



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. It also supports the Mayor’s Executive Order expanding Metro’s commitment to develop green and complete streets.

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

- **7.6%** of 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

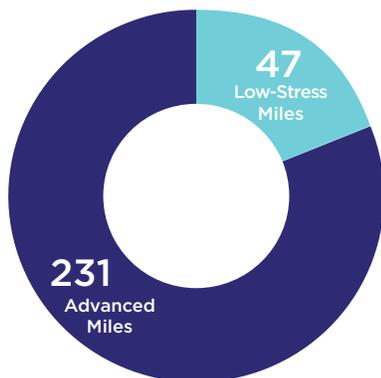


Existing Bikeway Network

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.



■ Advanced Bikeways
■ Low-Stress Bikeways

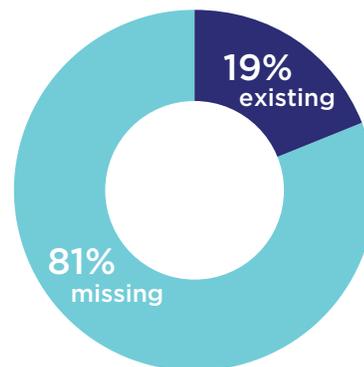


Existing Sidewalk Network

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 **1,118 miles** of existing sidewalks and sidewalks in progress.
- There are **1,900 miles** of missing sidewalks in areas of greatest need in Nashville-Davidson County.



■ Existing Sidewalks
■ Missing Sidewalks

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 is comprised of 91 miles of 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.

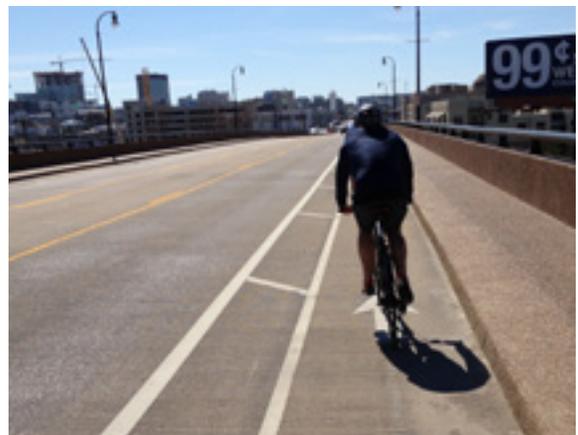
Bikeway Funding Scenarios:

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

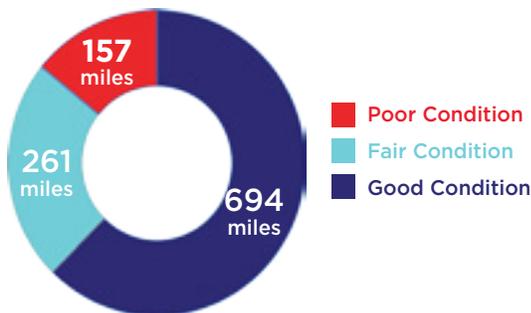
Several of the top scoring projects are along priority corridors for High Capacity Transit as identified in the ongoing transit plan update.

The total mileage of the Priority Sidewalk Network is 71 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 \$460 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
\$92,000,000	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:



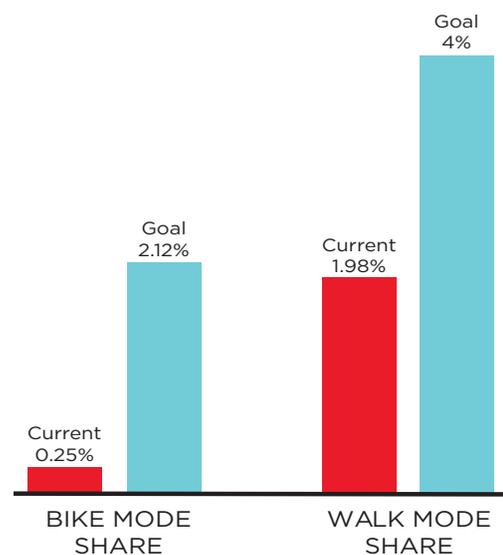
VISION ZERO

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.



This page intentionally left blank.



NASHVILLE, TENNESSEE

STRATEGIC PLAN FOR SIDEWALKS AND BIKEWAYS

walk**n**bike

FINAL DRAFT



Table of Contents

- 7** **Executive Summary**
- 15** **Chapter 1: The Vision**
Introduction, Plan Development Process, Vision Statement/
Goals + Key Benefits
- 33** **Chapter 2: What We've Heard**
Steering Committee Involvement + Public Outreach
Summary
- 57** **Chapter 3: Existing Conditions**
Achievements since 2008 Plan, Existing Conditions Analysis
+ Relationships to other Plans/Efforts
- 101** **Chapter 4: The Bikeway Network**
Facility Categories + Network Recommendations +
Prioritization + Cost Development
- 125** **Chapter 5: The Sidewalk Network**
Facility Categories + Network Recommendations +
Prioritization + Cost Development
- 145** **Chapter 6: Recommendations**
Policy, Programmatic, Design + Implementation Strategies
- 207** **Chapter 7: Five Year Strategic Plan**
Project Lists + Funding Scenarios



MARATHON

SYLVAN ESSO
SEPTEMBER 1

THE KILLS
SEPTEMBER 14

ALL THEM WITCHES

BQ
2016

P

Acknowledgments

Project Team

Jason Radinger, Project Manager, Metro Public Works
Mary Beth Ikard, Mayor's Office
Michael Briggs, Metro Planning
Peter Bird, Metro Planning

Steering Committee

Steve Anderson, Metro Police
Ricky Bearden, Metro Police
Steve Bland, Metro Transit Authority (MTA)
Tracy Buck, Prevention and Wellness Division, Metro Public Health
Rochelle Carpenter, Nashville MPO
Adams Carroll, Nashville MPO
Felix Castrodad, Metro Transit Authority (MTA)
Greg Claxton, Metro Planning
Laurel Creech, Metro Dept. of General Services
Faith Davenport, "Stop Take Notice", Hume-Fogg Academic Magnet High School
Kenton Dickerson, TN Disability Coalition
Shain Dennison, Metro Parks & Recreation, Greenways and Open Space
Dr. Stacy Dorris, Vanderbilt University School of Medicine; Walk Bike Nashville
John Drake, Metro Police
Gary Gaston, Nashville Civic Design Center
Debra Gibbs, Belmont University; Council on Aging
Mike Gilliland, Metro Police
John Gore, Barge Cauthon & Associates
Jerry Hall, Metro General Services
John Harkey, Nashville BPAC; Healthy Nashville Leadership Council
Cindy Harrison, Metro Parks and Recreation
Kristen Heggie, Skanska
Angie Henderson, Metro Council
Nora Kern, Walk Bike Nashville
Amanda LaBonte, Belmont University
Michelle Lacewell, Nashville MPO
Tommy Lynch, Metro Parks and Recreation
Mark Macy, Metro Public Works
Leslie Meehan, TN Dept. of Health
Dr. Bill Paul, Metro Public Health
Evan Pendencygraft, Belmont University
David Proffitt, Metro Public Schools
Keith Rawls, Nashville B-Cycle
Jonathan Russell, TN Department of Transportation
Michael Skipper, Nashville MPO
Doug Sloan, Metro Planning
Elizabeth Smith, "Stop Take Notice", Hume-Fogg Academic Magnet High School
Mary Pat Teague (Co-Chair), Vanderbilt University; BPAC Member
Tom Turner, Downtown Partnership
Mary Vavra, Lose & Associates; Transit Now Nashville
John Vick, Metro Public Health
Peter Westerholm, Nashville MPO/BPAC
Nancy Whittemore, Metro General Services
Jessica Wilson, TN Dept. of Transportation
Ron Yearwood, Nashville Civic Design Center
Ben York, Metro Public Works

Consultant Team

Alta Planning + Design
 MP&F Public Relations
 Civic Engineering & IT
 Hawkins Partners



The background of the slide is a blue-tinted photograph. The top half shows a cyclist in a white jersey with 'RCR' on the back, riding a road bike. The bottom half shows a group of pedestrians walking on a paved path. A large white rectangle is centered on the slide, containing the chapter title.

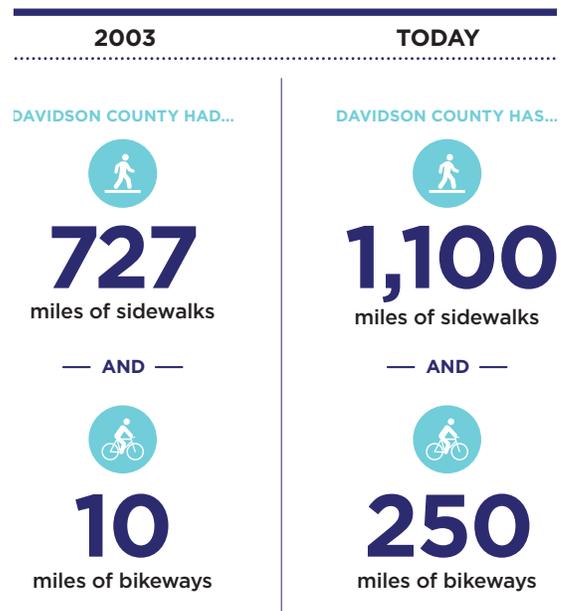
CHAPTER 1

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.



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. A complete streets policy was issued by Mayor Dean and expanded by Mayor Barry. The Mayor's Bicycle and Pedestrian Advisory Committee has continued to organize and meet through several mayoral terms.

