants, grocery stores, etc., similar to East Nashville, would stimulate the economy (easier access to spending, jobs, etc.) and increase property values. It would be great to see this in Antioch."*

**- NASHVILLE RESIDENT**




## NON-MOTORIZED DEMAND

2014 MPO REGIONAL BICYCLE
AND PEDESTRIAN STUDY

- <5
- 5-50
- 50-100
- 100-200
- >200

# Bicycle Level of Traffic Stress and Pedestrian Level of Service

The Bicycle Level of Traffic Stress (BLTS) is a model used to quantify the user experience along and across the existing network of roadways and trails. This methodology is adapted from the 2012 Mineta Transportation Institute (MTI) *Report 11-19: Low Stress Bicycling and Network Connectivity*. Inputs include:

- Posted speed limit
- Number of travel lanes
- Annual average daily traffic volumes (AADT)
- Traffic controls
- Presence and character of bicycle facilities

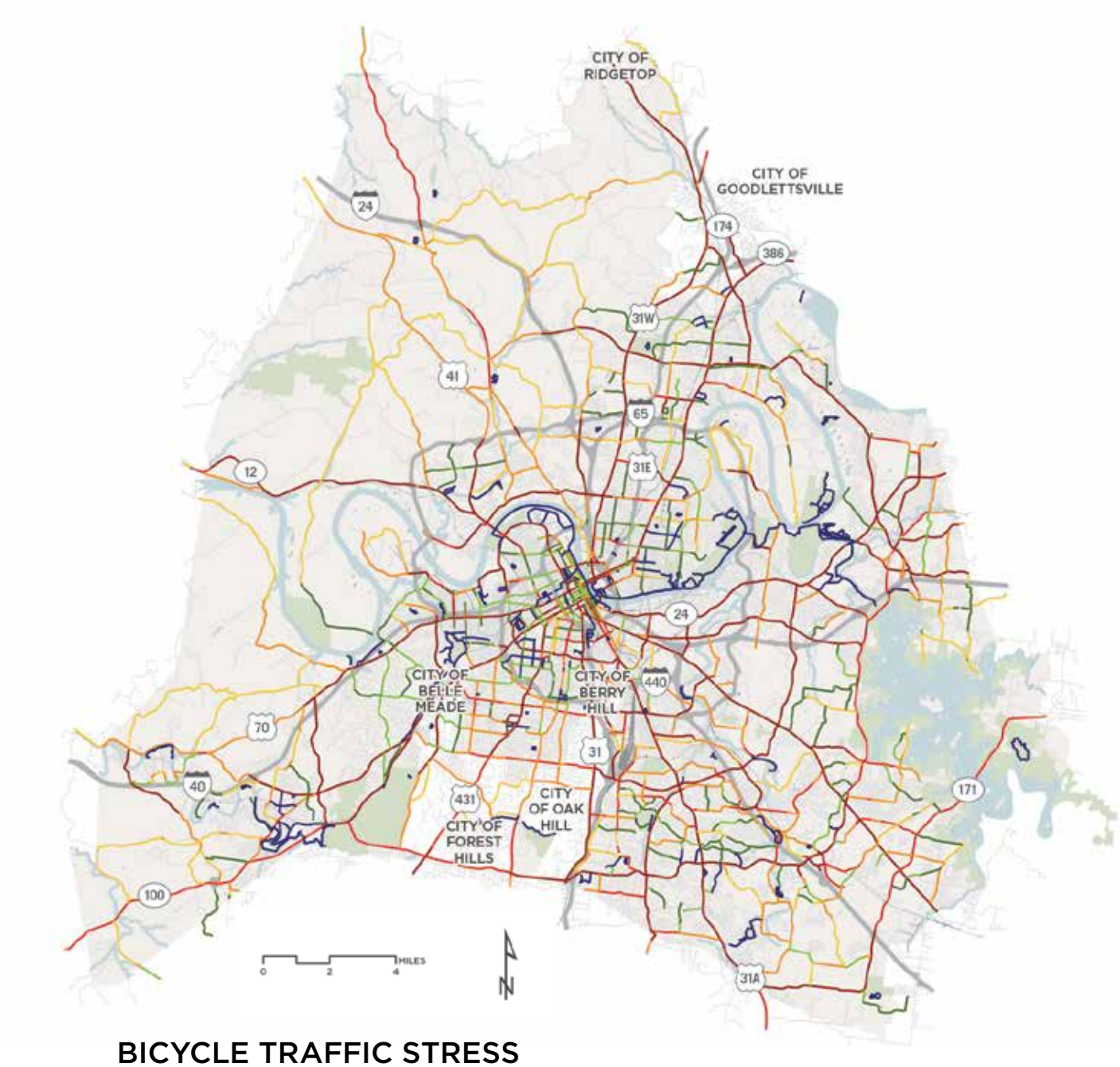
These inputs are used as proxies to determine bicyclists' levels of comfort along roadway segments. The lowest level of traffic stress, LTS 1, is assigned to roads that would be tolerable for most children to ride and also to shared-use paths that are separated from traffic. Proposed bicycle facilities were excluded from the analysis. Each roadway segment was assigned an LTS segment score depending on the type of bicycle facility present and on posted speed limit, number of travel lanes, and traffic volumes.

The Pedestrian Level of Service (PLOS) is similar to BLTS in that it seeks to quantify pedestrians' experiences along the road network by using proxies to determine their level of comfort. The analysis was completed in 2014 by the Nashville Area MPO for the entire MPO region, but the analysis was limited to major roadways. Inputs for this analysis include:

- Presence and width of sidewalk
- Sidewalk buffer
- Roadway width
- Bike lane/shoulder width
- On-street parking
- Number of travel lanes
- Annual average daily traffic volumes (AADT)

Like BLTS, a scoring system is used to rank road segments. Instead of a numeric system, road segments were ranked from A-F.

The results of the analysis show that the pedestrian level of service is generally higher in central Nashille due to a higher level of sidewalk coverage.




## BICYCLE TRAFFIC STRESS

### LEVEL OF TRAFFIC STRESS

- 1
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- 3
- 3.5
- 4

# BICYCLE TRAFFIC STRESS

## LEVEL OF TRAFFIC STRESS

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- 3.5
- 4

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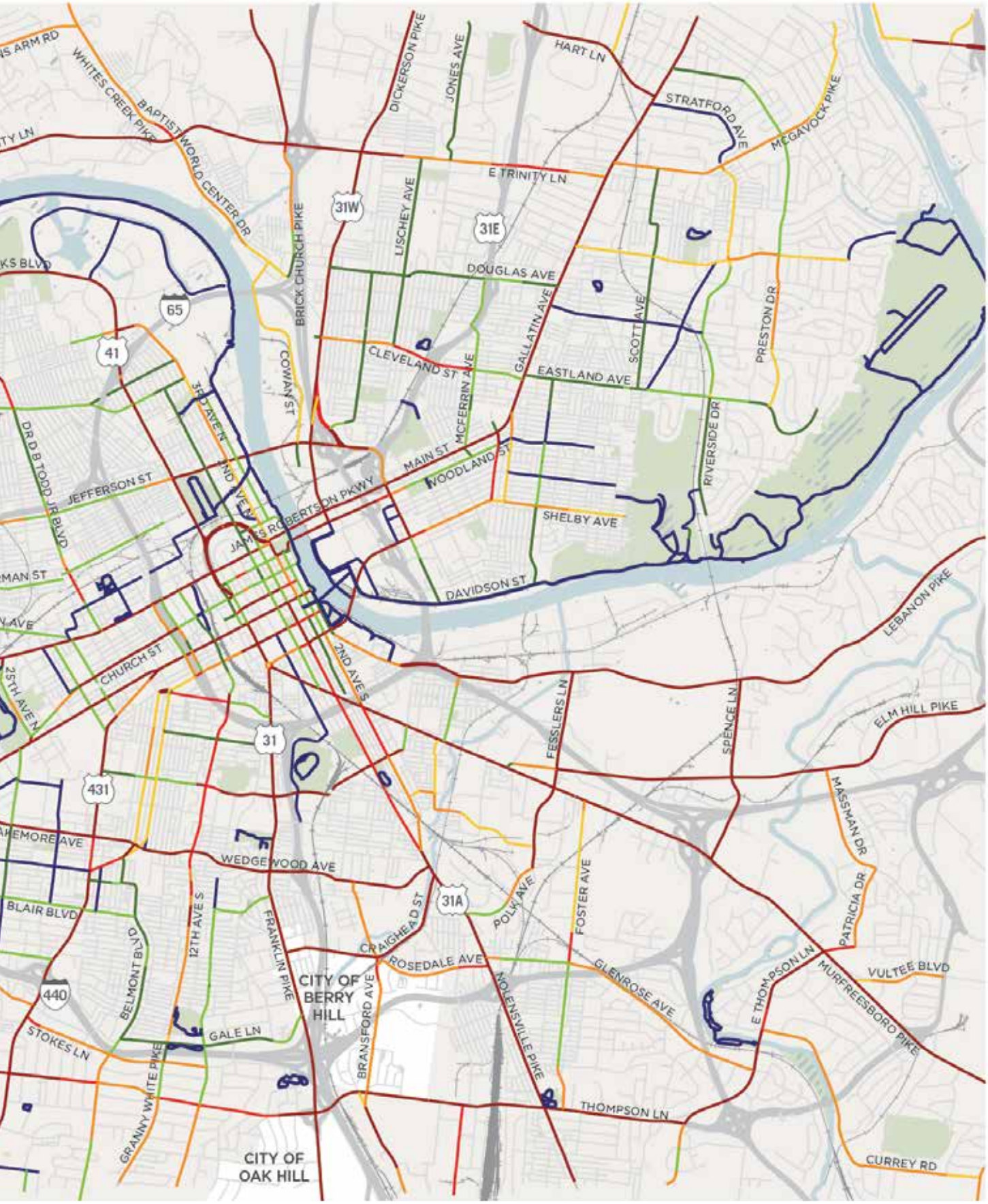
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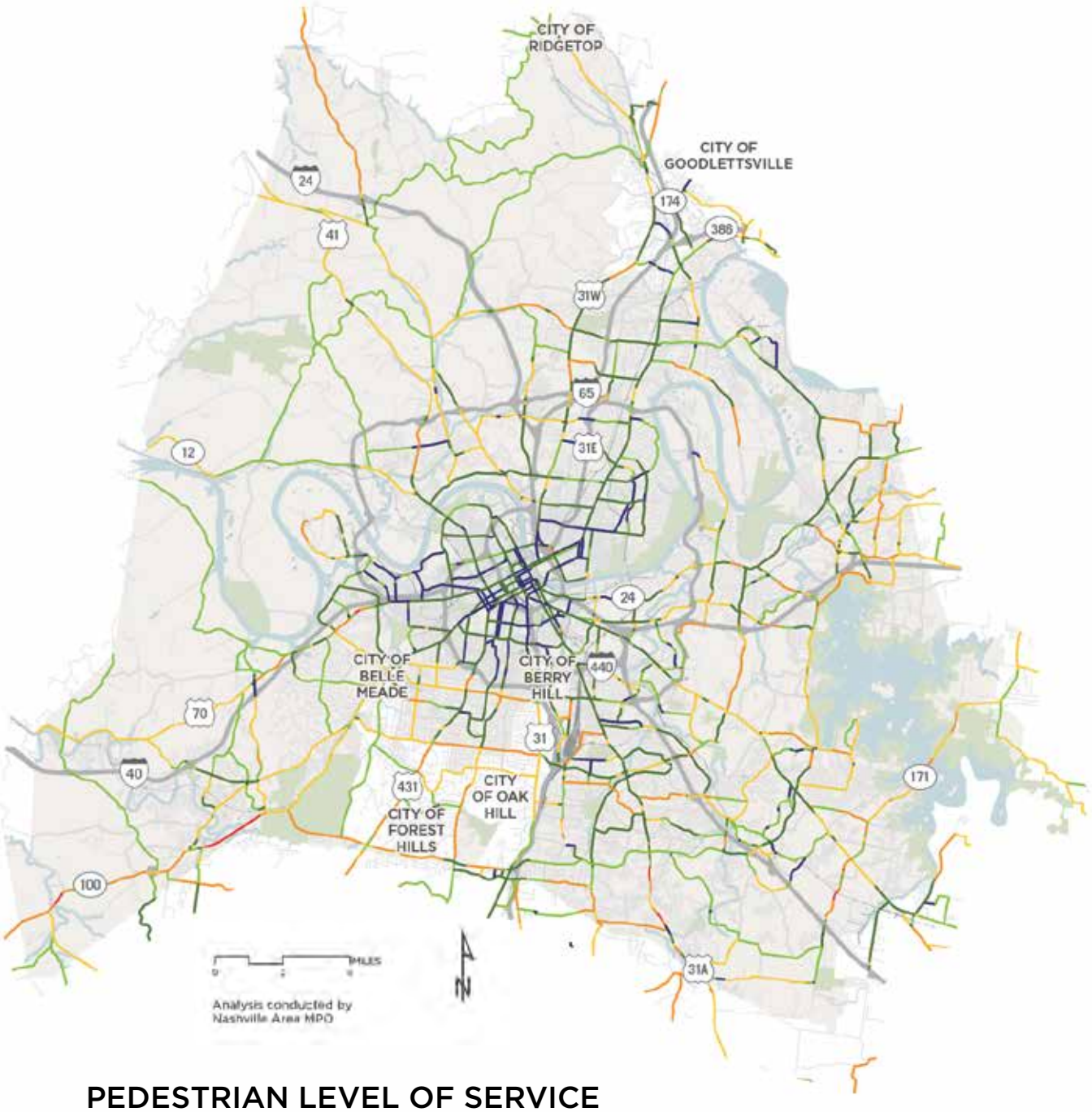


## PEDESTRIAN LEVEL OF SERVICE

### LEVEL OF SERVICE

- A
- B
- C
- D
- E
- F

# PEDESTRIAN LEVEL OF SERVICE

## LEVEL OF SERVICE

- A
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- F

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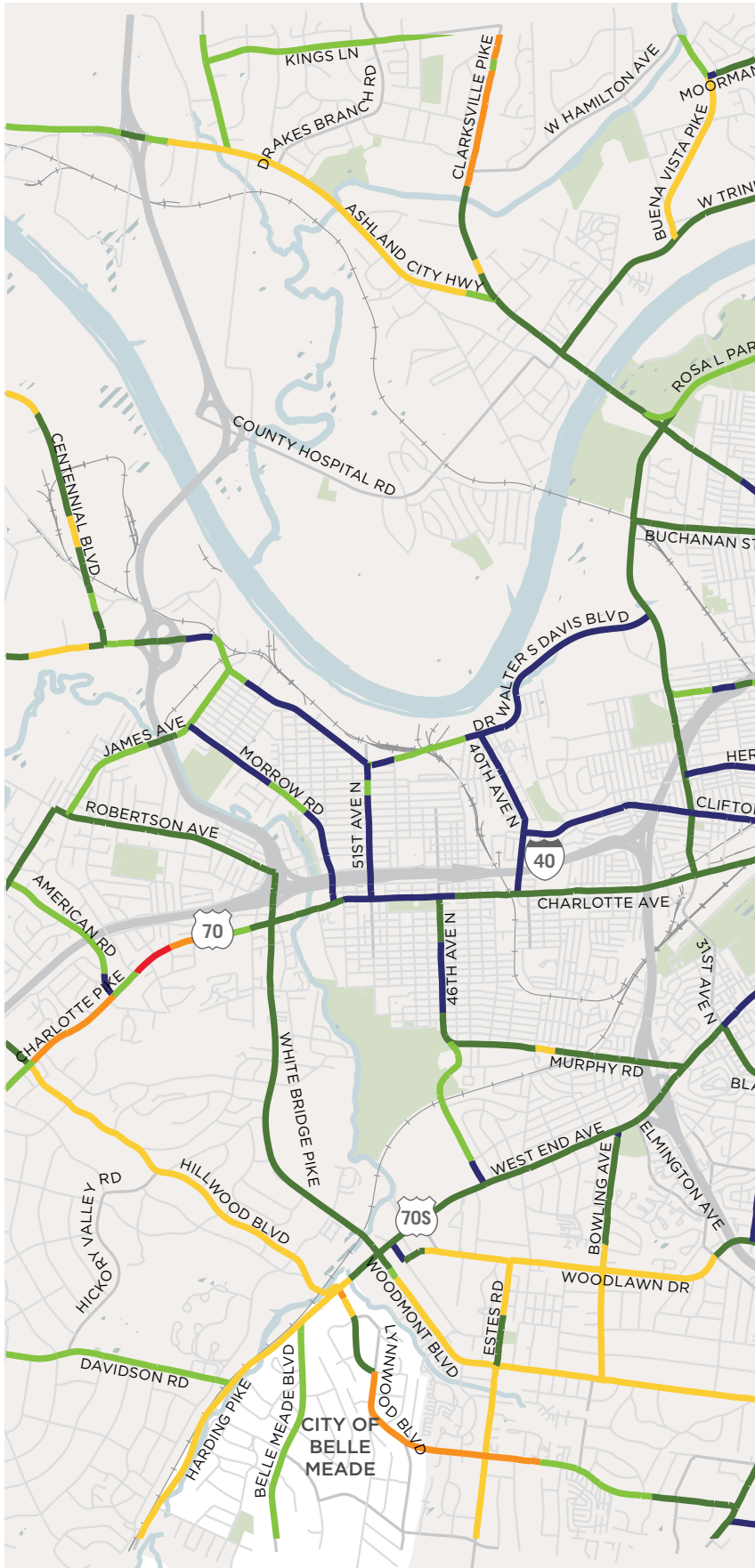

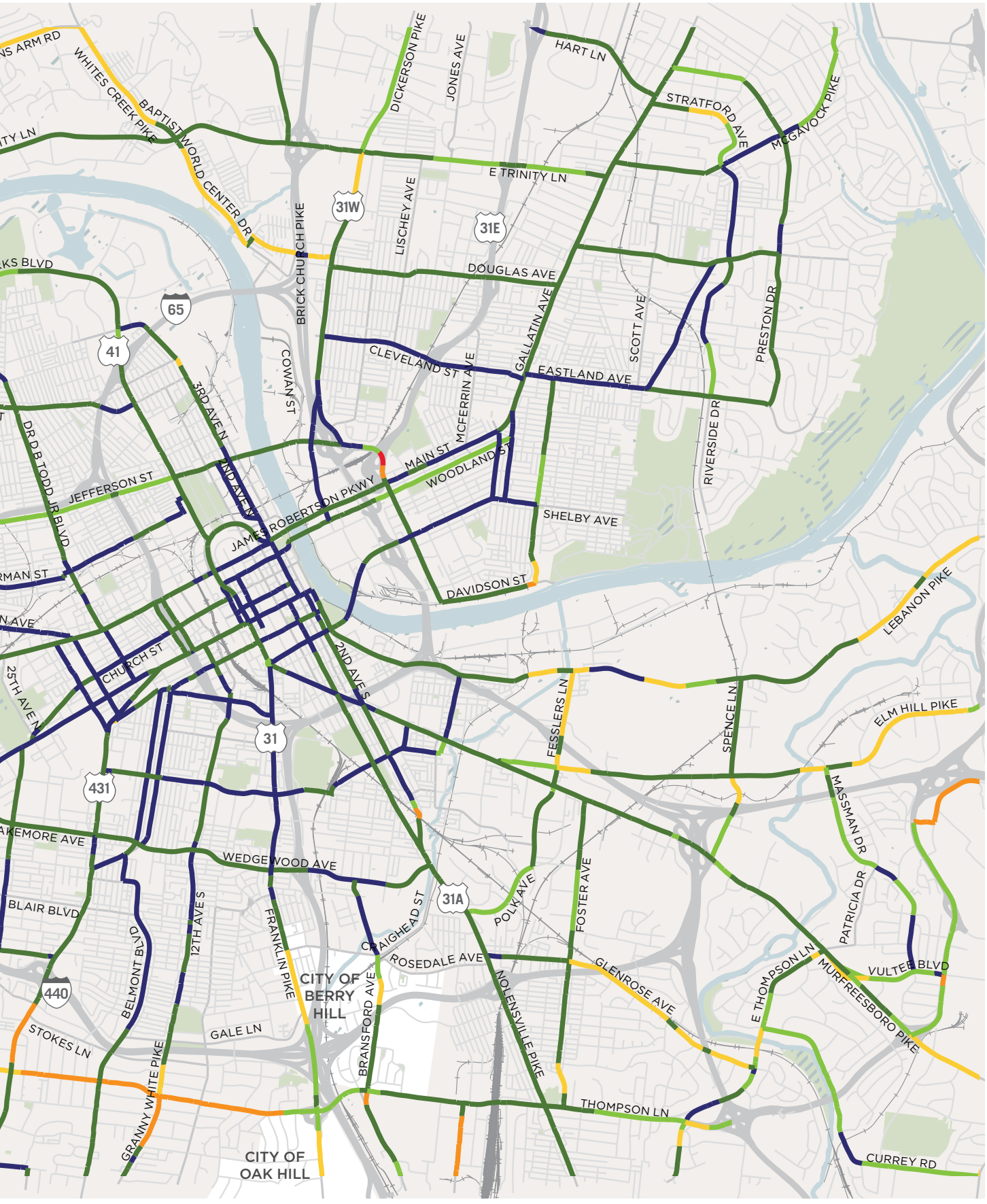
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CITY OF OAK HILL

# Bicycle Level of Traffic Stress

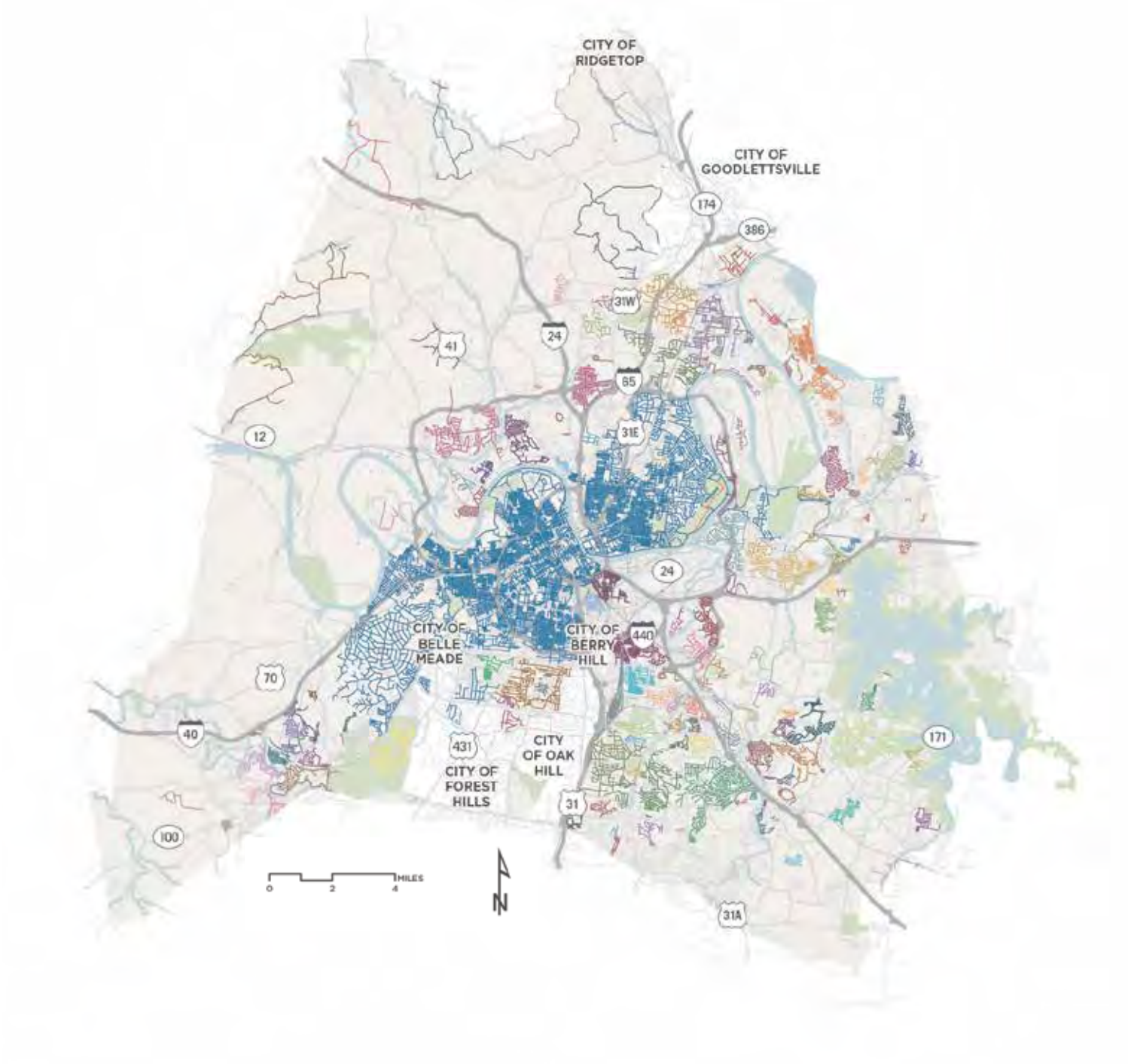
## Bicycle Level of Traffic Stress Results

Much of the network consists of low-stress local roadways. Many collectors provide low stress connections throughout central Nashville, complementing the greenway network and local road network. However, major pikes act as barriers to comfortable bicycle travel.

While major roadways act as barriers at unsignalized crossings, traffic signals provide a connection for bicyclists to move between low-stress neighborhood roadways. After analyzing the level of stress of each segment, the impact of crossing higher-stress links was added to the analysis in order to understand the connectivity of the low-stress network.

The following map displays connected clusters of roadways that can be travelled without using any link or crossing with a level of stress higher than 2. Thus, each color represents a distinct cluster of roads where a bicyclist could comfortably travel. The bicyclist would not be able to access another road network cluster (shown in a different color) without using a high-stress segment or crossing.

Central Nashville is largely connected at a low level of stress because of the presence of lower speed roadways. Outside of central Nashville, reduced road connectivity and higher speed roads results in many separated islands of low stress connectivity. This indicates that bicyclists would not be able to travel very far without crossing a high-stress crossing or high-stress segment.




## LOW STRESS CONNECTIVITY

### LOW STRESS ISLANDS

— LTS Level 1 or 2 (color varies)

# LOW STRESS CONNECTIVITY

## LOW STRESS ISLANDS

LTS Level 1 or 2 (color varies)

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POLK AVE
FOSTER AVE
PATRICIA DR
CRAIGHEAD ST
ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
E THOMPSON LN
MURFREESBORO PIKE
BLAIR BLVD
12TH AVE S
FRANKLIN PIKE
CITY OF BERRY HILL
440
NOLENSVILLE PIKE
BRANSFORD AVE
STOKES LN
GALE LN
GRANNY WHITE PIKE
THOMPSON LN
CITY OF OAK HILL
CURREY RD

# Pedestrian and Bicycle Suitability Analysis

The demand analysis provides insight into potential activity levels based on where people live, work, play, shop, learn, and access public transit.

The pedestrian level of service and bicycle level of service offer insight about the level of comfort that users experience along the existing pedestrian and bicycle network.

Variation in demand and supply are combined into the Supply and Demand Typology Model that is illustrated below.

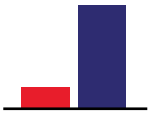
**Pedestrian Suitability Analysis Results**

Many corridors have segments of high demand in activity nodes but there are gaps between these nodes. Strategic investments can be made in these nodes rather than completing sidewalks along entire corridors at once. The majority of roadway segments with high demand for walking but have poor infrastructure are outside of central Nashville.

**Bicycle Suitability Analysis Results**

High priority routes for bikeways are concentrated in downtown, throughout southeast Nashville, and in strategic locations to the northeast and east.

**Model-Based Recommendations for Each Scenario**



### Low Demand/High Supply

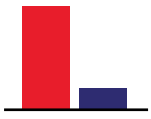
Encouragement programs; lower investment priority

### High Demand/High Supply

Innovative design treatments, closure of key gaps; high investment priority

### Low Demand/Low Supply

Basic infrastructure improvements; lower investment priority



### High Demand/Low Supply

Invest in infrastructure to meet demand; highest investment priority


## BICYCLE SUPPLY AND DEMAND

- High demand/low supply
- High demand/high supply
- Low demand/low supply
- Low demand/ high supply

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## PEDESTRIAN SUPPLY AND DEMAND

- High demand/low supply
- High demand/high supply
- Low demand/low supply
- Low demand/ high supply

# Relationship to Other Plans, Policies, and Regulations

This plan builds on previous planning efforts in Nashville-Davidson County and previous plans were reviewed as part of the planning process. Although this is not an exhaustive list, these plans were the most relevant to the planning and development of bicycle and pedestrian facilities. Recommendations from these plans were reviewed during the early stages of the planning process and influenced recommendations that were developed for this plan. Table 3.4 summarizes the purpose and major recommendations of the plans that were reviewed.

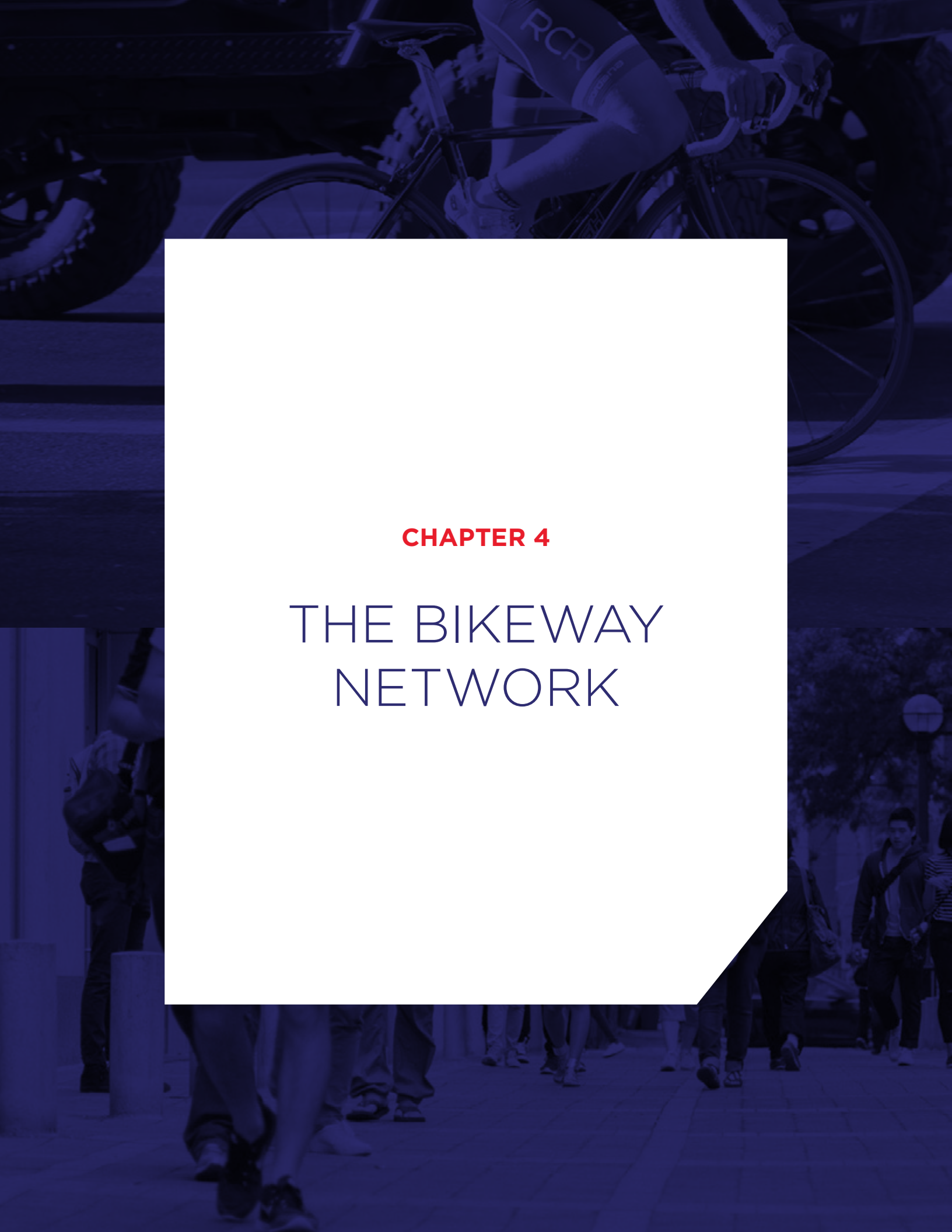
*Table 3-4. Previous Planning Efforts*

| Document Name | Year | Purpose | Major Recommendations |
|---|---|---|---|
| Metro Nashville Multi-modal Connectivity Study | 2010 | This study was initiated by the Mayor's Office in order to improve connectivity and enhance pedestrian, bicycle and transit accessibility throughout Metro Nashville/ Davidson County. The study identifies recommendations for providing improved connections between existing bicycle, pedestrian and transit facilities and trip attractors and generators. | Seventy-two projects are recommended for the Connectivity Plan. The recommended projects include 29 projects in the southwest, 14 projects in the southeast, 19 projects in the northeast, 7 projects in the northwest, and 1 project in the downtown inner loop. Types of projects include 10 greenway projects, 32 bike lane projects, 25 sidewalk projects, 2 major river crossing projects, and 3 bicycle storage/transport projects. Recommended projects are not prioritized so that there is more flexibility for implementation as funding becomes available. |

| Document Name | Year | Purpose | Major Recommendations |
|---|---|---|---|
| Gear Up 2020: Rapid Goal Setting for a 21st Century Nashville | 2016 | The goal of the document is to provide a set of actionable, short-term ideas to move Nashville forward by 2020. It recognizes that Nashville needs to have its systems and departments working together in order to maximize efficiency. Areas of study include transportation and public safety, infrastructure and utilities, and quality of open space. | Bicycle and pedestrian recommendations include the following: (1) dramatically increase active transportation options, (2) grow bikeshare fourfold (from 31 stations to 125), (3) in rank order, address the 50 worst pedestrian and 25 worst bike crash intersections, (4) commit to vision zero by 2025 by embracing the 5 E's and formalizing a Vision Zero program, (5) create Great Streets Corridor Program, (6) build context sensitive Complete Streets and default to pedestrians as priority, (7) join NACTO. Infrastructure and utilities recommendations include some bicycle and pedestrian elements. The applicable recommendations are: (1) account and accommodate for all users for all construction projects and (2) create street light master plan. |
| Nashville Next Volume 5: Access Nashville 2040 | 2015 | Access Nashville is a comprehensive framework for the city's multimodal transportation network to support Nashville's quality of life and manage growth, development, and preservation through 2040 and beyond. | The plan outlines a set of guiding principles and calls for broad improvements for walking and biking in Nashville. It is suggested that as density increases, redevelopment should include wider sidewalks to handle increased pedestrian traffic. Nashville Next supports the implementation of sidewalks along arterial-boulevards with mass transit service. The Strategic Plan for Sidewalks and Bikeways should establish a robust bicycling network for a range of bicyclists. Nashville Next suggests that the Strategic Plan needs to be updated to respond to current market trends and to implement the new infrastructure techniques described in NACTO's *Urban Street Design Guide*. Restructure the planning process for the Strategic Plan to include low-stress bikeways and innovative bicycling infrastructure concepts being implemented in peer cities, the Parks and Greenways Master Plan, and the city's bikeshare system. |

| Document Name | Year | Purpose | Major Recommendations |
|---|---|---|---|
| Nashville Next Volume 5: Access Nashville 2040 - Major & Collector Street Plan | 2015 | The Major and Collector Street Plan (MCSP) is a comprehensive plan and implementation tool for guiding public and private investment in the major streets of the city. It is a part of Access Nashville 2040. | The document provides design guidelines for bicycling, pedestrian, and transit facilities for different types of streets, such as collector-avenues, arterial-boulevards, arterial-parkways, and multimodal corridors (for transit only). |
| Multimodal Mobility Study | 2014 | The Multimodal Mobility Study was conducted to establish a mobility action plan for all modes of transportation in the Nashville region for the next 10 years. The study focuses on the downtown area. | The study presents 79 project and policy recommendations that will help accommodate mobility needs and support future economic development. A primary goal of the bicycle recommendations is to significantly enhance the existing bicycle network by implementing protected bike lanes, standard bike lanes, and shared bike routes. Recommended bikeway projects include 5.27 miles of protected/ buffered bike lanes, 4.11 miles of standard bike lanes, and 3.77 miles of shared bike routes. Some highlights of recommended improvements are to connect the existing Music City Bikeway and Rolling Mill Hill greenway and enhance the pedestrian environment of the downtown core and SoBro area, improve pedestrian mobility in Lower Broadway area, improve sidewalks in the SoBro area, improve pedestrian signal timing and implement advanced techniques. Recommendations are divided into short-term, mid-term, and long-term recommendations. |
| Update of Tennessee's State Bicycle Route Plan | 2011 | The 2011 update of TDOT's Long-Range Transportation Plan (PlanGo) evaluates the State's existing and proposed 2005 bicycle route system. | The intention of the State Highway Bicycle Route System is to provide a statewide bicycle route system for which local, regional, and other recreational facilities can connect. This update evaluates the State's existing and proposed 2005 bicycle route system. The proposed state bicycle route for the Nashville area are: Nashville to Chattanooga, Reelfoot Lake to Nashville, Kentucky to Natchez Trace Parkway, Nashville to Bristol, and Memphis to Nashville. |

| Document Name | Year | Purpose | Major Recommendations |
|---|---|---|---|
| Pedestrian and Bicycle Safety Pilot Project | 2014 | The pilot safety improvement program identified high hazard safety locations within Metro Nashville between 2010-2012 and part of 2013 and developed bike/ped countermeasures. Countermeasures were classified into 3 categories: conflicts, exposure, and vehicular speeds. The results of this pilot initiative will provide Metro Nashville with a methodology and process for addressing ped/bike safety locations and cost-effective countermeasures for improving bike/ped safety. | Based on the data analysis, it was found that increased percentages of minority populations, households below the poverty line, and households with zero automobiles positively impact pedestrian crash occurrence. The analyses also showed that 3 variables had significant relationships to crash occurrence: number of lanes on the roadway (pedestrian), presence of on-street parking on the roadway (pedestrian), presence of tourism and entertainment establishments within the area (pedestrian and bicycle). Recommendations include implementing concept plan countermeasures and conducting after studies to determine countermeasure effectiveness, formalizing the pilot study process as a formal practice within Metro Public Works' efforts to improve safety, and work with other departments and organizations to explore opportunities to address non-engineering solutions. |
| Nashville MPO Regional Bicycle and Pedestrian Study | 2009 | The regional Bicycle and Pedestrian Study is intended to establish a vision for improving walking and bicycling opportunities in the greater Nashville region. It will provide the basis by which future funding priorities of the MPO are established for bicycle and pedestrian accommodations. | Recommendations include sidewalk accommodations on all arterial classified roadways within an Urban Growth Boundary of the MPO and the designation of a Regional Bikeway Network which is intended to link communities and destinations. Sidewalk accommodations are proposed on all 914 miles of federally classified arterial roadways, of which 252 miles currently have sidewalk accommodations. The Regional Bikeway Network focuses on regional routes and connections. It consists largely of on-street facilities but also includes the Cumberland River Greenway in Davidson County and the Stones River Greenway. The network includes 908 miles on-street bicycle facilities and 219 miles of greenways |



CHAPTER 4

# THE BIKEWAY NETWORK

The Vision Statement and Goals set forth in Chapter 1 focus on the importance of a connected network for "all ages and abilities." This chapter discusses the types of cyclists (of all ages and abilities), development of the network, types of bikeways, bikeway network map, bikeway prioritization, and estimated build-out cost.

# Four Types of Cyclists

The most common classification system used to describe biking comfort level was originally developed by Roger Geller, Bicycle Coordinator for the City of Portland. Geller's "Four Types of Transportation Cyclists" classified the general population of the city into categories of transportation cyclists by their different needs and biking comfort levels given different roadway conditions. Based on Geller's work, the population of a city can be classified into four types of cyclists: "Strong and Fearless," "Enthusiastic and Confident," "Interested but Concerned," and "No Way No How."[1]

1. Geller, Roger. "Four Types of Cyclists." Portland Office of Transportation. https://www.portlandoregon.gov/transportation/article/264746

*Table 4-1. Four Types of Cyclists*

| | |
|---|---|
| **Strong and Fearless** **<1%** | This group is willing to ride a bike on any roadway regardless of traffic conditions. Comfortable taking the lane and riding in a vehicular manner on major streets without designated bike facilities. |
| **Enthusiastic and Confident** **5%** | This group consists of people riding bikes who are confident riding in most roadway situations but prefer to have a designated facility. Comfortable riding on major streets with a bike lane. |
| **Interested but Concerned** **60%** | This group is more cautious and has some inclination towards biking but are held back by concern over sharing the road with cars. Not very comfortable on major streets, even with a striped bike lane, and prefer separated pathways or low traffic neighborhood streets. |
| **No Way No How** **35%** | This group comprises residents who simply aren't interested at all in biking, may be physically unable or don't know how to ride a bike, and they are unlikely to adopt biking. |

It is important to note that people are categorized into these groups based only on their willingness to travel by bike as a means of transportation. People in the "interested but concerned" group may bike for recreation, but this classification system only refers to biking for transportation.