This Plan incorporates the most current and innovative design practices, policies, and programs 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. It furthers Mayor Barry's commitment to develop green and complete streets. 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.

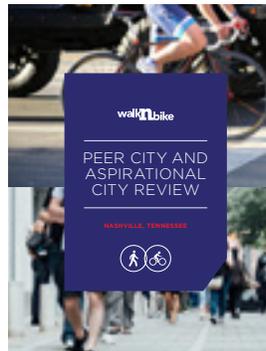
Historically, Nashville's bicycle facilities have mostly served people comfortable riding in or near traffic, which is a relatively small subset of the population. A central focus and purpose of this plan is to design and implement both bicycle and pedestrian facilities and programs that are safe and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

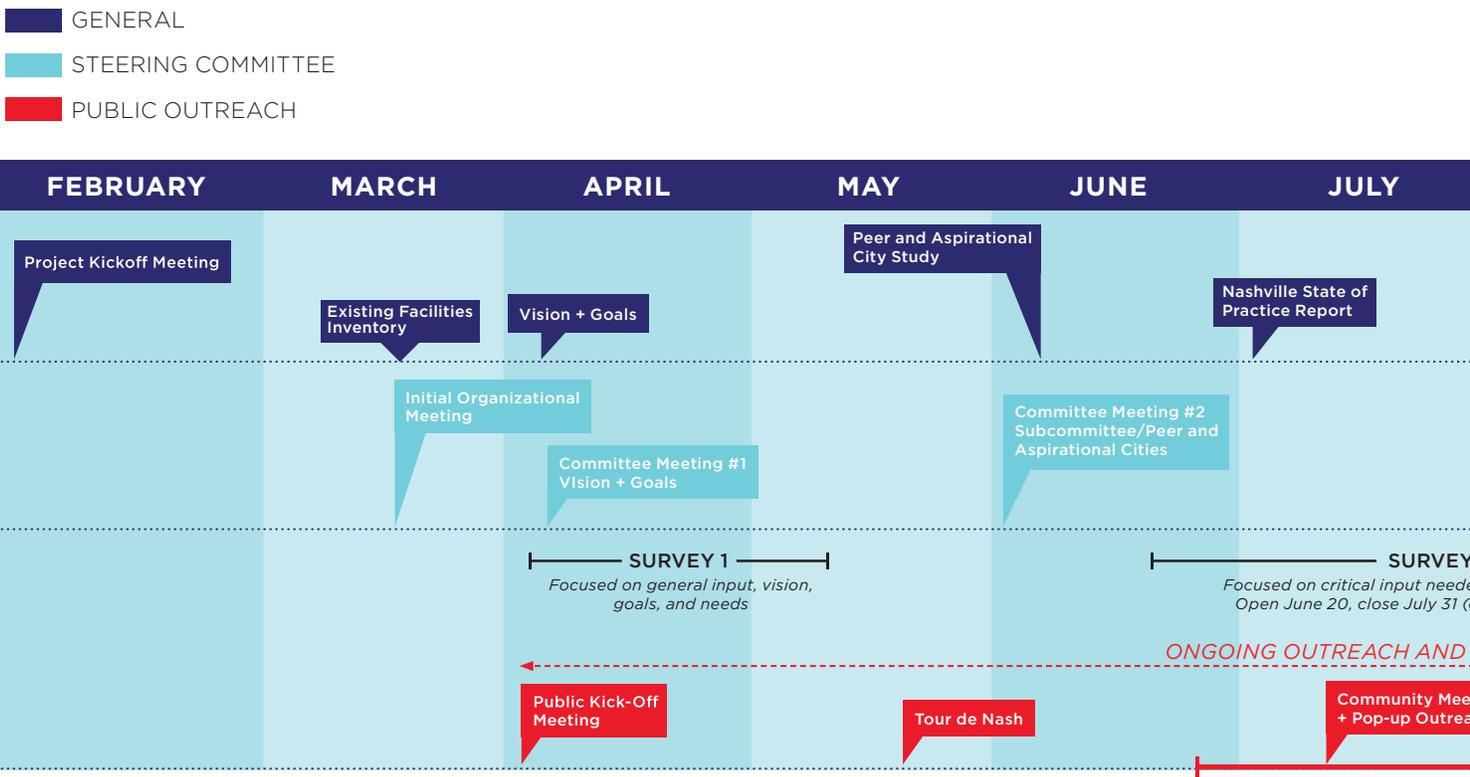
Objective: Partner with local organizations to offer a greater number of programs focused on walking and biking

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



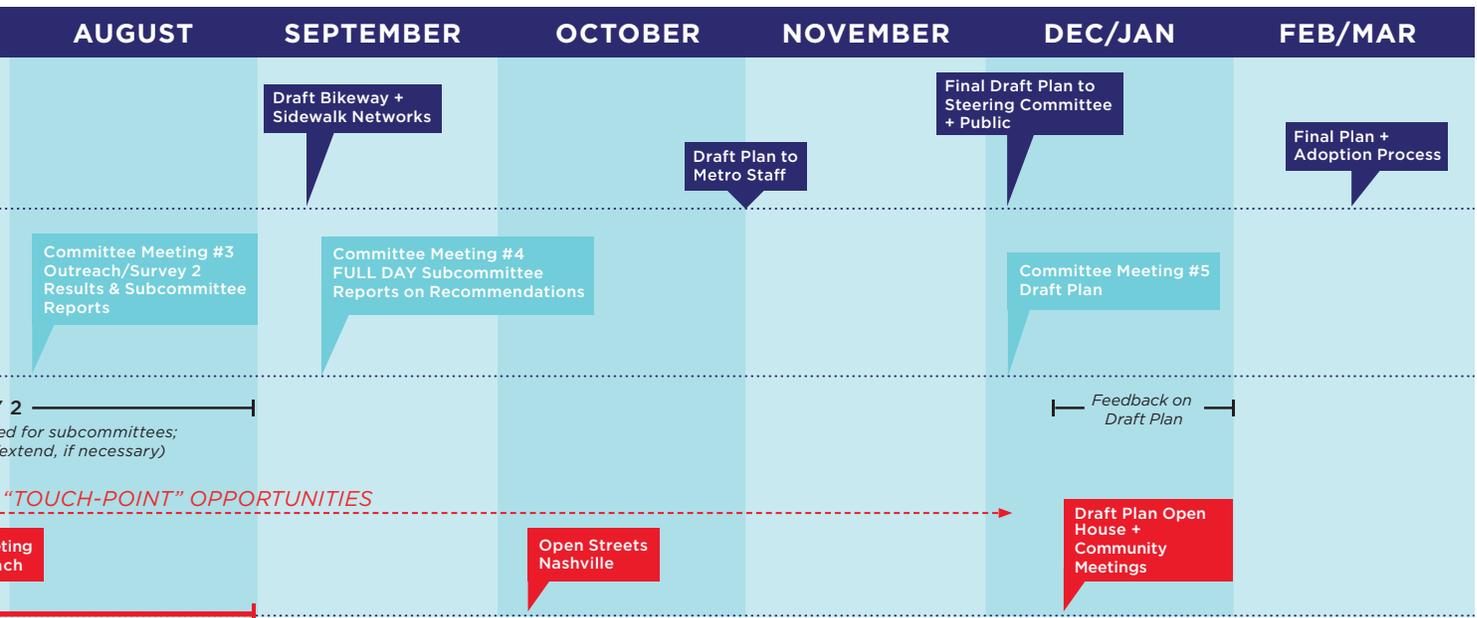
Policy and Enforcement

- 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

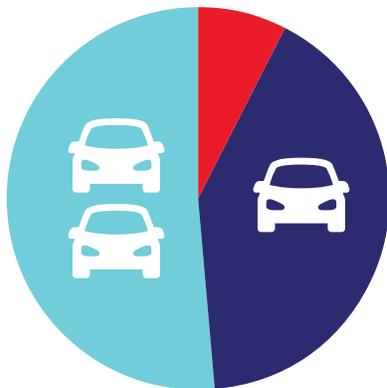


Why this Plan is Important

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.

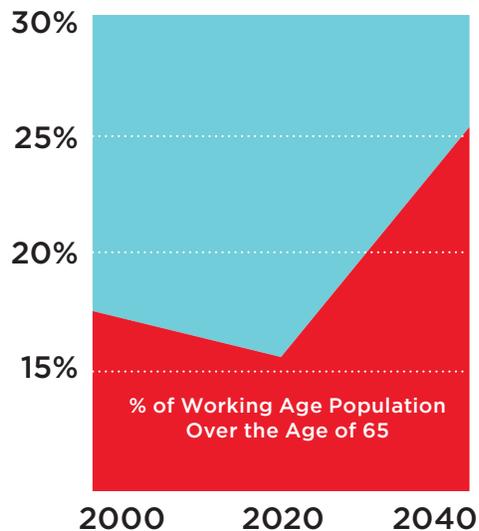


7.6% No Vehicle
41.1% One Vehicle
51.2% Two or More Vehicles

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.



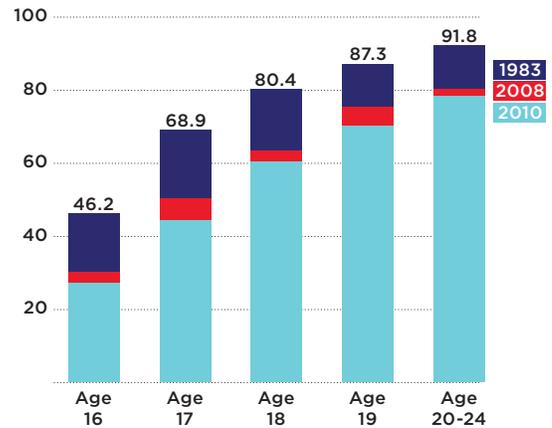
US Census (2000, 2020), Woods & Poole
 Economics, Inc projection (2040)

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).

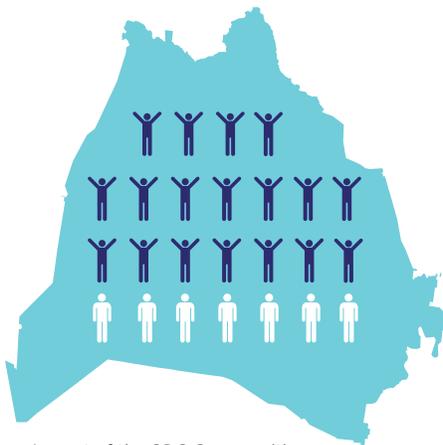
THE ADULT OBESITY RATE IS



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

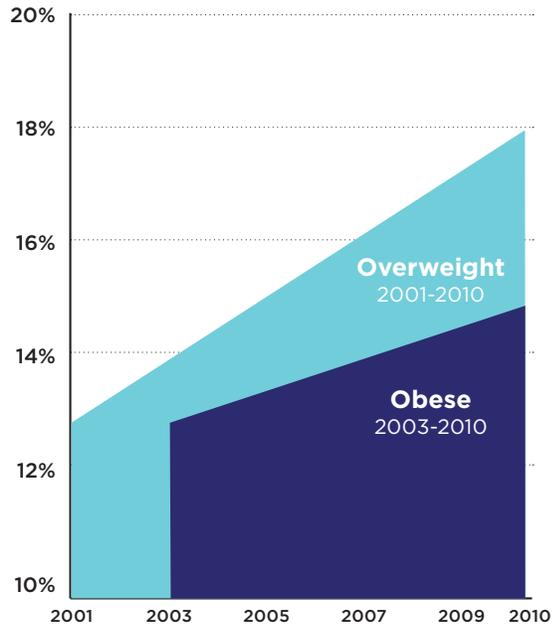
In a Nashville/Davidson County study, 26.7% of adults reported no physical activity in the last 30 days.



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.

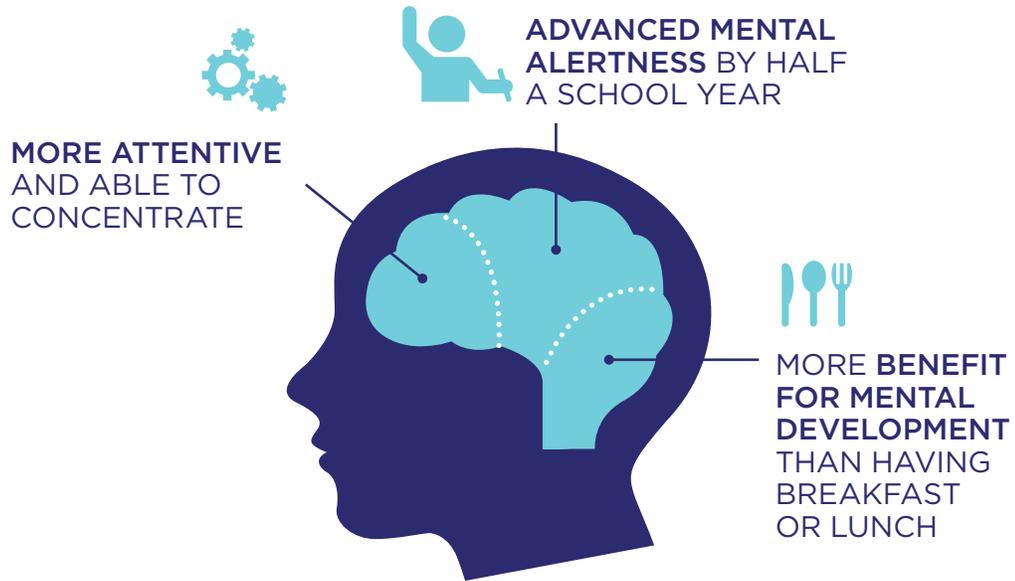
Source: Community Profile: Nashville/Davidson County, Tennessee; Centers for Disease Control and Prevention, Division of Community Health

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



Source: Centers for Disease Control Behavioral 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:

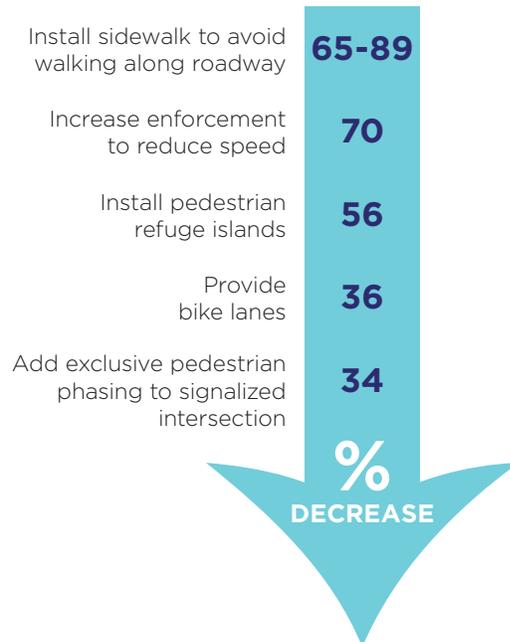


Source: Rosén, E., & Sander, U. (2009). Pedestrian fatality risk as a function of car impact speed. Accident Analysis & Prevention, 41(3), 536-542.

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.



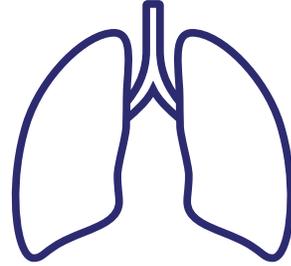
Source: New York City Department of Transportation (2012). *Measuring the Street: New Metrics for 21st Century Streets*.

Air Quality

REPLACING AUTOMOBILE TRIPS
WITH BIKING/WALKING TRIPS

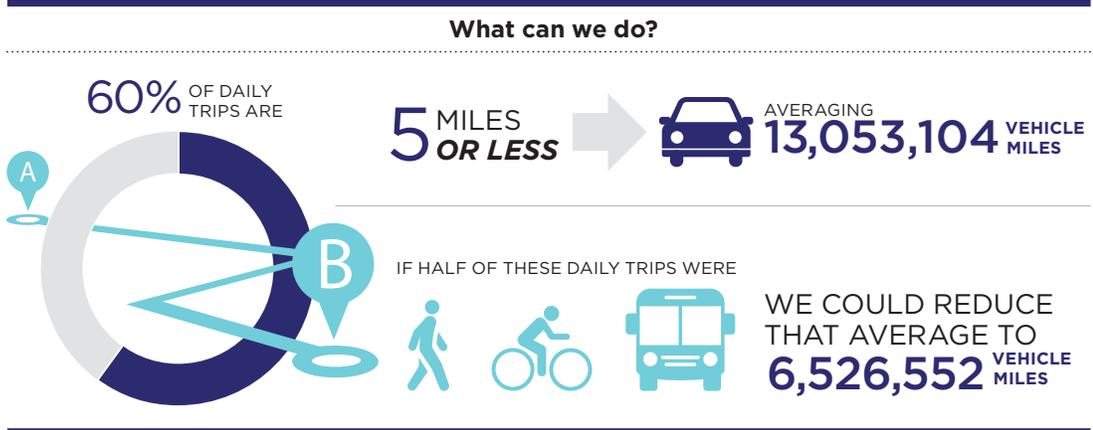
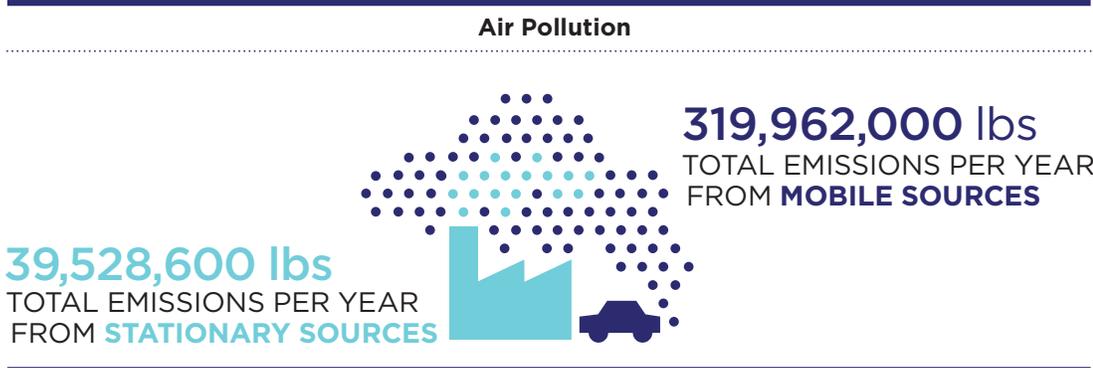
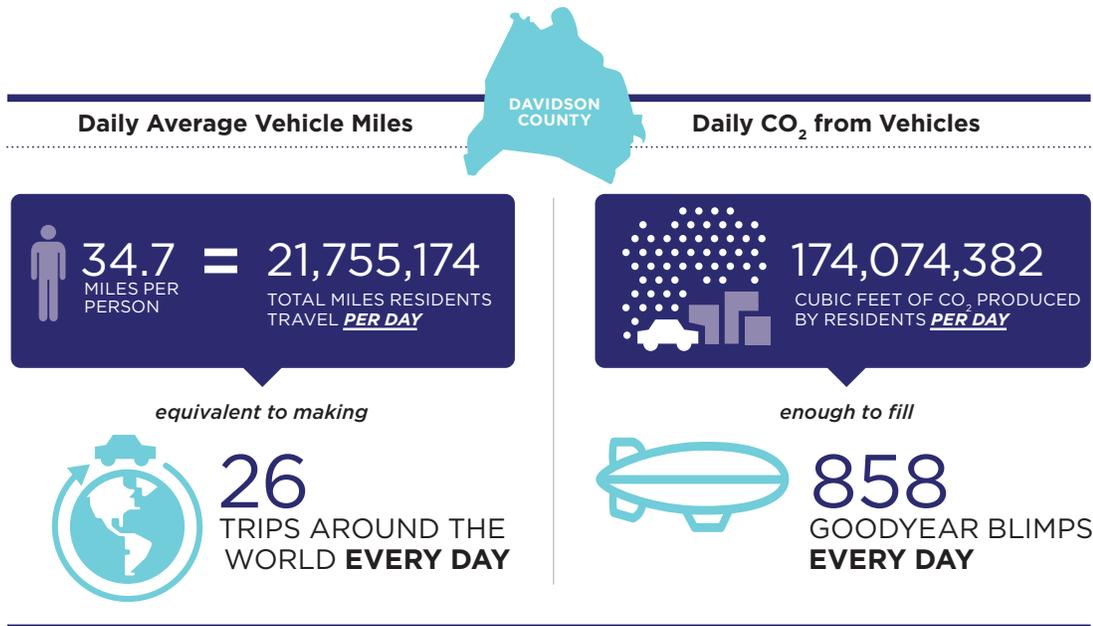