To understand the potential demand for biking in Nashville, the public survey included a question that asked respondents to identify what type of cyclist they consider themselves to be when riding alone. This question used Geller's classification of four types of cyclists. An additional category was added for those who don't have any other option but to bike for transportation but would rather drive if they could. The results are found on the following page.

## Who is Currently Biking in Nashville?

Based on survey results, almost half of respondents identified themselves as cyclists who are "interested but concerned." The respondents who are classified as "strong and fearless" and "enthusiastic and confident" are the ones who are most likely to already bike for transportation. Ridership in Nashville could increase if those in the "Interested but Concerned" group feel more comfortable riding for transportation. This means that building more low-stress facilities such as separated bike lanes, greenway trails, and bicycle boulevards would appeal to those who are "interested but concerned".

*Figure 4-1. Types of Cyclists in Nashville and Sample Survey Comments*

# NASHVILLE'S CYCLISTS*

## Strong and Fearless
## 10%

*"Bike as transit is a movement I strongly support."*

## Enthusiastic and Confident
## 25%

*"The bike path is for commuting... [they] have positive side-effects like healthy people and limited emissions, but I use the bike path for commuting first."*

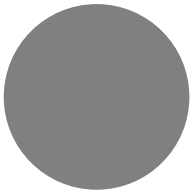


## Interested but Concerned
## 48%

*"I would bike in a park. Drivers are too distracted and there are no sidewalks in my neighborhood."*

## No Way, No How
## 10%

*"Biking is not a practical transit alternative and I really wish people would stop pretending that we're all going to bike to work..."*



## No Other Option
## 6%

*"I think it is important for availability for those who need to walk or bike to be able to. Especially for work or shopping needs..."*

**According to the Nashville WalknBike Public Survey (small sample size)*

# Planning the Bikeway Network

The proposed bike network is a result of a collaborative planning process that involved extensive public engagement, data collection, and technical analysis. Findings from the needs analysis, including the demand analysis, collision analysis, and level of traffic stress analysis provided quantitative data that directly informed the project recommendations. In addition to quantitative data, public input and feedback from the steering committee directed the project team towards a focus on developing a network of well-connected, low-stress facilities. Biking needs to be a safe, convenient, and pleasant form of transportation for the broadest array of people. Aligning with the vision of this plan of creating safe and comfortable bikeways, this low-stress network would be appropriate for people of all ages and abilities.

## Roadway Characteristics

- Number of Travel Lanes
- Speed Limit
- Average Daily Traffic
- Topography (Avoiding Steep Hills)

## Bicycle Demand

- Key Destinations
- Existing Network Connectivity
- Transit Connections

## Constructability

- Available Rights-of-Way
- Implementation Strategy (How will the facility be installed?)
  - Road Diet
  - Road Widening
  - Lane Re-purposing

## Public Input

- Steering Committee Review
- Public Comments (Survey + Online Map)
- TNDOT + Metro Review

# Low-Stress Bikeway Categories

## Major Separated Bikeway

Of all the on-street bike facilities, separated bike lanes offer the most protection from adjacent motor vehicle traffic. The major separated category includes facilities that have vertical separation, like curbs or bollards.

*Two-Way Separated Bikeway - 1st Avenue, Nashville*

*One-Way Separated Bikeway - Washington, D.C. Photo courtesy FHWA*

*One-Way Separated Bikeway - 11th Avenue, Nashville*

*Table 4-2. Level of Comfort on Different Types of Bikeways, from WalkNBike Survey*

| COMFORT LEVEL: | Very comfortable | Comfortable | Somewhat uncomfortable | Uncomfortable | No opinion |
|---|---|---|---|---|---|
| Bike lanes/ buffered bike lanes | 21% | 42% | 26% | 9% | 2% |
| **Separated Bikeways (Cycle tracks)** | **69%** | **24%** | **4%** | **1%** | **2%** |
| Shared-lane markings | 2% | 12% | 38% | 44% | 4% |
| Bike Boulevards (Calm, neighborhood bikeways) | 22% | 43% | 23% | 9% | 3% |
| **Greenways (Shared-use paths)** | **63%** | **25%** | **7%** | **3%** | **2%** |

The type of vertical separation can vary:

*Bollard Protected Bikeway, Davidson St., Nashville*

*Planter Protected Cycle Track, Vancouver, B.C.*

*Curb Separated Bikeway, San Francisco, CA*

*Parking Protected Bike Lanes, New York City*

## Minor Separated Bikeway

While this category of facilities separates bike traffic from vehicular traffic, there is no vertical separation. Because of this, the cyclists' perceptions of safety may be reduced.

*Contraflow Lane, Chicago, IL*

*Bike Lane, Nashville*

*Buffered Bike Lane, Nashville*

*Table 4-3. Level of Comfort on Different Types of Bikeways, from WalknBike Survey*

| COMFORT LEVEL: | Very comfortable | Comfortable | Somewhat uncomfortable | Uncomfortable | No opinion |
|---|---|---|---|---|---|
| **Bike lanes/ buffered bike lanes** | **21%** | **42%** | **26%** | **9%** | **2%** |
| Separated Bikeways (Cycle tracks) | 69% | 24% | 4% | 1% | 2% |
| Shared-lane markings | 2% | 12% | 38% | 44% | 4% |
| Bike Boulevards (Calm, neighborhood bikeways) | 22% | 43% | 23% | 9% | 3% |
| Greenways (Shared-use paths) | 63% | 25% | 7% | 3% | 2% |

## Bike Boulevard

Bike boulevards are a core component of the city's low-stress network. Bicycle boulevards, or neighborhood bikeways, are streets with low motorized traffic volumes and speeds that are designated and designed to prioritize bike travel. Often these streets are thought of as "quiet" streets that typically run parallel to a major corridor.


*Bike Boulevard Marking example, Berkeley, CA*


*Bike Boulevard Wayfinding example, Berkeley, CA*

*Bike Boulevard Speed Bump example, Portland, OR*

*Table 4-4. Level of Comfort on Different Types of Bikeways, from WalkNBike Survey*

| COMFORT LEVEL: | Very comfortable | Comfortable | Somewhat uncomfortable | Uncomfortable | No opinion |
|---|---|---|---|---|---|
| Bike lanes/ buffered bike lanes | 21% | 42% | 26% | 9% | 2% |
| Separated Bikeways (Cycle tracks) | 69% | 24% | 4% | 1% | 2% |
| Shared-lane markings | 2% | 12% | 38% | 44% | 4% |
| **Bike Boulevards (Calm, neighborhood bikeways)** | **22%** | **43%** | **23%** | **9%** | **3%** |
| Greenways (Shared-use paths) | 63% | 25% | 7% | 3% | 2% |

## Greenway Trail

Most likely the most recognized low-stress facility type, the greenway trail category offers a complete separation for motor vehicle traffic and is often completely separate from the public-right-of-way. Metro Parks manages and maintains the greenway trail system and the proposed routes shown on the bikeway recommendation maps on pages 111 to 114 represent priorities identified in the Plan to Play Master Plan.

*Paved Greenway, Nashville*

*Greenway Trail, Nashville*

*Table 4-5. Level of Comfort on Different Types of Bikeways, from WalkNBike Survey*

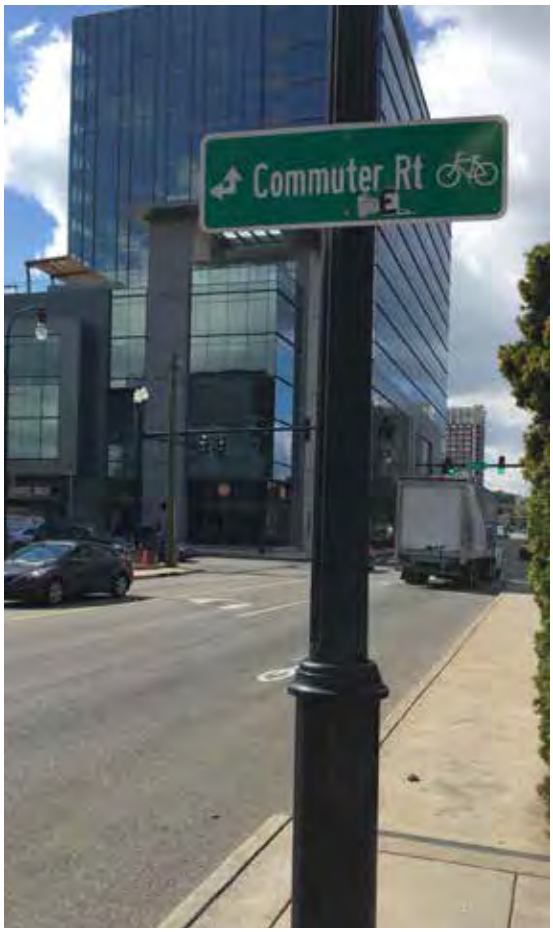
| COMFORT LEVEL: | Very comfortable | Comfortable | Somewhat uncomfortable | Uncomfortable | No opinion |
|---|---|---|---|---|---|
| Bike lanes/ buffered bike lanes | 21% | 42% | 26% | 9% | 2% |
| Separated Bikeways (Cycle tracks) | 69% | 24% | 4% | 1% | 2% |
| Shared-lane markings | 2% | 12% | 38% | 44% | 4% |
| Bike Boulevards (Calm, neighborhood bikeways) | 22% | 43% | 23% | 9% | 3% |
| **Greenways (Shared-use paths)** | **63%** | **25%** | **7%** | **3%** | **2%** |

# Other Network Recommendations

## Bikeway for Experienced Cyclists

This category of facility recommendation addresses obvious gaps in the network or existing facilities that make critical connections, but the roadway characteristics (high speed, high traffic volumes) don't fit into the low-stress network. These recommendations are most relevant for experienced cyclists, especially commuter traffic.

*Bike Lane, Nashville*




*Signed Routes, Nashville*

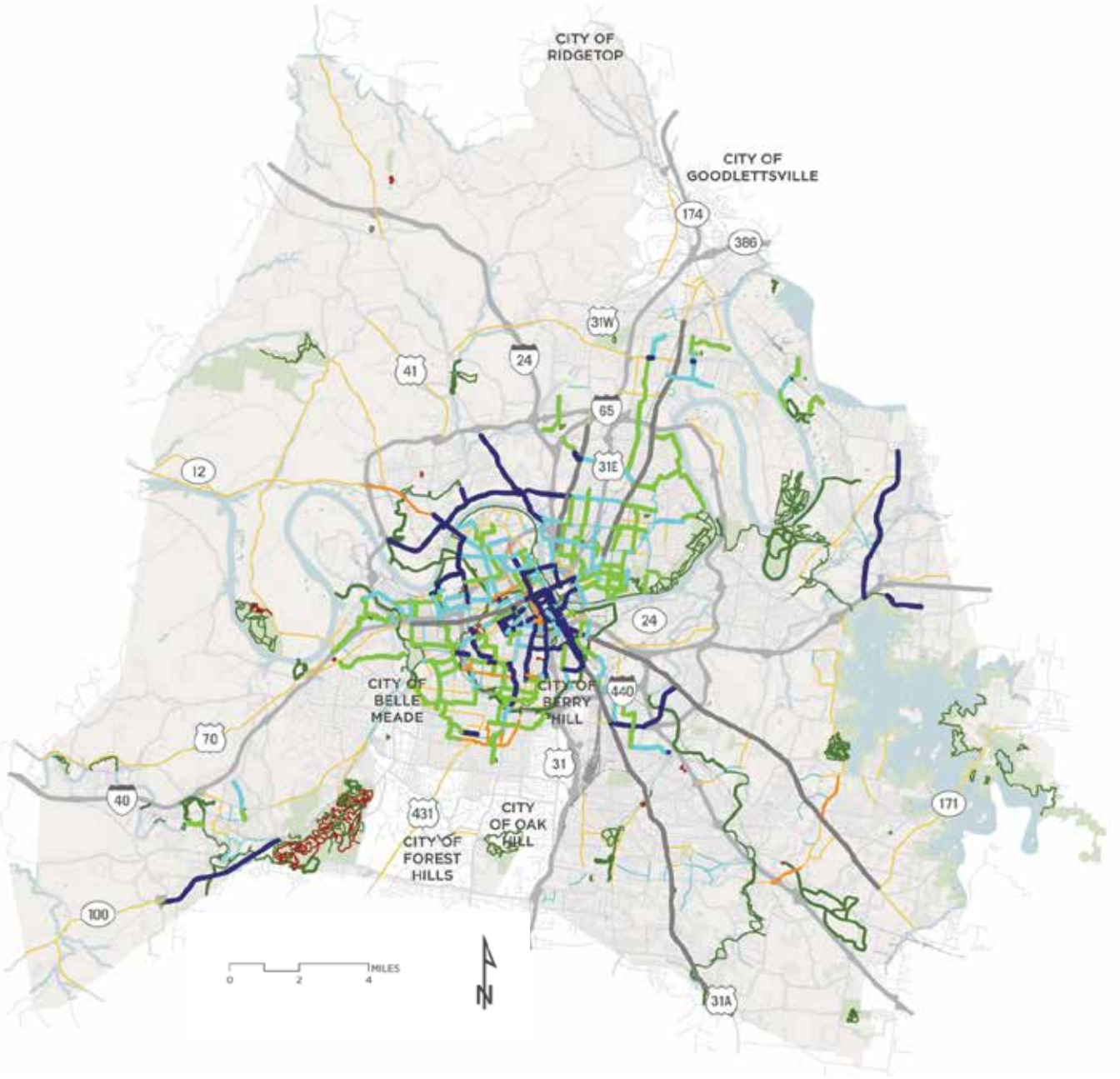
*Buffered Bike Lane, Nashville*

*Table 4-6. Recommended Bike Network Breakdown*

| | | | PROPOSED NETWORK IMPROVEMENTS | | | | |
|---|---|---|---|---|---|---|---|
| | | **Existing Network** | **Upgrade to Existing Bike Facilities** | **New Facilities** | **Total New or Upgraded Facilities to Build** | **Total Network** | **% of Total Network** |
| **Low-Stress Network** | Major Separated | 6.6 | 18 | 36 | 54 | 61 | 14% |
| | Minor Separated | 40 | 11 | 30 | 41 | 78* | 19% |
| | Bike boulevard | - | 9.7 | 68 | 78 | 78 | 19% |
| **Other Network Recommendations** | Bikeway for Experienced Cyclists | 231 | 3.6 | 9.3 | 13 | 204* | 48% |
| | **Total** | **278** | **43** | **143** | **186** | **421** | **100%** |

*In some cases, existing minor separated bikeways are recommended to be upgraded to major separated bikeways.

**In some cases, existing advanced bikeways are being recommended to be upgraded to separated bikeways.




## RECOMMENDED BIKEWAYS

- Major separated bikeway
- Minor separated bikeway
- Bike boulevard
- Bikeway for experienced cyclists
- High capacity transit corridor
- Priority greenway (proposed in Plan to Play)
- Existing/under development greenway
- Park trail
- Existing low stress bikeway
- Existing bikeway for experienced cyclists

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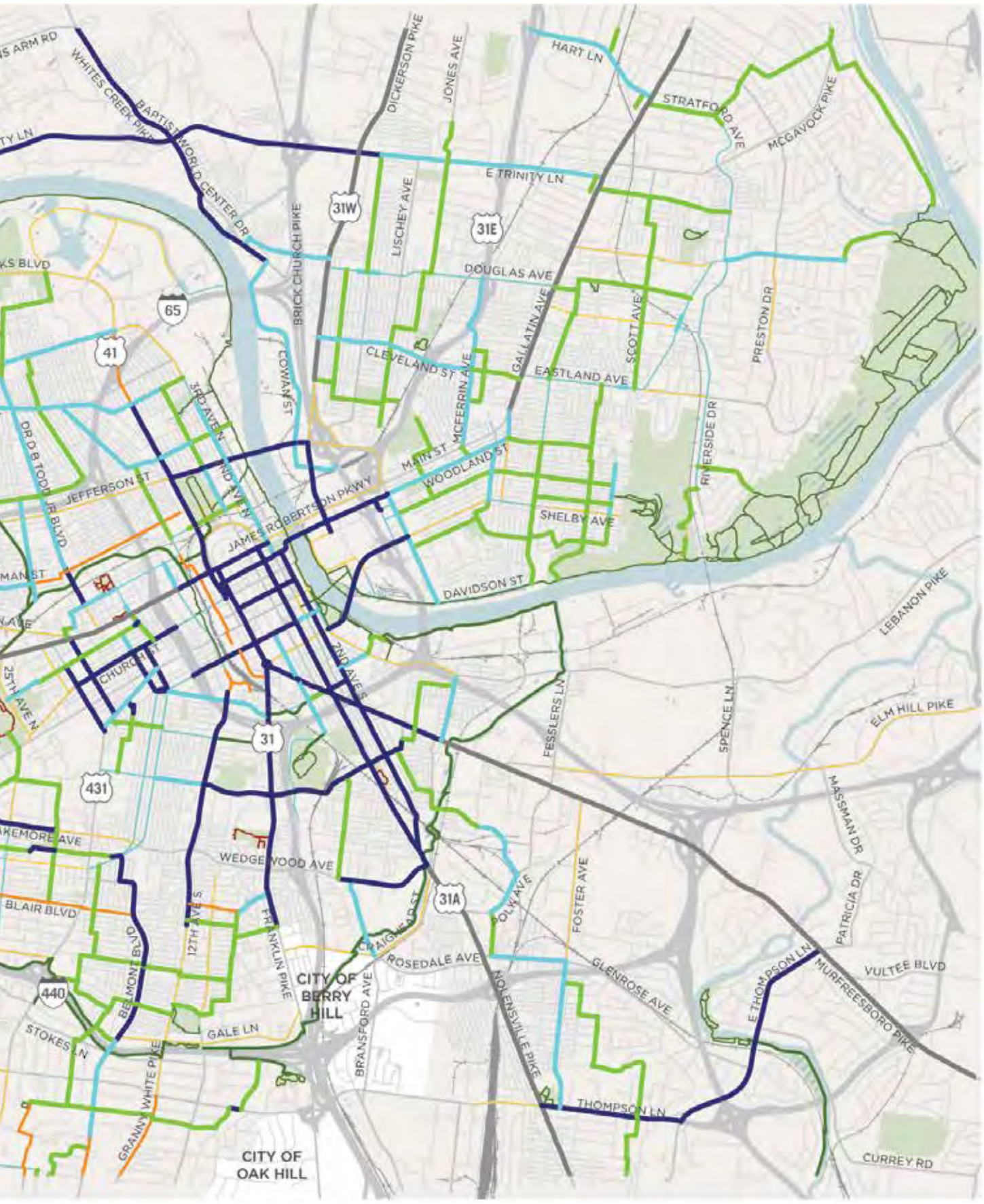
# RECOMMENDED BIKEWAYS: CENTRAL NASHVILLE

- Major separated bikeway
- Minor separated bikeway
- Bike boulevard
- Bikeway for experienced cyclists
- High capacity transit corridor
- Priority greenway (proposed in Plan to Play)
- Existing/under development greenway
- Park trail
- Existing low stress bikeway
- Existing bikeway for experienced cyclists



HART LN
STRATFORD AVE
MCGAVOCK PIKE
DICKERSON PIKE
JONES AVE
WHITES CREEK PIKE
BAPTIST WORLD CENTER DR
E TRINITY LN
31W
LISCHEY AVE
31E
BRICK CHURCH PIKE
DOUGLAS AVE
65
41
GALLATIN AVE
SCOTT AVE
PRESTON DR
CLEVELAND ST
EASTLAND AVE
COWAN ST
MCFERRIN AVE
MAIN ST
WOODLAND ST
RIVERSIDE DR
JEFFERSON ST
JAMES ROBERTSON PKWY
SHELBY AVE
DAVIDSON ST
LEBANON PIKE
CHURCH ST
2ND AVE S
FESSLERS LN
SPENCE LN
ELM HILL PIKE
31
431
MASSMAN DR
WEDGEWOOD AVE
31A
FOSTER AVE
PATRICIA DR
BLAIR BLVD
FRANKLIN PIKE
ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
CITY OF BERRY HILL
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MURFREESBORO PIKE
NOLENSVILLE PIKE
THOMPSON LN
STOKES LN
BRANSFORD AVE
GRANNY WHITE PIKE
CITY OF OAK HILL
CURREY RD

# Bikeway Treatments through Intersections

A bike facility is only as strong as its weakest link. A bike lane or separated bike lane along a corridor may provide a low-stress riding experience between intersections, but if the separated space disappears at any intersection, then the entire corridor will no longer be attractive to cyclists who are uncomfortable in traffic. Intersections are common locations of conflict between drivers and cyclists. Thus, particular attention to intersections is necessary in order to maintain a low stress riding experience along a corridor.

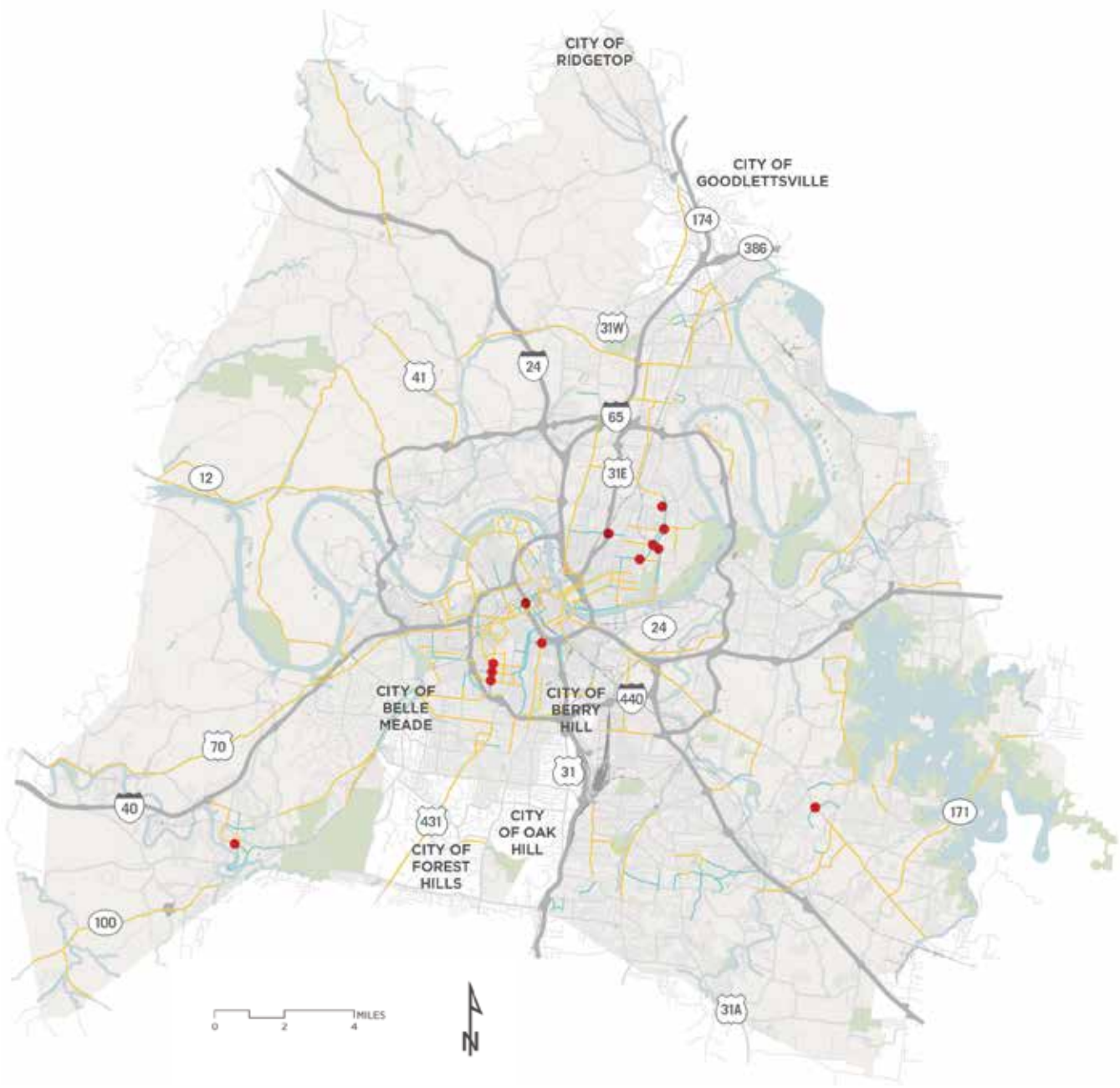
Intersection improvements are being included in new bikeway designs along corridors and will also get improved on existing bikeways with recommended upgrades. There are some existing low stress bikeways that are not recommended for upgrade, however, but drop off at intersections. Intersection improvements at these locations will maintain the low-stress experience along these corridors making these bikeways useful to a broader range of cyclists.

The map on page 116 shows recommended intersection improvement locations along existing bikeways. Potential improvements at these locations include the following:

- Through Bike Lanes
- Intersection Crossing Markings
- Bike Boxes
- Two-Stage Turn Queue Boxes
- Protected Intersections

Each of these elements is described in detail in the NACTO *Urban Bikeway Design Guide*. For more information on protected intersections, see page 184.

*The bike lane along Old Hickory Blvd extends through the intersection and green pavement markings highlight the potential conflict area.*




## LOCATIONS OF RECOMMENDED INTERSECTION IMPROVEMENTS

- Intersection Improvement Location
- Existing Low stress Bikeway
- Existing Advanced Bikeway

# Bikeway Prioritization Methodology

Full implementation of the recommended low stress bicycle network (including new facilities and upgrades to existing facilities) will take many years and cost approximately $87 million. It was essential to develop a process for selecting an equitable and realistic prioritization process in order to develop a 5-Year Strategy for bikeway implementation (see Chapter 7 for the prioritized 5-year project list and Appendix X for the full prioritized bikeway project list).

## Evaluation Process

All projects were evaluated based on detailed prioritization criteria and scored against each other, regardless of facility category. Figure 4-2 outlines the evaluation process and Table 4-7 details the prioritization criteria.

*Figure 4-2. Bikeway Evaluation Process*

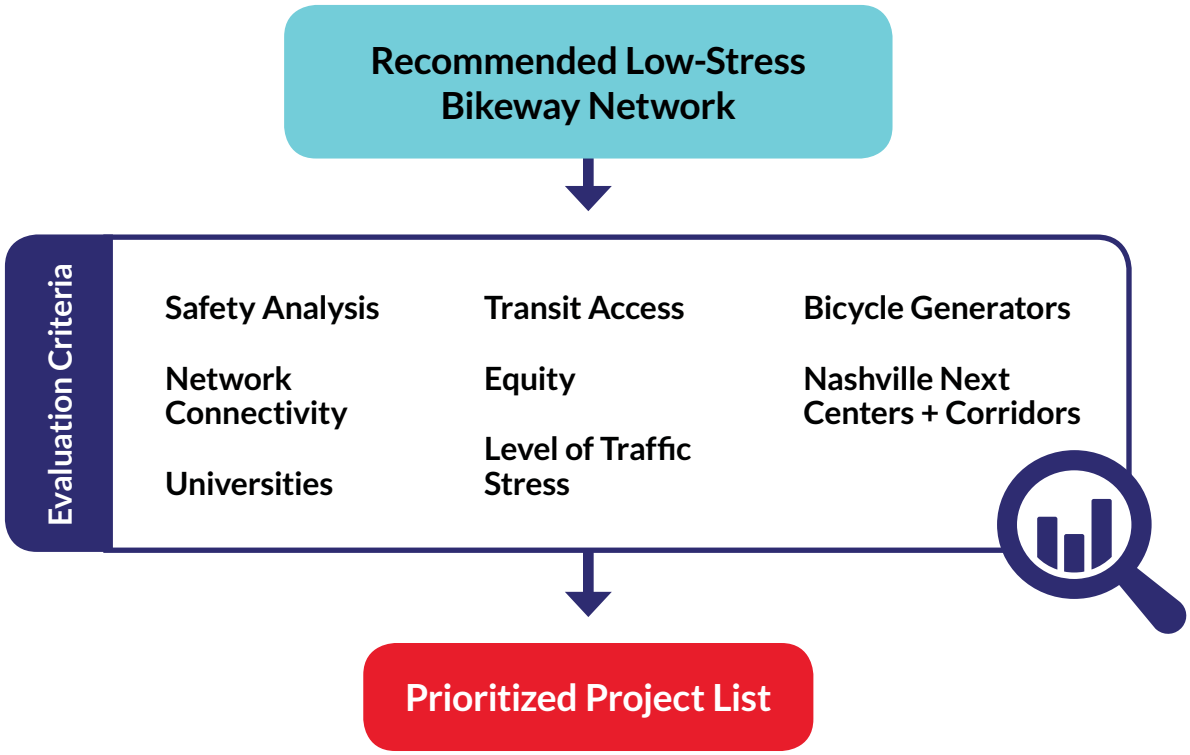


*Table 4-7. Bikeway Prioritization Criteria*

| CRITERIA | DEFINITION | INPUT | RANK | MEASUREMENT | POINTS |
|---|---|---|---|---|---|
| **Promote Safety** | Does the project address a location with a recorded safety concern? | Collision analysis shows intersections and street corridors with highest crashes | High | Multiple bike crashes have been reported along the segment in the last five years for which there is data (2010 – 2014) | 30 |
| | | | Medium | A bike crash has been reported along the segment in the last five years for which there is data (2010 – 2014) | 15 |
| **Health + Equity** | To what extent does the project benefit underserved communities? | Health Priority Areas composite measure (inputs include poverty, unemployment, carless households, aging population) | High | Census tract is in 3 or 4 health priority areas | 30 |
| | | | Medium | Census tract is in 1 or 2 health priority areas | 15 |
| **Transit Access** | To what extent does this improve bicyclist access to the transit network? | Transit ridership by stop (boardings) | High | Project is within 1/4 mile of a transit center or transit stop with more than 100 boardings a day | 30 |
| | | | Medium | Project is within 1/4 mile of a transit stop with 20 to 100 boardings a day | 15 |
| **Bikeway Connectivity** | Does the project support a connected bikeway network? | Existing bikeways (all facility types) | High | Project fills a gap in the existing bikeway network | 30 |
| | | | Medium | Project connects to the existing bikeway network | 15 |
| **Serves Activity Centers** | Is the project located in an area with high demand for biking? | Non-Motorized Demand Analysis | High | Estimated biking trips > 15 | 20 |
| | | | Medium | Estimated biking trips between 5 and 15 | 10 |
| **Supports Transportation Plan** | Is the project identified as a multimodal corridor in the Major and Collector Street Plan? | Major and Collector Street Plan Multimodal corridors | High | Serves immediate-term multimodal corridor or project in a first tier center | 20 |
| | | | Medium | Long-term multimodal corridor | 10 |

*Table 4-7. Bikeway Prioritization Criteria, Continued from Previous Page*

| CRITERIA | DEFINITION | INPUT | RANK | MEASUREMENT | POINTS |
|---|---|---|---|---|---|
| Roadway Characteristics | Does the project improve conditions on a corridor with poor or inadequate infrastructure? | Bicycle Level of Traffic Stress Analysis | High | BLTS is 3.5 or above | 20 |
| | | | Medium | BLTS is 2.5 to 3 | 10 |
| School Access | Does the project serve a school or University? | Locations of schools | High | Project is within 1/4 mile of a school or university | 20 |
| | | | Medium | Project is within 1/2 mile of a school or university | 10 |
| Recreation Access | Does the project serve a park or trail? | Locations of existing parks and trails | High | Project is within 1/4 mile of an existing park or trail | 10 |
| | | | Medium | Project is within 1/2 mile of an existing park or trail | 5 |
| Civic Amenity Access | Does the project serve a library or community center? | Locations of libraries and community centers | High | Project is within 1/4 mile of a public library or community center | 10 |
| | | | Medium | Project is within 1/2 mile of a public library or community center | 5 |
| Private Activity Center Access | Does the project serve a boys and girls club, YMCA, or senior center? | Locations of boys and girls clubs, YCMAs, or Senior Centers | High | Project is within 1/4 mile of a private activity center | 10 |
| | | | Medium | Project is within 1/2 mile of a private activity center | 5 |
| Shopping Access | Does the project serve a retail or commercial destination? | Retail, entertainment, and service employment (CNS7, 17,18) | High | Project is within 500' of a retail or commercial destination | 10 |
| | | | Medium | Project is within 1,000' of a retail or commercial destination | 5 |
| | | | | **Maximum Points** | **240** |

# Bikeway Project Cost Development

Planning-level cost estimates were developed, based on the four primary bikeway facility categories: major separated, minor separated, bicycle boulevard, and advanced bikeway. For each facility type, a range of planning-level cost estimates per linear mile was developed using cost information based on recent bikeway project experience and national unit prices. For major and minor separated facilities, a separate unit cost was developed for those projects that can be completed within the existing roadway width and those that will require widening of the roadway.

The cost estimates shown include engineering, construction, and right-of-way. Each individual bikeway segment cost will vary due to several elements including, but not limited to, existing pavement condition, pavement type, drainage basin, existing and proposed signals, and the details of bikeway design including elements like traffic calming for bike boulevards and vertical separation for separated bikeways. Detailed costing will be needed as part of the implementation of each individual project during the project development and design phase.

*Table 4-8. Summary of Planning-Level Bikeway Cost Estimates*

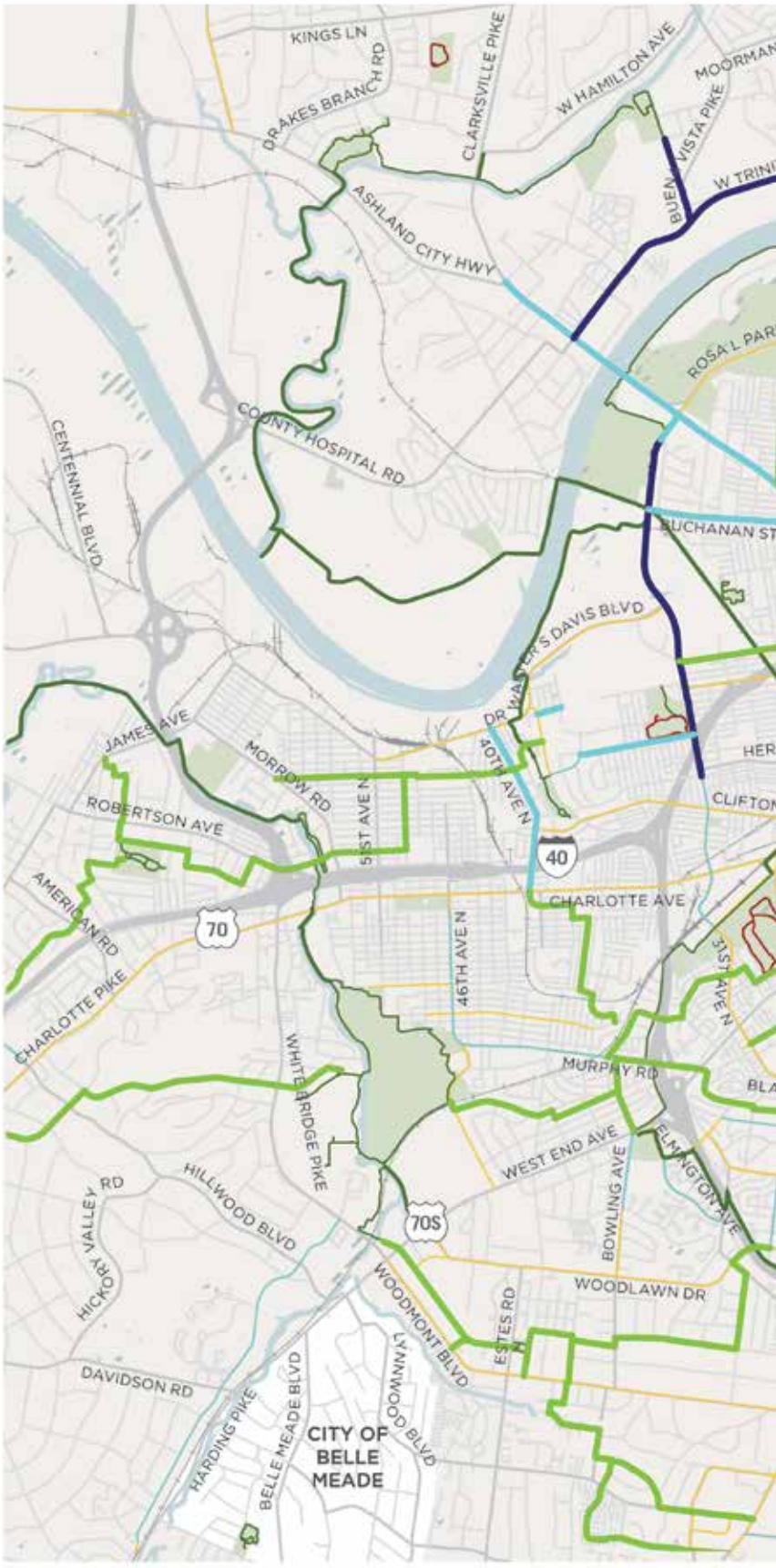
| | Total Recommended Network Miles | Approximate Cost per Mile | Total Cost per Category |
|---|---|---|---|
| **LOW-STRESS BIKEWAYS** | | | |
| **Major Separated** | 51 | $1,000,000 | $51,400,000 |
| **Major Separated – With Roadway Widening** | 2.7 | $1,500,000 | $4,000,000 |
| **Minor Separated** | 35 | $250,000 | $8,700,000 |
| **Minor Separated – With Roadway Widening** | 6.1 | $1,200,000 | $7,400,000 |
| **Bicycle Boulevard** | 78 | $200,000 | $15,500,000 |
| **ADVANCED BIKEWAYS** | | | |
| **Bike Lanes/Buffered Bike Lanes** | 5.0 | $250,000 | $1,300,000 |
| **Signed Routes and Signed Route Enhancements** | 7.9 | $65,000 | $500,000 |
| **ALL** | **186** | | **$88,800,000** |

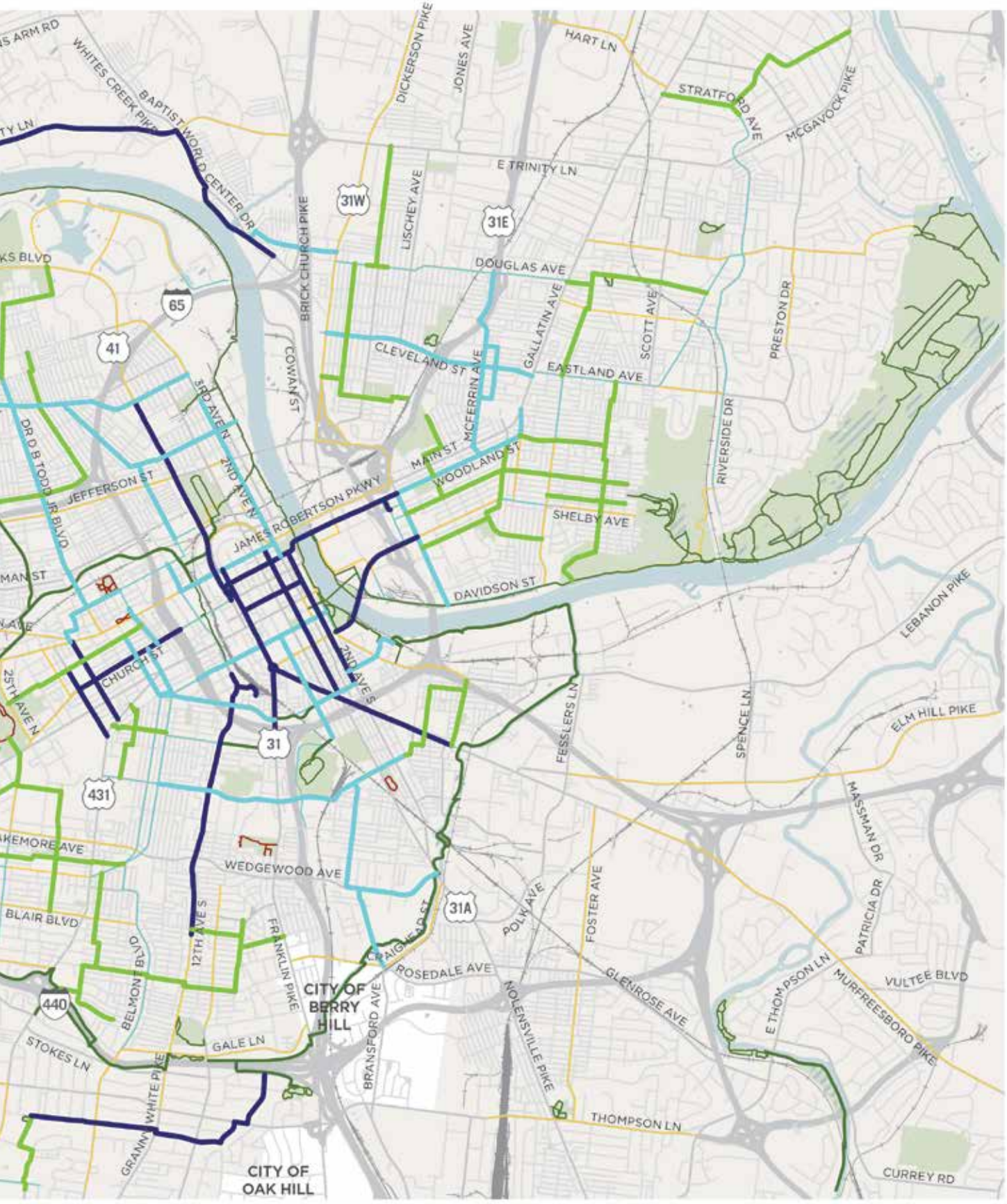
# PRIORITY BIKEWAY NETWORK (PBN): CENTRAL NASHVILLE

- Major separated bikeway
- Minor separated bikeway
- Bike boulevard
- Priority greenway (proposed in Plan to Play)
- Existing/under development greenway
- Park trail
- Existing low stress bikeway
- Existing bikeway for experienced cyclists

00 .5 1 MILES

N

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STRATFORD AVE
MCGAVOCK PIKE
E TRINITY LN
31W
31E
LISCHEY AVE
BRICK CHURCH PIKE
DOUGLAS AVE
65
41
COWAN ST
CLEVELAND ST
GALLATIN AVE
SCOTT AVE
PRESTON DR
EASTLAND AVE
RIVERSIDE DR
MCFERRIN AVE
MAIN ST
WOODLAND ST
3RD AVE N
2ND AVE N
JEFFERSON ST
DR D B TODD JR BLVD
JAMES ROBERTSON PKWY
SHELBY AVE
DAVIDSON ST
LEBANON PIKE
CHURCH ST
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2ND AVE S
FESSLERS LN
SPENCE LN
ELM HILL PIKE
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FOSTER AVE
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FRANKLIN PIKE
CRAIGLEA ST
ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
E THOMPSON LN
MURFREESBORO PIKE
440
BELMONT BLVD
CITY OF BERRY HILL
BRANSFORD AVE
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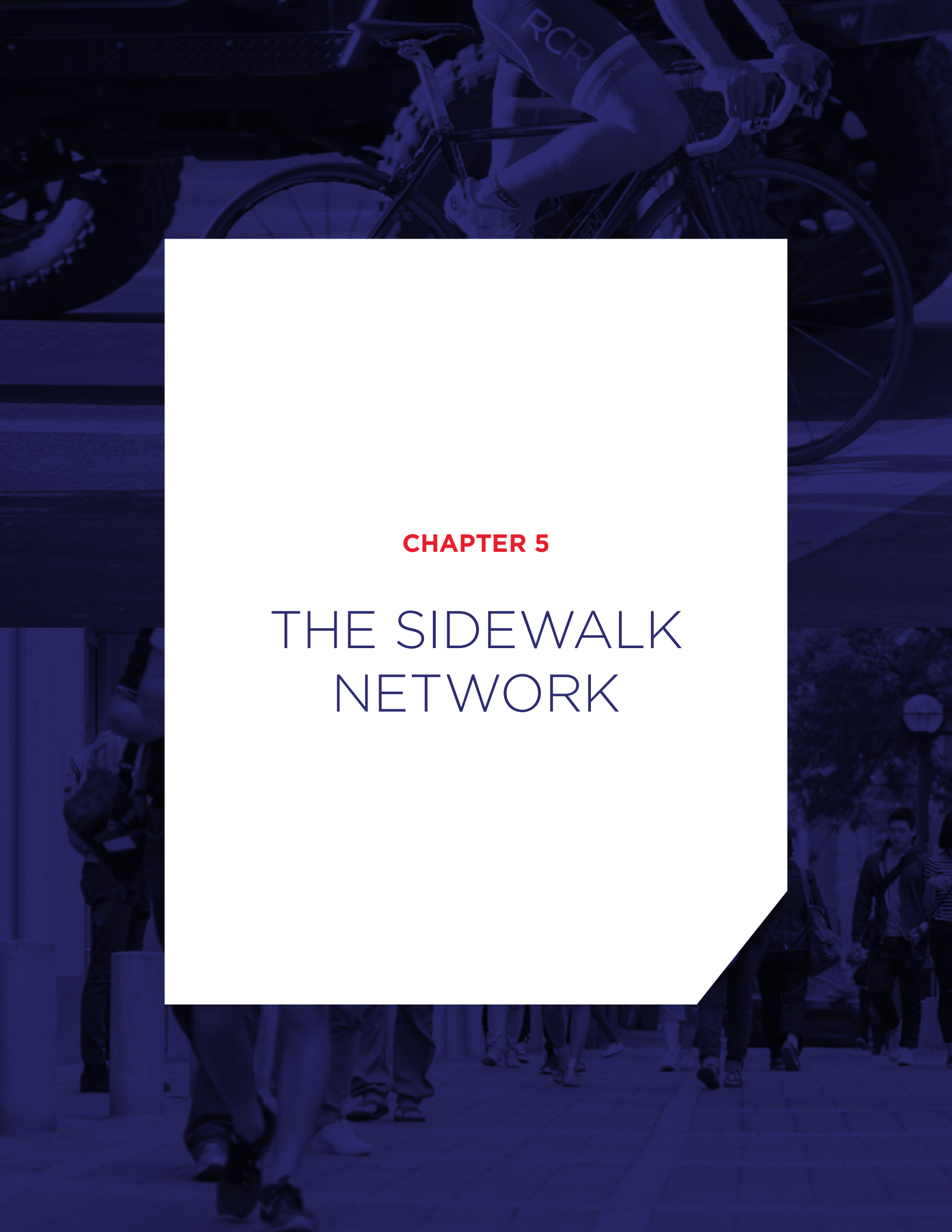
STOKES LN
GALE LN
GRANNY WHITE PIKE
THOMPSON LN
CITY OF OAK HILL
CURREY RD



CHAPTER 5

# THE SIDEWALK NETWORK

Similar to the development of the proposed bikeway network, the proposed sidewalk network is the result of extensive public input and review of existing conditions. The proposed sidewalk network aims to provide a safe and comfortable experience for users of all ages and abilities. The approach to developing the pedestrian network intends to concentrate resources in areas where improvements are most needed and where people are most likely to walk.

# Nashville's Pedestrian Comfort Level

The second public survey asked respondents to specify their level of comfort or their household members' level of comfort with traveling on different types of walking corridors. Survey results indicate that survey respondents feel the most comfortable walking along stamped and stained asphalt sidewalks with curbs.

Results from the public survey as well as input from the steering committee helped to inform the types of facilities that are needed as well as where these facilities are needed.

*Table 5-1. Survey Respondents' Level of Comfort on Different Types of Walking Corridors*

| | Very comfortable | Comfortable | Somewhat uncomfortable | Uncomfortable | No opinion |
|---|---|---|---|---|---|
| Stamped and stained asphalt sidewalk with curb (raised walkway) | 77% | 17% | 3% | 2% | 1% |
| Curb separated walking path at the same level as cars | 29% | 39% | 23% | 8% | 1% |
| Walking path at the same level as cars | 55% | 28% | 10% | 6% | 1% |
| Walking district (people walking and driving share the same roadway space) with traffic calming measures to slow cars | 8% | 14% | 29% | 45% | 4% |

# Types of Pedestrian Projects

**New sidewalk** – The *NACTO Urban Street Design Guide* recommends that sidewalks have a desired minimum through zone (the primary, accessible pathway) of 8-12 feet in downtown areas and 5-7 feet in residential areas. At a minimum, sidewalks should be at least 5 feet wide so that it is large enough for two people to walk side by side. If a sidewalk is directly adjacent to moving traffic, the desired minimum is 8 feet, which provides 2 feet for a buffer, such as landscaping or furniture. Nashville's Major and Collector Street Plan (MCSP) outlines appropriate sidewalk design based on envisioned character and context. Wider sidewalks outlined in centers and downtown while wider grass strips to buffer pedestrians against traffic are envisioned in more subruban areas. Drainage improvements may be necessary additions to a sidewalk project based on engineering judgment and existing conditions.

**Sidewalk repair** – Proposed projects in need of sidewalk repair are those that are currently inventoried as poor or fair condition. Sidewalk issues may include obstructions, cracks, uplifted slabs due to tree roots, and damaged segments. Sidewalks in need of repair can limit pedestrian access and pose safety concerns for pedestrians.

**Intersection improvements** – Proposed projects categorized as intersection improvements aim to improve pedestrian safety and comfort when crossing the road as well as minimize any potential conflicts with vehicles. The type of improvement needed depends on existing conditions and whether the intersection is signalized or unsignalized. Treatments that involve traffic control devices include warning signs, signals, pavement markings, and devices to warn motorists about the presence of pedestrians or cyclists.

# New Sidewalk Project Cost Development

Typical unit cost estimates were developed for new sidewalks along local roads, collector avenues, and arterial boulevards respectively. The complexity of right-of-way (ROW) acquisition and design tends to increase with increasing roadway hierarchy, so the costs increase with hierarchy. The costs also correspond to the cross-sections for each roadway classification in the Major and Collector Street Plan, which defines specific widths for the sidewalk and furnishing zone.

The estimated unit costs include right-of-way, construction, engineering, and inspection. The construction estimates include drainage and retaining walls, as well as a 15% contingency. The typical unit costs are high relative to historical sidewalk construction costs in Nashville because many of the remaining sidewalk gaps have significant design and construction challenges, particularly along major roadways. Detailed costing will be needed as part of the implementation of each individual project during the project development and design phase.

*Table 5-2. Summary of Planning-Level Sidewalk Cost Estimates*

| Roadway Classification | Priority Sidewalk Network<br>Feet | Approximate Cost per Foot | Total Cost per Category |
|---|---|---|---|
| **Local Road** | 220,000 | $900 | $200,000,000 |
| **Collector Avenue** | 50,000 | $1,200 | $60,000,000 |
| **Arterial Boulevard** | 210,000 | $1,350 | $285,000,000 |
| **TOTAL** | **480,000** | | **$550,000,000** |

# Sidewalk Repair Cost Development

An inventory of existing sidewalks across Nashville was completed in 2013 and updated in 2016, categorizing the condition of each sidewalk as 'good', 'fair', or 'poor'. A typical unit cost estimate was developed for sidewalks in fair and poor condition respectively. These costs are based on recent sidewalk repair projects in Nashville and include all construction, engineering, and inspection costs. The costs also take into account ROW acquisition and stormwater reconfiguration necessary to add furnishing zone, as is the current policy.

*Table 5-3. Summary of Planning-Level Sidewalk Repair Cost Estimates*

| Category | Total Network for Sidewalk Repair (along one side of road) | | Approximate Cost per Foot | Total Cost per Category |
|---|---|---|---|---|
| | Feet | Miles | | |
| **Sidewalk in 'Fair' Condition** | 1,380,000 | 261 | 85 | $117,000,000 |
| **Sidewalk in 'Poor' Condition** | 830,000 | 157 | 140 | $116,000,000 |
| **TOTAL** | **2,200,000** | **418** | | **$233,000,000** |

# Identifying the Priority Sidewalk Network

Full implementation of all missing sidewalk segments across Davidson County will take many years. Metro can only afford to build a certain amount of new sidewalks each year, so a focused, prioritized approach is necessary.

The process below describes the prioritization methodology used to develop the 5-Year Strategic Plan (see Chapter 7).

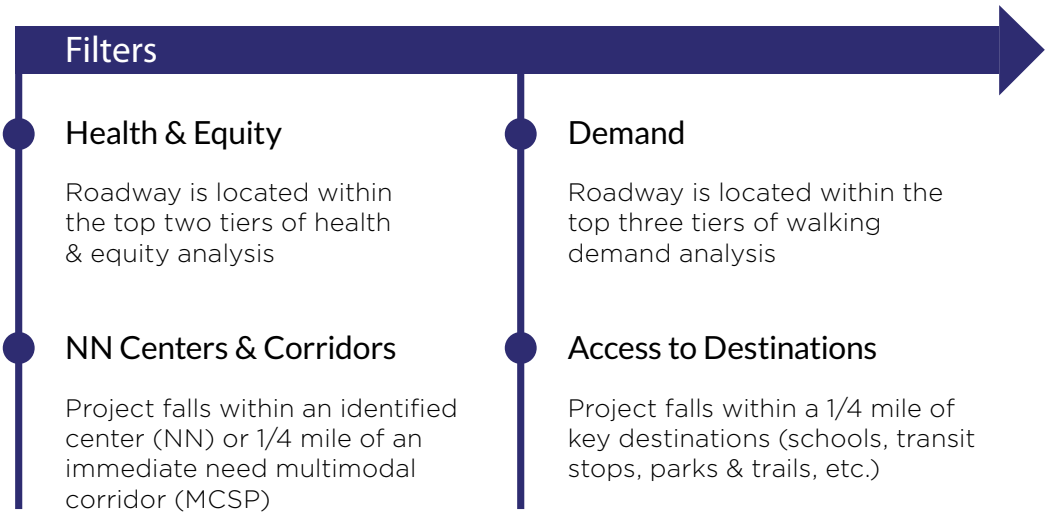
## Countywide Missing Sidewalk Network

In order to fully understand the extent of the missing sidewalk network, every missing sidewalk segment along major and minor thoroughfares, collectors, and local roadways were identified. Along the entire 2,993 miles of local, collector, and arterial roadways in Davidson County, there are approximately 1,130 miles of existing sidewalks and sidewalks in progress; there are 4,740 miles of missing sidewalks.

## Sidewalk Network Filters

Understanding the fact that sidewalks are not needed nor desired along every roadway in Davidson County, network filters were applied to focus implementation where high pedestrian demand is expected. After applying the network filters described in Figure 5-1, 1,900 miles of missing sidewalks was identified.

*Figure 5-1. Sidewalk Network Filters*



## Sidewalk Prioritization Inputs

After applying the network filters, a data-driven prioritization process was developed in order to determine where investments in new sidewalk are most needed. Figure 5-2 highlights the prioritization inputs used to prioritize the missing sidewalk network and Table 5-4 outlines the criteria scoring.

*Figure 5-2. Sidewalk Prioritization Inputs*

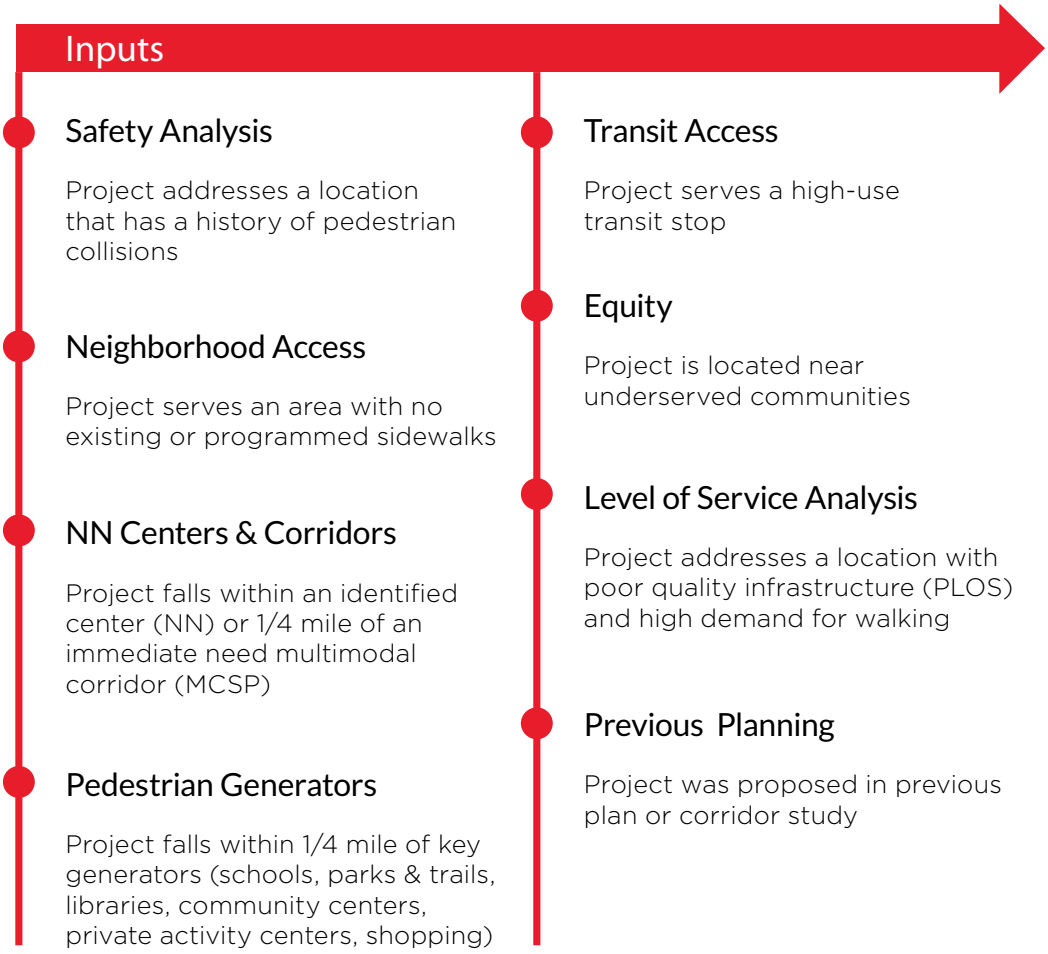


*Table 5-4. Sidewalk Scoring Criteria*

| CRITERIA | DEFINITION | INPUT | RANK | MEASUREMENT | POINTS | |
|---|---|---|---|---|---|---|
| **Promote Safety** | Does the project address a location with a recorded safety concern? | Collision analysis shows intersections and street corridors with highest crashes | High | Multiple pedestrian crashes have been reported along the segment in the last five years for which there is data (2010 – 2014) | 30 | |
| | | | Medium | A pedestrian crash has been reported along the segment in the last five years for which there is data (2010 – 2014) | 15 | |
| **Health + Equity** | To what extent does the project benefit underserved communities? | Health Priority Areas composite measure (inputs include poverty, unemployment, carless households, aging population) | High | Census tract is in 3 or 4 health priority areas | 30 | |
| | | | Medium | Census tract is in 1 or 2 health priority areas | 15 | |
| **Transit Access** | To what extent does this improve pedestrian access to the transit network? | Transit ridership by stop (boardings) | High | Project is within 1/4 mile of a transit center or transit stop with more than 100 boardings a day | 30 | *Includes commuter rail, park and ride* |
| | | | Medium | Project is within 1/4 mile of a transit stop with 20 to 100 boardings a day | 15 | |
| **Serves Activity Centers** | Is the project located in an area with high demand for walking? | Non-Motorized Demand Analysis | High | Estimated walking trips > 150 | 20 | |
| | | | Medium | Estimated walking trips between 50 and 150 | 10 | |
| **Supports Transportation Plan** | Is the project identified as a walkable corridor in the Major and Collector Street Plan? | Major and Collector Street Plan Multimodal corridors | High | Immediate-term multimodal corridor or project in a first tier center | 20 | |
| | | | Medium | Long-term multimodal corriodor | 10 | |
| **Roadway Characteristics** | Does the project improve conditions on a corridor with poor or inadequate infrastructure? | Pedestrian Level of Service Analysis | High | PLOS is E or F | 20 | |
| | | | Medium | PLOS is C or D | 10 | |
| **School Access** | Does the project serve a school? | Locations of schools | High | Project is within 1/4 mile of a school or college | 20 | |
| | | | Medium | Project is within 1/2 mile of a school or college | 10 | |

| CRITERIA | DEFINITION | INPUT | RANK | MEASUREMENT | POINTS | |
|---|---|---|---|---|---|---|
| Recreation Access | Does the project serve a park or trail? | Locations of existing parks and trails | High | Project is within 1/4 mile of an existing park or trail | 10 | |
| | | | Medium | Project is within 1/2 mile of an existing park or trail | 5 | |
| Civic Amenity Access | Does the project serve a library or community center | Locations of libraries and community centers | High | Project is within 1/4 mile of a public library or community center | 10 | |
| | | | Medium | Project is within 1/2 mile of a public library or community center | 5 | |
| Shopping Access | Does the project serve a retail or commercial destination? | Retail, entertainment, and service employment (CNS7, 17,18) | High | Project is within 500' of a retail or commercial destination | 10 | |
| | | | Medium | Project is within 1,000' of a retail or commercial destination | 5 | |
| Previously Proposed Projects | Does the project have direct support expressed by inclusion in an adopted planning document? | Community Plans | N/A | Project corresponds to a pedestrian improvement recommendation in an adopted plan | 10 | |
| | | | | **Maximum Points** | **210** | |

## WHAT HAPPENED TO THE PGI?

**The Pedestrian Generator Index (PGI) has served as the sidewalk prioritization framework since the 2008 Sidewalk and Bikeway Plan was developed. The data-driven prioritization tool used land use categories, destinations, and major streets to estimate demand for walking (See Appendix X: The PGI Explained).**

**The WalknBike Plan has updated the prioritization process to reflect new policy objectives, peer and aspirational city best practices, and community priorities.**

## Priority Sidewalk Network

The full set of filtered street segments representing potential sidewalk projects was scored and prioritized using the new prioritization process described above. High-scoring segments were identified and grouped with adjacent segments into sidewalk projects. Projects fall into one of the four categories listed to the right.

Several of the top scoring projects are along priority corridors for High Capacity Transit, as identified in the ongoing transit plan update. These sidewalks are not included in the priority sidewalk network and project list since they will be included in transit corridor projects.

The "Priority Sidewalk Network (PSN)" will serve as the foundation for the development of the 5-year Strategic Project List.

The PSN is sorted into the following four categories:

**Destination + Transit Access** Projects focus around ***Nashville Next Centers and Corridors*** that connect to destinations and transit stops

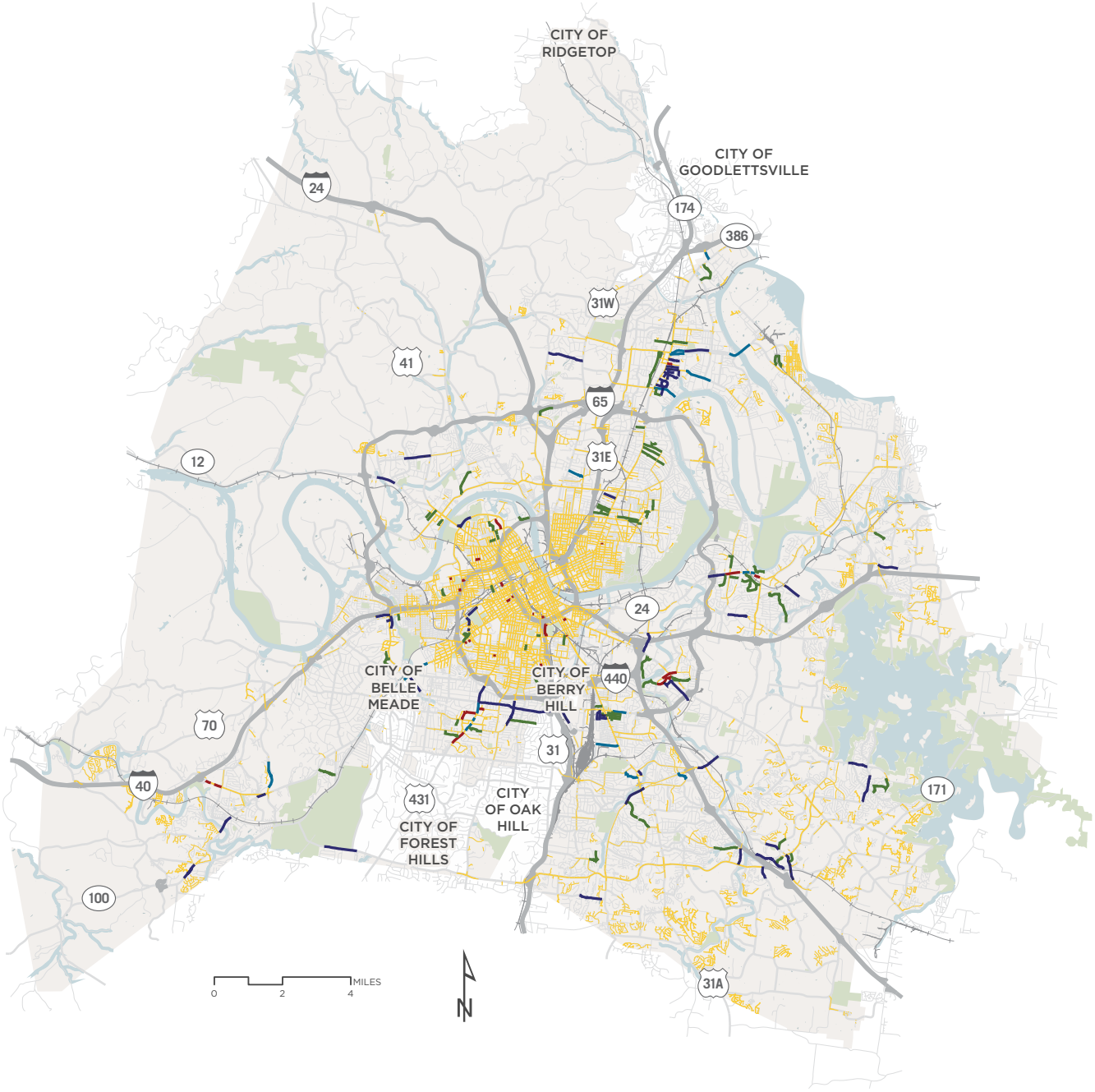
**School Connections** Projects on local roads and minor collector streets that connect neighborhoods to schools

**Vision Zero** Projects address corridors that have a history of multiple pedestrian crashes and/or serious or fatal injury

**Sidewalk Gaps** Projects that are less than 500 feet in length and connect to an existing sidewalk on both ends

*Table 5-5. Recommended New Sidewalk Network Breakdown*

| | | PROPOSED NETWORK IMPROVEMENTS | | | |
|---|---|---|---|---|---|
| | **Destination + Transit Access** | **School Connections** | **Vision Zero** | **Sidewalk Gaps** | **Total Priority Network** |
| **Distance in Miles** | 43 | 32 | 11 | 5 | 91 |
| **% of the Total Network** | 47% | 35% | 12% | 6% | 100% |




## PRIORITIZED SIDEWALK NETWORK

- Destination + Transit Access Projects
- School Connection Projects
- Vision Zero Projects
- Sidewalk Gap Projects
- Existing sidewalk

# PRIORITIZED SIDEWALK NETWORK: CENTRAL NASHVILLE

- Destination + Transit Access Projects
- School Connection Projects
- Vision Zero Projects
- Sidewalk Gap Projects
- Existing sidewalk
- College/university
- K-12 school

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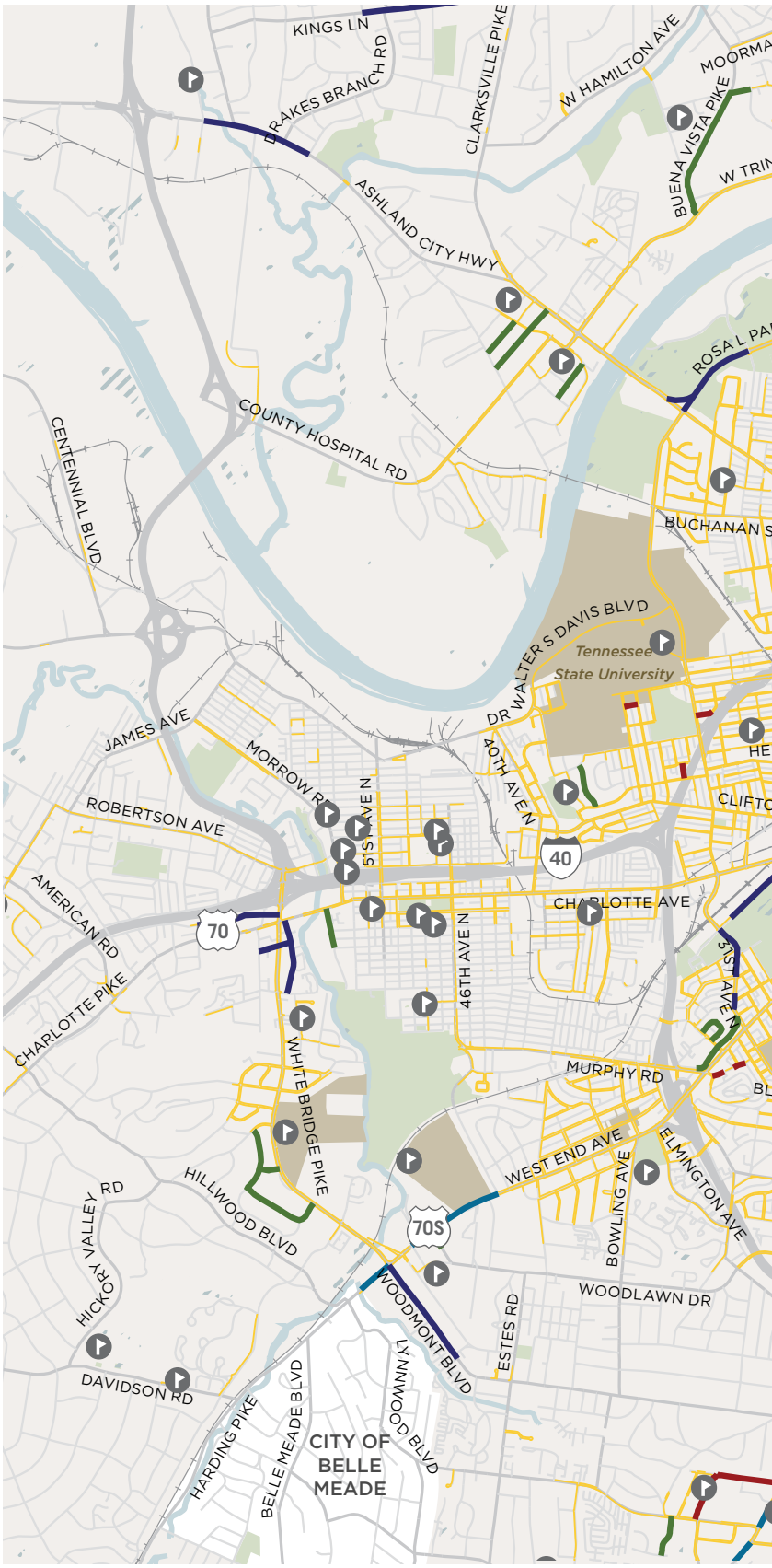

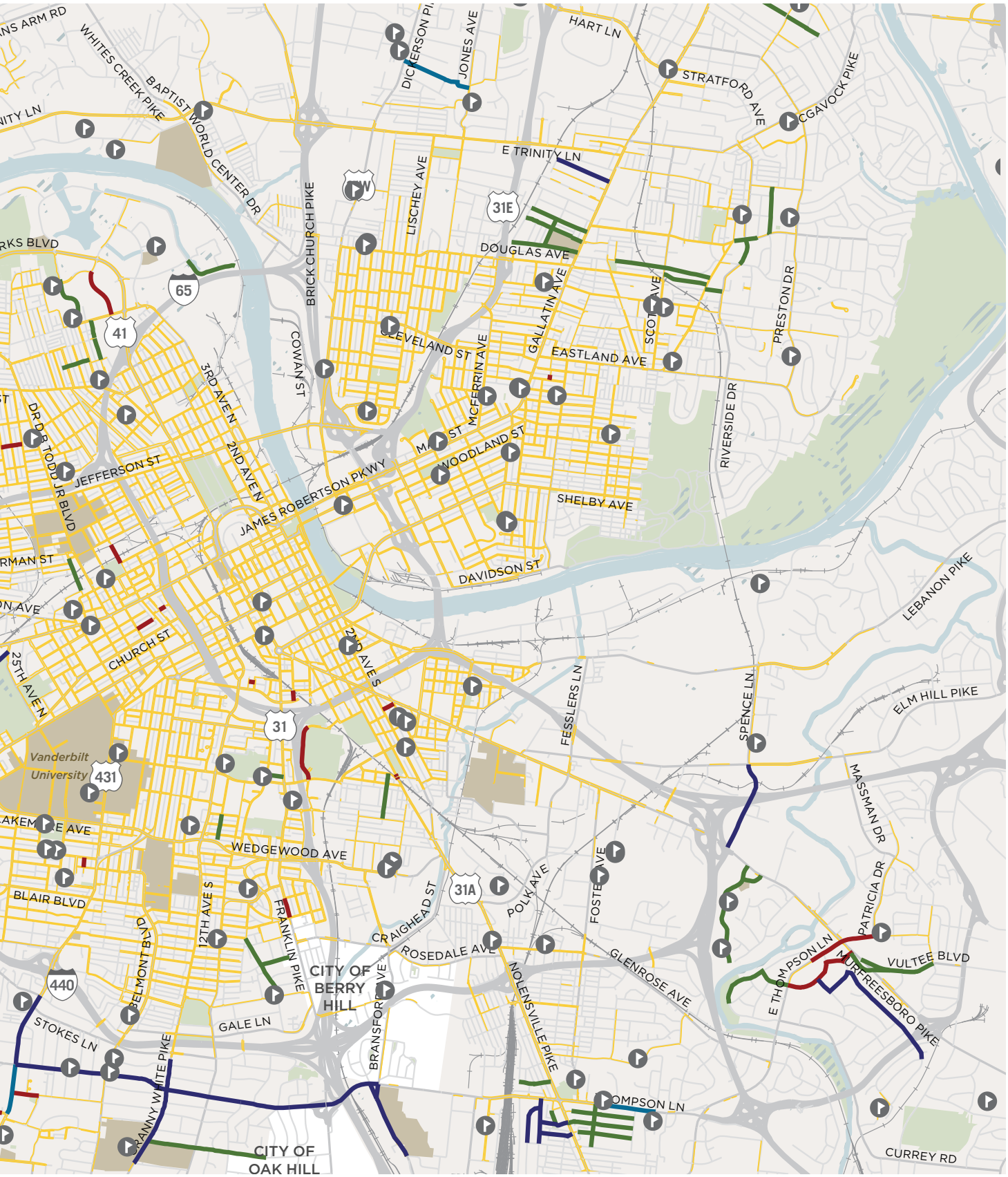
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JEFFERSON ST
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SHELBY AVE
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SPENCE LN
ELM HILL PIKE
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FOSTER AVE
PATRICIA DR
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ROSEDALE AVE
GLENROSE AVE
VULTEE BLVD
MURFREESBORO PIKE
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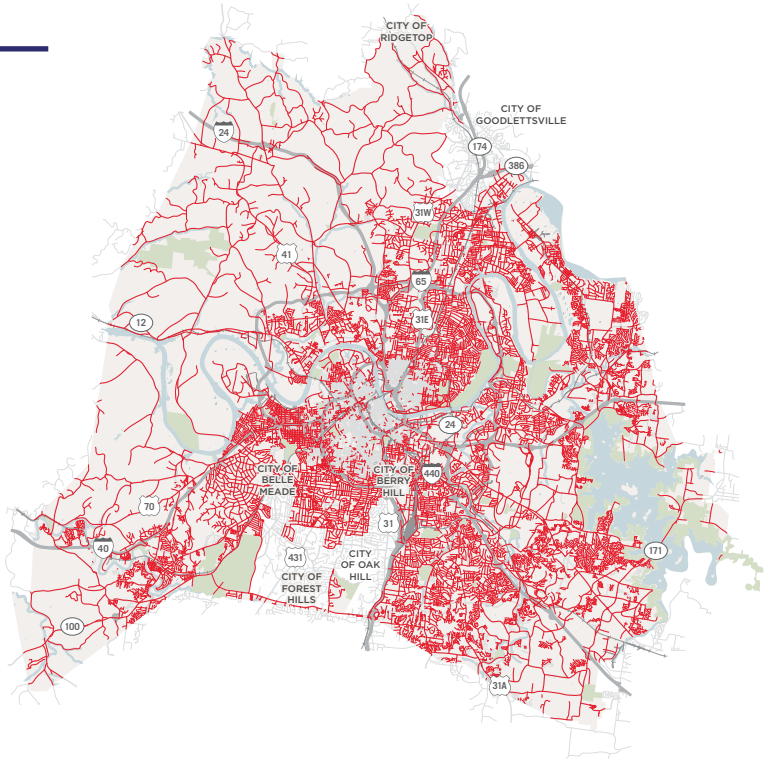
BELMONT BLVD
CITY OF BERRY HILL
GALE LN
STOKES LN
BRANSFORD AVE
NOLENSVILLE PIKE
HANNY WHITE PIKE
CITY OF OAK HILL
CURREY RD

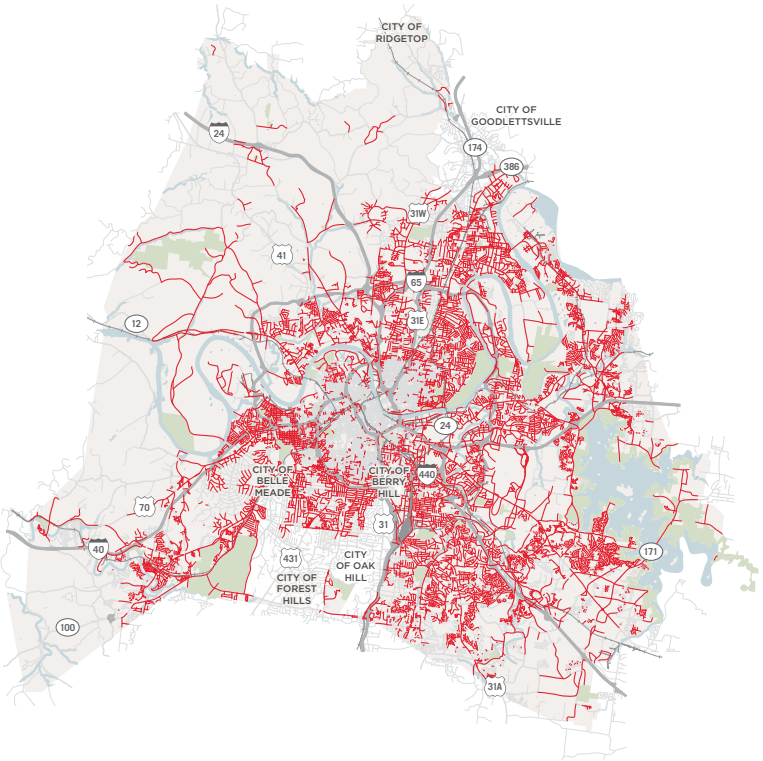
# Visual Priority Sidewalk Network Development




## Step 1

Identify All Missing Sidewalk Segments

**4,700 MILES**




## Step 2

Apply Network Filters

**1,900 MILES**

**$10.3 BILLION**

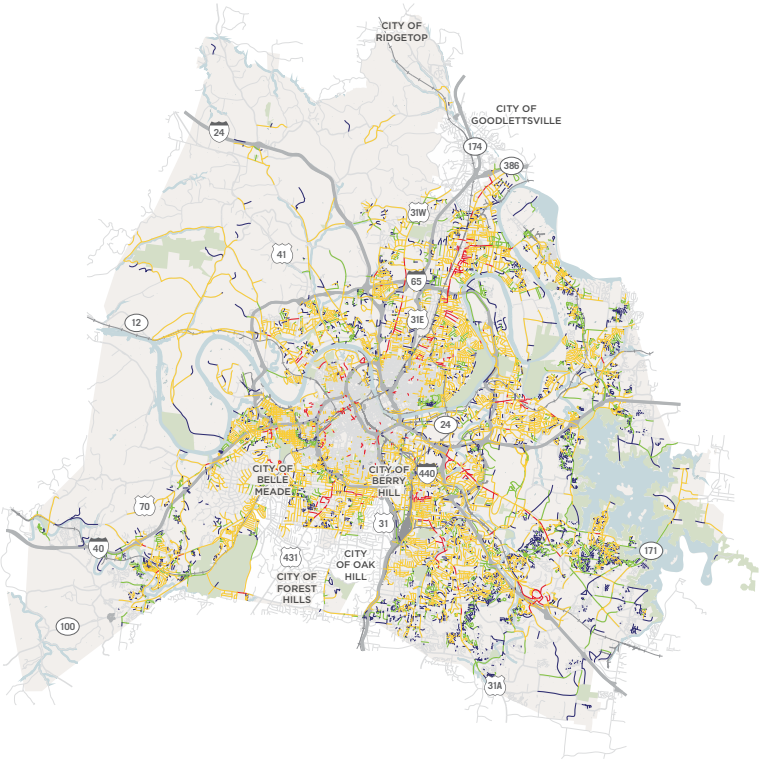
## Step 3

Prioritize Projects

Priority Score
- 0 - 25
- 26 - 45
- 46 - 109
- 110 - 195

**1,900 MILES**

**$10.3 BILLION**



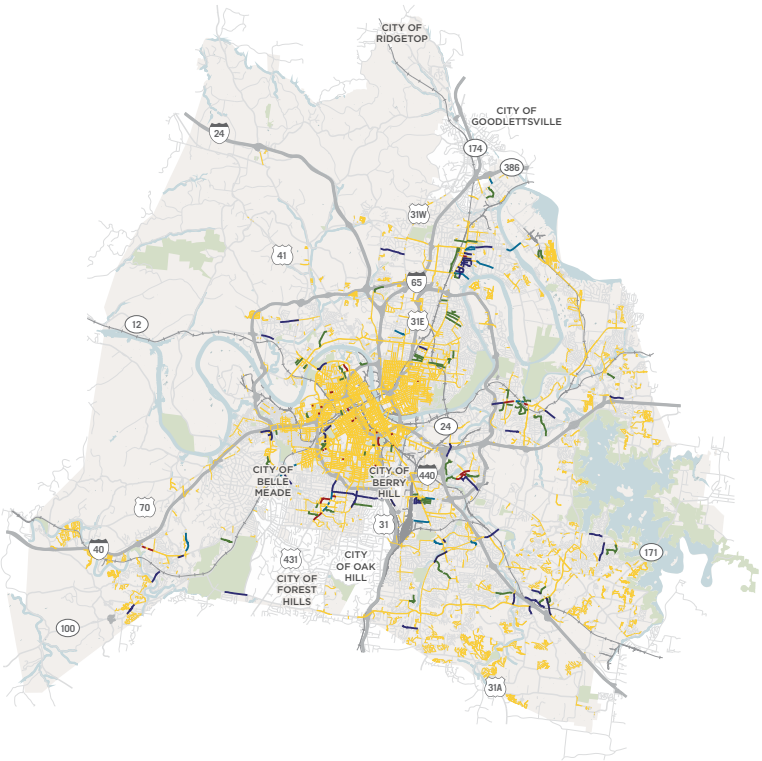

## Step 4

Select Priority Sidewalk Network

- Destination + Transit Access Projects
- School Connection Projects
- Vision Zero Projects
- Sidewalk Gap Projects

**91 MILES**

**$550,000,000**



# Sidewalk Repair Priorities

Nashville-Davidson County has over 1,100 miles of existing sidewalks. As with most public infrastructure, as facilities have aged, the need for repair and maintenance has significantly grown. In 2016, Metro updated a 2013 inventory of the existing sidewalk network and categorized sidewalks into the three condition categories (see information to the right).