IMPROVES
AIR QUALITY AND
DECREASES
PUBLIC HEALTH
CONCERNS SUCH
AS ASTHMA.



**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.

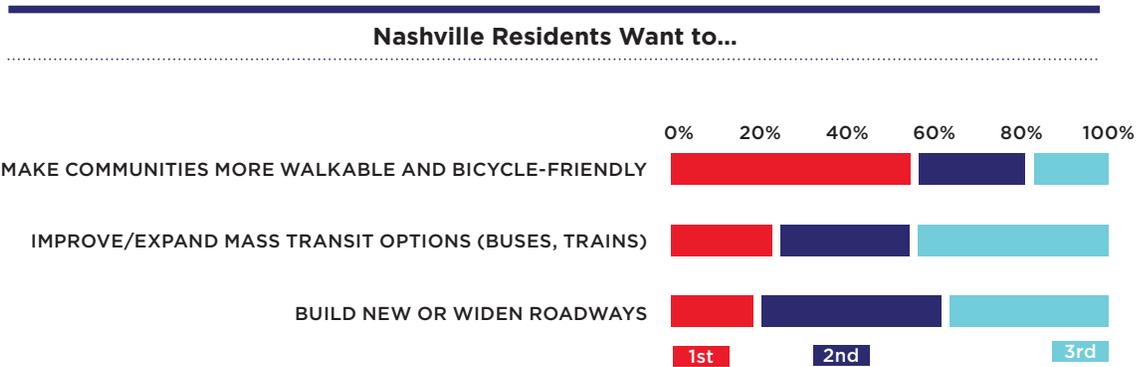


Source: *Shaping The Healthy Community: The Nashville Plan 2016*. Nashville Civic Design Center.

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.



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.
7. 2014 Pedestrian and Bicycle Safety Pilot Project. Metro Nashville Public Works Department.
8. Flusche, Darren, for the League of American Bicyclists. The Economic Benefits of Bicycle Infrastructure Investments, 2009.
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 Gas Emissions from the U.S. Transportation Sector: 1990-2003. Report number EPA 420 R 06 003.

The background of the slide is a blue-tinted photograph. The top half shows a cyclist in a white jersey with 'RCR' on the back, riding a road bike. The bottom half shows a group of pedestrians walking on a paved path. A large white rectangle is overlaid in the center, containing the chapter title.

CHAPTER 2

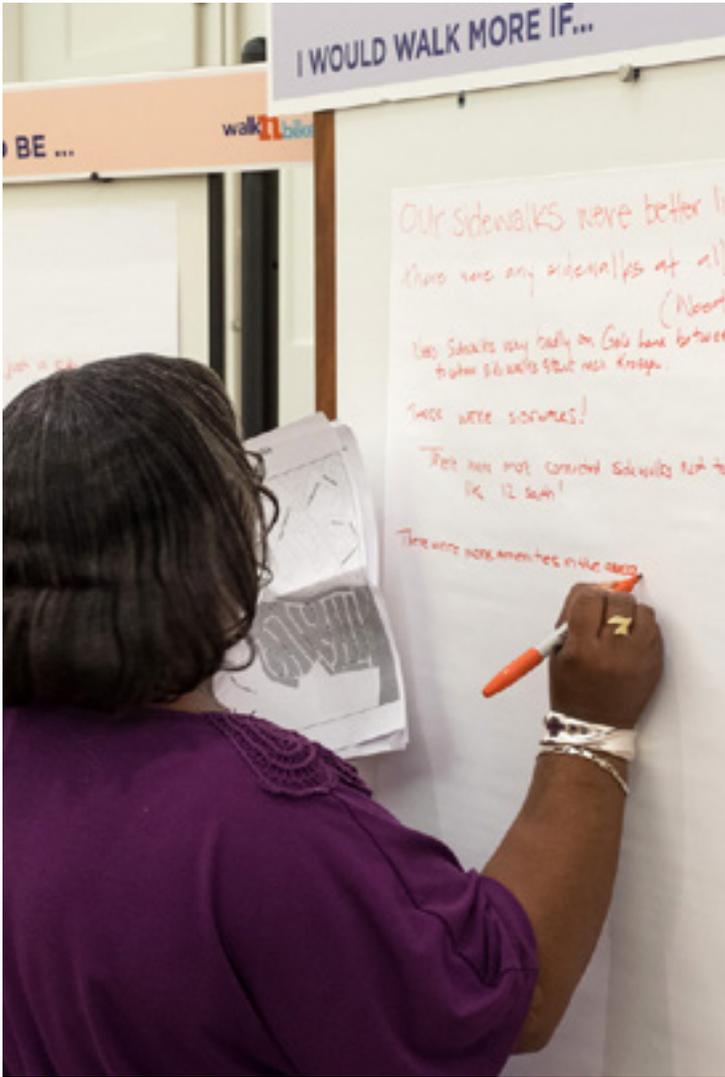
WHAT WE'VE HEARD

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,

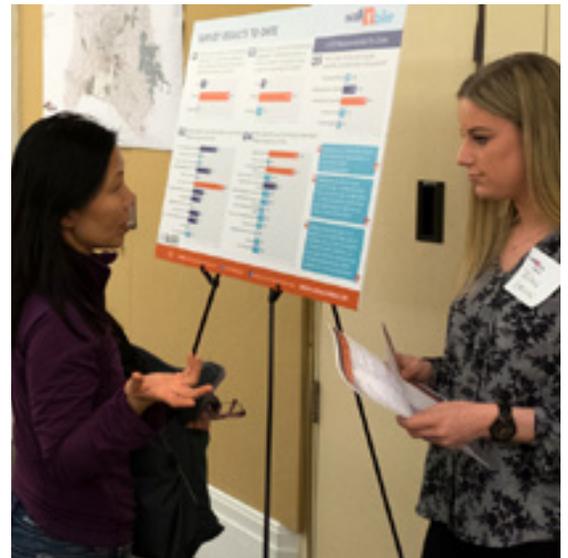
own businesses, play, and enjoy leisure activities in the city. Feedback from the public guided where investments should be prioritized.





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

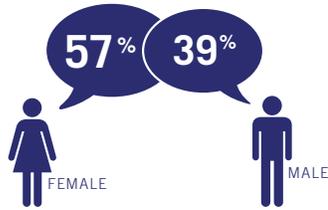
Two separate online surveys were used to gather feedback. The first survey was launched in March 2016 shortly after the project kicked off. The focus of the survey was to gather input about barriers and attitudes towards walking and biking in Nashville. A total of 1,904 respondents completed the first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



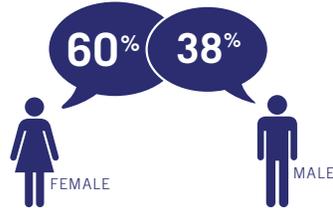
Lack of Dedicated Bike Space (68%)



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
93%



TO TRANSIT STATIONS
93%



RECREATION
91%



Bikeway Network



RECREATION
55%



COMMUTING (WORK OR SCHOOL)
54%



HEALTH
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)