- **Good Condition** – Sidewalks in good condition are considered a low priority relative to those in fair and poor condition and therefore are not included in the five-year plan.
  - » Miles: 694
- **Fair Condition**
  - » Miles: 261
  - » Cost to Repair: $117,000,000
- **Poor Condition**
  - » Miles: 157
  - » Cost to Repair: $116,000,000

## ADA Requests and Compliance

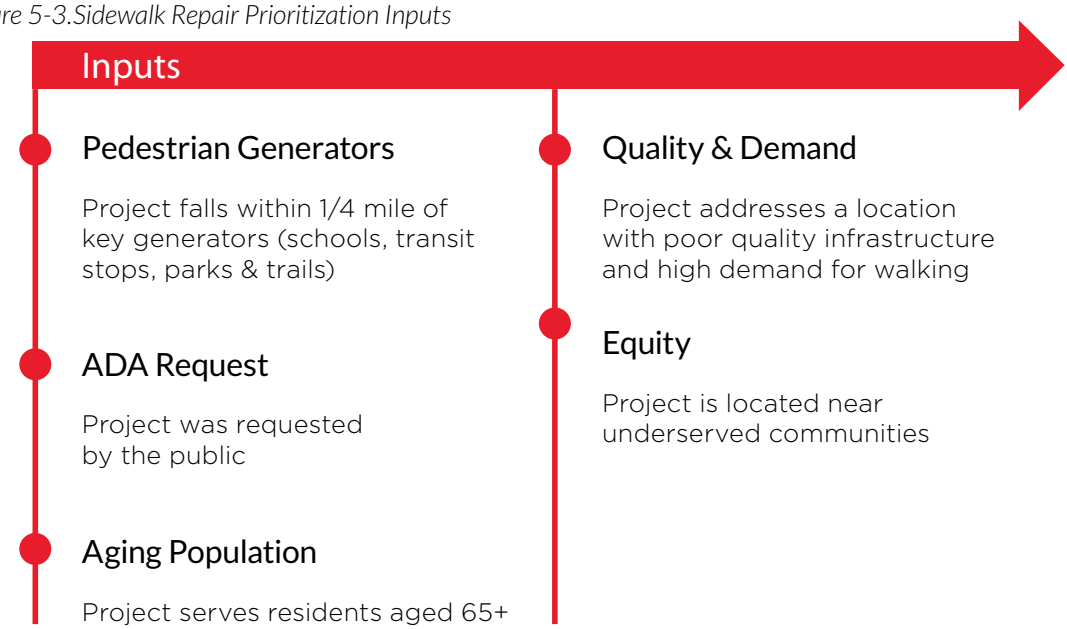
Accessible sidewalks enable people with disabilities to reach their destinations in the community and to enjoy the benefits of services, programs, and activities. Where sidewalks are provided, it is both the policy and responsibility of the Metropolitan Government of Nashville and Davidson County to ensure that continuous, unobstructed sidewalks are maintained in operable, working condition.

Request for sidewalk repair are collected through the Department of Public Works customer service center. While this plan recommends a prioritization process for repair activities, projects that have been identified through an ADA request or compliance complaint should be prioritized first at the discretion of the Public Works ADA coordinator or the ADA & Safety Services Division.

## Targeted Investments

Since capital funds for sidewalk repair and maintenance are limited, especially with the substantial network of missing sidewalks across the county, a clear prioritization scheme was developed to support targeted public investments in sidewalk repair. Figure 5-3 describes the prioritization process applied to all sidewalks categorized in "poor" condition. See Appendix X for the complete sidewalk repair priority project list.

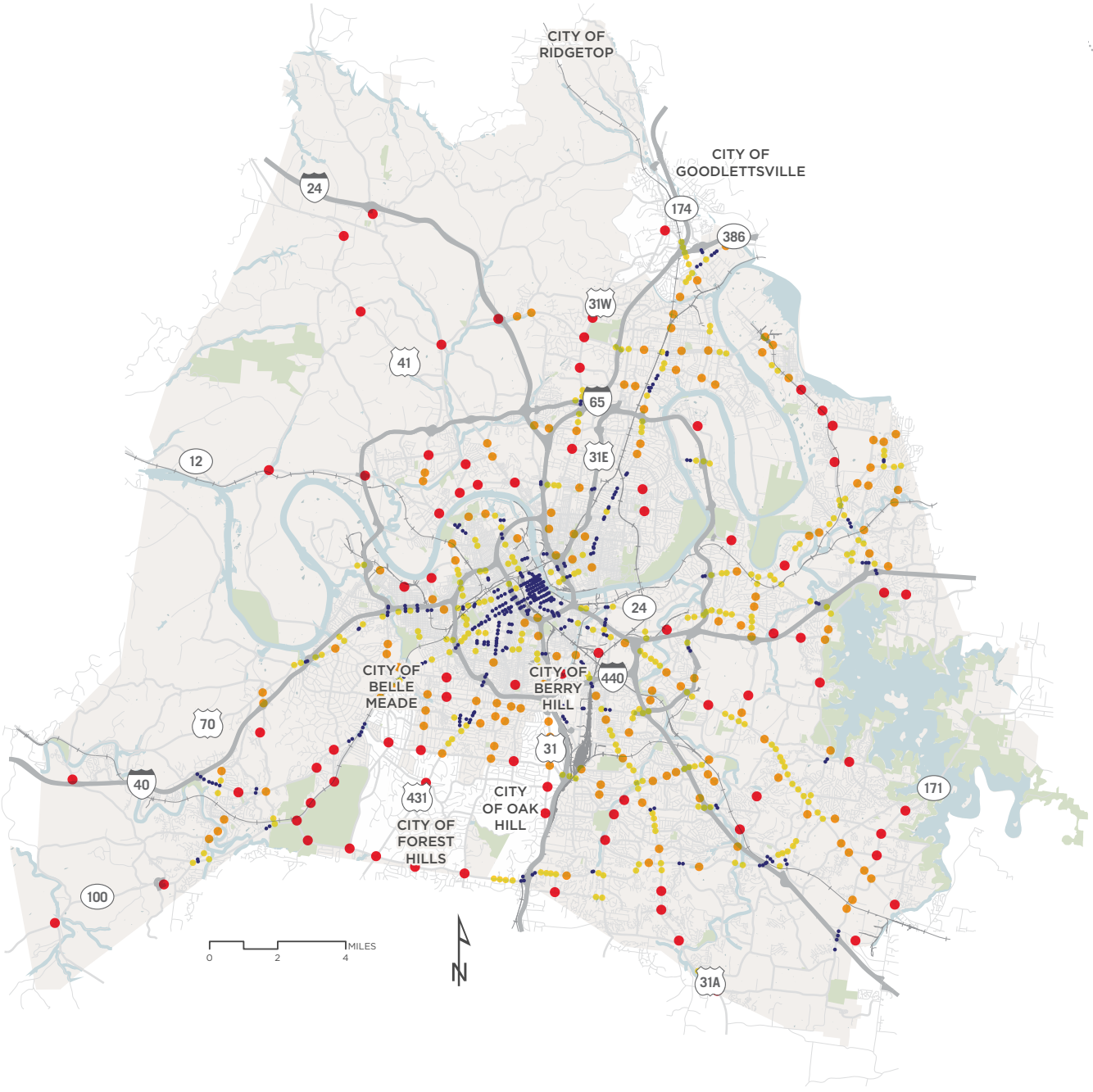
*Figure 5-3.Sidewalk Repair Prioritization Inputs*



# Intersection Priorities

In 2014, Metro Nashville Public Works developed a pedestrian and bicycle safety pilot program. This program identified high hazard safety locations within Metro Nashville for both pedestrians and cyclists. In line with Nashville's commitment to Vision Zero, these safety locations are the priorities for intersection improvements in this plan.

Pedestrian and bicycle mobility is greatly limited by major roads with long distances between controlled crossings. These roadways act as barriers between neighborhoods and can lead pedestrians to make unsafe crossings. A controlled crossing spacing analysis was conducted to highlight problematic areas along major corridors in Nashville. The results can be used to identify midblock crossing needs to be addressed in future safety program updates.




## CONTROLLED STOP SPACING (MAJOR ROADWAYS)

- 1/4 mile or greater
- 1/8 to 1/4 mile
- 1/16 to 1/8 mile
- Less than 1/16 mile

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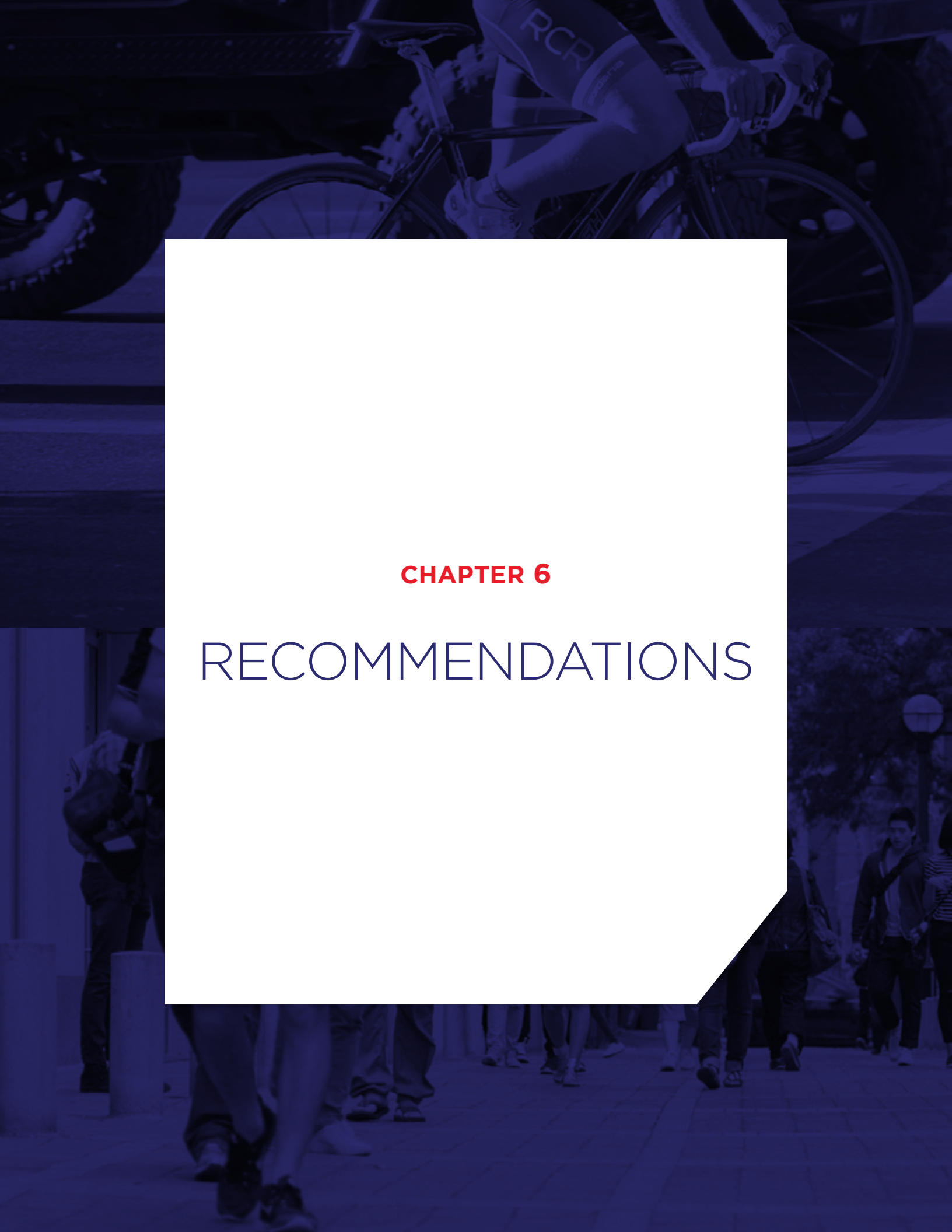


CHAPTER 6

# RECOMMENDATIONS

# Recommendations

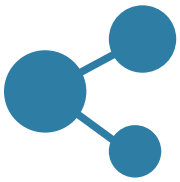
In order to realize the plan's goals and objectives, Nashville must consider a multi-pronged strategy. These strategies, which fall into four categories, will guide the city towards improving walking and biking conditions for people of all ages and abilities. Simply building more bikeways and walkways will not enable Nashville to reach the goals that are outlined in this plan. A comprehensive approach to making Nashville more pedestrian-friendly and bike-friendly will need to integrate policy, programmatic, design, and implementation elements.

In this chapter, rationale is provided for why each recommendation is needed as well as specific guidance and key action steps. Case studies and lessons learned from cities across the U.S. are also included as part of the recommendations. Each recommendation is designed as a cut-sheet so that it can be easily referenced and implemented either as a standalone project or in conjunction with other recommendations.

## Policy

Recommendations that fall under this category focus on policy-oriented strategies to send a signal to visitors, residents, and workers that Metro is undertaking a long-term commitment to improving walkability and bikeability. These policies touch on different aspects of the pedestrian and cyclist experience such as conflicts with motor vehicles, walking or biking through construction areas, or finding a bike share station that is closer to their place of residence or work.

Input from the WalknBike Policy and Enforcement Subcommittee informed policy recommendations.



## Programmatic

Education, encouragement, enforcement, and promotional programs will help people discover, feel more confident, and learn how to safely travel along Nashville's walkways and bikeways. Programs that are tailored to people of all ages and abilities will help them to realize the full potential of Nashville's new and proposed walkways and bikeways. The recommended programmatic actions will increase the visibility of people who walk and bike, communicate that all road users are expected to look for each other no matter how they travel, create safer streets, and develop a common understanding of traffic safety.

Input from the WalknBike Outreach and Education Subcommittee informed programmatic recommendations.

## Design

When designing bikeways and walkways, Nashville should consult national standards and guidelines for the most up-to-date innovations and best practices. The Federal Highway Administration (FHWA), National Association of Transportation Officials (NACTO), and American Association of State Highway and Transportation Officials (AASHTO) have a wealth of resources and reports to reference for current design standards of pedestrian and bike facilities. In addition, other cities across the United States could serve as models for how to design safe streets for all users. The design recommendations included in this chapter will provide guidance beyond the construction of standard bikeways and walkways.

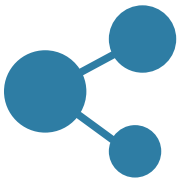
Input from the WalknBike Design Practices Subcommittee informed design recommendations.

## Implementation

Aside from policy, programmatic, and design elements, this plan provides recommendations for how Nashville can forge partnerships to further support walking and biking. Given the present-day economic challenges that local governments face, it is difficult to know the extent of financial resources available at different timeframes during implementation of this plan. These recommendations provide guidance on how Nashville can leverage resources with other government agencies and external agencies to efficiently implement bike and pedestrian projects.

Input from the WalknBike Prioritization Subcommittee informed implementation recommendations.

| Policy Topic | Page number |
|---|---|
| Bike share integration | 150-151 |
| Bike parking | 152-153 |
| Traffic calming and speed reduction policy | 154-155 |
| Bike and pedestrian access in construction zones | 156-157 |



| Programmatic Topic | Page number |
|---|---|
| Staffing for bike and pedestrian planning & programs | 158-159 |
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| Implement Vision Zero Policy and Plan | 164-165 |
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|---|---|
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| Implementation Topic | Page number |
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| Bikeway maintenance | 186-187 |
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| Bike facility selection | 190 |
| Utility and fixed object coordination | 192-193 |
| Tactical urbanism approach to pedestrian & bike infrastructure | 194-195 |
| Transit first/last mile | 196-197 |
| NACTO involvement | 198-199 |

# Bike Share Integration

MODE

## Part I. Background

As discussed in *Gear Up 2020*, an expanded Nashville B-cycle system should coordinate with an expanded transit system, major job centers, universities, and schools. This will reach other types of users who don't identify as tourists and will increase the bike mode share as biking becomes a more utilitarian transportation option. Coupled with this expansion, Bike Share should directly address the need for an Equity Program by providing low cost or free memberships and providing bike share stations in low-income communities.

The Metro Health Department first conceived Nashville B-cycle and the system later moved to Nashville Downtown Partnership (NDP) as it was initially focused within the downtown area. As the program expands to other job centers and neighborhoods, the program administration may need to shift from the NDP to a Metro-wide department with a focus on integrating mode shares. This could potentially fall under MPW (becoming the new DOT) or MTA.

The program should also explore options to include electric bikes within the system.

**RECOMMENDATION:**

- ☑ Expand Bike Share program by adding more stations
- ☑ Provide integration of a Bike Share Equity Program for low-income communities as a part of the expansion
- ☑ Once it is established, the Department of Transportation will administer this program and work with Planning, Parks, Health, and MTA on new locations and future funding for expansion.

## Part II. Details

Timeframe

- ☑ **SHORT-TERM**
- ○ **MID-TERM**
- ○ **LONG-TERM**

Funding Needs

- ○ **LOW**
- ○ **MEDIUM**
- ☑ **HIGH**

Responsible Party

**LEAD ROLE**

*Currently Nashville Downtown Partnership (NDP) – move to new DOT*

**SUPPORT ROLE**

*Planning, Health, MTA, Parks & Walk Bike Nashville*


*Bike Share Station on 1st St in Nashville*

## Case Study

The bike share program in Philadelphia, called Indego, launched an initiative, called Indego30 Access, to target low-income residents as part of its efforts to expand bike share membership. Residents who qualify for food stamps are eligible for a monthly membership rate of $5 instead of the regular rate of $15. The sign-up process has been simplified for them in that residents don't need to show any proof of their status other than their existing electronic benefits transfer (EBT) card, which is called the ACCESS card in Philadelphia. Participants can sign up online at any time. In addition, Indego recognized that it needed to address the issue that some low-income residents may not possess credit cards. They launched a cash program where participants can pay by cash to add value to their bike share account by visiting a 7-Eleven or Family Dollar store. Lastly, operators of the system heard from residents that they would like to use the bikes longer for recreation. Indego responded by cutting the fee for the second hour of riding from $4 to $2. Due to the simplicity of signing up for this program, Indego30 Access is the fastest growing bike share discount program in the United States.

Source: Andersen, M. "In Philly, $5 Bike Share Memberships for Food Stamp Users Take Off". Better Bike Share Partnership. http://betterbikeshare.org/2016/08/29/philly-offering-bike-share-discounts-food-stamp-cards-working-great/

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Develop strong partnership package with developers to fund stations | NDP, nonprofit partners | Early 2018 |
| Determine appropriate department to implement bike share as a part of a comprehensive transportation system. | NDP, Public Works | End of 2018 |
| Apply for additional federal and partnership grants for expanded stations and bike equity program funding | Planning, Health, MDHA, Public Works | Early 2018 |
| Set goals and budget to support number of stations to be added each year (with partnerships and grants helping to accelerate the number) | NDP, Public Works | Early 2019 |

*Indego30 Access Program (Source Mayor's Fund for Philadelphia)*

# Bike Parking Program

MODE

**RECOMMENDATION:**

- Implement a bike rack program which allows for bike parking to be provided within the street right-of-way
- Develop a policy for how to administratively retrofit on-street parking as bike corrals in areas with high bike volumes

## Part I. Background

Metro passed its first Bike Parking ordinance in 2014 (BL 2014-714) which provided for bicycle parking for new multi-family and commercial development within the Urban Zoning Overlay and within all Urban Design Overlays (Section 17.20.135 of the Zoning Code). This bike parking program supports the growing bike infrastructure in the city and provides bike parking in new areas. It provides opportunities for owner-supplied bike racks within the public right-of-way and for the city to provide bike racks in areas where they are needed.

The current bike parking code should be amended to allow for bike parking to be provided in the public right-of-way when adequate space is available and when the right-of-way provides for better visibility of bike racks. Metro Public Works could administer a program and provide an application for business owners to apply for bike racks that are placed within the public right-of-way.

*Bike corral in Raleigh, NC*

Furthermore, many areas within Nashville's street right-of-way are occupied by on-street vehicular parking spaces, some of which are metered. This bike rack program should identify a process for administrative approval by Public Works without individual hearings and that is based on bike parking density for bike corral locations. Through this program, bike corrals may replace parking spaces. NACTO guidelines should be consulted for ideal bike parking density in areas with high bike volumes.

The bike parking code should also be expanded to increase the types of uses required to install bike parking and evaluate the thresholds for building expansion that trigger parking requirements.

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Planning*

**SUPPORT ROLE**

*Public Works, WalkBike Nashville. Metro Council*

## Case Study

### Pittsburgh, PA

The City of Pittsburgh installs sidewalk bike racks on a district-wide basis and does not charge a fee. Applicants can apply to install a standard bike rack using their own contractor or apply for a sidewalk rack permit where the city installs the rack through their rack installation program. The applications are evaluated to make sure they meet the public space regulations.

### Minneapolis, MN

The City of Minneapolis provides guidelines for where on-street bike corrals can be located. The applicant and the city share the costs equally, and the city owns the corrals with the intention that the locations exist for a minimum of 5 years. The applicant is responsible for the day-to-day upkeep.

### Seattle, WA

Racks are installed at the request of citizens and business or property owners. Racks remain the property of Seattle Department of Transportation (SDOT). SDOT assumes responsibility for the racks but not for bicycles parked at them. Several criteria are used in siting the racks; one criteria is that they must be installed in public space within the City of Seattle limits, usually on a sidewalk with six feet or more of clear sidewalk space remaining. Racks on private property are usually paid for by the property owner. City racks are not available for purchase, but Bicycle Program staff can help property owners choose appropriate racks and installation locations. SDOT will also consider bike corrals upon request of the adjacent business owner. Converting a vehicle space is typically warranted where bike parking demand exists and where sidewalks are constrained.

Source: http://pittsburghpa.gov/dcp/bicycleparking
http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmsp-172354.pdf
http://www.seattle.gov/transportation/bikeparking.htm

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Propose policy amendment | Planning, Public Works | Mid-year 2017 |
| Develop program and process for owner-supplied bike racks | Public Works, BPAC, Walk Bike Nashville | End of 2017 |
| Develop program and policy for bike corral program and obtain approval from Traffic & Parking Commission | Public Works, BPAC, Walk Bike Nashville | End of 2017 |
| Identify funding source and staff for implementation of City-provided bike rack program | Public Works | Early 2018 |

*Top right: Bike parking in Pittsburgh; Bottom left: Bike corral outside a cafe in Minneapolis, MN (Source: Finance & Commerce); Bottom right: Bike corral in Seattle, WA (Source: City of Seattle)*

# Traffic Calming and Speed Reduction Policy

MODE

**RECOMMENDATION:**

- Streamline the current process to implement traffic calming measures on neighborhood streets
- Develop clear and concise guidelines for traffic calming measures
- Reduce speed limits on neighborhood streets to 25 mph or lower
- Identify 5 pilot projects to implement 20 mph zones near intersections with high collision history and/or near high pedestrian generators

## Part I. Background

Traffic calming is used to mitigate the effects of speeding and cut-through traffic in residential neighborhoods. Traffic calming measures improve safety for pedestrians, cyclists, and residents who travel along neighborhood streets. The goal of the current Metro Neighborhood Traffic Management Program is to create an improved neighborhood environment that promotes safety for all roadway users.

The current process must be initiated by a neighborhood association and then proceed through a complex and lengthy study, review, and implementation process. As a result, implementing a traffic calming measure or management plan can take a significant amount of time and can get held up in review and approvals. The process should be revised so that it is efficient and effective. Also, the program should include the ability to install temporary traffic calming measures that is approved through administrative review.

A common traffic calming strategy is to reduce posted speed limits. Lowering speed limits on streets can dramatically reduce injuries and fatalities that result from pedestrian and cyclist collisions. According to the ITE Transportation Planning Council, the risk of fatality decreases from 45% to 5% when the speed limit is reduced from 30-35 mph to 20-25 mph. This reduction is consistent with the Mayor's Green and Complete Streets Executive Order No. 031, which includes the goal of achieving zero traffic deaths on Nashville's streets.

## Part II. Details

Timeframe

- ◯ **SHORT-TERM**
- ☑ **MID-TERM**
- ◯ **LONG-TERM**

Funding Needs

- ◯ **LOW**
- ☑ **MEDIUM**
- ◯ **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works*

**SUPPORT ROLE**

*Planning, Metro Police Department*

## Case Study

### Raleigh, NC

The City of Raleigh addresses traffic calming through its Neighborhood Traffic Management program. Through the City of Raleigh website, residents can apply to have their street evaluated for traffic calming. Evaluation criteria include the amount of traffic speeding on the street, number of speed-related collisions on the street, and the amount of pedestrian activity. Residents can also petition to reduce the speed on their street if that residential street carries less than 4,000 vehicles per day. At least 75% of adult residents or property owners on the street must agree to the speed limit reduction. Once a petition is received for a street, the request will be reviewed by City Council.

Treatments are considered based on street width. Streets wider than 31 feet are eligible for the Neighborhood Streetscape Program, which uses treatments such as enhanced landscaping and landscape islands to reduce speed. Streets narrower than 31 feet are eligible for traditional traffic calming measures. There are no fees or assessments for Neighborhood Streetscape Projects; they are funded by Transportation Bond and Capital Improvement Funds. Each year the city reviews and approves projects.

Source: City of Raleigh

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Revise the application and implementation process to reduce application, review and implementation time | Public Works | End of 2017 |
| Change speed limit for all local streets to 25 mph | Public Works, Traffic and Parking Commission | End of 2017 |
| Identify funding source for traffic calming program | Mayor's Office, Planning, Public Works | Early 2018 |
| Conduct targeted enforcement on neighborhood speeding | Metro Police, Public Works | Early 2018 |
| Identify 5 pilot projects for 20 mph slow zones. Install devices to monitor the speed of cars in these slow zones and identify opportunities for expansion and improvements in future phases | Public Works | Early 2018 |
| Change signs and road markings, where applicable | Public Works | Mid-year 2018 |

### Seattle, WA

In September 2016, Seattle City Council unanimously approved a measure to reduce speeds on arterials to 25 mph and speeds on residential streets to 20 mph. This new policy change will affect about 2,400 miles of neighborhood streets. Advocates were instrumental in pushing the reduced speed limit. Traffic studies confirmed that lowering the speed limit would not cause traffic delay. This builds upon the city's existing 20 mph zones program, called "Designing Safer Streets," where six neighborhoods were piloted as 20 mph zones.


*Advocates in favor of lowering the speed limit of neighborhood streets to 20 mph (Source: Seattle Neighborhood Greenways)*

http://bikeportland.org/2016/09/27/seattle-just-passed-a-citywide-20-mph-speed-limit-and-portland-could-be-next-192316

# Bike and Pedestrian Access in Construction Zones

**MODE**

**RECOMMENDATION:**

- Re-evaluate and increase fees for construction closures in bikeways and walkways during construction
- Implement a monitoring and enforcement program with penalties for un-permitted closures and the identification of dedicated staff to manage the program
- Establish a clear and easy to use guidebook that outlines the planning and approval process for sidewalk and bikeway closures

## Part I. Background

In July 2016, Metro Nashville adopted an ordinance, which addressed bike and pedestrian safety in construction zones (BL2016-240). The ordinance requires adoption of temporary traffic control plans when closures exceed 20 days. This does not completely address the regular closure of lanes and sidewalks in high construction areas and the reduced safety of pedestrians and cyclists.

Currently, the Sidewalk and Lane Closure Permit is minimal (varies from an average of $10 to $20 per day) for the closure and inconvenience that cyclists and pedestrians experience. Sidewalk and lane closures often result in out of way routing, which causes pedestrians to often walk in the street instead of taking the alternate route.

In order to deter and reduce long-term closures of bikeways and sidewalks, Metro Nashville should increase fees for construction sites. Sidewalk closures, especially in high traffic areas, should be the last option and only allowed on a temporary basis. Nashville should establish a maximum distance for sidewalk and bikeway detours. Additionally, Nashville should evaluate a requirement for enclosed and covered walkways in high impact areas, as designated by Public Works, to promote the safe passage of pedestrians. Lastly, Nashville should adopt a platform for all public right-of-way management (emergency, development and utility coordination) to minimize disruption to residents and businesses, enforce no duplicate digging, and ensure cost sharing of work.

## Part II. Details

Timeframe

- ◯ **SHORT-TERM**
- ☑ **MID-TERM**
- ◯ **LONG-TERM**

Funding Needs

- ◯ **LOW**
- ☑ **MEDIUM**
- ◯ **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works*

**SUPPORT ROLE**

*Planning, Police Department, Permitting, Codes*

## Case Study

### Raleigh, NC

In 2014, the City of Raleigh's Public Works Department created a safety manual called "Making Great Strides – A guide to accommodating pedestrians in active work zones." In order to reduce confusion around codes and legislative documents, this document uses laymen's terms to explain best practices for pedestrian accommodations in work zones, the planning and approval process, and examples of how it's being done. Topics covered in this manual include planning and design, detour options, protective barriers, safety measures, and consideration for utilities.

### Seattle, WA

The City of Seattle instituted the Construction Hub Coordination Program in 2014 to address construction impacts to sidewalks. The program was initiated as a response to the access challenges experienced during the unprecedented growth and development of the city. The hub team of project and on-site coordinators assess permitted construction holistically, across public and private lines, in areas with multiple simultaneous construction projects in close proximity—otherwise known as construction hubs.

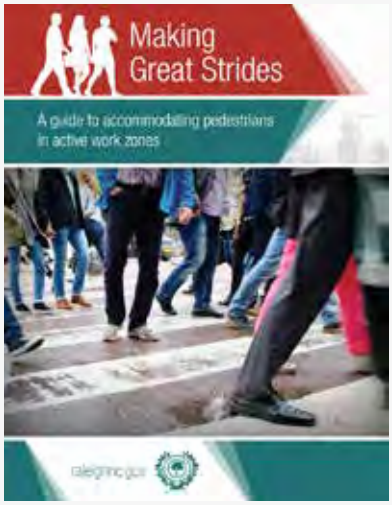
Source: Currier, S. "'Making Great Strides' to Keep Pedestrians Safe in Active Work Zones." 12 April 2016. http://www.dsinsider.com/blog/30-development-services/161-raleigh-is-making-great-strides-to-keep-pedestrians-safe

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Evaluate existing fees and fee increases | Public Works, Planning | Mid-year 2017 |
| Establish monitoring and enforcement program | Public Works, Permitting | Early 2018 |
| Evaluate policy and how it addresses closures, maximum detour distances, and covered and protected walkways | Public Works, Planning | Early 2018 |
| Establish platforming for right-of-way (ROW) management | Public Works, Permitting | Mid-year 2018 |
| Develop guidebook | Planning, Public Works | End of 2018 |

Site coordinators bring together leads from all public and private projects in a hub to encourage:

- Pedestrian detours to the opposing sidewalk at the nearest crossing
- Advanced warning signs for closures and detour signs
- Walkthrough scaffolding, to provide overhead protection and full-time pedestrian access




*Top: City of Raleigh "Making Great Strides" guidebook; Bottom: Pedestrians walking adjacent to a construction zone in Nashville*

# Staffing for Bike and Pedestrian Planning & Programs

**MODE**

## Part I. Background

Establishing a Bicycle and Pedestrian Division that is dedicated solely to active transportation projects would increase efficiency, provide greater oversight of active transportation projects, and serve as a central hub for all sidewalk and bikeway projects and programs. The creation of this division would further support Vision Zero efforts and implementation. Furthermore, the creation of this division signifies a long-term commitment to improving walkability and bikeability in Nashville.

**RECOMMENDATION:**

- [x] Provide dedicated staff for bike and pedestrian projects
- [x] Regardless of whether a Department of Transportation is created, a separate Bicycle and Pedestrian Division should be established with the following positions: Active Transportation Program Manager, Bikeway Planner, Pedestrian Planner

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [x] **LOW**
- [ ] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Mayor's Office, Metro Council*

**SUPPORT ROLE**

*Public Works, Planning, MTA, Parks & Recreation*

*Nashville WalknBike Open House*

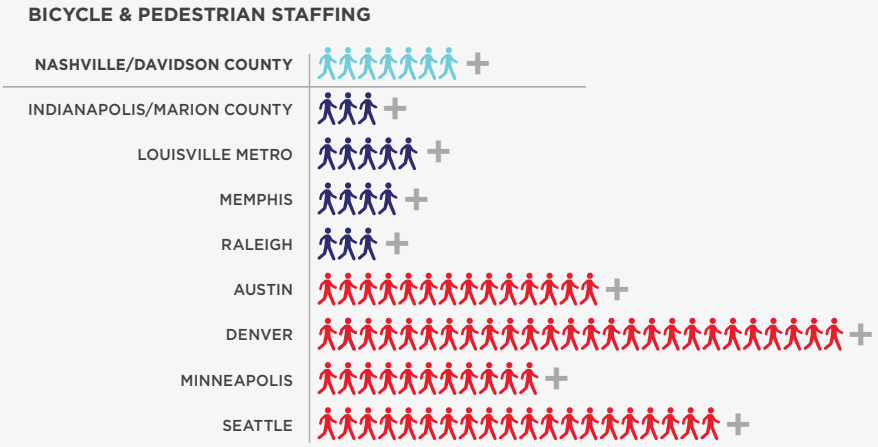
## Case Study

The City of Austin's Active Transportation Division is housed within its Department of Transportation. The division, which was created in 2014, is responsible for the planning, design, and implementation of pedestrian and bicycle facilities as well as programs and services that promote walking and biking. Aside from overseeing the update of the sidewalk master plan and bicycle master plan, the division manages several programs, including Smart Trips (an active transportation encouragement program), Austin B-cycle, and VIVA! Streets (open streets event). The Active Transportation Division works closely with the Public Works Department for planning, constructing, and maintaining sidewalks, trails, and bikeways. As of 2016, a total of 14 staff work on bicycle and pedestrian projects.

The *WalknBike Peer and Aspirational City Report* looked at dedicated staffing levels among Nashville's peer and aspirational cities. Denver has 26 dedicated full-time employees, which is the most among the peer and aspirational cities. All 4 peer cities - Indianapolis, Louisville, Memphis, and Raleigh - have a bike and pedestrian coordinator who works on both pedestrian and bike programs. Austin and Denver have separate staff who work on either the bike or the pedestrian program.

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Meet with Parks and Recreation, Public Works, and Planning to discuss the need to create a Bicycle and Pedestrian Division as well as to develop the responsibilities of this division | Mayor's Office, Public Works, Planning, BPAC | Mid-year 2017 |
| Transition all staff who work on bikeway and sidewalk projects into a newly established Bicycle and Pedestrian Division | Mayor's Office | End of 2017 |
| Apply for federal and state funding for bike and pedestrian projects | Bicycle and Pedestrian Division | Ongoing |
| Apply for Bicycle Friendly Community (BFC) and Walk Friendly Community (WFC) designation | Bicycle and Pedestrian Division | Early 2018 |




*Note: The number of staff displayed for each city represents full-time staff and part-time staff. Additional staff are often involved in bicycle and pedestrian projects and programs, making it difficult to quantify an exact number.*

# Transportation Demand Management (TDM)

**MODE**

**RECOMMENDATION:**

Establish a transportation demand management (TDM) program to manage congestion, encourage and incentivize residents and visitors to use all forms of transportation, and shift single occupancy vehicle trips to nonmotorized modes.

## Part I. Background

Nashville's population is increasing at a rapid rate and alternative modes of transportation must be considered to reduce congestion and accommodate growth in a sustainable manner. An investment in pedestrian and bike infrastructure may not necessarily produce increased demand. Workers and residents in Davidson County may not be aware of all the transportation options that are available to them, such as biking, carpooling, vanpooling, and transit options. Furthermore, workers and residents may need more incentives to rely less on automobiles.

The *Gear Up 2020* report also recommends that Metro Nashville create a regional TDM program. The report's project team recommends that Metro Planning conduct a 30-day best practice review with the involvement of Tennessee Department of Transportation, MPO, and a newly established Metro Department of Transportation.

As part of the TDM program, the city would need to establish partnerships with employers, developers, and Nashville MTA, and to develop new strategies to combat congestion in the city. Ultimately, a TDM program will contribute to a higher quality of life for Nashville's residents.

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Planning to shift to DOT*

**SUPPORT ROLE**

*MTA, Public Works, WalkBike Nashville, Chamber of Commerce*

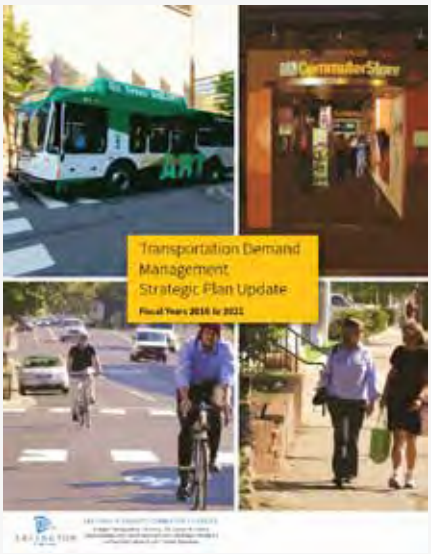
## Case Study

Arlington County, Virginia incorporated an integrated TDM approach to accommodate an increase in its resident and worker population with nearly no increase in road infrastructure or vehicular traffic. Due to its TDM efforts, the share of both Arlington residents and Arlington workers who report driving alone to work has decreased. Since 2008, Arlington saw a reduction of 41,000 single occupancy vehicle trips on an average weekday, which corresponds to a 39% reduction in the number of vehicle miles traveled. Arlington County Commuter Services (ACCS) is the Transportation Demand Management (TDM) provider for Arlington County and updates its TDM Strategic Plan every year. ACCS has 9 business units that execute and manage a suite of programs and services that enable more efficient use of Arlington's existing transportation network for workers, residents, and visitors. ACCS provides programs and services that focus on starting points and destinations of trips. These programs work with employers, hotels, and developers to implement commuter benefit programs. They also ensure that the public is aware of other trip options, such as transit, walking, biking, and carpooling in order to decrease single occupancy vehicle trips. Service offerings include ride matching services, carpool incentive programs that offer reserved spaces and reduced parking rates for pooled vehicles, residential outreach, transit benefit assistance to employers, telework programs, marketing, guaranteed ride home (GRH) program, Capital Bikeshare, carsharing, and commuter stores to assist commuters to purchase transit passes.

Arlington County has been widely recognized for its commitment to smart growth strategies and transit-oriented development. Nearly 90% of residents live within a quarter mile of the nearest bus stop while 34% live within three-quarters of a mile of a Metrorail stop.

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Develop a TDM Strategic Action Plan to identify priority actions, goals, and strategies for a Nashville TDM program | Planning, Public Works, MTA, WalkBike Nashville, Chamber, TDOT | End of 2017 |
| Coordinate with Nashville MTA to develop commuter benefits for those who use transit | Planning, MTA | End of 2017 |
| Work with employers to offer incentives for using alternative travel modes for commuting | Planning, Chamber, Downtown Partnership, | Mid-year 2018 |
| Work with developers of high-density residential complexes to offer driving alternatives | Planning | On-going |
| Implement a marketing program to educate residents, workers, and visitors about available transportation options, including walking, biking, and transit | Planning, MTA, WalkBike Nashville, Chamber of Commerce | End of 2018 |
| Routinely collect data and monitor progress; Issue an annual report that summarizes program activities and progress towards reaching goals | Planning, Public Works, MTA, MPO | Ongoing |




*Arlington County Commuter Services (ACCS) Transportation Demand Management Strategic Plan Update*

# Safety Campaign

**MODE**

**RECOMMENDATION:**

- [x] Implement a comprehensive safety campaign that includes education, encouragement, and enforcement components
- [x] Implement safety campaign in conjunction with Vision Zero efforts and include current Safe Routes to School programming

## Part I. Background

Nashville does not have an education or outreach campaign that has a broad reach and that is geared towards improving pedestrian and bicyclist safety. Walk Bike Nashville runs a number of education and encouragement programs, including Walk Bike University, reCYCLE program, and Travel Green. Through the planning process, residents have continually expressed that they don't feel safe walking or biking along corridors where cars are traveling at high speeds or where motorists are not looking out for pedestrians or bicyclists.