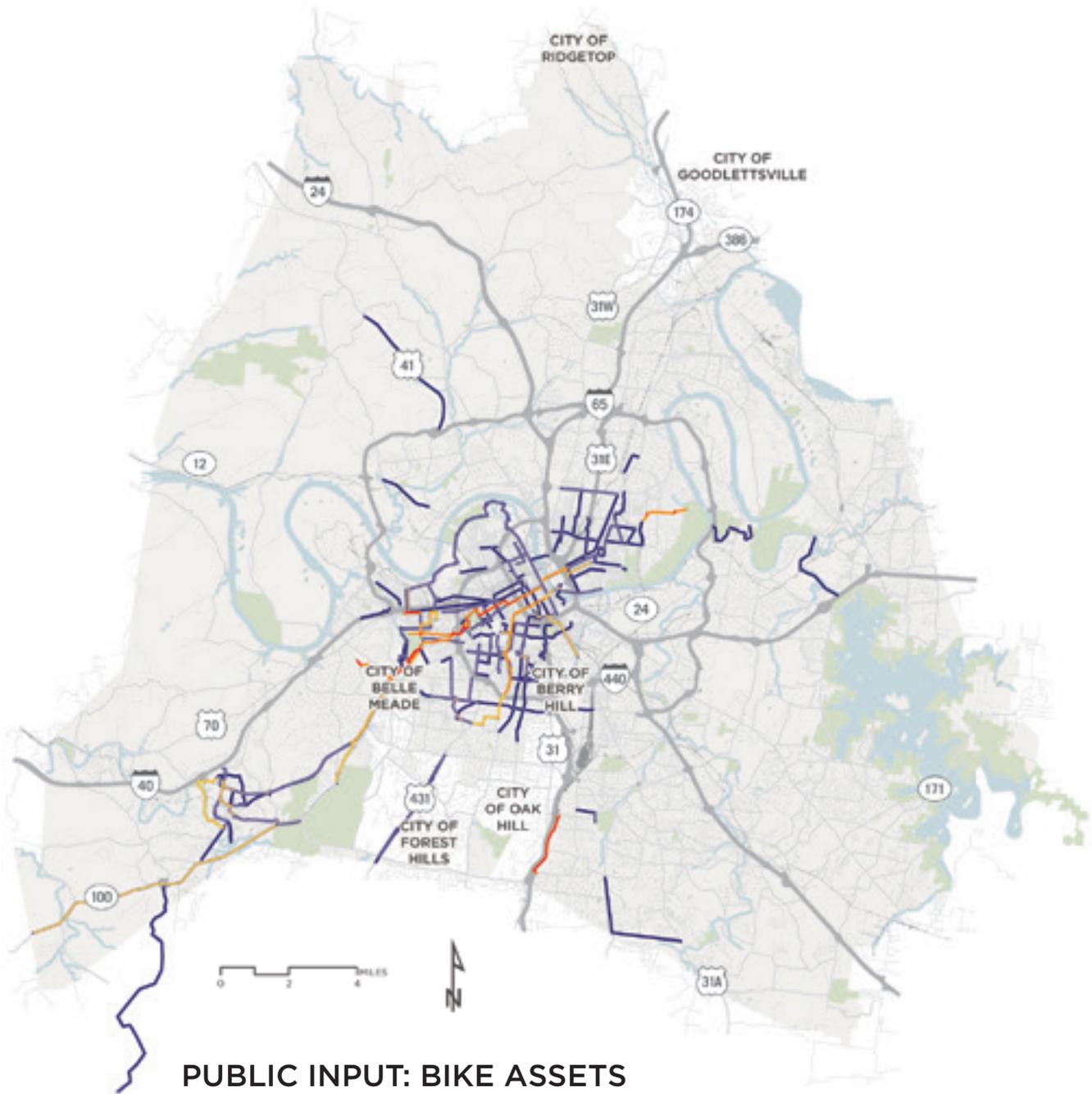


Equity and Need
(1,192 Votes)

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

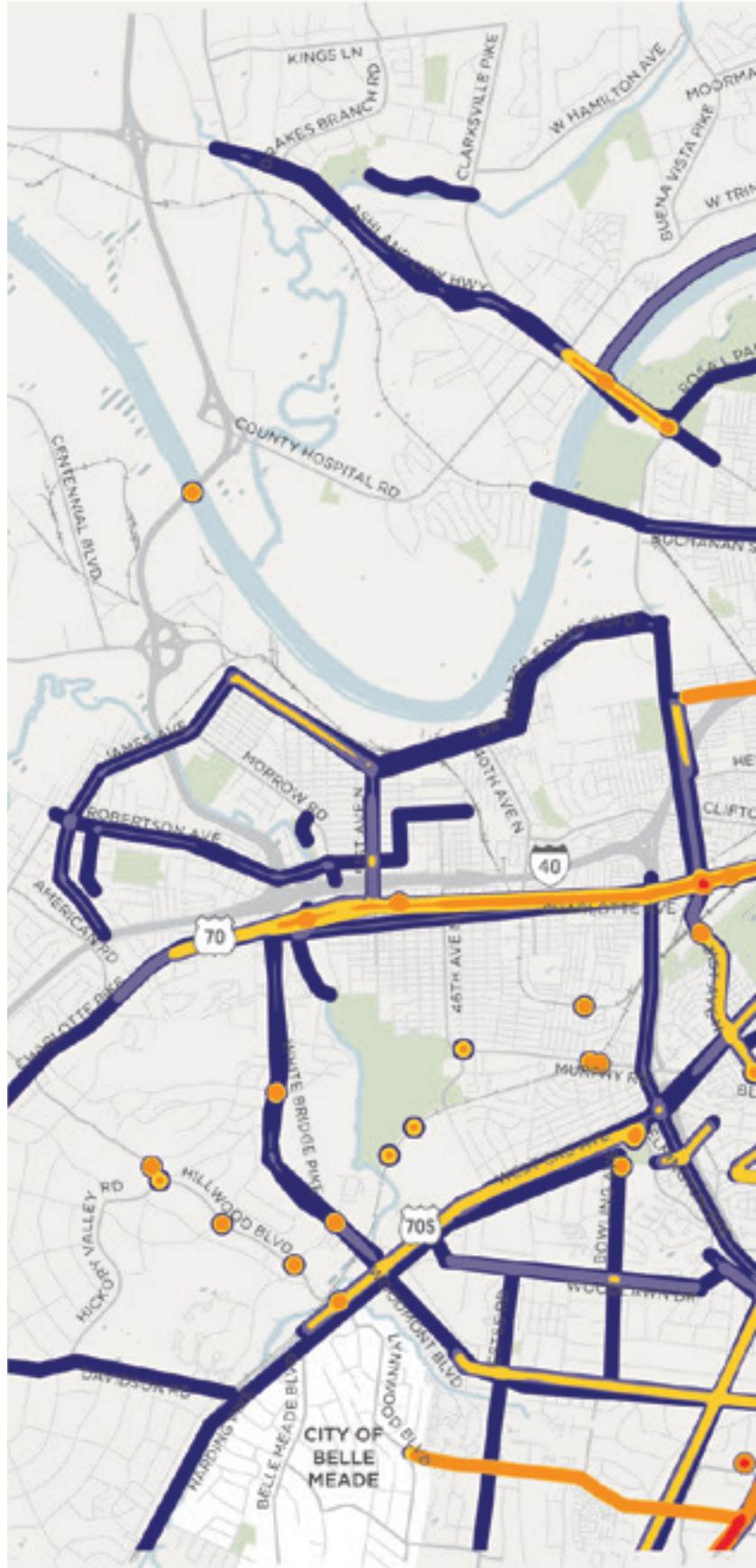
“Route that could be improved for bicyclists”
or “Barrier to bicycling”

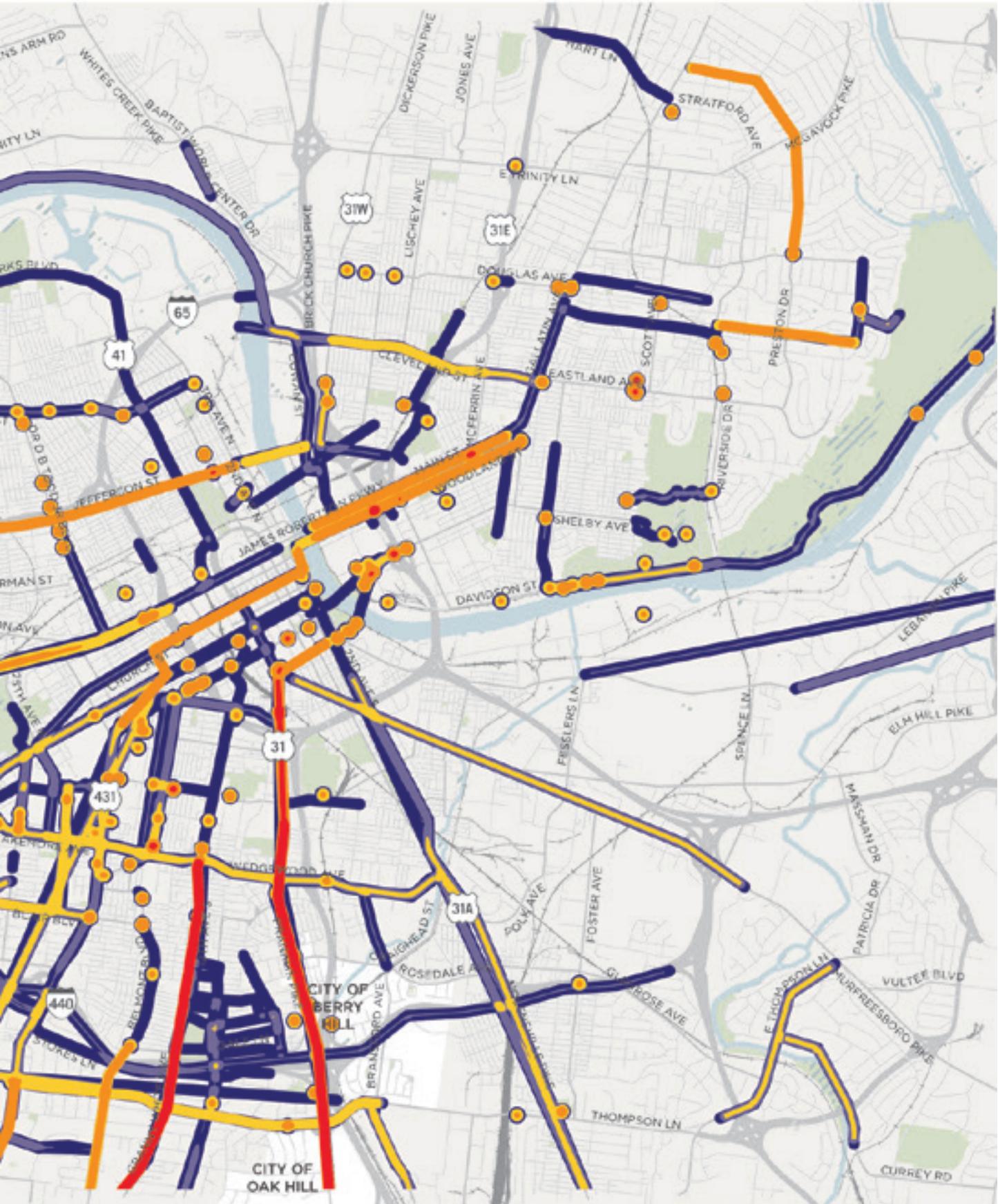


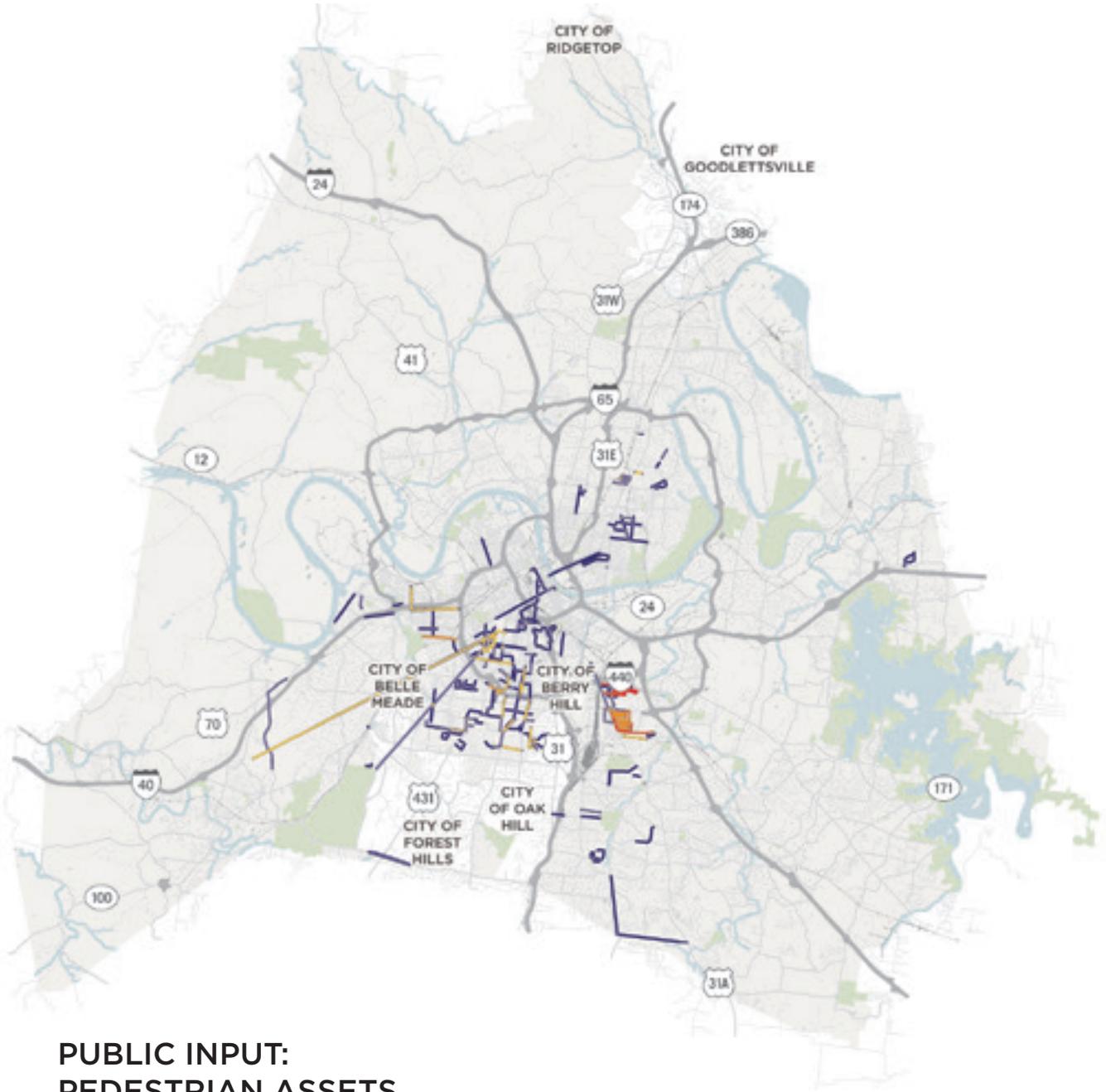
PUBLIC INPUT: BIKE NEEDS

“Route that could be improved for bicyclists” or “Barrier to bicycling”

- Highest Support
-
-
-
- Lowest Support







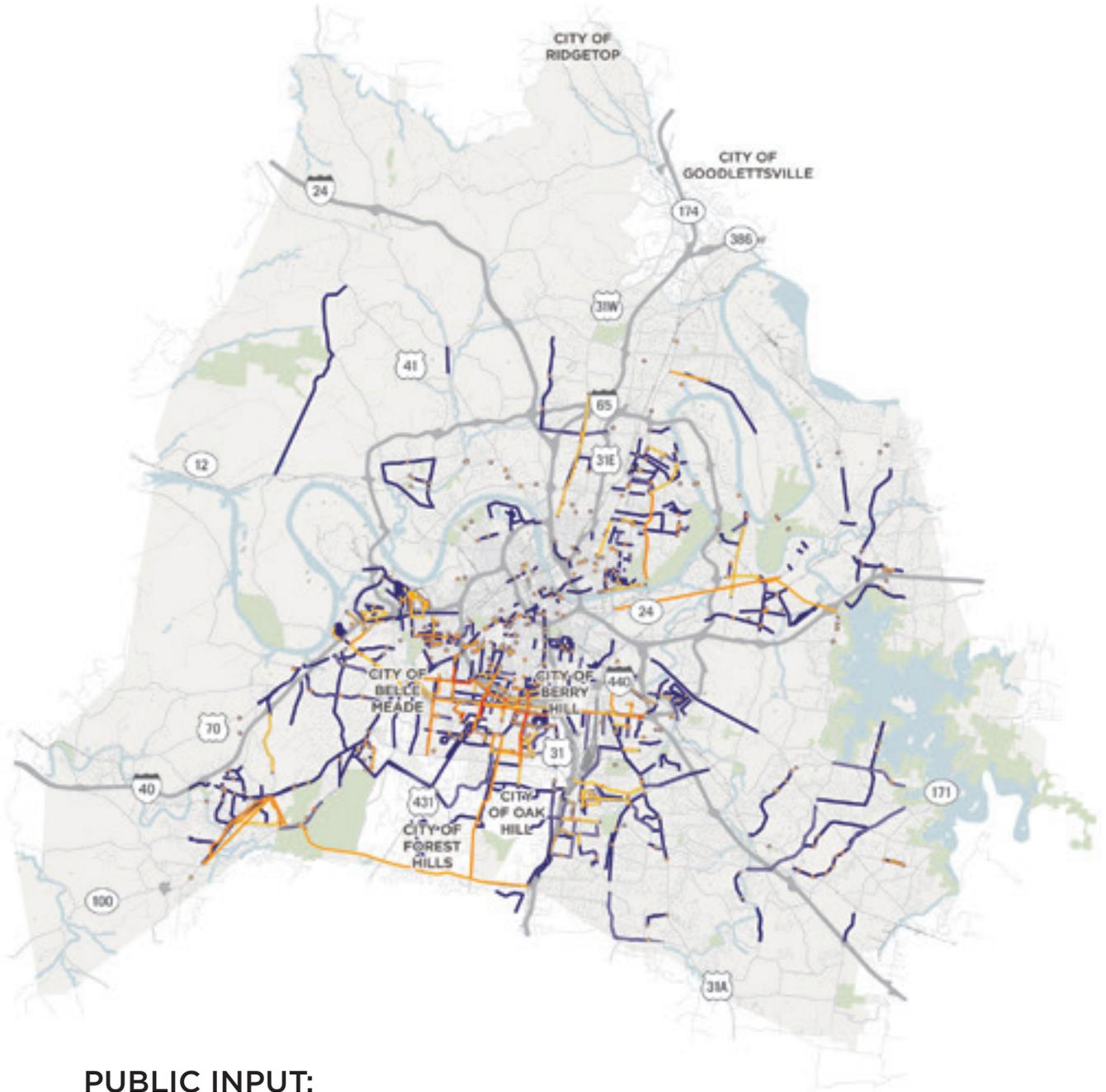
**PUBLIC INPUT:
PEDESTRIAN ASSETS**

PUBLIC SUPPORT

“Route I like and currently use as a pedestrian”