Aside from engineering improvements, Metro Nashville should invest in programming that focuses on the other E's: education, enforcement, and encouragement. Advocacy groups and nonprofit organizations, including Walk Bike Nashville and the Mayor's Bicycle and Pedestrian Advisory Committee (BPAC), would be important partners in this comprehensive safety campaign. Any future safety campaign would need to reach residents of all ages and abilities. Programming would need to be tailored for specific age groups, such as seniors and students in K-12 schools. In the Nashville area, Safe Routes to School programs are coordinated by local groups such as Walk Bike Nashville. A safety campaign should include current Safe Routes to School efforts and potentially try to apply for more funding to expand the program.

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*DOT, Planning, Health*

**SUPPORT ROLE**

*Public Works, Mayor's Office, Metro Police, Metro Public Schools, nonprofit organizations, advocacy groups*

## Case Study

Be Safe, Be Alert is a citywide traffic safety campaign in Chicago that urges motorists, pedestrians, and cyclists to follow traffic laws, pay attention, and create a safer city. The campaign encourages motorists to travel at 30 mph or less on city streets.

Since 2001, the City of Chicago's program has trained staff, called Safe Routes Ambassadors and Bicycling Ambassadors, to promote safe biking and walking. The goals of the Ambassadors are to promote safety, encouragement, and education for cyclists and pedestrians as well as to reduce crashes. The Ambassador programs are funded through the Chicago Department of Transportation (CDOT). Chicago's Safe Routes and Bicycling Ambassadors programs are the largest and longest-running programs of their type in North America. Each season, the Ambassadors visit schools, parks, libraries, and outreach events. They also act as a street team for Divvy, Chicago's bike share program, during high-usage events and at new station locations. During the school year, the Safe Routes Ambassadors reach out directly to public and private schools so that they can speak to individual classrooms in the second and fifth grades as well as in high school.

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Implement education programming for K-12 schools and for seniors ages 65+ | Walk Bike Nashville | Ongoing |
| Update "Moving in Harmony" campaign or create new pedestrian/bike/motor vehicle safety campaign | Health, MTA, Public Works, Planning, Walk Bike Nashville | Early 2018 |
| Partner with Police Department to strategize and implement targeted enforcement, possibly in areas with high number of crashes or near schools | Public Works, Planning, Police Department | Ongoing |
| Continue Safe Routes to School programming through Nashville MPO; Explore the possibility of expanding the program to more schools | Nashville Area MPO, Walk Bike Nashville | Ongoing |
| Partner with local advocacy groups and nonprofit organizations to organize encouragement events to promote safe walking and biking | Health, Walk Bike Nashville, Public Works, local advocacy group, nonprofit organizations | Ongoing |

The Chicago Pedestrian and Bicycle Safety Initiative Enforcement program includes joint safety enforcement events with the Chicago Police Department and the Bicycling Ambassadors. Bike safety events are held during peak commuting hours at the locations with the highest number of crashes. At these events, information is distributed about distracted driving, failure to yield to pedestrians and cyclists at controlled intersections, riding against traffic, and other behaviors. Bicycling Ambassadors partner with police to distribute bike headlights to cyclists riding without headlights.


*Chicago Safety Campaign Poster (Source: Chicago Department of Transportation)*

# Implement Vision Zero Policy and Plan

MODE 

**RECOMMENDATION:**

- ☑ Adopt a Vision Zero policy and action plan
- ☑ Commit to a goal of zero traffic fatalities by 2025
- ☑ Implement education, enforcement, and street design strategies that align with Vision Zero

## Part I. Background

Pedestrian and bicyclist fatalities are at a 20-year high and a crash occurs every 26 minutes in Davidson County, according to *Access Nashville, Nashville Next*. A 2014 report published by the Public Works Department identified high crash locations in the Metro Nashville area. Focusing on these high crash locations could result in a dramatic improvement to safety in Nashville. A number of cost-effective pedestrian and bicycle safety countermeasures exist that can be used to improve safety for non-motorized modes.

A formalized Vision Zero policy and plan signifies that Nashville is committed to improving road safety for all users. A citywide Vision Zero effort would be a concerted effort between various Metro departments, advocacy groups, schools, businesses, and nonprofit organizations. Implementing Vision Zero in Nashville would require education, enforcement, and design components in order to make a broad scale impact. *Gear-Up 2020* also calls for Nashville to commit to a goal of zero traffic fatalities by 2025. Strategies for implementation include enforcement efforts to target behaviors that could endanger all types of road users, outreach efforts to community members, and safety improvements to the urban core where there are the largest numbers of pedestrians and cyclists.

A Vision Zero policy and plan would build upon the "Complete and Green Streets" executive order passed in May 2016 and the city ordinance passed in July 2016 to accommodate pedestrians and cyclists in construction zones. The construction zone ordinance will make it harder for construction sites to close sidewalks and bike lanes during construction.

## Part II. Details

Timeframe

- ○ **SHORT-TERM**
- ☑ **MID-TERM**
- ○ **LONG-TERM**

Funding Needs

- ○ **LOW**
- ☑ **MEDIUM**
- ○ **HIGH**

Responsible Party

**LEAD ROLE**

*Mayor's office*

**SUPPORT ROLE**

*Planning, Public Works, Metro Council, Health, MTA, Police, MPO*

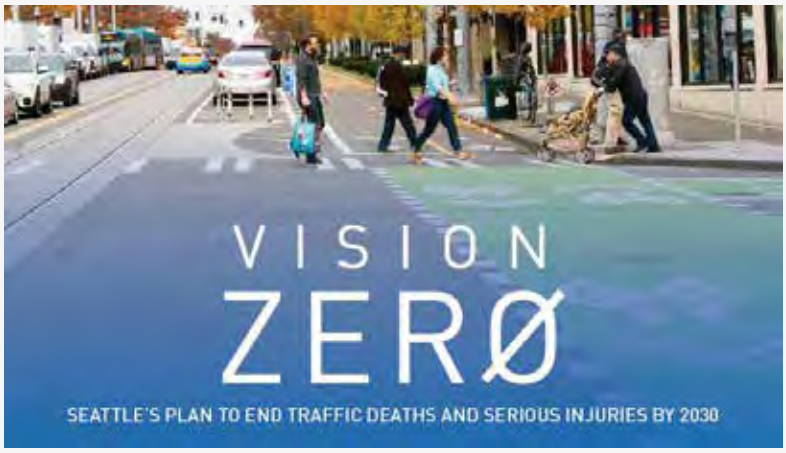
## Case Study

While the rate of traffic fatalities in Seattle has steadily declined, the city has adopted the view that one death is too many. The Seattle Vision Zero Plan sets a goal of eliminating traffic fatalities by 2030. Support from the Mayor's Office and partnerships with multiple city departments, government agencies, and community groups is integral in achieving this goal. Near-term actions are categorized into three groups: (1) street design, policies, and regulation, (2) education and public engagement, and (3) enforcement. Examples of some street design, policies, and regulations include a 20 mph zone program to reduce speeds on residential streets, reduce speed limits to 25 mph throughout downtown, construction coordination, and improving transit safety such as lane allocation improvements. Examples of education and public engagement include targeted outreach such as pedestrian safety for seniors (ages 50 and up), public engagement, and a vision zero campaign to serve as an overarching outreach effort. Enforcement efforts include school zone photo enforcement, corridor safety patrols, and high visibility enforcement.

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Complete a Vision Zero Action Plan | Public Works, Planning | Early 2018 |
| Adopt Vision Zero Action Plan | Mayor's Office | Early 2018 |
| Develop and implement targeted education programs geared towards improving pedestrian and bicyclist safety | Public Works, Planning, Health, WalkBike Nashville, MTA | Mid-year 2018 |
| Target enforcement efforts towards top 50 high-crash intersections | Police Department, Public Works | Ongoing |
| Collaborate with Nashville MTA to improve safety along transit corridors | Public Works, Planning, MTA | Ongoing |

In 2016, the city implemented a distracted driving campaign to encourage drivers to put away their phones while on the road. The city has also partnered with ridesharing services, Uber and Lyft, to offer discounted rides in order to prevent drunk driving. The city reports on its Vision Zero progress through an annual report. A city website for Vision Zero is also updated regularly.




*Seattle has adopted an aggresive and implemenation oriented action plan with the goal of ending traffic deaths and serious injuries by 2030.*

Sources: Seattle Vision Zero Plan

Walk Bike Nashville. "#DontBlockMyWalk Legislation Passes." http://www.walkbikenashville.org/dontblockmywalkcouncil

# Bike and Pedestrian Counts Program

**RECOMMENDATION:**

- [x] Establish a bike and pedestrian counts program that will regularly track and monitor the number of pedestrians and cyclists using select facilities across Nashville
- [x] Determine the appropriate counter technology for Nasville based on feasibility and available funding

**MODE**

## Part I. Background

Information obtained from bike and pedestrian counters will provide data on bike and pedestrian trends. Currently, the City of Nashville does not collect data to track how often pedestrian and bike facilities are used. Collecting data will enable the Public Works Department to evaluate trends, such as increase/decrease in usage, peak travel periods, and high activity locations. Better data on pedestrian and cyclist travel can help to determine where investments are most needed. It also helps to quantify the benefits of walking and biking. Ultimately, better data will make active transportation projects more competitive for funding opportunities.

The Nashville Area MPO conducts regional bike and pedestrian counts as part of the National Bicycle and Pedestrian Documentation Project. The counts occur every two years and are conducted by volunteers at 33 locations throughout the MPO region. Any future counts program conducted by the City of Nashville should be in coordination with the efforts carried out by Nashville Area MPO so that sites aren't duplicated and so that data is shared between agencies.

A number of counters are available that track bicyclist and pedestrian activity. Types of technology available to conduct counts are:

- Wireless sensors
- Pneumatic tube counters
- Inductive loop
- GPS-enabled route trackers
- Magnetometer
- Thermal imaging
- Imagery/ video detection systems
- App based counting software

## Part II. Details

Timeframe

- [ ] **SHORT-TERM**
- [x] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works to shift to DOT*

**SUPPORT ROLE**

*Planning, Nashville Area MPO*

## Case Study

The County of San Diego Health and Human Services Agency, San Diego Association of Governments, and San Diego State University collaborated to install automated pedestrian and bicycle counters throughout the region. The network of counters was initially funded by the Center for Disease Control and Prevention (CDC) and Communities Putting Prevention to Work (CPPW) grant. A systematic process was used to select the locations of counters. The four criteria are: (1) locations along the existing or planned regional bicycle network, (2) locations with a Smart Growth Opportunity Area (mixed-use, high-density infill development), (3) geographic variety across the region, and (4) socioeconomic factors.

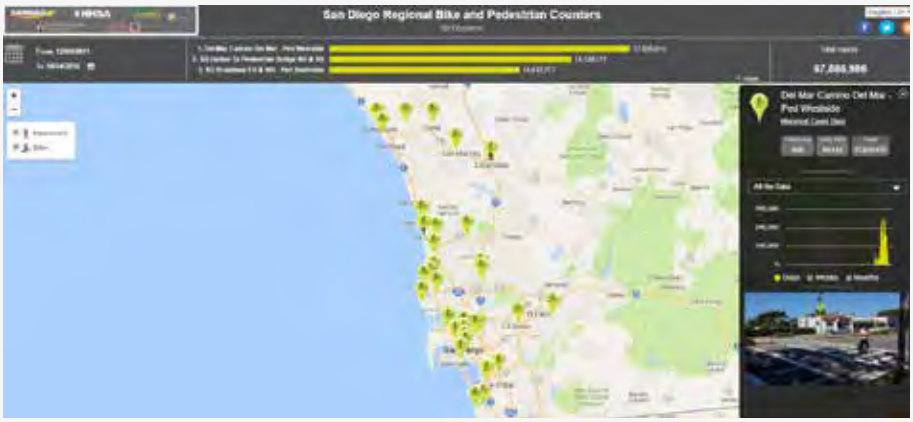
The initial network of counters was installed in 2012. Currently, 54 counters have been installed at 37 sites across 15 jurisdictions in the San Diego region. Three types of counters are dispersed throughout the region: those that count people biking, those that count people walking, and counters that count both people walking and biking. Data is collected every 15 minutes and uploaded daily to the Eco-Counter website. A link to the data is also provided on the SANDAG website.

Sources: NCHRP Report 797: "Guidebook on Pedestrian and Bicycle Volume Data Collection."

Ryan, S. "Regional Bicycle Data Collection and Metrics: San Diego and Maricopa County." Presentation on Apr 7, 2016. https://www.parks.ca.gov/pages/1324/files/regional%20bicycle%20data%20collection%20and%20metrics.pdf

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Seek funding for a bicycle and pedestrian counts program; Assign staff to manage counts program | Public Works, Planning, MPO | Mid-year 2018 |
| Determine locations for pedestrian and bicycle counts | Planning, Public Works, Health, MTA, WalkBike Nashville, Parks, BPAC | Mid-year 2018 |
| Conduct routine maintenance of counters | Public Works | Ongoing |
| Regularly review counts data to evaluate trends in bicycle and pedestrian travel | Public Works | Ongoing |
| Establish procedures for sharing counts data with the public | Planning, Public Works, MPO, ITS | Mid-year 2018 |




*Top: SANDAG Eco-Counter website*


*Left: Automated real-time bike counter in San Francisco, CA. Nashville could consider installing this technology along priority bikeways, such as Woodland Ave.*

# Wayfinding System

MODE

**RECOMMENDATION:**

- [x] Implement a comprehensive wayfinding system to help users navigate pedestrian routes, transit options, bikeways, and trails
- [x] Develop signage that conveys distance and direction to major directions

## Part I. Background

Wayfinding elements such as signage and mile markers will help to draw visitors, help users to identify the best routes, and enhance their ability to connect to major destinations. A wayfinding system will give users a unique experience while improving safety by alerting both users and motorists of the presence of pedestrian and bicycle routes. In 2011, Nashville unveiled a wayfinding program to provide improved directional signage and maps for visitors in Downtown Nashville, North Nashville and West End. This wayfinding system integrates pedestrian maps and signage with local street and interstate traffic guidance signs. The current wayfinding system can be further expanded to include bicycle routes and trails to create a comprehensive nonmotorized network. As the number of residents, workers, and tourists increases, it is important that Nashville implements a wayfinding system that enables all users to easily navigate through the nonmotorized network.

## Part II. Details

Timeframe

- [ ] **SHORT-TERM**
- [x] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works*

**SUPPORT ROLE**

*Planning, BPAC, Downtown Partnership, WalkBike Nashville, MTA/RTA*


*A sign in Downtown Nashville (Source: Informing Design, Inc.)*

## Case Study

### Bicycle Wayfinding: Berkeley, CA

In 2002-2003, Berkeley, CA has implemented a bicycle signage system for their bikeways and bicycle boulevards. Many of the bicycle boulevards are along residential streets with few landmarks and thus the city wanted a better way to distinguish these routes to provide more guidance for bicyclists. The city decided to use a nonstandard purple color for all signs with a prominent and recognizable logo. The system includes seven types of signs to identify routes and destinations and to provide guidance and information when the route changes or for intersecting routes. Signs and legends are reflective and visible at night. Berkeley also uses pavement markings that designate a bicycle boulevard and these pavement markings take up almost the full width of a travel lane.

### Pedestrian Wayfinding: New York, NY

WalkNYC is New York City's pedestrian wayfinding system that was implemented in the summer of 2013. Although the city is known as a pedestrian-friendly city, there was a need to create a universal design that would apply to all the diverse boroughs and neighborhoods that make up the city. WalkNYC provides clear visuals and graphics to orient pedestrians and to provide a system of signs to help pedestrians navigate throughout the city. The maps are designed to encourage people to walk, bike, use public transit, and to help guide users to major landmarks and destinations. Each kiosk displays a large map of the streets within a 5-minute walking distance and another map showing the area in relation to a larger section of the city. The maps use a "head-up" orientation in which the compass direction corresponds with the direction in which the user is facing, similiar to existing wayfinding signs in Nashville. WalkNYC maps are installed at all subway stations, Staten Island Railway stations, and Citi Bike station kiosks.

Sources: Pedestrian and Bicycle Information Center, City of Berkeley, CA
http://nacto.org/case-study/bicycle-way-finding-signage-berkeley-ca/

http://www.nyc.gov/html/dot/html/pedestrians/walknyc.shtml
https://segd.org/walknyc-pedestrian-wayfinding
http://www.aiga.org/case-study-walknyc-pedestrian-wayfinding

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Conduct a wayfinding study and/or wayfinding plan; deliverables will include concepts and placement plan | Public Works, Planning, MTA/RTA, Parks | Mid-year 2017 |
| Consult NACTO Urban Bikeway Design Guide and MUTCD for design standards | Public Works | Ongoing |
| Apply and obtain funding for a wayfinding system | Public Works, Planning | Mid-year 2018 |
| Install wayfinding signage and pavement markings | Public Works | End of 2018 |
| Conduct regular maintenance for wayfinding signs and pavement markings (if applicable) | Public Works | Ongoing |


*Bicycle boulevard pavement marking in Berkeley, CA (Source: NACTO)*

*WalkNYC kiosk in New York City (Source: Society for Experiential Graphic Design)*

# Introduction to Design Resources

**RECOMMENDATION:**

Metro Nashville should update all design guidelines to include current, innovative treatments found in these design resources

A number of notable federal and state resources are available for bike and pedestrian planning and design. These design guidelines and treatments represent tools for creating a more walkable and bikeable Nashville. A thorough evaluation by an engineering and/or design professional should be conducted prior to construction of any facility. Below is a brief description of each resource.

## National Guidance

### AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (AASHTO)

*Guide for the Development of Bicycle Facilities, 4th Edition* (2012) is geared towards planners and designers and provides guidance on how to accommodate bike travel and operations in most riding environments and situations. Because these are guidelines, there is flexibility in tailoring the designs so that it is sensitive to local context.

*Guide for the Planning, Design, and Operation of Pedestrian Facilities* (2004) aims to provide guidance on the planning, design, and operation of pedestrian facilities along streets and highways. In particular, the guide focuses on identifying effective measures for accommodating pedestrians on public rights-of-way.

### FEDERAL HIGHWAY ADMINISTRATION (FHWA)

*Achieving Multimodal Networks* (2016) is intended to serve as a resource for practitioners on how to build multimodal transportation networks. The focus of this publication is to provide guidance on how to reduce multimodal conflicts and to improve the connectivity of multimodal networks so that walking and biking are more attractive transportation modes.

*Separated Bike Lane Planning and Design Guide* (2015) outlines planning considerations for separated bike lanes, which are also known as cycle tracks or protected bike lanes and provides design options for one-way and two-way separated bike lanes. This guide captures the current state of practice and covers other topics such as options for providing separation, intersection design, and lessons learned from around the U.S.

*Incorporating On-Road Bicycle networks into Resurfacing Projects* (2016) provides recommendations on how roadway agencies can incorporate bicycle facilities into their resurfacing program. In addition, the guide provides recommendations on how to accommodate bicycle facilities on existing roadways, cost considerations, and case studies. While the guide doesn't provide specific design guidance, it offers best practices for providing bikeways in conjunction with resurfacing projects.

### NATIONAL ASSOCIATION OF TRANSPORTATION OFFICIALS (NACTO)


*Urban Bikeway Design Guide* (2014) is a guide developed by reviewing best practices in cities across the world and the intended audience is cities. The guide provides state-of-the-practice solutions for creating complete streets that are safe for bicyclists.


*Urban Street Design Guide* (2013) serves as a toolkit for making city streets safer, more livable, and more economically vibrant. Topics covered in the guide include street design elements, interim design strategies, intersections, and design controls.


*Transit Street Design Guide* (2016) provides design guidance for the development of transit facilities on city streets, and for the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit.

## Tennessee Guidance

### TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT)

*TN Traffic Laws Relating to Bicycles: A Handbook for Motorists and Bicyclists* provides an overview of traffic laws for both motorists and cyclists. The handbook covers cycling signals for turns, riding on the sidewalk, and road position for cyclists.

*TDOT Multimodal Access Policy* (2015) stresses the importance of safety and mobility for users of all ages and abilities. The policy covers the planning, design, construction, maintenance, and operation of new construction, reconstruction and retrofit transportation facilities that are either federally funded or state funded. The policy can be found at: http://www.tn.gov/assets/entities/tdot/attachments/TDOT_Multimodal_Access_Policy_Signed.pdf

*Tennessee Bicycle Laws* – The TDOT website covers all of the bicycle laws in the state and clearly states

# Midblock Crossings

**MODE**

## Background

Improving pedestrian safety at all types of crossings is necessary. Installed at locations between intersections, midblock crossings improve the safety and visibility of pedestrians. Midblock crossings may provide a more direct path to destinations where block lengths are longer. Most often, midblock crosswalks are implemented in places where there is significant pedestrian activity. These include bus stops, parks, plazas, and schools. Midblock crossings may not be appropriate in all types of environments and designers should study both existing and projected pedestrian volumes in determining whether a midblock crossing is warranted. At a minimum, a marked crosswalk is provided at midblock crossings. Midblock crossings can also pose design challenges since motorists may not be expecting pedestrians to be crossing at a midblock location.

**RECOMMENDATION:**

- Improve safety and visibility of pedestrians at midblock crossings
- Coordinate with MTA to identify and prioritize midblock crossing needs to enhance access to transit
- Implement pedestrian safety countermeasures at midblock crossings

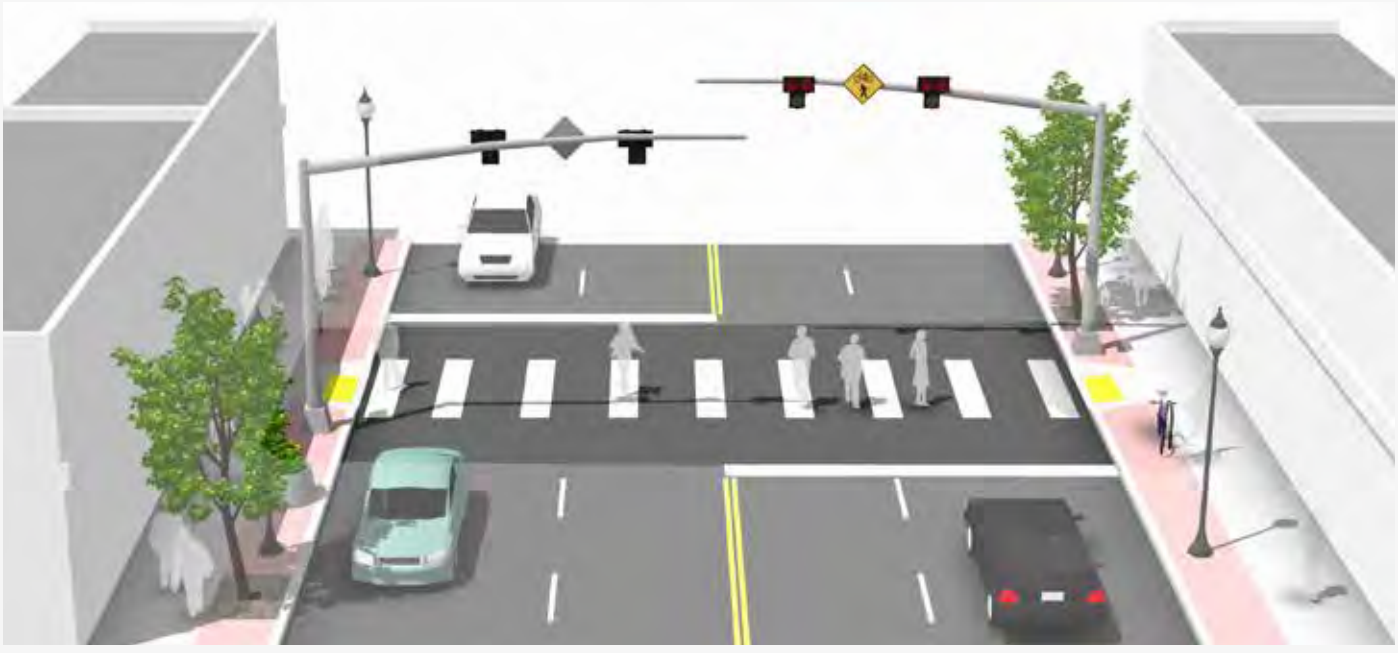
*Pedestrian island - Korean Veterans Blvd, Nashville*

## Hybrid beacon/HAWK beacon

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

### GUIDANCE

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
  - » If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
  - » Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.
- Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.



*Hybrid beacon/Hawk beacon*

## Median Refuge Island

Median refuge islands are located at the mid-point 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.

### TYPICAL APPLICATION:

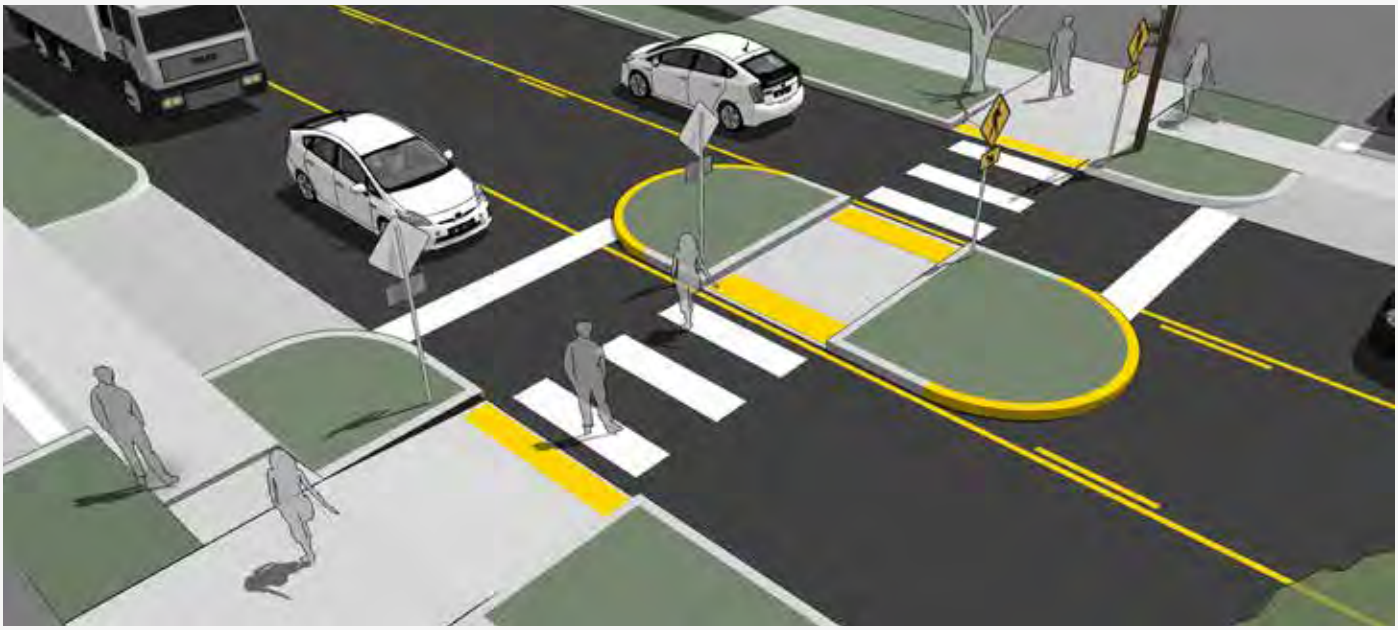
- Can be applied on any roadway with a left turn center lane or median that is at least 6 feet wide
- May be appropriate on multi-lane roadways depending on speeds and volumes. Consider configuration with active warning beacons for improved yielding compliance.
- Appropriate at signalized or unsignalized crosswalks.

### DESIGN FEATURES:

- The island must be accessible, preferably with at-grade passage through the island rather than ramps and landings. Detectable warning surfaces must be full-width and 3' deep to warn blind pedestrians
- Requires 6' width between travel lanes (8-10' preferred to accommodate bikes with trailers and wheelchair users) and 20' length (40' preferred). Clear width of 4' required, but preferably same width as crosswalk
- On streets with speeds higher than 25 mph, there should be a double centerline marking, reflectors, and "KEEP RIGHT" signage

### CONSTRUCTION COSTS

The cost to install median refuge islands range from $535 to $1,065 per foot for a typical cost range from $3,500 to $40,000, depending on the design, site conditions, landscaping and whether the median can be added as part of a larger street rebuild or utility upgrade.



*Median Refuge Island*

## Rectangular Rapid Flashing Beacon (RRFB)

RRFBs are user actuated lights that supplement warning signs at unsignalized intersections or mid-block crossings. RRFB's provide a high-visibility strobe-like warning to drivers when pedestrians use a crosswalk.

RRFB's are placed on both sides of a crosswalk below the pedestrian crossing sign and above the arrow indication pointing at the crossing. The flashing pattern can be activated with pushbuttons or automated (e.g. video or infrared) with pedestrian detection. They are unlit when not activated.

The RRFB system produces the highest yielding rate of all traffic control devices not featuring a red display and costs significantly less than other traffic control devices.

### TYPICAL APPLICATION

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

*Rectangular Rapid Flashing Beacon (RRFB)*

Sources:
NACTO Urban Street Design Guide
"Designing Sidewalks and Trails for Access." FHWA. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm

*Median Refuge Island with RRFB*

# Traffic Calming for Pedestrians

**RECOMMENDATION:**

Utilize traffic calming measures to improve safety for pedestrians

**MODE**

## Background

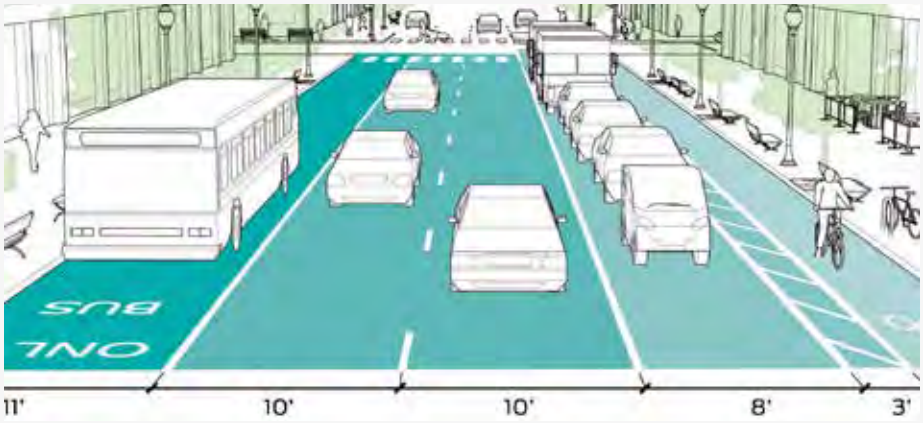
The Institute of Traffic Engineers (ITE) defines traffic calming as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." Reducing the speed of motor vehicles will create safer environments for pedestrians and cyclists. Slowing vehicle speeds dramatically reduces the risk of pedestrians suffering from severe and fatal collisions. Traffic calming approaches will differ for neighborhood streets and arterial streets.

## Speed humps

A speed hump is a raised area in the roadway pavement surface extending transversely across the road. Speed humps are generally used on residential streets. Most agencies have put in speed bumps that are 3-3.5 inches high and a travel length of 12 to 14 feet. On residential streets where a car approaches a speed hump, the vehicle will typically slow to around 20 mph.

## Reducing Lane Widths

Reducing the width of travel lanes prompts motorists to travel at lower speeds, which will in turn reduce the severity of collisions. Lane widths of 10 feet are appropriate in urban areas and can improve safety without impacting the flow of traffic.




*Top: Speed hump in Sacramento, CA*

*Bottom: Recommended lane widths in urban areas (Source: NACTO)*

## Bulb out/ Curb Extension

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

### TYPICAL APPLICATION

- On streets with on-street parking lanes
- At intersections where reduced crossing distance and traffic exposure is desired
- To physically protect parklets from traffic exposure

### GUIDANCE

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 feet and the two radii should be balanced to be nearly equal
- Curb extensions should terminate one foot short of the parking lane to maximize cyclist safety

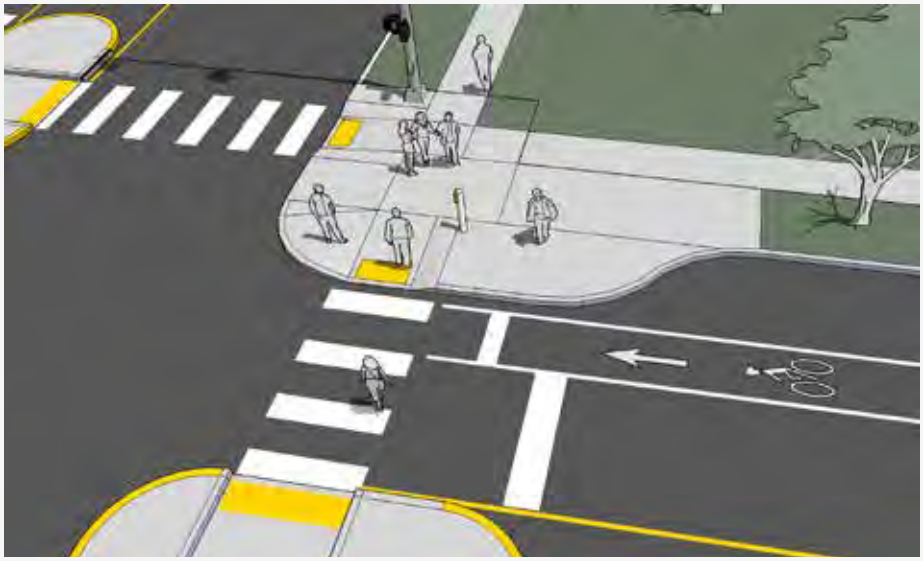
## Raised Crosswalks

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used only in very limited cases where a special emphasis on pedestrians is desired, and application should be reviewed on case-by-case basis.

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway
- Approaches to the raised crosswalk may be designed to be similar to speed humps
- May be unsuitable on emergency response routes

*Raised crosswalk in San Francisco, CA*

*Curb extension*



*Curb extension*

# Bike boulevards

**MODE**

**RECOMMENDATION:**

Implement bike boulevards along low-speed, low-volume residential streets according to recommendations in priority project list

## Background

Bike boulevards, or neighborhood bikeways, are an integral part of the low-stress bike network. Many local streets with low speeds and low traffic volumes can serve as safer biking environments for people of all ages and abilities. Bike boulevards may appeal more to cyclists who are less willing to ride with traffic on high-volume and higher speed collectors and arterials. Cyclists traveling on bike boulevards typically share the street with motorists. These streets can be enhanced using a range of design treatments that modify the street for cyclist travel while discouraging through motor vehicle travel.

Bike boulevards are low-volume, low-speed streets modified to enhance bike safety and comfort by using design treatments such as signage, pavement markings, speed and/or volume reduction features, and crossing improvements. Local bikeways create high quality, low-stress facilities for cyclists without physical separation because the roadway design itself creates a calm traffic environment where people biking and people driving can comfortably share the road.

**BENEFITS**

- Provides comfortable and attractive places to bike, attracting people of all ages and abilities
- Signage and pavement markings serve as wayfinding for bike riders and also brings awareness to the street as a bikeway
- Can benefit pedestrians, residents and other users through crossing improvements, traffic calming, landscaping, and reduced impact from motor vehicle volumes such as noise, air quality, and traffic safety

*Bike boulevard*

## TYPICAL APPLICATION

- Parallel with and in close proximity to major thoroughfares (1/4 mile or less)
- Follow a desire line for bike travel that is ideally long and relatively continuous (2-5 miles). The bikeway should have less than 10% out of direction travel compared to the shortest path of the primary corridor
- Reduce traffic volumes down to 2000 cars per day (1,500 cars per day maximum)
- Use traffic calming to maintain an 85th percentile speed below 20 mph (25 mph maximum)
- Selection of major street crossing treatments based on cross street volumes, lane configurations, presence of medians and traffic control devices

## DESIGN FEATURES

- No centerline on roadway to promote use of the full roadway by cyclists
- Bike boulevard markings or shared lane markings should be placed frequently along the route to identify the bike boulevard
- Wayfinding signs should be used to identify bikeway network connections and direct users to nearby destinations
- Minimal use of stop signs along the route allow for fast bike travel
- Speed management methods avoid creating narrow pinch points for cyclicts
- Volume management methods should always allow through access for cyclists
- At offset intersections, treatments should reduce exposure to fast vehicles and may concentrate bike crossings at one location to permit the use of robust crossing treatments

## FURTHER CONSIDERATIONS

Bicycle boulevards should be a complementary element of a bike network and should not serve as replacements for separated facilities on high demand corridors.

### CASE STUDY

**Portland, OR**

3,000 bicyclists per day on bike boulevards

400 bicyclists per day on arterial bike lanes

*Bike boulevard in Portland, OR*


*Bike boulevard markings*

# Separated Bikeways

**RECOMMENDATION:**

Evaluate opportunities to implement separated bike lanes to increase cyclist safety and comfort

**MODE**

## Background

Members of every segment of the population feel that a major barrier to biking is sharing the road with motor vehicles. In particular, the "interested but concerned" cyclists would prefer to ride on the road when they are physically separated from motor vehicle traffic. A before and after study in Montreal of physically separated bike lanes found that this type of facility can result in a crash reduction of 74% for collisions between cyclists and vehicles.

Implementing separated bike lanes, also known as cycle tracks, in Nashville would improve safety and comfort for cyclists of all ages. Depending on the environment, a one-way or two-way separated bike lane may be appropriate. This would depend on a variety of factors, including presence of on-street parking, if the street is a one-way street or two-way street, number of potential conflicts on the street, and types of connections that the bike facility would provide.

When retrofitting separated bike lanes onto existing streets, a street-level design may be most appropriate. This design provides protection through physical barriers and can include flexible delineators, curbs, on-street parking or other barriers. A street level separated bike lane shares the same elevation as adjacent travel lanes.

*One-way cycle track in New York City*

## One-Way Cycle Track

### TYPICAL APPLICATION

- Streets with high motor vehicle volumes and/or speeds and high bike volumes
- Streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bike markings through the intersection, and other signalized intersection treatments
- Appropriate for most riders on most streets, although caution should be used when approaching intersections or other conflict areas

### DESIGN FEATURES

- Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bike lane and at intervals along the facility
- 7 foot width preferred (5 foot minimum)
- 3 foot minimum buffer width adjacent to parking. 18 inch minimum adjacent to travel lanes [NACTO, 2012]. Channelizing devices should be placed in the buffer area
- If the buffer area is 4 feet or wider, white chevron or diagonal markings should be used

### FURTHER CONSIDERATIONS

- A retrofit separated bike lane has a relatively low implementation cost compared to road reconstruction by making use of existing pavement and drainage and by using the parking lane as a barrier
- Gutters, drainage outlets and utility covers should be designed and configured as not to impact bicycle travel
- Special consideration should be given at transit stops to manage bike and pedestrian interactions

### CONSTRUCTION COSTS

The implementation cost is low if the project uses existing pavement and drainage, but the cost significantly increases if curb lines need to be moved. A parking lane is a low-cost option for providing a barrier. Other barriers might include concrete medians, bollards, tubular markers, or planters.

*One-way cycle track*

## Two-Way Cycle Track

Two-way cycle tracks are bicycle facilities that allow bicycle movement in both directions on one side of the road. Two-way cycle tracks share some of the same design characteristics as one-way cycle tracks, but may require additional considerations at driveway and side-street crossings.

### TYPICAL APPLICATION

- Works best on the left side of one-way streets
- Streets with high motor vehicle volumes and/or speeds
- Streets with high bicycle volumes
- Streets with a high incidence of wrong-way bike riding
- Streets with few conflicts such as driveways or cross-streets on one side of the street
- Streets that connect to shared-use paths

### DESIGN FEATURES

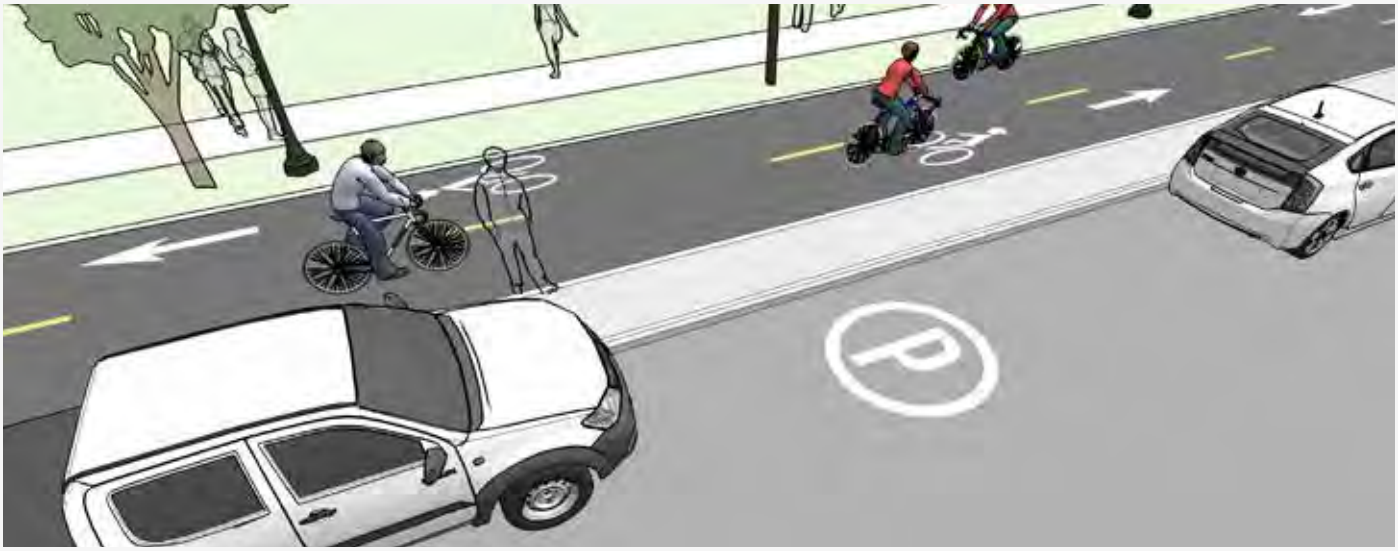
- 12-foot operating width preferred (10 ft. minimum) width for two-way facility
- In constrained environment, an 8-foot operating width may be considered
- Adjacent to on-street parking, a 3-foot minimum width channelized buffer or island shall be provided to accommodate opening doors
- Additional signalization and signs may be necessary to manage conflicts

### FURTHER CONSIDERATIONS

- A two-way separated bike lane on a one-way street should be located on the left side
- A two-way protected bike lane may be configured as street level as a raised separated bicycle lane with vertical separation from the adjacent travel lane
- Two-way separated bike lanes should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles

### CONSTRUCTION COSTS

The implementation cost is low if the project uses existing pavement and drainage, but the cost significantly increases if curb lines need to be moved. A parking lane is a low-cost option for providing a barrier. Other barriers might include concrete medians, bollards, tubular markers, or planters.




*Two-way cycle track*

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# Protected Intersections

**MODE**

**RECOMMENDATION:**

Evaluate whether there is a need to convert certain intersections to protected intersections

## Background

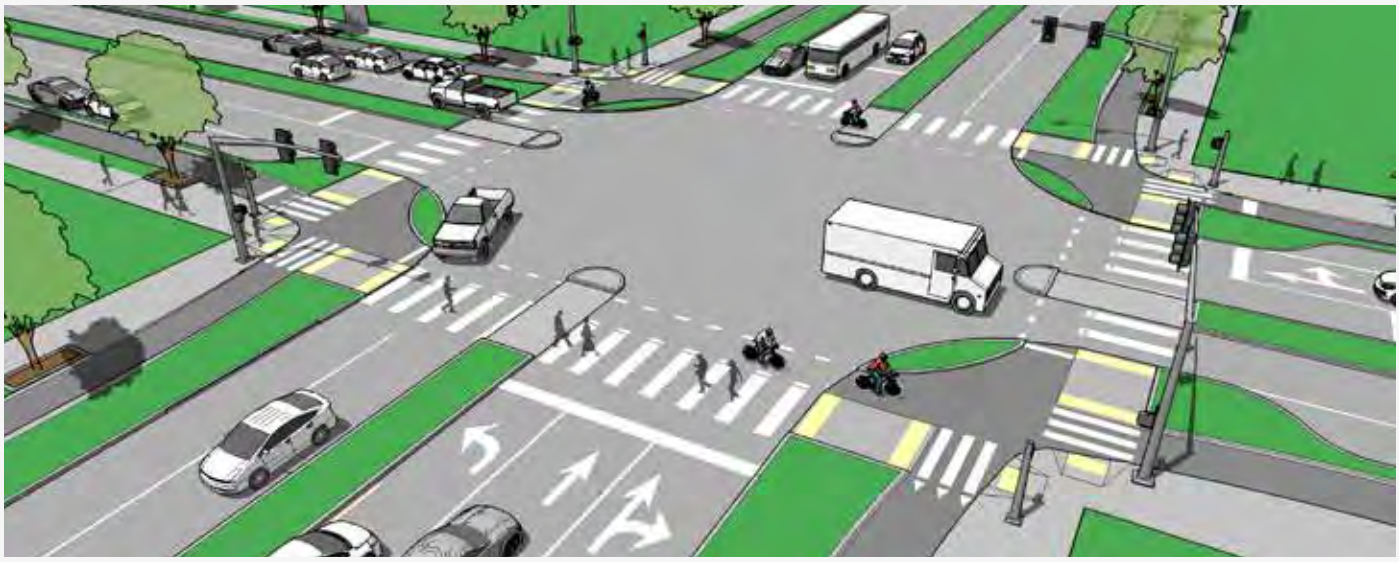
Efforts to improve bikeability will gradually result in higher numbers of cyclists in Nashville. While there have been investment in bikeways along corridors in Nashville, connections through intersections have been more difficult to implement due to costs and righ of way impacts. Intersections are where conflicts between cars, bikes, and pedestrians are most prevalent. Innovative design features, such as protected intersections, should be considered to improve access and safety for all users.

While separated bike lanes create separation between vehicles and cyclists, protection for cyclists often ends at the intersection.

A protected intersection uses a collection of intersection design elements intended to maintain lane separation, maximize user comfort within the intersection, and to promote a high rate of yielding to cyclists and pedestrians traveling through the intersection. The design is based on a setback bikeway crossing using physical separation within the intersection to define the turning paths of motor vehicles, slow motor vehicle turning speed, and offer a comfortable refuge for cyclists waiting within the intersection at a red signal.

**BENEFITS**

- Slows driver turning speed
- Improves driver sightlines of overtaking cyclists
- Provides a deceleration zone for yielding drivers
- Provides a physically separated space for cyclist waiting at an intersection on a red signal
- Shortens cyclist and pedestrian crossing distances



*Protected intersection*

## TYPICAL APPLICATION

- At signalized intersections along streets with separated bike lanes
- Along crossings of minor streets with stop controlled approaches
- May be compatible with conventional bike lanes or neighborhood bikeway facilities by transitioning the bikeway into separated bike lanes just upstream of the intersection

## DESIGN FEATURES

- Setback bike crossing of 20 feet allows for one passenger car to queue while yielding. A larger setback is desired in high speed areas (> 35 mph). A smaller setback distance is possible in low-speed, space constrained conditions
- Corner safety island with a 15-20 foot corner radius desired to slow motor vehicle speeds. Larger radius designs may be possible when paired with a deeper setback or a protected signal phase
- A forward stop bar should indicate the area for cyclists to wait at a red signal
- If a permissive left turn is allowed, a median island extending into the intersection should be used to channelize and direct left turning motor vehicles
- Intersection crossing markings should be used to identify the bike crossing. Consider green pavement to highlight the crossing area

## FURTHER CONSIDERATIONS

- Colored pavement may be used within the corner refuge area to clarify use by cyclists and discourage use by pedestrians or motorists
- Intersection approaches with high volumes of right-turning vehicles should provide dedicated right-turn only lane paired with a protected signal phase to separate the right turn movements from through bike movements

## POTENTIAL INTERSECTIONS IN NASHVILLE FOR PROTECTED INTERSECTIONS

- 12th Ave and South St
- Church St and 20th Ave
- Demonbreun St and 8th Ave

*Protected intersection in Salt Lake City, UT*

# Bikeway Maintenance

**MODE**

**RECOMMENDATION:**

- [x] Conduct routine maintenance of on-road bikeways; Purchase a sweeper to keep bikeways free of debris

## Part I. Background

Sweeping of bikeway facilities is included in the routine roadway sweeping schedule. Nashville's roadway sweeping is carried out by the Metro Water Services Department as part of its storm water maintenance efforts.

Although sweeping of bikeways is part of routine sweeping, Nashville residents have expressed concern that bikeways are not properly maintained and that they often find debris in bikeways. This signals that bikeways are not swept often enough. Debris within a bike facility reduces safety for cyclists and may even deter cyclists from biking as their means of transportation. As Nashville furthers its commitment to implementing more separated bikeways, Nashville must also prioritize bikeway sweeping and maintenance.

Comments in the WalknBike public survey reflected residents' concerns about bikeway maintenance.

*"The bike lanes in Nashville are often unrideable due to debris, sticks, branches, trash cans, rocks, glass, parked cars, etc. Regular sweeping of bike paths would be huge. Remember our tires are only 1-2 inches wide!"*

*"Something that goes with safe biking is a commitment to keeping streets swept. Gravel, glass and the like cause bikes to either move into traffic lanes or just stop biking."*

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [x] **LOW**
- [ ] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**
*Public Works, Water Services*

**SUPPORT ROLE**
*Mayor's Office & Council*

## Case Study

### Bikeway Maintenance in Denver, CO

The Denver Public Works Street Maintenance Division purchased equipment specifically for sweeping protected bike lanes since conventional sweepers do not fit within the space available in a protected bike lane. They also purchased a snow removal unit, which typically comes equipped with a plow, broom, bucket, snow blower, and liquid deicer tank. Public Works has developed winter maintenance standard operating procedures for removing snow in bike lanes. The City of Denver is experimenting with different snow-clearing methods for protected bike lanes located in its downtown area. The goal of these snow clearing efforts is to avoid snow accumulation in the buffer zone so that melted snow that flows into the protected bike lane does not freeze overnight. For on-street bike lanes, street sweeping and snow clearance occur at the same time as other travel lanes. Crews make conscious efforts to plow the snow as close to the curb as possible so that bike lanes are not obstructed.

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Dedicate funding to bikeway maintenance | Public Works; Mayor's Office | Early 2018 |
| Purchase appropriate equipment to maintain bikeways | Public Works, Water Services | Mid-year 2018 |
| Establish routine schedule for maintenance of separated bikeways | Public Works | Mid-year 2018 |


*Sweeping of bike lane in Denver, CO*

# Batched Bikeway Projects

**MODE**

**RECOMMENDATION:**

- [x] Identify diverse funding strategies for bikeway projects
- [x] Group bikeway projects together when appropriate and feasible in order to save on costs and time

## Part I. Background

Due to limited federal and state grant funding, cities must be innovative in how they finance and expand their bicycle networks. A deliberate strategy is needed to maximize available funding. Nashville should capitalize on existing resources and build new partnerships, especially with developers and private entities, so that it can continue to grow and enhance its bikeway network. Nashville should continue to implement new bikeways during street resurfacing and major street improvements. The city and the MPO should also seek out private partnerships when appropriate in order to support bike parking and development of bikeways.

Nashville's peer and aspirational cities carry out bikeway projects as part of road resurfacing projects or through larger Complete Streets projects. Funding sources for these projects vary and may be a mix of federal, state, and local sources.

## Part II. Details

Timeframe

- [ ] **SHORT-TERM**
- [ ] **MID-TERM**
- [x] **LONG-TERM**

Funding Needs

- [x] **LOW**
- [ ] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works to shift to DOT*

**SUPPORT ROLE**

*Mayor Office, Council, Planning*

*A bicycle friendly business in Nashville*

## Case Study

### Memphis, TN

Currently, Memphis doesn't have a dedicated funding source for bikeway projects in its capital improvement budget. Many of the bikeway projects are implemented through street resurfacing or other projects that are already happening. For some projects, such as greenways, groups that aren't part of the city are the ones who initiate the projects. For example, a cycle track was constructed on Jefferson Avenue that was initiated by the Memphis Medical District Collaborative (MMDC), a nonprofit community development entity. MMDC focuses its work heavily on streetscape improvements throughout the Medical District. Memphis's Hampline, a combined on and off-street bikeway, was initiated by the public and paid for in part by crowdfunding. The project's supporters launched a digital fundraising campaign (similar to Kickstarter) to pay for part of the project's cost.

### Raleigh, NC

Raleigh's Long Term Bikeway Plan and the city's Complete Streets Policy directs the city to continue to include bike facilities in street projects and in new developments (when appropriate). The city currently installs pavement markings for bicycle facilities through the street resurfacing program. In addition, the city coordinates with the greenway and pedestrian plan implementation to install shared use paths where appropriate. Building a shared use path could serve multiple purposes while also saving capital. Similar to Memphis, the City of Raleigh also undertook a crowdfunding campaign to raise money for various public projects. The crowdfunding campaign raised $9,000 to finance bike racks and greenway benches.

Sources: Raleigh Bike Plan Update 2015, Andersen, Michael. "Memphis is About to Build the Country's First Crowdfunded Bike Lane." People for Bikes. http://www.peopleforbikes.org/blog/entry/memphis-is-about-to-build-the-countrys-first-crowdfunded-bike-lane

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Identify funding strategies for bikeway projects | Planning, Public Works, Mayor Office, Council | Mid-year 2017 |
| Continue implementation of bikeway projects through street resurfacing | Public Works, TDOT | Ongoing |
| Engage business community and other private partners | Planning, Public Works, Nashville Area MPO, BPAC, Advocacy groups | Ongoing |
| Engage neighborhood groups, advocacy groups, and other nonprofit organizations | Planning, Public Works, Nashville Area MPO | Ongoing |
| Coordinate with Parks and Recreation Department on greenway and trail projects | Planning, Public Works, Parks and Recreation, MTA | Ongoing |

*Hampline in Memphis, TN*

# Bike Facility Selection

**MODE**

**RECOMMENDATION:**

Utilize the bike facility selection matrix to assist Metro in determining appropriate treatments for minor and major separated bikeway facility types

A range of factors can influence cyclists' comfort and safety. Selecting the appropriate bike facility for a roadway must balance traffic conditions, land use context, and implementation cost.

As a starting point to identify a preferred facility, the figure to the right can be used to determine the recommended type of bikeway to be provided along a roadway with a particular posted speed and volume situation. To use the chart, identify the appropriate daily traffic volume and travel speed on the existing or proposed roadway and locate the facility type(s) indicated by those key variables.

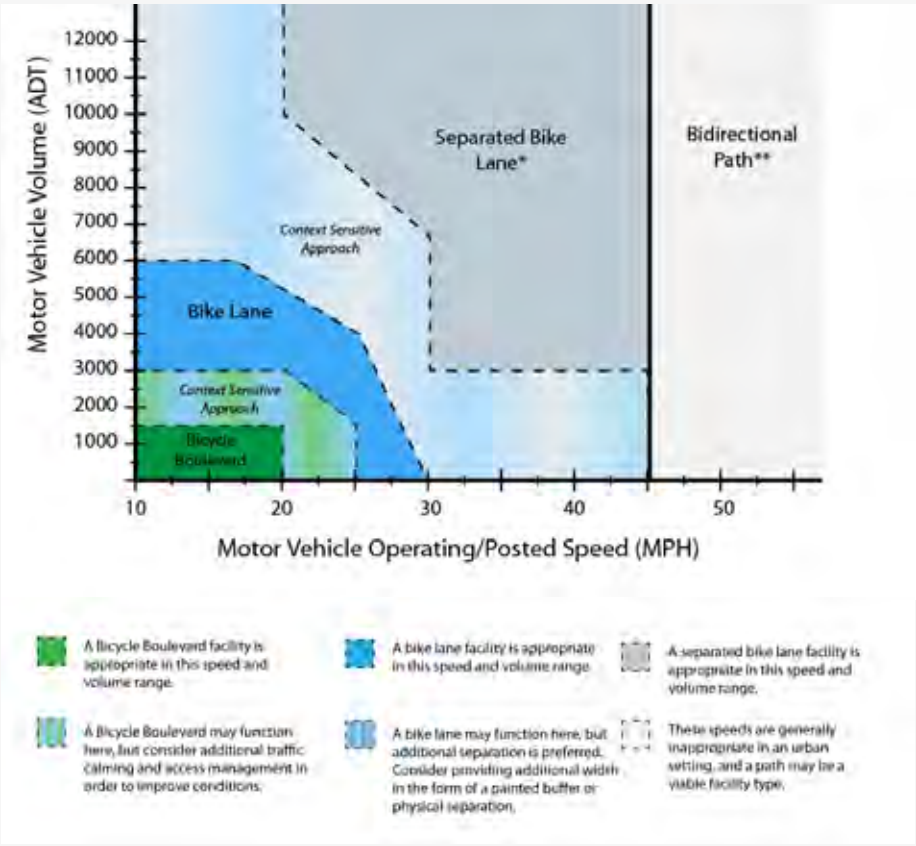
Other factors beyond speed and volume which affect facility selection include:

- traffic mix of automobiles and heavy vehicles
- presence of on-street parking
- available roadway or roadside space
- intersection density
- surrounding land use

Although these factors are not included in the chart, they should always be considered during facility selection and street design process.

The bike facility selection chart presents simplified guidance from a variety of sources, including the AASHTO Bike Guide and NCHRP Report 766:

Recommended Bicycle Lane Widths for Various Roadway Characteristics. Practitioners who are seeking to implement facilities that are not covered in the chart should consult these resources for more detailed guidance.



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# Utility and Fixed Object Coordination

**MODE**

**RECOMMENDATION:**

- [x] Create a guidebook to address fixed obstacles within sidewalk zones
- [x] Evaluate existing sidewalks for their accessibility, with special attention to utility and fixed object obstacles
- [x] Enhance standards for sidewalk construction, including minimum width and furnishing zones

## Part I. Background

As Nashville expands and improves its pedestrian network, accessibility and usability are key factors that must be considered to create a viable and safe network. Sidewalks in the public realm are typically designed to be a minimum of five feet wide. However, in many areas, the width of existing sidewalks is much narrower. Many factors contribute to narrow width of existing sidewalks, such as constrained right-of-way, old sidewalks that have not been repaired, and obstructions outside of the existing sidewalk zone. In many instances, the "sidewalk zone" starts at the back of curb and extends outward within the right-of-way. This zone is often the location of fixed objects such as utility and electric poles as well as lighting, signage, benches, and transit stops. When these items are located within the sidewalk zone, the accessible width is reduced and often reduced to less than three feet. This creates areas that are impassible for users in a wheelchair, people pushing strollers, etc.

A guidebook should be created to address fixed obstacles within sidewalk zones. The sidewalk zone width, or minimum pedestrian travel area, should be determined based on the transect, street type, and pedestrian demand model. Conduit placement for future underground power lines for new sidewalk projects should be evaluated and considered in the guidebook.

No new or replacement sidewalks should be built that result in an obstacle or barrier. All new sidewalks should contain a furnishing zone that would be in addition to the minimum required sidewalk width. Fixed objects such as utility poles, lighting, signs, benches and trash receptacles should be located in this zone. This zone is also appropriate for landscaping such as street trees and bio-swales. In the Major and Collector Street Plan (MCSP), this zone is typically referred to as the "green zone".

## Part II. Details

Timeframe

- ◯ **SHORT-TERM**
- [x] **MID-TERM**
- ◯ **LONG-TERM**

Funding Needs

- ◯ **LOW**
- [x] **MEDIUM**
- ◯ **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works, Planning*

**SUPPORT ROLE**

*NES, utility companies, MTA*

## Case Study

### Seattle, WA

Seattle uses a similar landscape/furniture zone located between the roadway curb face and the front edge of the walkway with a minimum width of 5-6 feet. This area is used to locate street trees, utility poles, furniture, and lighting. Transit Zones are located in the landscape/furniture zone and are designated for transit riders as well as for loading and alighting. It may also include transit signage, shelters, benches, trash receptacles, and pedestrian scale lighting. Seattle has a standard that the sidewalk shall be clear of all vertical obstructions, such as poles, fire hydrants, street furniture, and other elements for a width of at least 5 feet. These obstructions should be placed in the landscape / furniture zone or behind the sidewalk. Relocation of existing utilities may be required to meet clearance requirements. These requirements and others can be found within the Seattle Right-of-Way Improvements Manual, which can be found on the city's website.

### NACTO

The NACTO *Urban Street Design Guide* can be consulted for further guidance on addressing utility conflicts. Similar to the practice of other cities, NACTO suggests a "street furniture/curb zone". This refers to the section of the sidewalk between the curb and the edge of sidewalk as the appropriate location for items such as lighting, newspaper kiosks, and utility poles. It is critical that sidewalks have a desired minimum width of 6 feet and absolute minimum of 5 feet with a minimum 2 feet buffer for street furniture and utilities.


*Online version of the Seattle Right-of-Way Improvements Manual. Users can select links in the illustration to access information about design criteria*

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Inventory obstructions and constrained widths in existing sidewalks that are part of the priority sidewalk network | Public Works, NES | End of 2017 |
| Create a task list that outlines the obstruction, existing degree of obstruction, party responsible for relocation, and then prioritize items on the list | Public Works, Planning | Early 2018 |
| Work with NES and communication companies to identify a dedicated funding source to relocate utility poles from sidewalks. This should be a yearly recurring fund | Mayor's Office, Council, Public Works, NES | Mid-year 2018 |
| Work with MTA to develop a strategy and plan to relocate bus stops and benches outside of the sidewalk zone | Public Works, Planning, MTA | Mid-year 2018 |
| Create a guidebook to clearly outline the process to address obstacles in sidewalks | Public Works, Planning, NES | End of 2018 |

# Tactical Urbanism Approach to Pedestrian & Bike Infrastructure

**MODE**

## Part I. Background

Tactical urbanism, also known as living laboratory, has been embraced as a low-cost alternative to implementing both temporary and permanent pedestrian projects. This method of testing out longer-term infrastructure improvements sprung out of a series of citizen-led efforts to "take action when confronted with the slow pace of change." It can take shape in many forms, ranging from smaller "guerilla interventions" to demonstration projects led by both community groups and cities. Tactical urbanism projects may or may not be carried out with the approval of city governments. Examples of methods include pavement markings, pop-up bikeways, adding furniture and/or seating to create public space, and using planters as barriers for a protected bike lane.

**RECOMMENDATION:**

- ☑ Implement low-cost strategies to complete the pedestrian network
- ☑ Utilize tactical urbanism approaches to install both temporary and permanent pedestrian infrastructure

Nashville should embrace tactical urbanism as a strategy of implementing pedestrian improvements. Tactical urbanism projects have low costs and have the potential to garner excitement around active transportation. Tactical urbanism projects also allow residents to envision an environment with improved pedestrian facilities and to test out these

*Top and bottom: Temporary crosswalk effort led by TURBO Nashville*

## Part II. Details

Timeframe

- ☑ **SHORT-TERM**
- ○ **MID-TERM**
- ○ **LONG-TERM**

Funding Needs

- ☑ **LOW**
- ○ **MEDIUM**
- ○ **HIGH**

Responsible Party

**LEAD ROLE**

*Planning to shift to DOT*

**SUPPORT ROLE**

*Public Works, Walk Bike Nashville, BPAC, TURBO Nashville*

## Case Study

### Seattle Low-Cost Sidewalk Program

In 2015, Mayor Ed Murray furthered his commitment to creating a walkable city and proposed that the city use innovative techniques to complete more sidewalk projects. The Mayor plans to deliver at least 250 blocks of new sidewalks over the next nine years at the same cost as constructing 150 blocks using the traditional concrete sidewalk model. In order to achieve that goal, sidewalks could be constructed with stamped asphalt, at-grade sidewalks separated by curb stops or planter boxes, and other quick-to-implement, low-cost pedestrian infrastructure solutions. These sidewalk improvements will be implemented on streets where no sidewalks exist and will be constructed on one side of the street rather than both sides.

The 2016 low-cost sidewalk improvements will cost $1.5 million and will be primarily funded through Move Seattle, a property tax levy. Mayor Murray is also hoping to identify private sources of funding to expand the sidewalk network by establishing new partnerships with homeowners and businesses. The City plans to improve enforcement and outreach when private entities are responsible for repairing sidewalks, leverage existing development to incentivize building better pedestrian environments, and update Seattle Department of Transportation's tools for tracking sidewalk conditions.

Sources: Fesler, Stephen. "Seattle Mayor Ed Murray Reveals Low-Cost Sidewalk Program." The Urbanist. 22 Oct 2015. https://www.theurbanist.org/2015/10/22/seattle-mayor-ed-murray-reveals-low-cost-sidewalk-program/
Kaufman, Rachel. "Seattle Just Voted to Build 250 Blocks of 'Alternative' Sidewalks." Next City. https://nextcity.org/daily/entry/seattle-vote-250-blocks-new-sidewalks-alternative-concrete

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Implement citywide tactical urbanism policy to implement demonstration projects and low cost pedestrian projects | Mayor's Office, Planning | End of 2017 |
| Partner with community organizations to implement temporary demonstration projects to test pedestrian and bike infrastructure treatments | Planning, Public Works, Walk Bike Nashville, BPAC | Ongoing |

### Quick-build projects in Memphis and New York City

Departments of Transportation (DOTs) in cities across the United States have implemented "quick-build" projects that focus on improving pedestrian and bike infrastructure. These projects typically have short timeframes and are installed within a year of planning. Materials that are easily transferable and mobile, such as traffic barriers, planters, and posts, are used so that the space can be altered. MEMFix, a community initiative in Memphis, has implemented short-term alterations to city blocks with bike lanes, community gardens, and green space. New York City has a Plaza Program, which is a city initiative that collaborates with community organizations to convert underutilized roadways into public spaces. These projects use paint, plants, and moveable seating. Some projects, such as the pedestrian plaza at Times Square, have become permanent through capital construction plans.

*Top: Stamped asphalt sidewalk in Seattle (Source: Seattle Bike Blog); Bottom: Times Square Pedestrian Plaza (Source: Irving Commons)*

# Transit First/ Last Mile

**MODE**

**RECOMMENDATION:**

- [x] Partner with Nashville MTA and RTA to provide amenities at priority transit stops
- [x] Improve pedestrian and bike connections to transit stops, regional transit centers, and park-and-ride lots
- [x] Plan walksheds and bikesheds around each priority transit stop

## Part I. Background

In 2016, nMotion was adopted as the long-term strategic plan for Nashville MTA and RTA to improve regional mobility. One strategy to improve transit service for riders is for MTA and RTA to improve pedestrian access and provide better bike connections. The plan outlines strategies that MTA, RTA, and the Metro Nashville will undertake to make pedestrian improvements along transit routes. In the outer counties, RTA will work with communities to develop pedestrian infrastructure at key points along Regional Rapid Bus lines. MTA and RTA will provide space for bikes on light rail vehicles and BRT vehicles and continue to provide bike racks on all other buses.

Metro Nashville should work with RTA and MTA to focus on planning walksheds (half-mile radius) and bikesheds (3-mile radius) around each priority transit stop. These walksheds and bikesheds should be the focus of where pedestrian and bike connections to transit are made. An overwhelming number of respondents for the nMotion public survey expressed that improved transit service must also be accompanied by sidewalks and bikeways to those transit stops. Focusing on these walksheds and bikesheds would improve safety for cyclists and pedestrians and increase the likelihood of shifting vehicle trips to active transportation and transit trips. The High Capacity Transit Corridor recommendations are discussed in Chapter 7.

## Part II. Details

Timeframe

- [ ] **SHORT-TERM**
- [x] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [ ] **LOW**
- [x] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*MTA, RTA*

**SUPPORT ROLE**

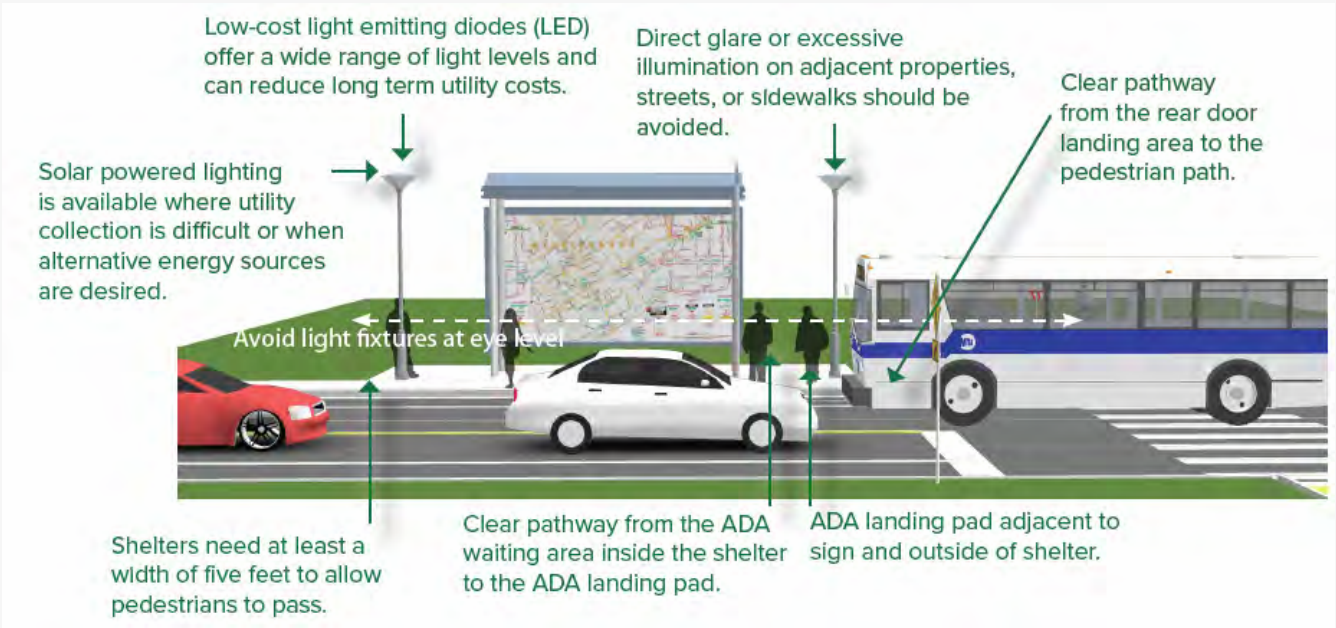
*Public Works, Planning*

**Key transit amenities to promote walking and biking at transit stops are (refer to illustration below):**

- ADA compliant curb ramps and ADA landing pad
- Bench
- Lighting
- Bus route information
- Bus shelter
- Bike parking
- Public art
- Trash receptacles

## Part III. Action Steps

| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Plan walksheds and bikesheds around priority transit stops | MTA, RTA, Public Works, Planning | End of 2017 |
| Improve biking amenities, such as providing space for bikes on all transit vehicles (including BRT and light rail vehicles), bike parking at bus stops, and bike parking at regional transit centers | MTA, RTA | End of 2018 |
| Make pedestrian improvements along transit routes, including crossings and sidewalks | MTA, RTA, Public Works | Mid-year 2019 |


*Right: FTA Policy on bike and pedestrian improvements near public transportation; Bottom: Illustration of key amenities at transit stops*

# NACTO Involvement

**MODE**

## Part I. Background

NACTO's core mission is to build a strong network of peer communities as well as foster open communication and collaboration between cities. They help to fulfill this mission by providing its members valuable tools to improve their transportation infrastructure in order to provide a safe environment for all road users. In 2014, Nashville endorsed NACTO's Urban Street Design Guide. However, Nashville is not a member of NACTO and does not have access to the myriad of tools, technical assistance, training resources, and learning opportunities such as information sharing, peer city review, policy committee participation, workshops, and forums. Nashville became a NACTO member in 2016 in order to access the many benefits that NACTO has to offer.

**RECOMMENDATION:**

- [x] Join NACTO
- [x] Formally adopt NACTO guidelines as defacto design standards with exceptions as noted in the Complete Streets Executive Order
- [x] Maintain NACTO membership as an annual cost

Each year, Nashville should dedicate funding to send a representative from Metro to the NACTO annual meeting. Metro Nashville should plan yearly study visits to aspirational cities to meet with government officials and leaders to learn about innovative practices, policies, and services as well as lessons learned. Representatives from Metro Nashville should visit a city outside the U.S. every few years to expand learning and understanding of best practices.

Smaller US cities can join NACTO as Affiliate Members. Annual costs for Affiliate Membership is $8,000 for larger cities (over 300,000 residents).

## Part II. Details

Timeframe

- [x] **SHORT-TERM**
- [ ] **MID-TERM**
- [ ] **LONG-TERM**

Funding Needs

- [x] **LOW**
- [ ] **MEDIUM**
- [ ] **HIGH**

Responsible Party

**LEAD ROLE**

*Public Works, Mayor's Office*

**SUPPORT ROLE**

*Planning*

## Peer and Aspirational City Membership

### Member Cities:

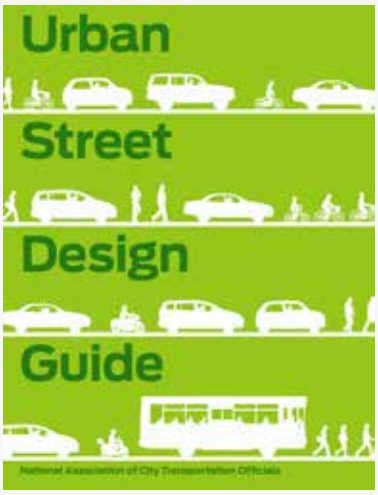
- Austin, TX
- Minneapolis, MN
- Seattle, WA
- Denver, CO

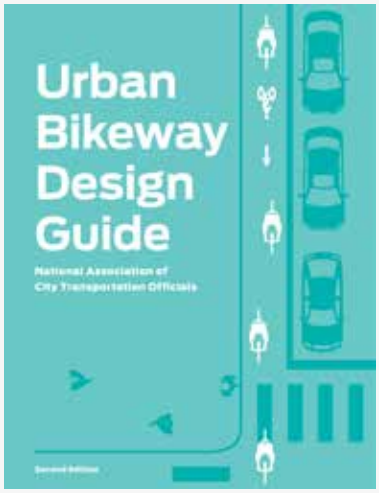
### Affiliate Member Cities:

- Indianapolis, IN
- Louisville, KY
- Memphis, TN

## Part III. Action Steps

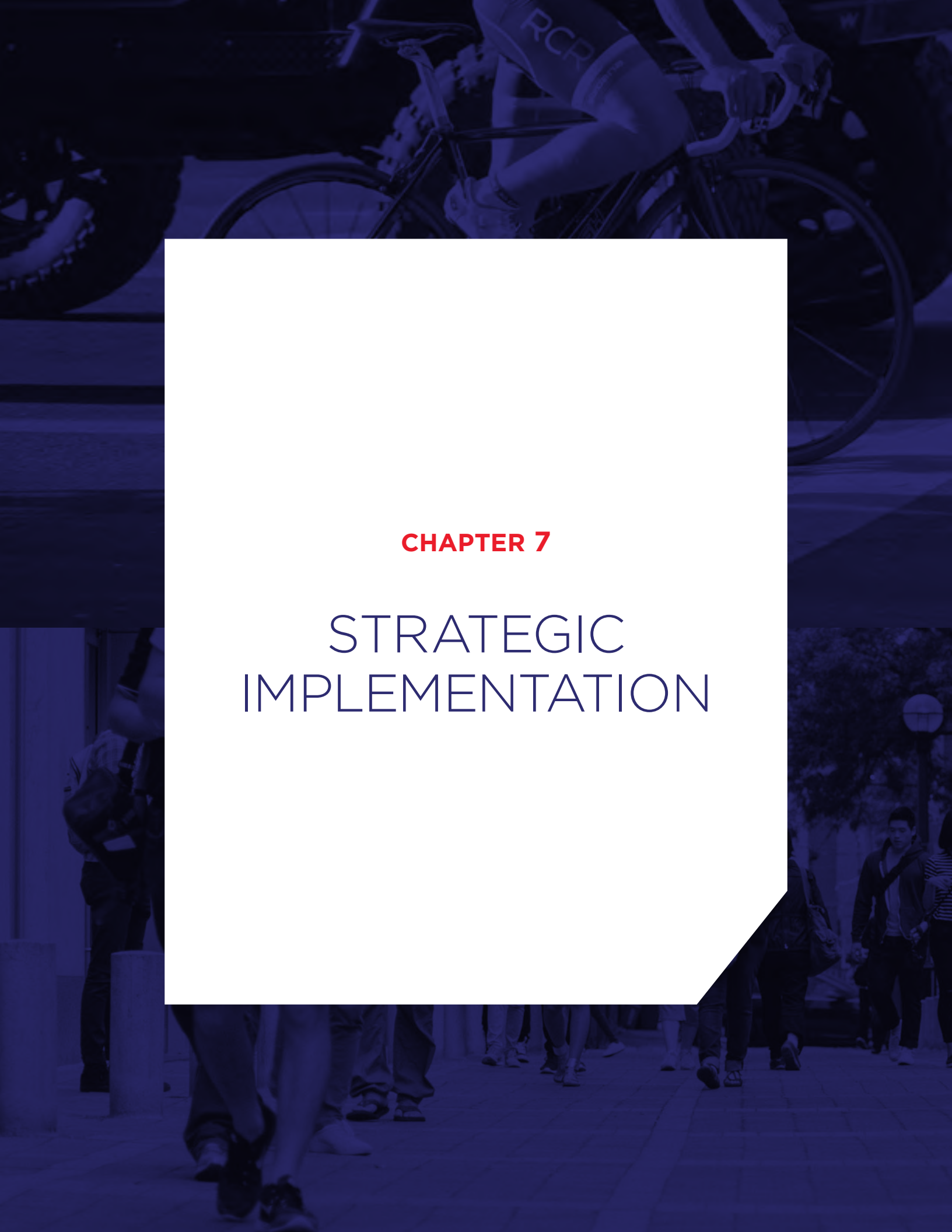
| Action Steps | Person(s)/ Organization(s) Responsible | Target Completion Date |
|---|---|---|
| Maintain membership in NACTO | Planning, Public Works, Mayor's Office, MTA | On-going |
| Adopt NACTO guidelines | Public Works, Mayor's Office | End of 2017 |
| Conduct a study visit to an aspirational city in the U.S. | Public Works, Planning, Mayor's Office, MTA, Parks | Early 2019 |
| Conduct a study visit to an aspirational city abroad | Public Works, Planning, Mayor's Office, MTA, Parks | End of 2020 |



*Top left: NACTO 2016 Membership Guide; Top right: Urban Street Design Guide; Bottom left: Urban Bikeway Design Guide; Bottom right: Transit Street Design Guide*



CHAPTER 7

# STRATEGIC IMPLEMENTATION

Improving conditions for walking and biking is an important priority for Nashville. However, implementation of the projects and strategies in this document will need to be phased over time and will depend on available resources.

Implementation of the WalknBike Plan will require leadership and dedication to facility and program development on the part of a variety of agencies. Equally critical, and perhaps more challenging, will be securing a dedicated annual funding source. This can be done through strategic collaboration with regional and state agencies, the private sector, non-profit organizations and Davidson County residents.

## Our Priorities

### NEW SIDEWALK

- Improve pedestrian safety.
- Connect schools, bus stops, parks, and neighborhoods.
- Increase equitable access.

### SIDEWALK REPAIR

- Respond to ADA complaints and concerns to address accessibility barriers for users of all abilities.
- Repair and maintain sidewalks currently inventoried in "POOR" condition.

### LOW-STRESS BIKEWAYS

- Implement projects that create a connected network of bikeways that appeals to users of all ages and abilities.

### VISION ZERO

- Address projects that improve safety for all users and increase bicycle and pedestrian comfort.

### LIVING LAB

- Pilot projects to test and develop innovative and low-cost design alternatives.

# Project List Development

The updated prioritization process helps to identify potential sidewalk and bikeway projects. However, that is just one component of the project development process. The prioritized list of projects will undergo a three step process (see explanation to the right) to develop an annual project list that satisfies available funding.

The result of this process is an annual sidewalk and bikeway project list. To communicate with the public and maintain a transparent project selection process, a status tracker to easily track the status of the projects is recommended. Refer to the sidewalk implementation flow chart on page 204-205 for more details on sidewalk development.

To be most useful to Metro, this implementation strategy must allow for flexibility and encourage Metro staff to take advantage of opportunities as they arise. For example, Metro will continue to implement sidewalks and bikeways as development/redevelopment occurs. Leveraging external opportunities will support a more walkable and bikeable Davidson County.

**STEP 1:**
**CONSTRUCTABILITY AUDIT**

Potential projects will undergo a thorough feasibility review to account for Right-of-Way impacts, environmental constraints, design considerations, and detailed cost development.

**STEP 2:**
**COORDINATION EFFORT**

Metro will review the updated project list to evaluate potential conflicts with Metro adopted priorities, including Nashville Next, nMotion, and Plan-to-Play. The list will also be coordinated with other public agencies, such as TDOT and NES.

**STEP 3:**
**COLLABORATION PROCESS**

Metro will collaborate with individual project stakeholders to understand their concerns and priorities. Stakeholders could include property owners, business community, elected officials, and advocacy groups.

# What if my bikeway or sidewalk project isn't on the project list?

Building more sidewalks and bikeways is one component of a multi-pronged approach to improving walkability and bikeability in Nashville. There is a significant need for sidewalks and bikeways in Nashville-Davidson County, which incurs significant costs. At the same time, limited funds are available to build sidewalks and bikeways. Policy and programmatic approaches to improving safety for all road users are also needed as part of a comprehensive approach to improve walking and biking conditions. Local organizations such as Walk Bike Nashville and Metro's BPAC would be great champions of policy changes and partners for implementing programs.

## Policy

As discussed in Chapter 6, policy approaches can help to promote safety at the citywide level. If Metro Nashville chooses to adopt a Vision Zero policy, then Metro should also undertake a policy that reduces speeds on local roads. In line with Vision Zero and speed reduction, Metro can consider using traffic calming techniques such as speed bumps on local roads, traffic circles, and curb extensions. Specific design requirements for traffic calming techniques are discussed in the Design section of Chapter 6.