- Highest Support
-
-
-
- Lowest Support





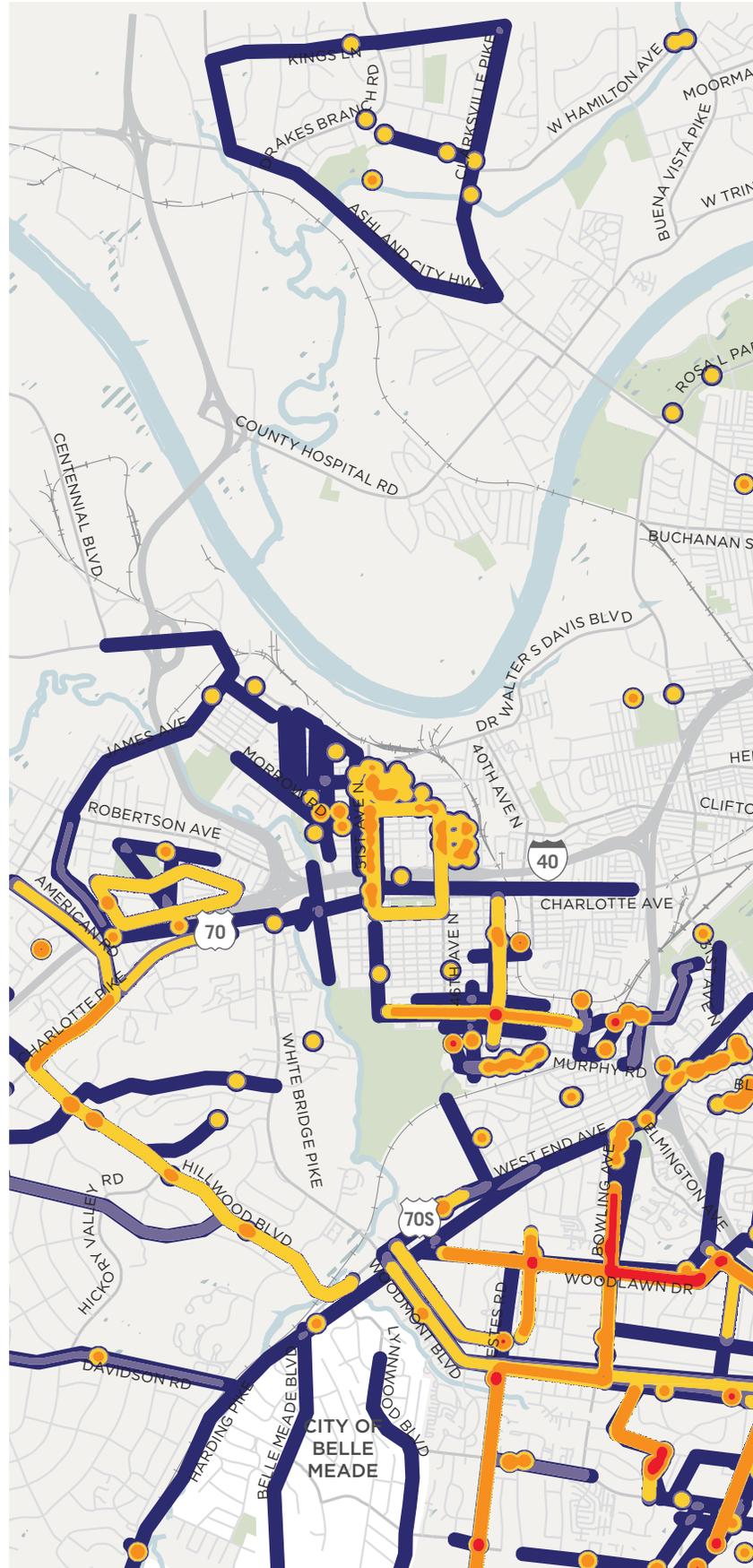
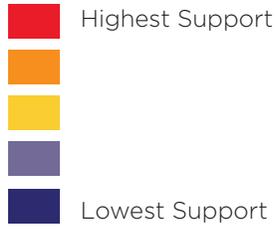
PUBLIC INPUT: PEDESTRIAN NEEDS

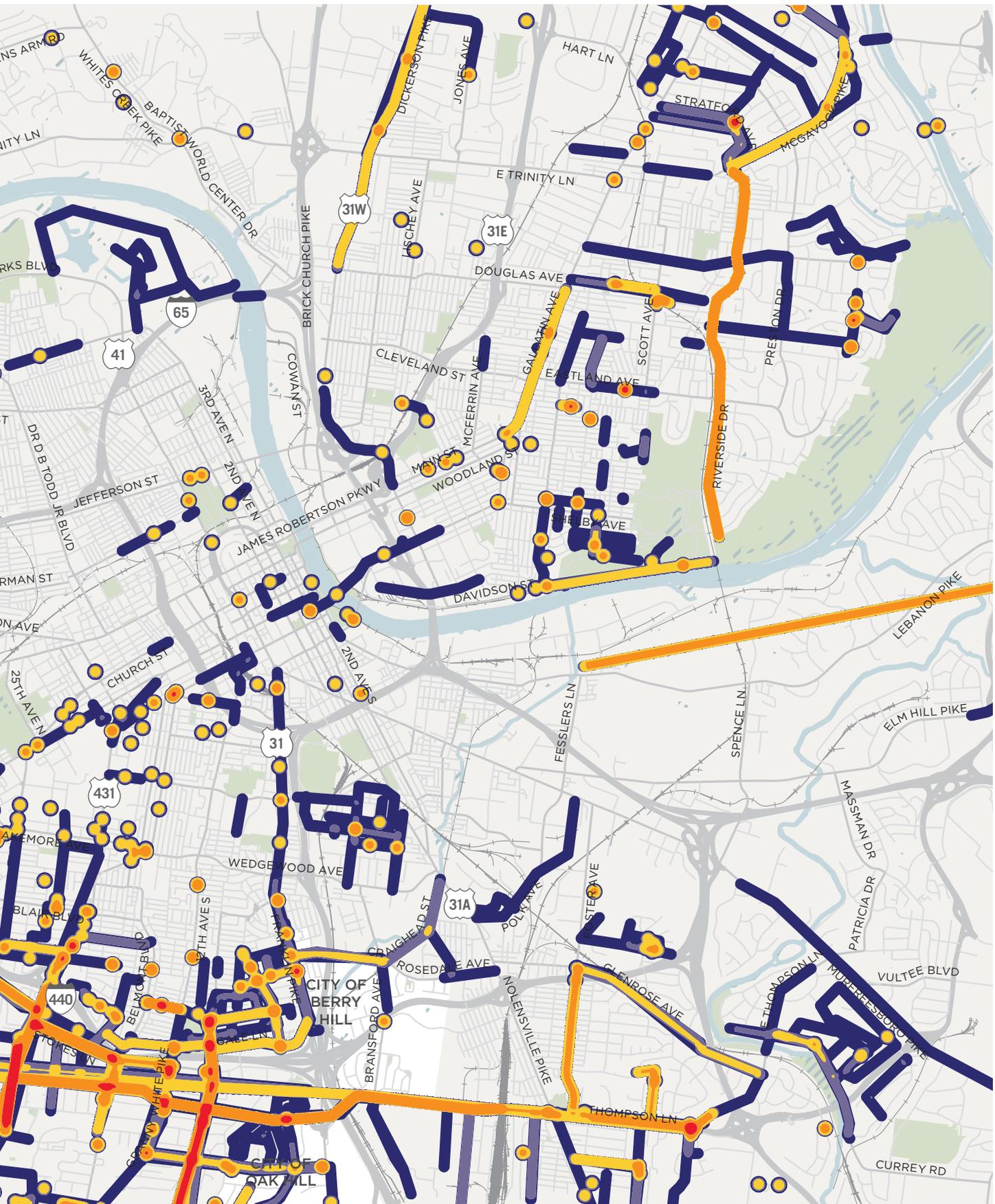
“Route that could be improved for pedestrians” or
“Barrier to walking”