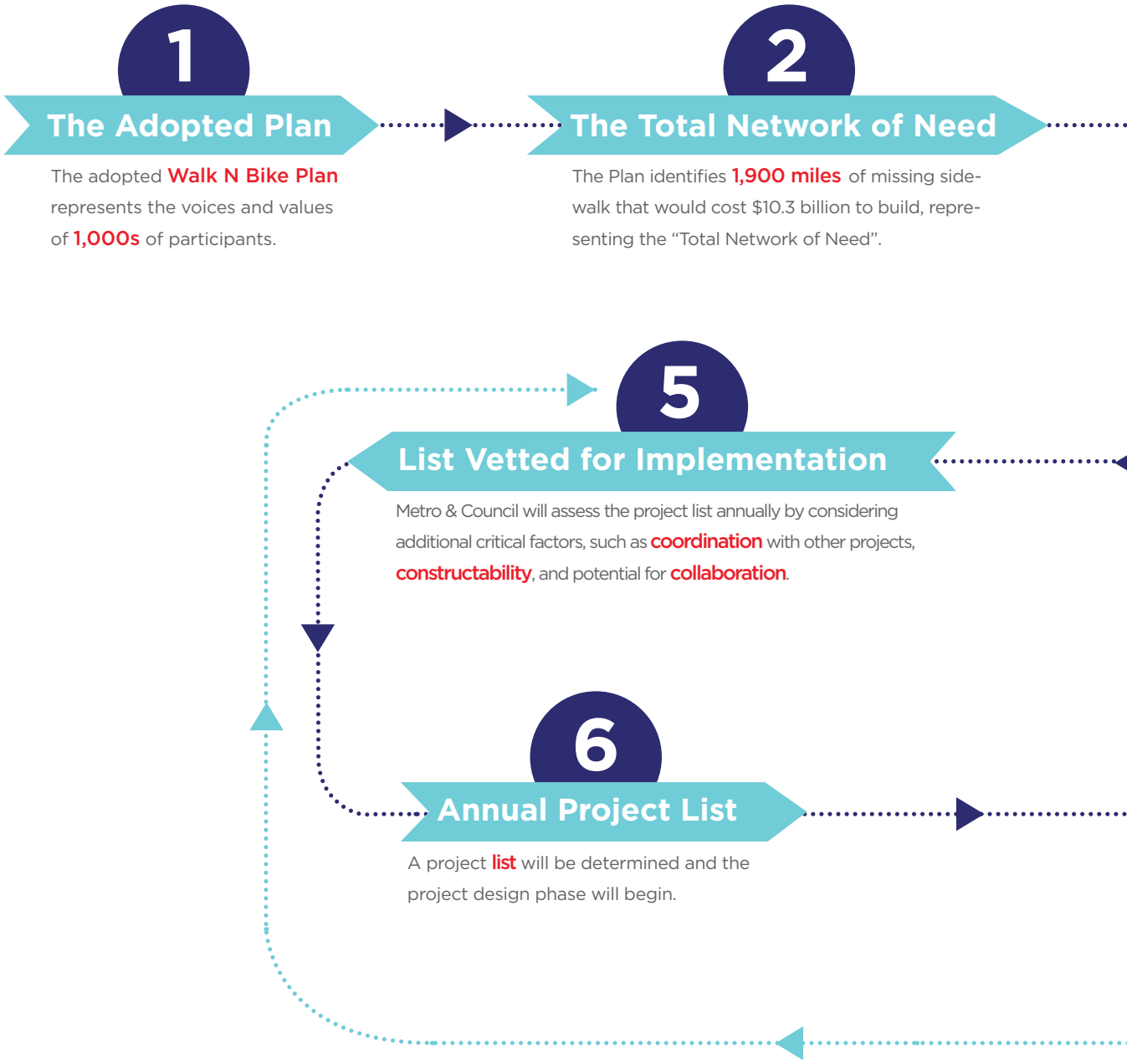
## Programs

Chapter 6 also discusses possible programs that focus on other E's (education, encouragement, and enforcement), celebrate biking and walking, improve skills and confidence for people to bike on roadways, and ensure that roads are safe for all users. Enforcement strategies require partnering with law enforcement agencies to ensure that vehicles are abiding by the posted speed limits and other rules of the road.

*Safe Routes to School is a federally funded program that is implemented locally to increase the number of children who walk or bike to and from school*

*Walk Bike Nashville works to build a more walkable and bikeable Nashville by offering educational programs on safety and skills as well as participating in advocacy efforts*

# Implementation Flowchart for Sidewalk Projects




*Implementation Flowchart for Sidewalk Projects*

## 3 Prioritization Process

The "Total Network of Need" was prioritized using a **new methodology** that accounts for schools, parks, equity, and other factors.

## 4 Priority Sidewalk Network

The result of prioritization is two project lists, one for **sidewalk repair**, and another for **new sidewalks** These can be viewed in spreadsheet format or as a map.

## Allocate Annual Funding

## 7 Projects Underway!

Projects take time. The design process, securing right-of-way, relocating utilities, and even the funding source can make projects take longer than expected.

## 8 Status Tracker Updates

A status tracker page will be provided online to **communicate** the status of current projects.

***Annually, the process starts at step 5***

# Vision Zero

Mayor Barry has a vision for a safe Nashville where people feel safe traveling in the growing County, whether traveling by foot, bike, bus or car.

At the heart of the worldwide Vision Zero movement is the belief that death and injury on public streets is unacceptable and preventable. Peer and aspirational cities have set similar goals and are seeing reductions in crashes, deaths, and injuries.

A Nashville Vision Zero program would call for street design that emphasizes safety, predictability, and the potential for human error, coupled with targeted education and data-driven enforcement. Some key implementation strategies include:

- Continually monitor collision trends and deploy enforcement appropriately.
- Review factors that contribute to each serious collision that occurs to learn as much as possible from each incident.
- Implement 20mph zones in areas close to schools, parks, and residential neighborhoods.
- Install spot safety improvements along corridors and at intersections with a history of crashes.

## Action Item

Implement the recommendations from the 2014 Bicycle and Pedestrian Safety Pilot Study; Assemble a Vision Zero steering committee to identify high crash locations and recommend improvements.

VISION ZERO

SAFER STREETS FOR SEATTLE

*Seattle modeled their comprehensive Vision Zero program after Washington State's Target Zero program since traffic fatalities have dropped 40% across the state since the first version of Target Zero launched in 2000. Both programs could serve as peer programs for Nashville.*


*In 2014, New York City passed legislation to make the default speed limit 25mph. This policy changes was a key action step in their Vision Zero program.*

*Intersections are often where the most bicycle and pedestrian crashes occur. Treatments such as the protected intersection in Salt Lake City, UT provide improved safety and access.*

# Living Lab

In order to achieve the goals and vision established in WalknBike, Nashville must be willing to be creative and innovative in the design, funding, and implementation of sidewalks and bikeways.

A Living Lab will allow Nashville to test street designs, tactical urbanism approaches, and low-cost solutions. Tactical urbanism approaches are discussed in Chapter 6. The key to this program is to monitor national best practices, evaluate piloted treatments, and communicate opportunities for audiences to provide feedback on pilot projects as part of the ongoing evaluation process.

## Action Item

It is recommended that Metro collaborate with existing agencies and stakeholders, such as the Nashville Civic Design Center, Walk Bike Nashville, and TURBO Nashville to implement the Living Lab program. Organizing a stakeholder committee to identify potential pilot project locations, research design solutions, and develop a communication strategy would be a key action item.


*Nashville could model their program after Boulder, CO's Living Lab program.*

*Seattle has developed a low-cost sidewalk program that uses lower cost materials, such as stamped and stained asphalt, to reduce construction costs. Seattle is also proposing new public-private partnerships to expand the sidewalk network.*

# Sidewalk Repair

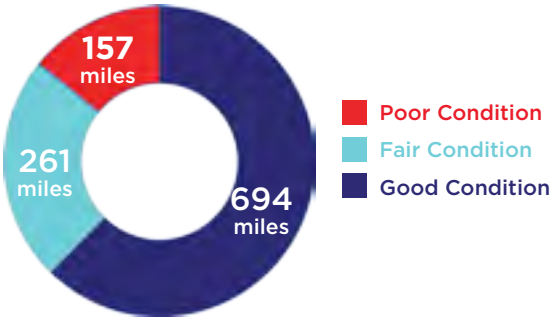
The goal of the Metro sidewalk repair program is to ensure that all sidewalks are safe and accessible for all pedestrians.

Damaged sidewalks can pose a hazard to pedestrians and the repair program can help reduce the likelihood of someone getting injured. Even slight defects in sidewalks can cause pedestrian injuries or cause the sidewalk to be out of compliance with the Americans with Disabilities Act (ADA).

## Funding Scenarios

Table 7.1 highlights three different annual funding allocation scenarios and the number of years it would take to repair existing sidewalks categorized in "poor" or "fair" condition. This is a 2016 snapshot of current needs. As the sidewalk network expands and ages, repair needs will increase.

It's important to remember that the WalknBike Plan does not set funding allocations. Instead, the plan identifies the priority projects and the annual budget program is developed by the Metro Council and Mayor's Office.




**Davidson County** maintains 1,130 miles of existing sidewalk.

*Table 7-1. Sidewalk Repair Funding Scenarios*

| Annual Funding Allocation | Years to Complete "Poor" and "Fair" Needs |
|---|---|
| $5,000,000 | 47 years |
| $15.000.000 | 16 years |
| $47,000,000 | 5 years |

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# Bikeway Funding Scenarios + Access Benefits

Peer and aspirational cities across the country have shown that a broad based approach to bikeway investment funding for low-stress infrastructure can simultaneously realize marked increases in bicycle use and safety. To attain the successes of aspirational cities, Metro Nashville should emulate their strategies and commitment to bicycling, including providing continuous and predictable investments.

## Funding Scenarios

The following map series is a conceptual display of the priority bikeway network's growth over the next five years according to three different funding allocations.

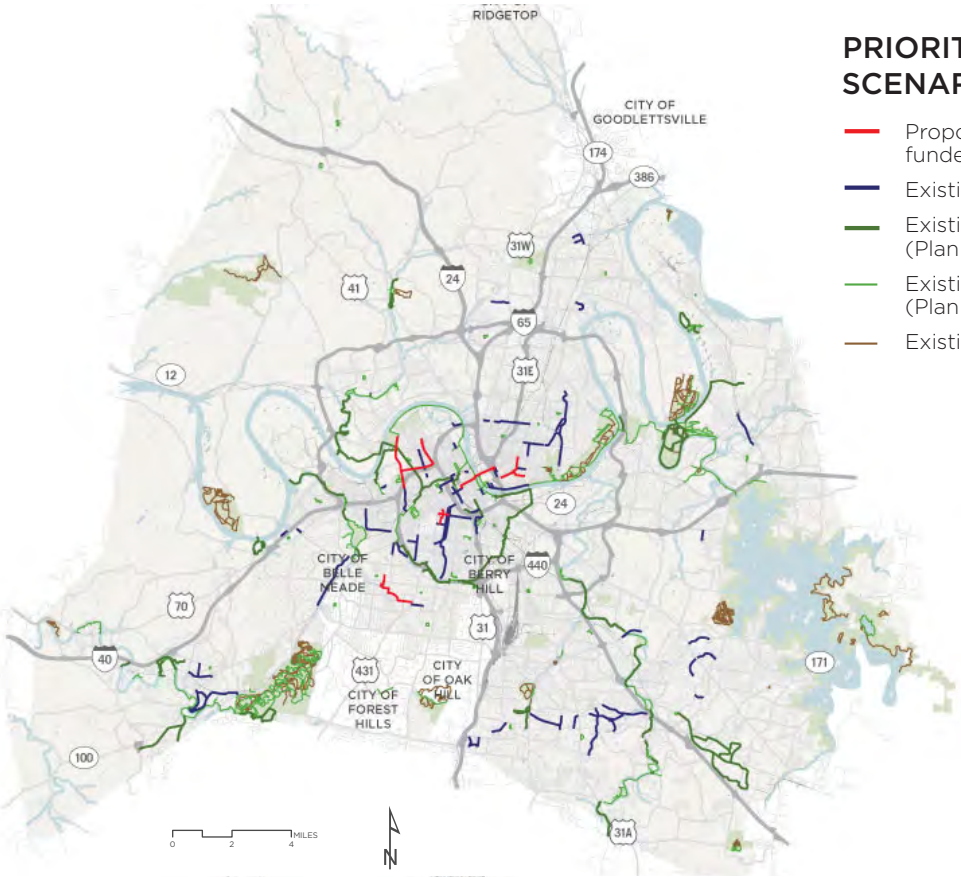
It's important to remember that the WalknBike Plan does not set funding allocations. Instead, the plan identifies the priority projects and the annual budget program is developed by the Metro Council and Mayor's Office.

*Table 7-2. Bikeway Funding Scenarios*

| Annual Funding Allocation | Years to Complete Priority Low-Stress Bikeway Network |
|---|---|
| $1,000,000 | 41 years |
| $4.000.000 | 10 years |
| $8,000,000 | 5 years |

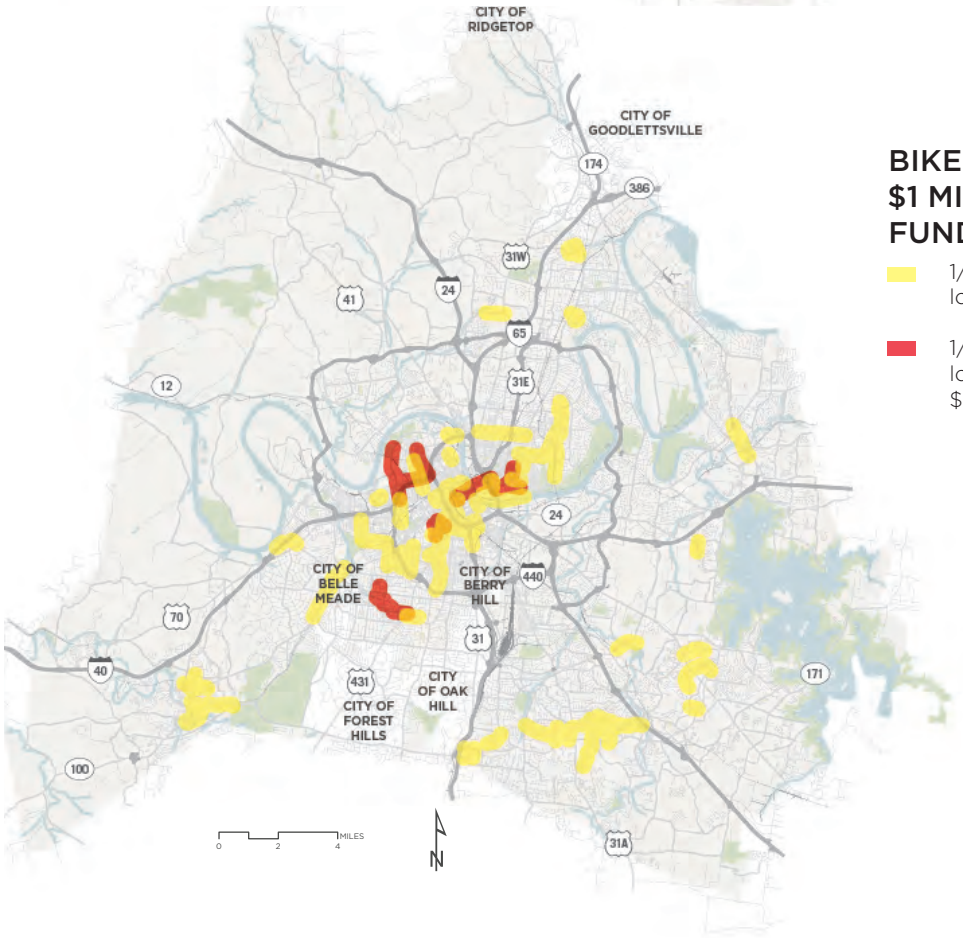
**Raleigh** received a $1.1 million federal Congestion Mitigation and Air Quality (CMAQ) grant to install 27 miles of on-road bikeways. The grant required a $225,000 local contribution.

**Portland, OR**
America's *Bike Capital* has installed 94 miles of low-stress bikeways and has an existing network of 350 miles of bikeways with a value of $60 million.



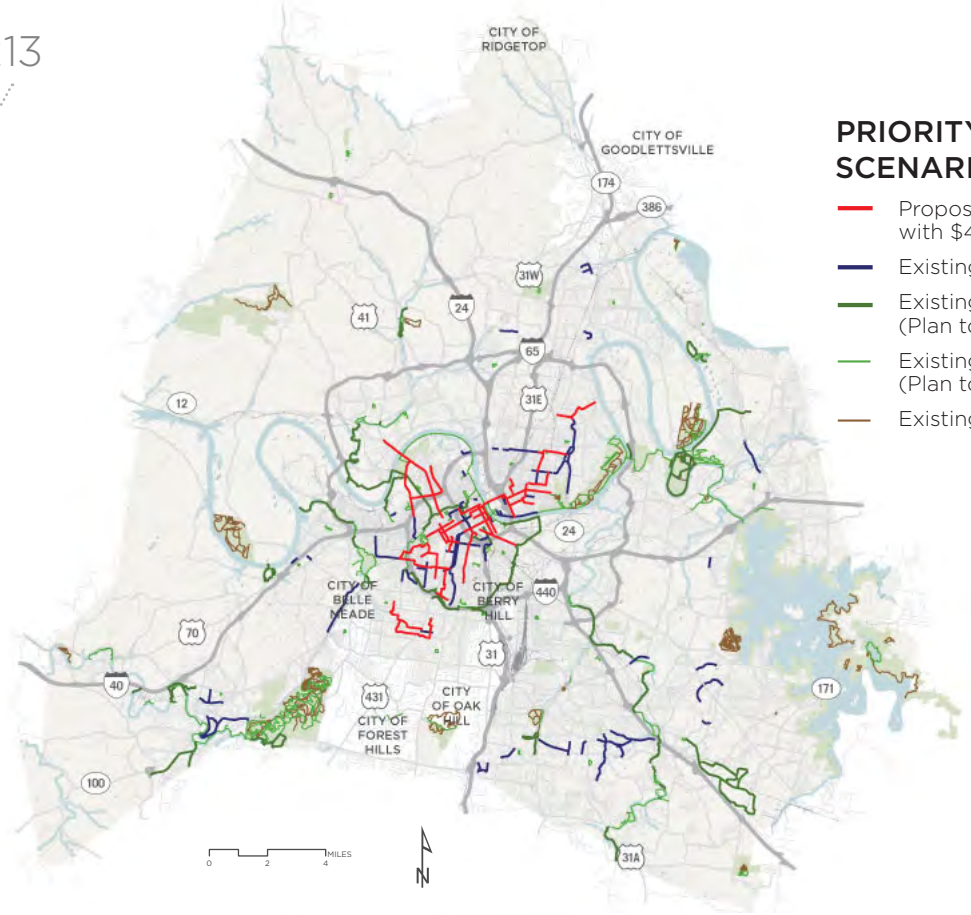

## PRIORITY BIKEWAY FUNDING SCENARIO: $1 MILLION/5 YEARS

- Proposed high priority bikeways funded with $1 million/year
- Existing low-stress bikeways
- Existing or priority greenway (Plan to Play)
- Existing & priority greenways (Plan to Play)
- Existing unpaved trail



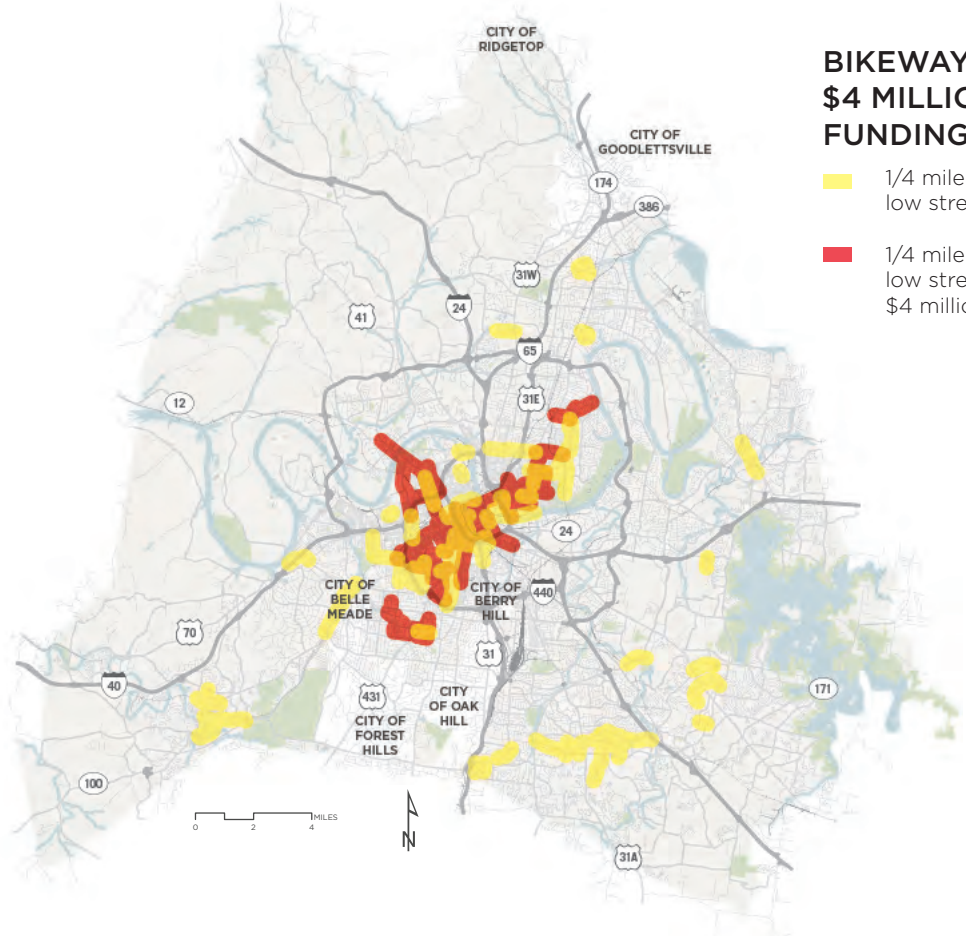

## BIKEWAY NETWORK ACCESS: $1 MILLION/ 5 YEARS FUNDING SCENARIO

- 1/4 mile bikeshed for existing low stress bikeways
- 1/4 mile bikeshed for proposed low stress bikeways funded with $1 million/year




## PRIORITY BIKEWAY FUNDING SCENARIO: $4 MILLION/5-YEARS

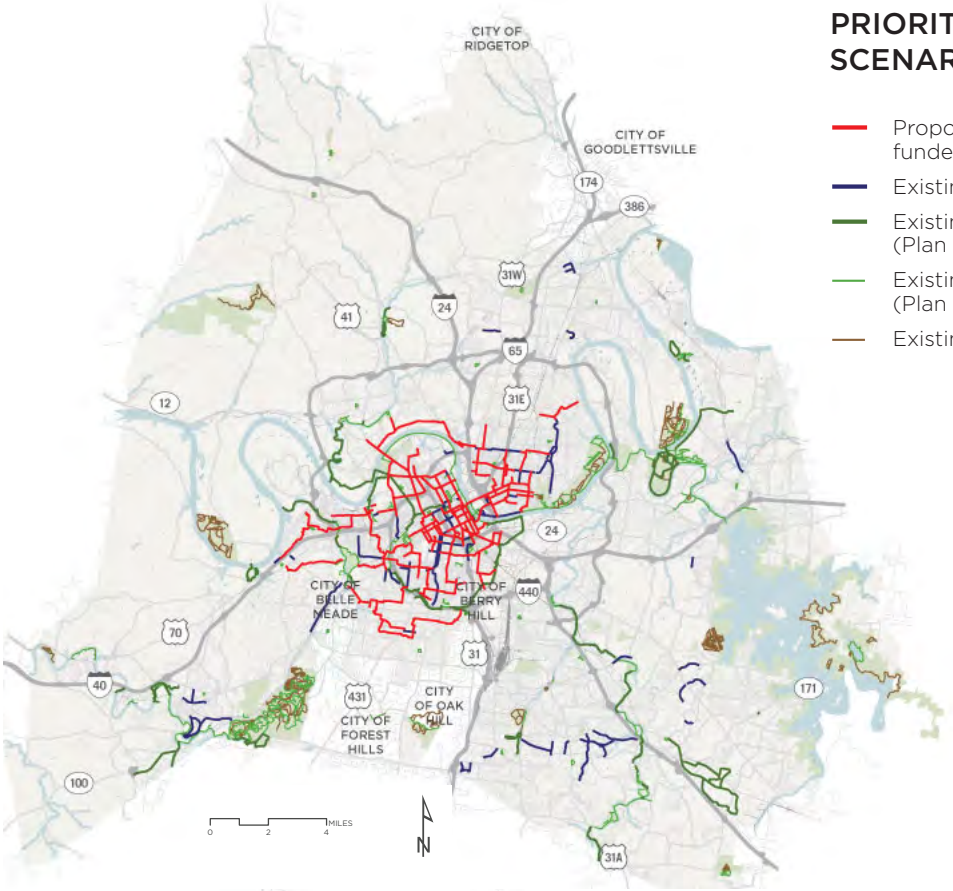
- Proposed high priority bikeways funded with $4 million/year
- Existing low-stress bikeways
- Existing or priority greenway (Plan to Play)
- Existing & priority greenways (Plan to Play)
- Existing unpaved trail




## BIKEWAY NETWORK ACCESS: $4 MILLION/5-YEARS FUNDING SCENARIO

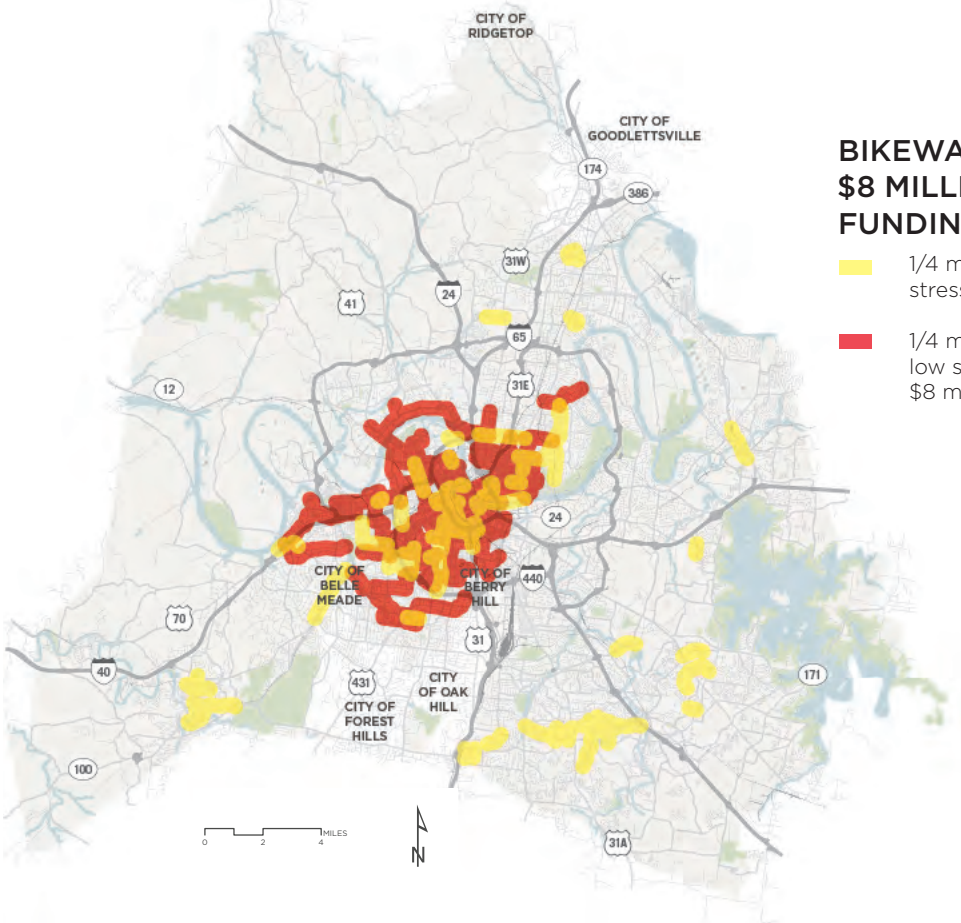
- 1/4 mile bikeshed for existing low stress bikeways
- 1/4 mile bikeshed for proposed low stress bikeways funded with $4 million/year

## PRIORITY BIKEWAYS FUNDING SCENARIO: $8 MILLION/5-YEARS




- Proposed high priority bikeways funded with $8 million/year
- Existing low-stress bikeways
- Existing or priority greenway (Plan to Play)
- Existing & priority greenways (Plan to Play)
- Existing unpaved trail

## BIKEWAY NETWORK ACCESS: $8 MILLION/5-YEARS FUNDING SCENARIO



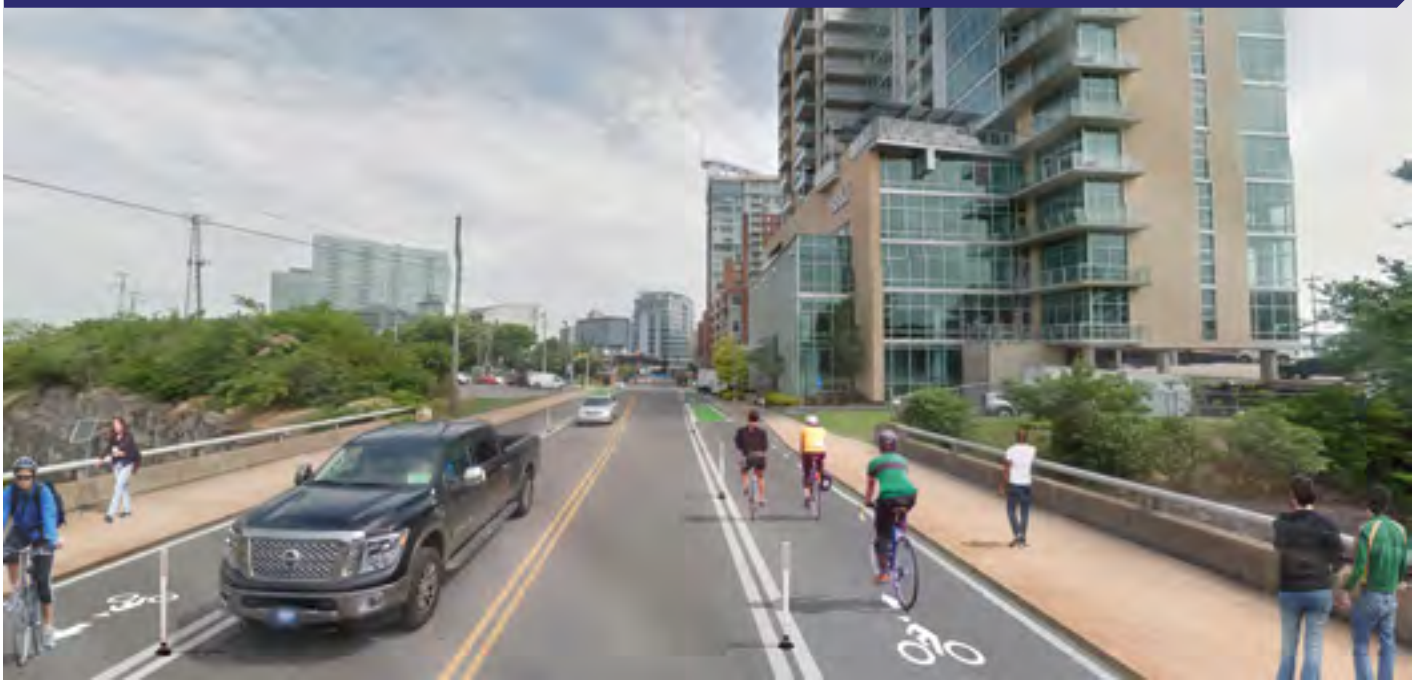

- 1/4 mile bikeshed for existing low stress bikeways
- 1/4 mile bikeshed for proposed low stress bikeways funded with $8 million/year

# Photo Simulation Example of Potential Bikeway Implementation

## 12th AVENUE
EXISTING CONDITIONS

## RAISED ONE-WAY CYCLETRACK EXAMPLE

## ONE-WAY CYCLETRACK WITH BOLLARDS EXAMPLE



# Sidewalk Funding Scenarios + Access Benefits

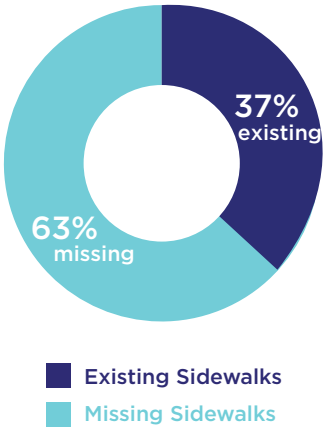
While Nashville has made great strides by building more than 300 miles of sidewalks since 2003, the majority of streets in Davidson County are still without sidewalks. Furthermore, retrofitting streets with sidewalks can have significant drainage, right-of-way, and construction costs.

Because Nashville is behind in building its sidewalk network, it's imperative that investments are strategic. The priority sidewalk network identified in Chapter 5 represents areas with the highest demand and need, while also providing equitable access.

## Funding Scenarios

The following map series is a conceptual display of the priority sidewalk network's growth over the next five years according to three different funding allocations.

It's important to remember that the WalknBike Plan does not set funding allocations. Instead, the plan identifies the priority projects and the annual budget program is developed by the Metro Council and Mayor's Office.




**Davidson County** has 1,130 miles of existing sidewalk and 1,900 miles of sidewalk need.

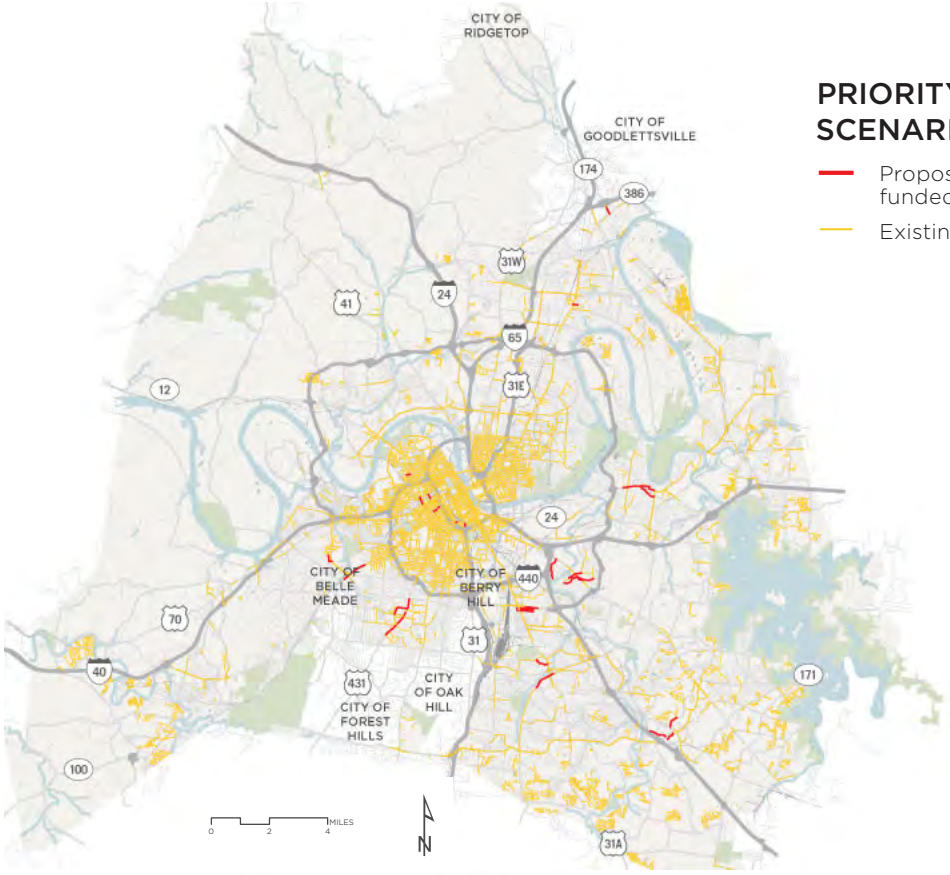
92% of all streets in **Minneapolis** have sidewalks.

71% of all streets in **Seattle** have sidewalks.

50% of all streets in **Austin** have sidewalks.

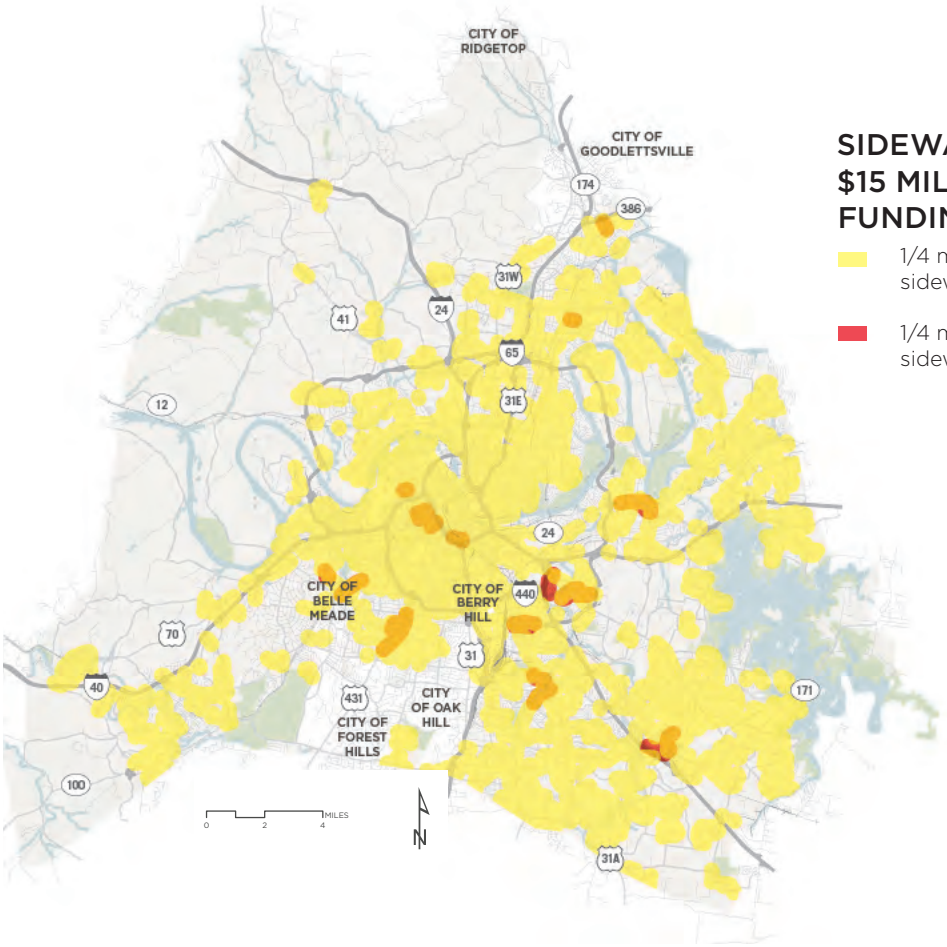
*Table 7-3. Sidewalk Funding Scenarios*

| Annual Funding Allocation | Years to Complete Priority Sidewalk Network |
|---|---|
| $15,000,000 | 35 years |
| $30.000.000 | 20 years |
| $110,000,000 | 5 years |



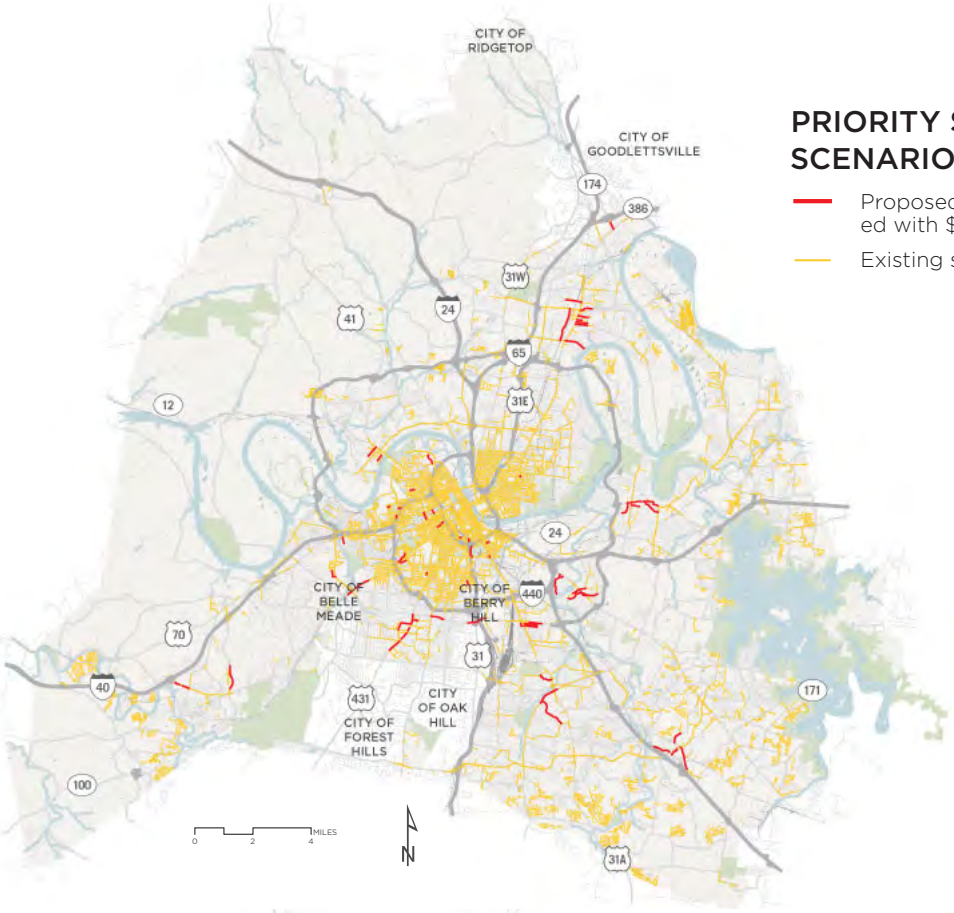

## PRIORITY SIDEWALK FUNDING SCENARIO: $15 MILLION/5-YEARS

- Proposed priority sidewalks funded with $15 million/year
- Existing sidewalks



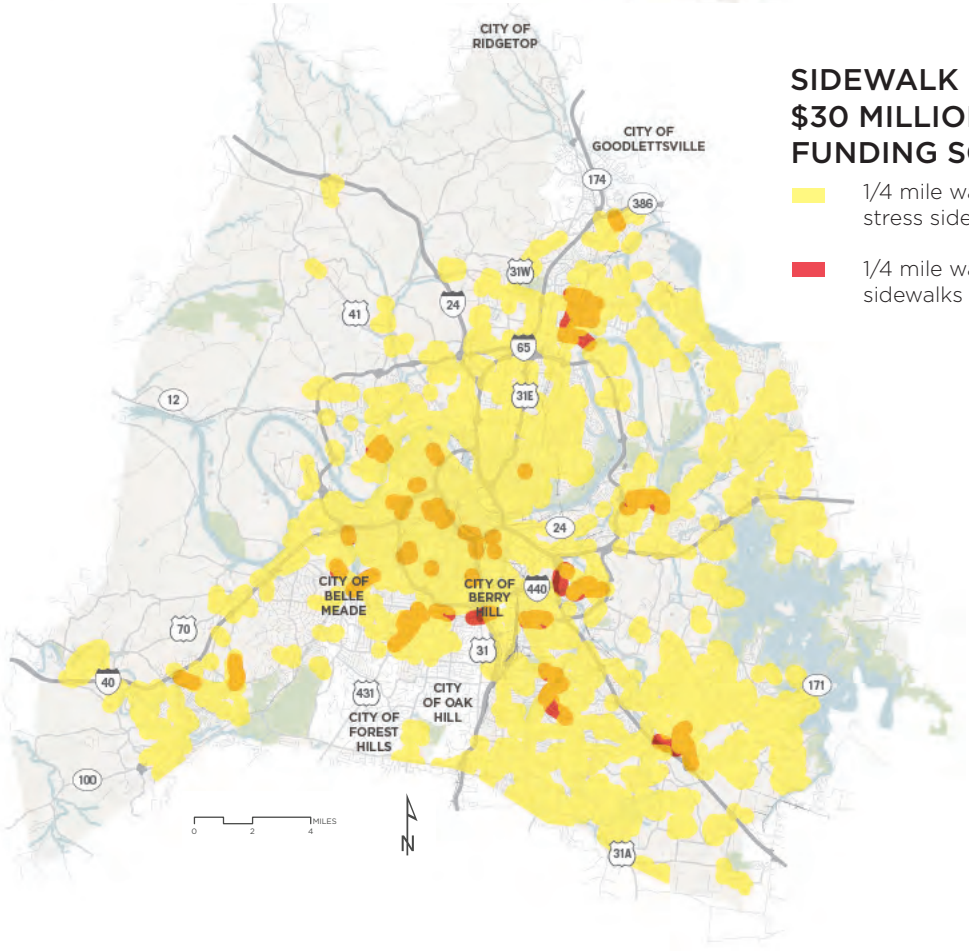

## SIDEWALK NETWORK ACCESS: $15 MILLION/5-YEARS FUNDING SCENARIO

- 1/4 mile walkshed for existing sidewalks
- 1/4 mile walkshed for proposed sidewalks with $15 million/year



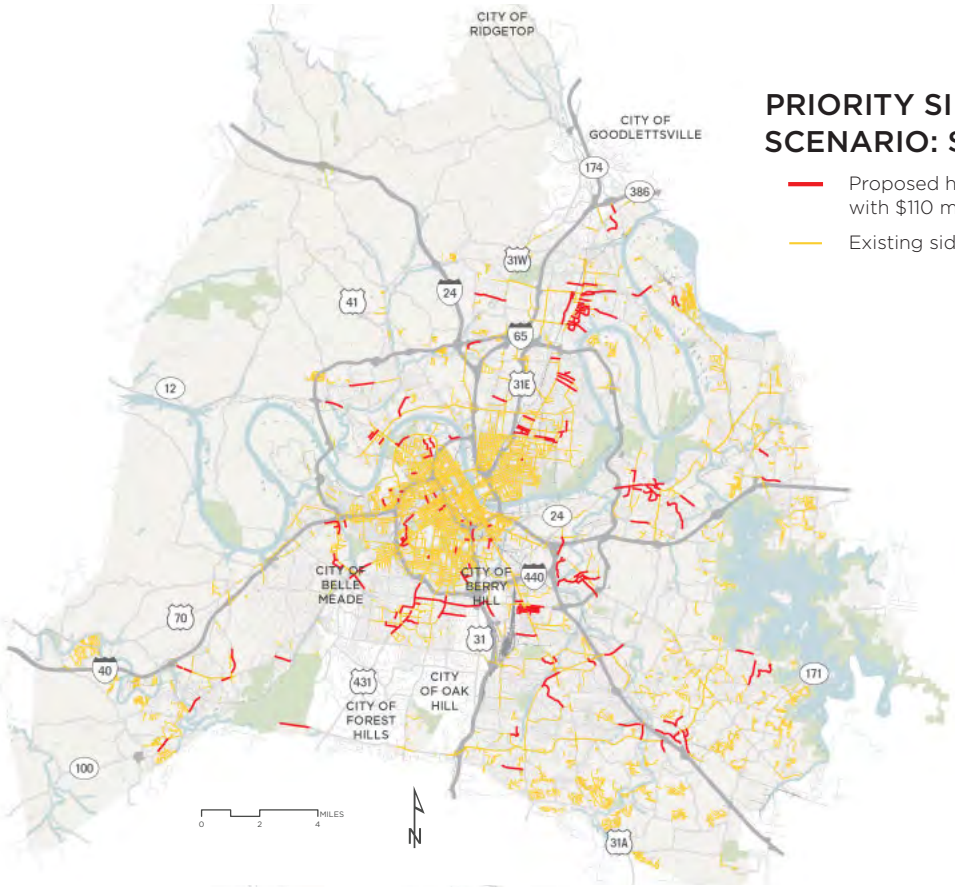

## PRIORITY SIDEWALK FUNDING SCENARIO: $30 MILLION/5-YEARS

- Proposed high priority sidewalks funded with $30 million/year
- Existing sidewalks



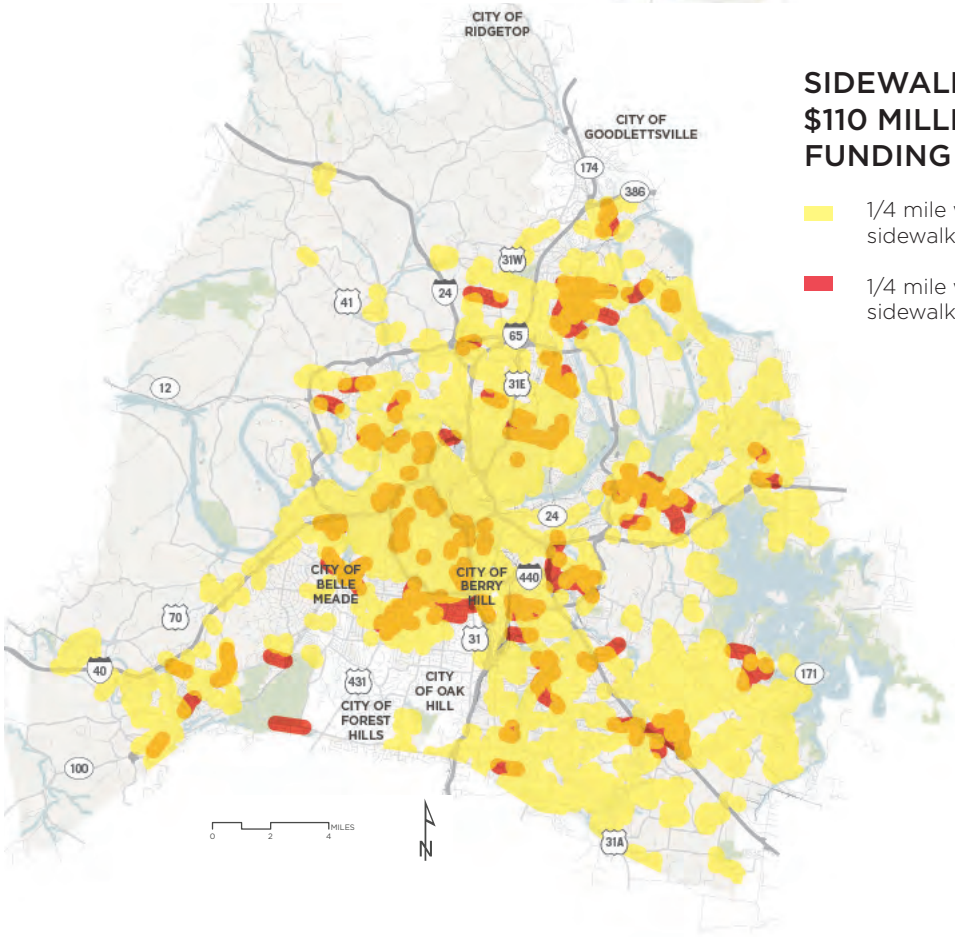

## SIDEWALK NETWORK ACCESS: $30 MILLION/5-YEARS FUNDING SCENARIO

- 1/4 mile walkshed for existing low stress sidewalks
- 1/4 mile walkshed for proposed sidewalks with $30 million/year




## PRIORITY SIDEWALK FUNDING SCENARIO: $110 MILLION/5-YEARS

- Proposed high priority sidewalks funded with $110 million/year
- Existing sidewalks




## SIDEWALK NETWORK ACCESS: $110 MILLION/5-YEARS FUNDING SCENARIO

- 1/4 mile walkshed for existing sidewalks
- 1/4 mile walkshed for proposed sidewalks with $110 million/year

# Sidewalk Construction Cost Estimates

## Sidewalk Built to Current *Major & Collector Street Plan* Standards

The cost estimates used to develop funding scenarios for the Priority Sidewalk Network correspond to the sidewalk standards in the *Major & Collector Street Plan*. Individual elements that are determined during design - such as right-of-way acquisition and drainage requirements - influence the final cost of a specific sidewalk project. The estimates used for planning sidewalks across the city are high-level values that will be refined for each project during the three-step implementation process. A breakdown of these values is provided in table 7.4 below to show how various factors are likely to influence total cost.

## Planning Level Cost Estimate per Foot

Note : Each cost item is approximate and should be considered the middle of a large range

*Table 7-4. Planning Level Cost Per Foot*

| | Roadway Type | | |
|---|---|---|---|
| **Item** | **Local** | **Collector** | **Arterial** |
| Construction Cost* | $607 | $794 | $885 |
| Contingency (15%) | $92 | $120 | $133 |
| Planning/Program Management/Survey/Engineering/ Inspection | $152 | $199 | $222 |
| RoW - Residential | $5 | $2 | $1 |
| RoW - Commercial | $2 | $15 | $32 |
| Property Easement | $20 | $30 | $40 |
| Adjacent Property Restoration | $10 | $10 | $10 |
| Appraisal/Closing | $13 | $13 | $13 |
| **Total Estimated Cost** | **$901** | **$1,183** | **$1,336** |

*This cost includes curb and gutter, driveways, striping improvements, traffic control, retaining walls, storm drainage, street trees, and many other elements that may be necessary to construct sidewalks.

# Sidewalk Construction Costs

## Sidewalk Built using Non-Standard Cross-Sections & Other Lower-Cost Design Solutions

Many communities are using alternatives to the ideal sidewalk cross-section to increase pedestrian connectivity at a lower cost. When considering these alternatives, Nashville must analyze the trade-offs between high-quality infrastructure and sidewalk coverage. A summary of several options and some of their pros and cons are provided below.

### Sidewalks without Curb and Gutter

When drainage allows, sidewalks can be installed next to the roadway without installing curb and gutter.

- **PRO** - Removes the significant cost of curb and gutter
- **Con** - Lower sense of separation from traffic without a curb, particularly in constrained locations

### Sidewalks behind the Swale

Sidewalks can be placed behind the swale to avoid installing curb and gutter when there is insufficient room between the roadway and drainage swales to fit a sidewalk as shown above.

- **PRO** - Good separation from traffic
- **CON** - Likely to require more ROW

### Vertical Separation

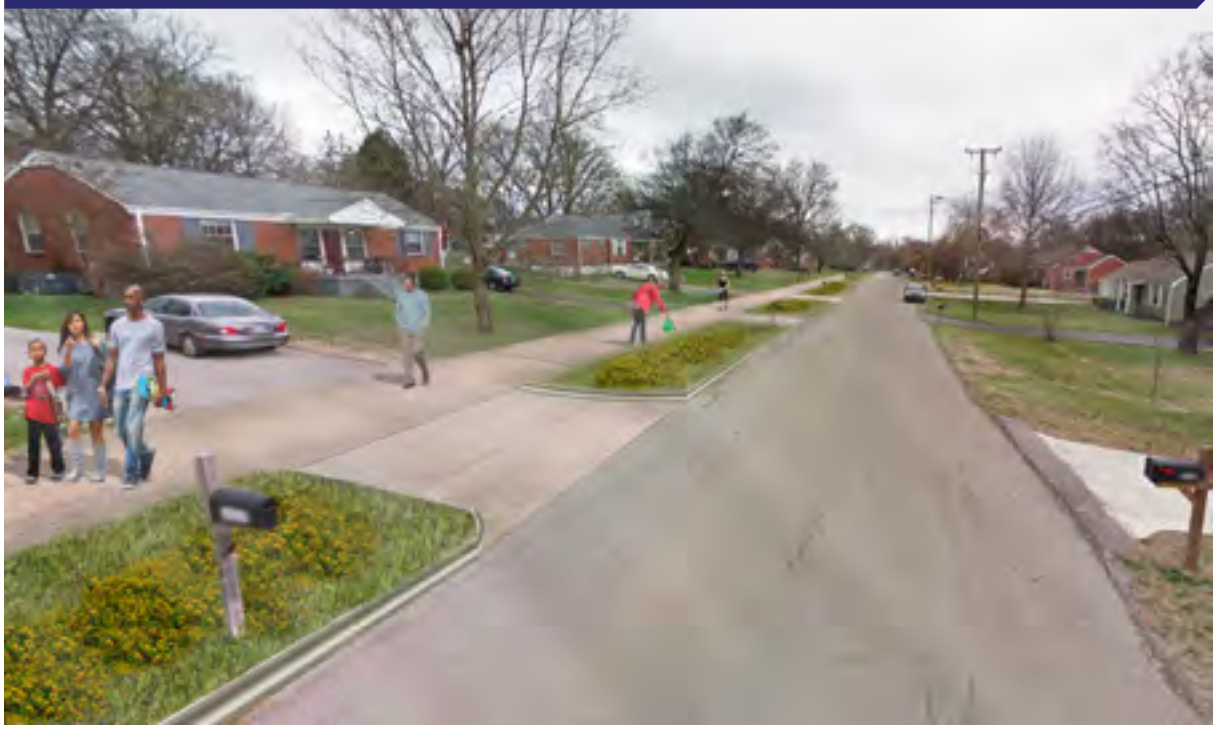
Vertical barriers can be placed between vehicular lanes and wide shoulders or an adjacent sidewalk to make space for pedestrians.

- **PRO** - Vertical barriers create separation in the absence of a buffer
- **CON** - ADA needs would not be addressed on shoulder-based projects

# Photo Simulation Example of Potential Sidewalk Implementation

## TAMMANY DRIVE
EXISTING CONDITIONS

## TRADITIONAL NEW SIDEWALK CONSTRUCTION EXAMPLE



## LOWER-COST, ALTERNATIVE DESIGN EXAMPLE

# High Capacity Transit Corridors

High Capacity Transit (HCT) corridors represent the five primary travel corridors serving all trip types and all modes. For the purposes of this plan, the five HCT corridors do not have a specific sidewalk or bikeway recommendation. Funding for these corridor improvements will have to be outside the scenarios described in this chapter and be part of an overall funding initiative to complete transit corridors with walking and biking connections.

The *nMotion* plan envisioned high-capacity transit to include regional, commuter and light rail as well as bus rapid transit (BRT). These overlaps are largely due to:

- The pikes' ability to provide direct connections to destinations and between neighborhoods and urban centers
- These corridors serve a variety of demands from competing modes of transportation, and the needs of large freight and transit vehicles often constrain bikeway facility development on existing roadways.

*Dickerson Pike*

*Gallatin Pike*

*Murfreesboro Pike*

*Charlotte Pike*

*Nolensville Pike*

As MTA kicks-off their 2017 High Capacity Transit Corridor Study to analyze each corridor in more detail, it is important all modes be accommodated along the same street. Because these 5 corridors are being studied further, WalknBike does not include specific recommendations along these corridors. **However, this plan recommends that shared-used paths should be considered as preferred facilities along these corridors.** This study will also inform the Major and Collector Street Plan, which will help as redevelopment occurs to coordinate building placement and require private development to contribute to "complete street" enhancements.

Decisions about how to allocate the right-of-way on these corridors are made difficult by the limited number of direct connections coupled with issues of topography, differences in travel speed, and right-of-way limitations. Mobility needs for people and safety of all modes is the highest priority when making decisions about right-of-way allocation. Furthermore, motor vehicle volumes, travel speeds, and addressing how to ensure people abide by the posted speed limit are important considerations when evaluating street design alternatives.

The following questions should be considered and answered to guide design and operations decisions on High Capacity Transit Corridors:

- Can each mode run on primary street safely, comfortably, and with enough space/person capacity?
- Is a parallel route option available?
- Does the corridor primarily serve inter-neighborhood or regional trough trips?
- Can the existing roadway cross-section be changed?
- Can person capacity be added?


*For more information about transit priorities and ways to get involved, visit www.nmotion2015.com*

*Table 7-5. High Capacity Transit Corridors*

| HCT Corridor | From | To | Mileage |
|---|---|---|---|
| Charlotte Pike | I-40 E & E Charlotte Pike | Charlotte Ave & 5th Ave N | 7.10 |
| Dickerson Pike | Old Hickory Blvd | 3rd Ave N & James Robertson Pky | 7.94 |
| Gallatin Pike | TN-386N/ Conference Dr | 5th Ave N & Charlotte Ave | 12.30 |
| Murfreesboro Pike | Lafayette St & 4th Ave S | I-24 & Bell Rd | 12.06 |
| Nolensville Pike | 4th Ave N & Charlotte Ave/ Union St & 2nd Ave N | 250 feet south of Bienville Dr | 13.29 |


## HIGH CAPACITY TRANSIT CORRIDORS

— High Capacity Transit (HCT) Corridor

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# Funding Sources

## Federal Funding Sources

Various sources of funding are available to fund maintenance of existing sidewalks, construction of new sidewalks, and development of on-road bikeways. Types of federal funding sources that are available for bike and sidewalk projects are shown in Table 7-6. Most federal funding sources tend to be available through a competitive process.

*Table 7-6. Federal Funding Sources*

| Name of Funding Source | Overview | Eligible applicants | Eligible projects |
|---|---|---|---|
| Transportation Alternatives (TA) | FAST Act funding source, funds are available through a competitive process | Local governments, regional transportation authorities, transit agencies, school districts or schools, and any other local or regional government entity with responsibility for oversight of transportation or recreational trails | SRTS programs; on-road and off-road trails, sidewalks, bikeways, pedestrian and bike signals, traffic calming, lighting and other safety-related infrastructure; rail-trails; recreational trails program; construction, planning, and design of infrastructure-related projects that will provide safe routes for non-drivers including children and seniors |
| Surface Transportation Block Grant (STBG) Program | Provides states with flexible funds for a variety of highway, road, bridge, and transit projects | Funding is allocated to states | Pedestrian improvements including trails, sidewalks, crosswalks, pedestrian signals, and other ancillary facilities; modification of sidewalks to comply with ADA requirements; Safe Routes to School; congestion pricing projects and strategies; recreational trail projects |
| Highway Safety Improvement Program (HSIP) | Helps communities achieve significant reductions in traffic fatalities and serious injuries on all public roads | Funding is allocated to states | Safety projects that are consistent with the State's Strategic Highway Safety Plan; bike and pedestrian safety improvements, traffic calming projects, and crossing treatments such as pedestrian hybrid beacons, medians, and pedestrian crossing islands |
| Safe Routes to School (SRTS) Program | SRTS helps make walking and biking to school a safe and more appealing method of transportation for students | Funding is administered by State Departments of Transportation (DOTs). Eligible recipients are state, local, and regional agencies as well as nonprofit organizations. | Infrastructure-related projects such as sidewalk, traffic calming and speed reduction, pedestrian and bike crossing, bike facilities, pedestrian facilities, and bike parking<br>Noninfrastructure projects include educational, encouragement, and enforcement activities. |
| Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants | Grants are intended to support multimodal projects, surface transportation projects, rail, transit, and port projects | Funding is allocated to states State, local, and tribal governments; transit agencies, port authorities, metropolitan planning organizations (MPOs) | Capital projects that include highway or bridge projects (including bike and pedestrian-related projects), certain public transportation projects, passenger and freight rail transportation projects, and intermodal projects |

## State, Local, and Private Funding Sources

Federal transportation spending can vary and tends be dependent on economic factors. Municipalities and local governments should be creative in obtaining different sources of funding in order to implement projects. In the state of Tennessee, Jeff Roth Cycling Foundation and First Tennessee Foundation are two philanthropic organizations that award grant funding towards bike and pedestrian projects. Other funding options, including state, local, and private sources for active transportation projects can be found in Table 7-7.

*Table 7-7. State, Local/Regional, and Private Funding Sources*

| Funding Level | Sources of Available Funding |
|---|---|
| State | State bike and pedestrian grants<br>State multi-modal access grants<br>State Safe Routes to School (SRTS) funds |
| Local or regional | Business Improvement District (BID) funds<br>General obligation bonds<br>Local Capital Improvement Programs (CIP)<br>Regional bike and pedestrian program funds<br>Tax increment financing (TIF)<br>Unspecified city funds<br>Voter-approved sales taxes or other levies<br>Transit agency funding (operating)<br>Speeding infraction revenue |
| Private | Developers<br>Hospitals<br>Philanthropy/ foundations<br>Universities |

## Spotlight: LEVY TO MOVE SEATTLE

In November 2015, Seattle residents voted to approve a nine-year, $930 million Levy to Seattle, which provides funds for nearly 30 percent of the city's transportation budget. The levy provides funds for a multimodal transportation system, including sidewalk maintenance and repair, transit improvements, Vision Zero investments for walking, biking and driving safety, and improvements and expansion of the pedestrian and bicycle network. The $930 million levy will be paid through a property tax, which will cost the median Seattle household about $275 a year. The current levy replaces the previous nine-year levy, known as Bridging the Gap, which voters approved in 2006. This previous levy cost the median Seattle household about $130 a year.


## Spotlight: ANN ARBOR NEW SIDEWALK ASSESSMENT

In Ann Arbor, Michigan, property owners are responsible for the first-time construction costs for new sidewalks in the public right-of-way. New sidewalks can be funded through a combination of Special Assessment District funding, millage, and other city and federal funds. Sidewalk gaps and sidewalk projects identified as the highest priority through the prioritization process are then included in the city's Capital Improvements Plan (CIP). Shorter sidewalk segments that are high priority but too short for a standalone project may be addressed through a "Sidewalk Gap Elimination" program. Since citizen requests are one of the criteria for sidewalk prioritization, written requests, which can be submitted to the city engineer, may help to move a project along. Once a project is created, it will get scheduled for a particular year as part of the city's CIP. City Council will vote on authorizing city staff to begin design work on the special assessment project. After the preliminary design and cost estimates are completed, City Council will establish the Special Assessment District, which is the list of properties that would be assessed and the corresponding estimated assessments for each property. Once the assessment is approved by City Council and the project is constructed, the property owners adjacent to the new sidewalk may pay off their assessments in installments.

## Spotlight: INDIANAPOLIS CULTURAL TRAIL

The Indianapolis Cultural Trail, one of the most ambitious separated bikeway projects in the country, was funded largely by private philanthropy in addition to public funds. The $62.5 million, 8-mile trail connects downtown business and cultural districts and utilized $15.5 million in federal funds, $26.5 million from private funds – mostly from the Central Indiana Community Foundation, and a $20.5 million US Department of Transportation TIGER grant. Completed in 2013, the Indianapolis Cultural Trail has had an estimated $864.5 million of economic impact.


## Spotlight: CHICAGO SHARED COST SIDEWALK PROGRAM

In Chicago, assistance is provided to property owners who need to repair sidewalks within the public right-of-way. The city has a shared cost sidewalk program, which is a voluntary program in which the city shares the cost of repairing sidewalks with property owners. Property owners submit an application for consideration and if accepted, property owners are charged for the repair at a rate that is well below what private contractors would charge. Seniors and persons with disabilities may qualify for an even lower discounted rate (50%). Applications are accepted based on the availability of funds and can be submitted through the city's 311 system.

Once the program budget amount is met, the program will close applications for the year.

# Importance of Mode Share

Limited data is available that captures how many people walk or bike. The U.S. Census Bureau collects data on how residents typically commute to work. While this data only captures work trips and does not include other trip purposes such as exercise or recreation, it is the most consistent and reliable data source for walking and biking trips. Therefore, cities typically use commute mode share data provided by the U.S. Census Bureau to gauge how many people are walking and biking. The actual percentages may differ because of exercise and recreation trips that involve walking or biking as well as fluctuations in ridership due to changes in weather. To supplement commute mode share data and to obtain more robust data, Nashville should consider a formalized bike and pedestrian counts program.

## Setting Mode Share Goals and Benefits Analysis

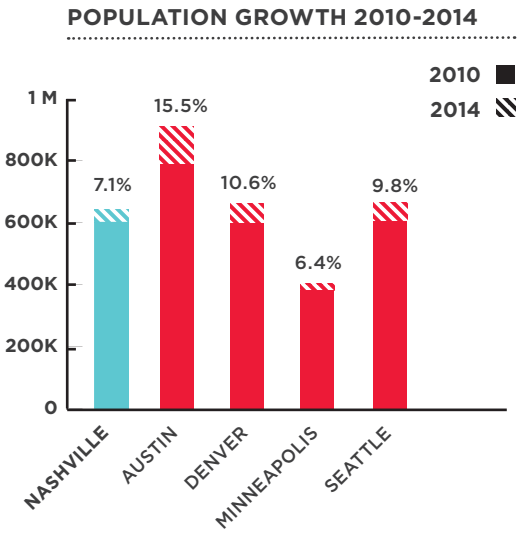
Full buildout of the priority sidewalk and bikeway network will help Nashville to attain increases in levels of walking and biking. To estimate anticipated benefits and shift in walking and biking trips, the project team carried out a benefits analysis. WalknBike set mode share goals for Metro Nashville by examining levels of walking and biking in Nashville's aspirational cities. Four aspirational cities – Austin, Denver, Minneapolis, and Seattle - were previously identified in the *Peer and Aspirational City Report*. The following charts illustrate how Nashville compares to its aspirational cities in terms of Bicycle Friendly Community (BFC) designation, population density, population growth, and land area.

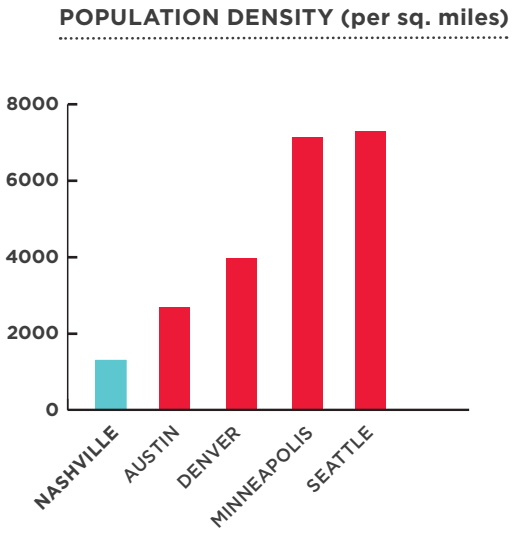
**BFC DESIGNATION**

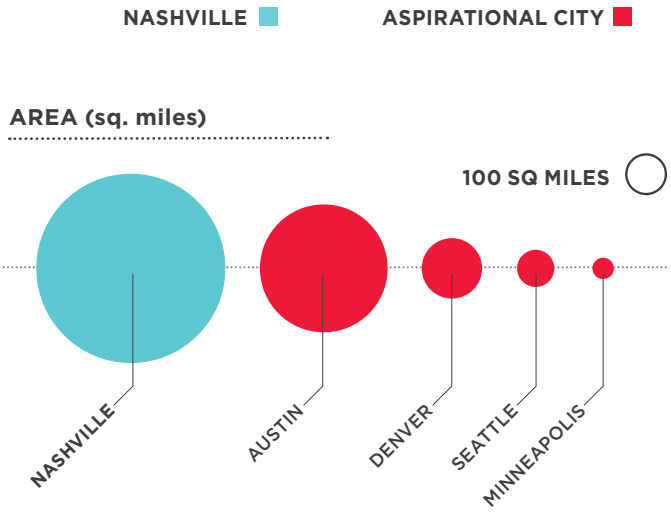
| | |
|---|---|
| NASHVILLE | *Bronze* |
| AUSTIN | *Gold* |
| DENVER | *Silver* |
| MINNEAPOLIS | *Gold* |
| SEATTLE | *Gold* |

**CONSOLIDATED GOVERNMENT?**

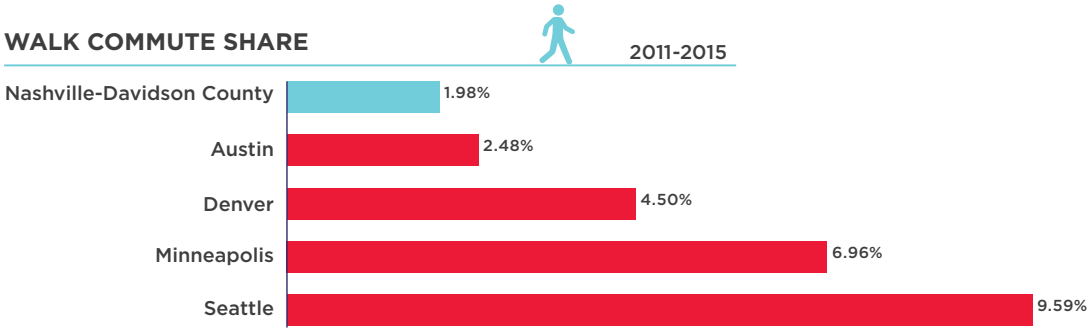
| | *yes* | *no* |
|---|---|---|
| NASHVILLE | ● | ○ |
| AUSTIN | ○ | ● |
| DENVER | ● | ○ |
| MINNEAPOLIS | ○ | ● |
| SEATTLE | ○ | ● |

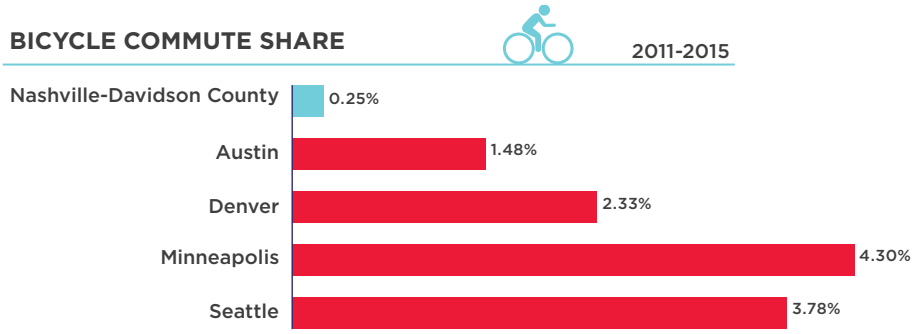

POPULATION GROWTH 2010-2014
2010
2014
1 M
800K
600K
400K
200K
0
7.1%
15.5%
10.6%
6.4%
9.8%
NASHVILLE
AUSTIN
DENVER
MINNEAPOLIS
SEATTLE


POPULATION DENSITY (per sq. miles)
8000
6000
4000
2000
0
NASHVILLE
AUSTIN
DENVER
MINNEAPOLIS
SEATTLE


NASHVILLE
ASPIRATIONAL CITY
AREA (sq. miles)
100 SQ MILES
NASHVILLE
AUSTIN
DENVER
SEATTLE
MINNEAPOLIS

Data from the 2011-2015 American Community Survey (ACS) 5-year estimates was used for this analysis. The project team first analyzed bike commute data and walk commute data from each city. Compared to its aspirational cities, Nashville has the lowest bike commute mode share (0.25%) and lowest walk commute mode share (1.98%).



Mode share increases were calculated by gathering U.S. Census data on means of transportation to work, total population, and school enrollment for Nashville and its 4 aspirational cities. Based on the existing bike commute mode share in the aspirational cities, Nashville should strive for 2.12% bike commute mode share within 5 years (see Table 7-8). This is based on the difference between Nashville's existing bike commute mode share and the 25th percentile of existing bike commute mode shares in Austin, Denver, Minneapolis, and Seattle. In terms of walking, Nashville should strive for 4% walk commute mode share within 5 years. This is also based on the difference between Nashville's existing walk commute mode share and the 25th percentile walk mode share of aspirational cities.

The benefits analysis then utilized over 50 multipliers in order to extrapolate daily, monthly, and annual trip rates, trip distance, vehicle trips replaced, emission rates, physical activity rates, and other externalities linked to an increase in bicycling and walking trips and to a decrease in motor vehicle trips. It should be noted that even with extensive research incorporated into the analysis, it is nearly impossible to predict the exact impacts of various factors. Therefore, all benefit values should be considered estimates rather than exact amounts.

Table 7-8 displays the benefits that are expected to result from the bike and walk mode share increases.

*Table 7-8 Mode Share Goals*

| | Bike | Walk |
|---|---|---|
| Employed population | 322,885 | 322,885 |
| Daily commute trips (extrapolated) | 1,632 | 12,788 |
| Commute mode share (2011-2015 ACS estimates) | 0.25% | 1.98% |
| Future commute mode share goal | 2.12% | 4% |

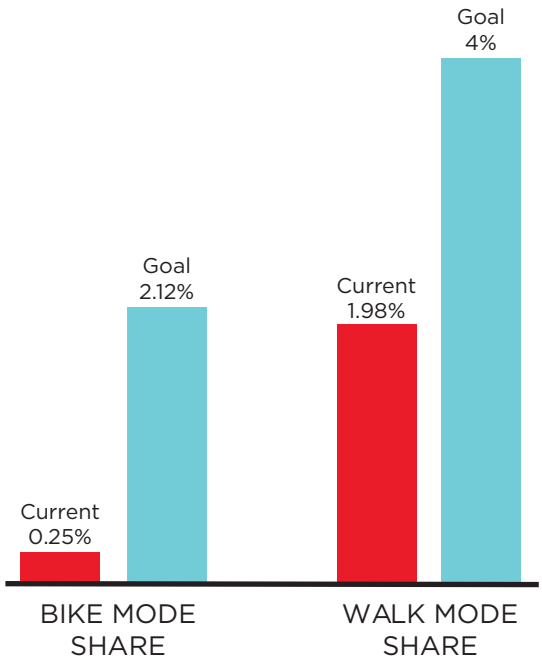


*Table 7-9. Anticipated Health, Environmental, and Transportation Benefits Per Year*

| | Current Mode Share | | Commute Mode Share Goal (25th percentile of aspirational cities' commute mode shares) | |
|---|---|---|---|---|
| **Benefits** | **Bike** | **Walk** | **Bike** | **Walk** |
| Health | | | | |
| Annual Trips | 3,596,000 | 34,533,000 | 30,389,000 | 69,707,000 |
| Annual Miles | 7,828,000 | 23,113,000 | 39,829,000 | 33,053,000 |
| Annual Hours of Physical Activity | 783,000 | 7,704,000 | 3,983,000 | 11,018,000 |
| Number of People who Meet Recommended Physical Activity Minimum | 6,023 | 59,262 | 30,638 | 84,754 |
| Regional Physical Activity Need Met | 0.95% | 9.34% | 4.83% | 13.36% |
| Healthcare cost savings | $280,000 | $1,631,000 | $2,364,000 | $3,292,000 |
| Environmental | | | | |
| CO2 Emissions Reduced (pounds) | 11,517,000 | 11,517,000 | 97,322,000 | 23,248,000 |
| Other vehicle emissions reduced (pounds) | 101,000 | 359,000 | 853,000 | 724,000 |
| Total vehicle emission costs reduced | $104,000 | $370,000 | $879,000 | $746,000 |
| Transportation | | | | |
| Annual VMT reduced | 3,110,000 | 11,048,000 | 26,277,000 | 22,301,000 |
| Reduced traffic congestion costs | $249,000 | $884,000 | $2,102,000 | $1,784,000 |
| Reduced vehicle crash costs | $1,119,000 | $3,977,000 | $9,460,000 | $8,028,000 |
| Reduced road maintenance costs | $466,000 | $1,657,000 | $3,942,000 | $3,345,000 |
| Household vehicle operation cost savings | $1,772,000 | $6,297,000 | $14,978,000 | $12,711,000 |
| **Total Benefits** | **$18,806,000** | | **$63,631,000** | |

**Current Mode Share provides $19 million in total benefits**

**Increasing Mode Share to WalknBike goals would result in an estimated $64 million in total benefits**

**WalknBike investment would result in an estimated $45 million difference in total benefits**

If Nashville increases its bike commute mode share to 2.12% and its walk commute mode share to 4% by implementing this plan, then the city could experience a total of $63,631,000 in health, environmental, and transportation benefits per year. This is an increase of $44,825,000 in benefits from what is currently experienced.

In order to achieve mode share increases, Nashville could strive for annual increases in walking and biking percentages. Several existing conditions and initiatives illustrate that it is feasible to increase the number of people who walk and bike in Nashville. According to the Nashville Area MPO, 40% of car trips in the Nashville region are less than 2 miles. Due to the short trip distance, these trips may be the most amenable to changing from vehicle trips to walking and biking trips. Furthermore, most transit trips start or end with walking or biking. The Nashville Area MPO also reported that 90% of transit users in the region walk or bike to the transit stop. The *nMotion* transit plan estimates that due to all the improvements that will take effect, ridership is projected to increase by 550% on weekdays. MTA and RTA are also increasing their operating costs from $83.2 billion to $346.8 million. Increased investment in transit options will not only result in increased transit ridership but it will also create environments that are more conducive to walking and biking.

# Performance Measures

Performance measures help to track the plan's progress and effectiveness over time. The Planning Department is currently researching best practices for performance measures as part of Mayor Barry's Green and Complete Streets Executive Order to monitor Nashville's progress. Table 7-10 outlines recommended performance measures to track progress towards achieving the WalknBike goals.


*National recognition through programs such as the Walk Friendly and Bike Friendly Communities can help elevate Nashville as a premier mutli-modal City.*

*Table 7-10. WalknBike Performance Measures*

| Performance Measure | Desired Trend | Performance Target | Data Source | WalknBike Goal Addressed |
|---|---|---|---|---|
| Percent of sidewalks and bikeways completed in Health Priority Areas | Increasing percentage of sidewalks and bikeways completed in Health Priority Areas | 100% of priority projects completed by 2021 | Public Works | Access and equity |
| Percent of sidewalks and bikeways completed in areas of highest bicyclist and pedestrian demand | Increasing percentage of sidewalks and bikeways completed in areas of high demand | 100% of priority projects completed by 2021 | Public Works | Network connectivity |
| Number of pedestrian and bike collisions that are classified as fatal or severe injury | Decrease in collisions that involve severe injuries and fatalities | Pedestrian and bike fatalities reach zero by 2025 | Tennessee DOT | Safety |
| Number of partnerships, programs, and initiatives focused on walking and biking that are in partnership with other agencies and organizations | Increase in number of new partnerships between governmental agencies, nonprofit organizations, etc. and/or increase in number of new programs | None recommended | Public Works | Collaboration |
| "Bicycle Friendly Community" and "Walk Friendly Community" designation from League of American Bicyclists | Higher designation status for "Bicycle Friendly Community" and "Walk Friendly Community" | Silver level "Bicycle Friendly Community" designation and silver level "Walk Friendly Community" designation | League of American Bicyclists (LAB) | National recognition |