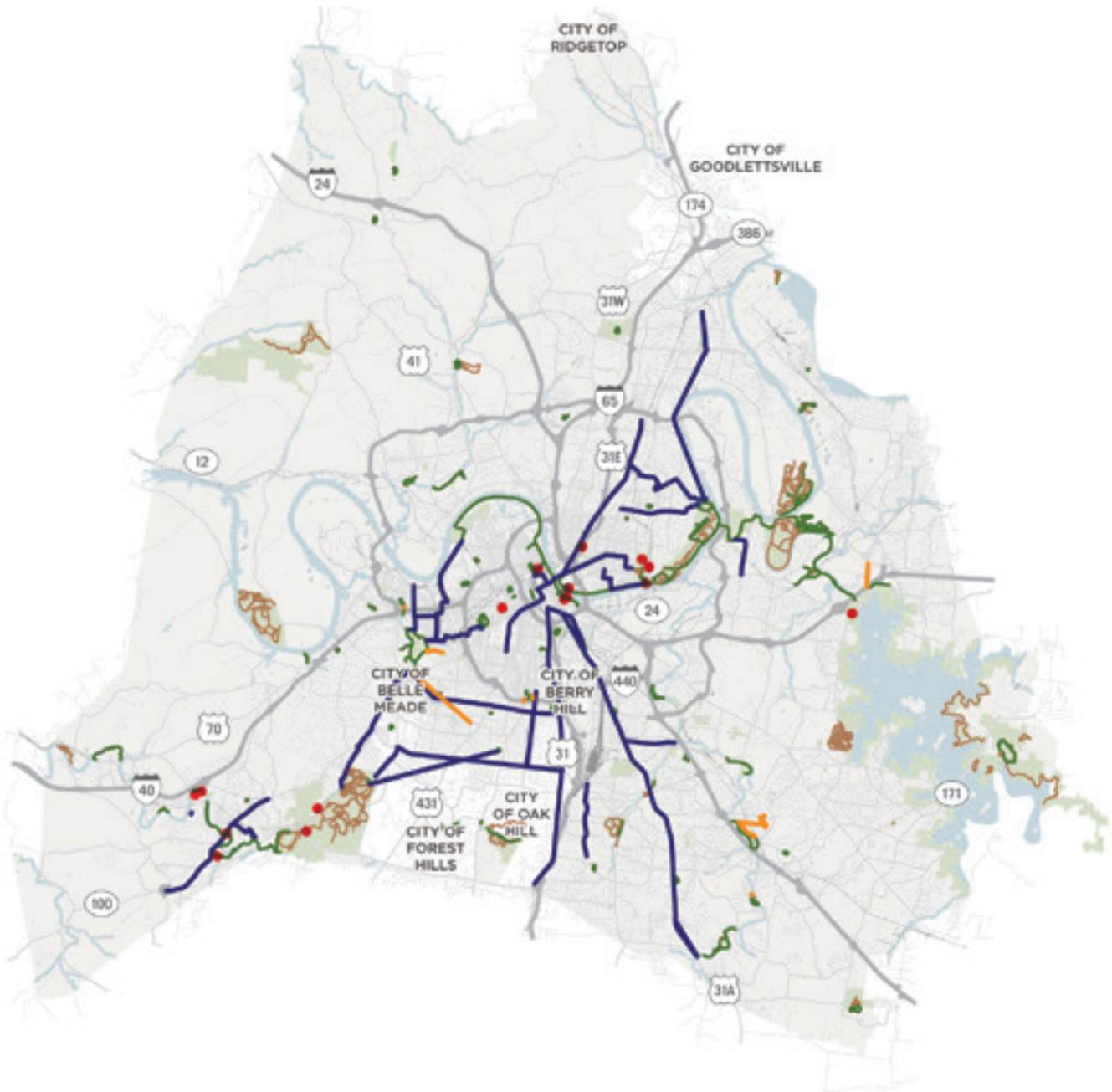


PUBLIC INPUT: PEDESTRIAN NEEDS

“Route that could be improved for pedestrians” or “Barrier to walking”







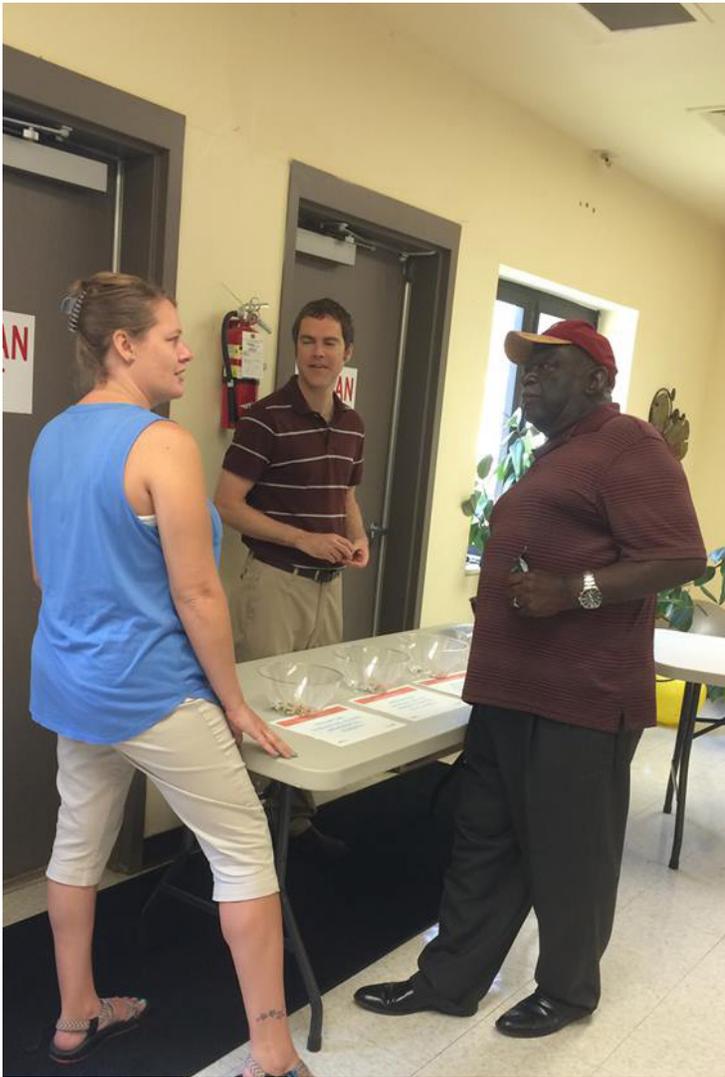
PUBLIC INPUT: GREENWAY ACCESS

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



This page intentionally left blank.



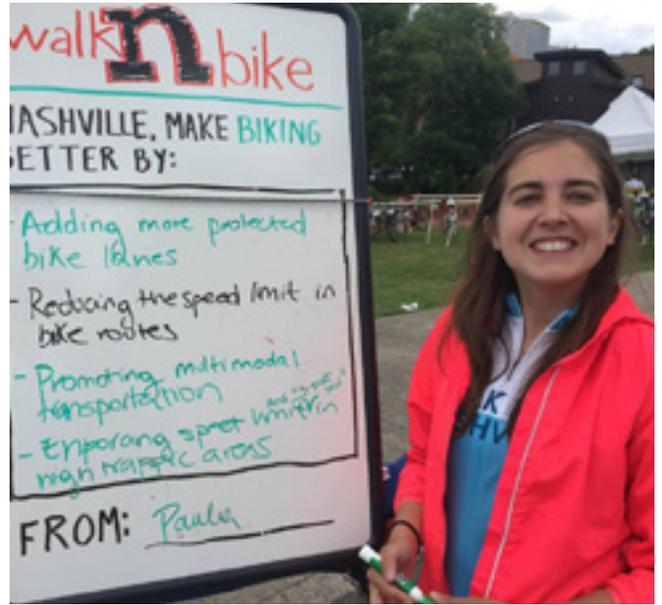
Collaborating

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.**

This page intentionally left blank.

What We Heard

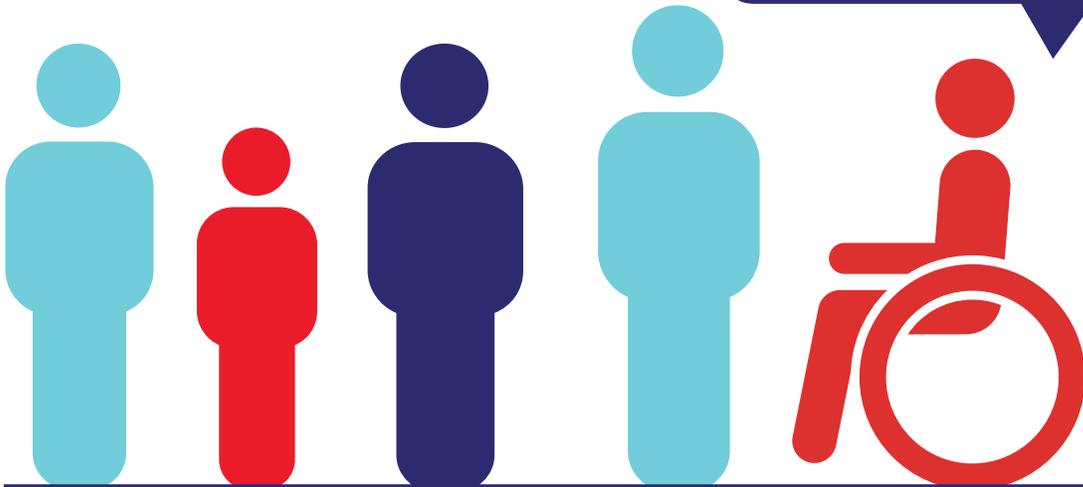
Sidewalks in neighborhoods would help combat our obesity and declining health in Nashville. In the older neighborhoods such as Oak Hill, there are no sidewalks and we all walk in the street which is dangerous at night.

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.

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.



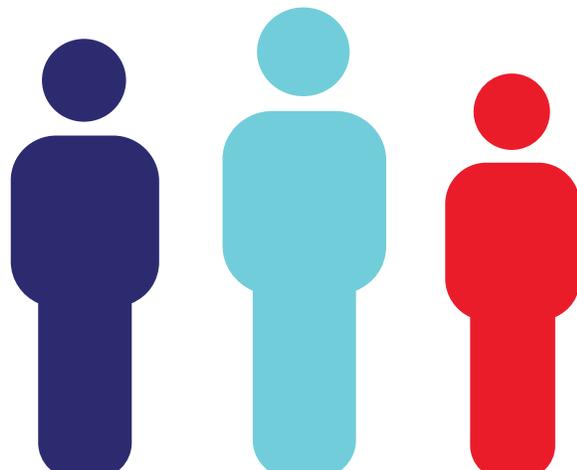
I think increasing bike access as we increase mass transit options will be critical. For example, if I can safely ride to a train station, I am more apt to use the options together. So some thought should be given to this as mass transportation continues.

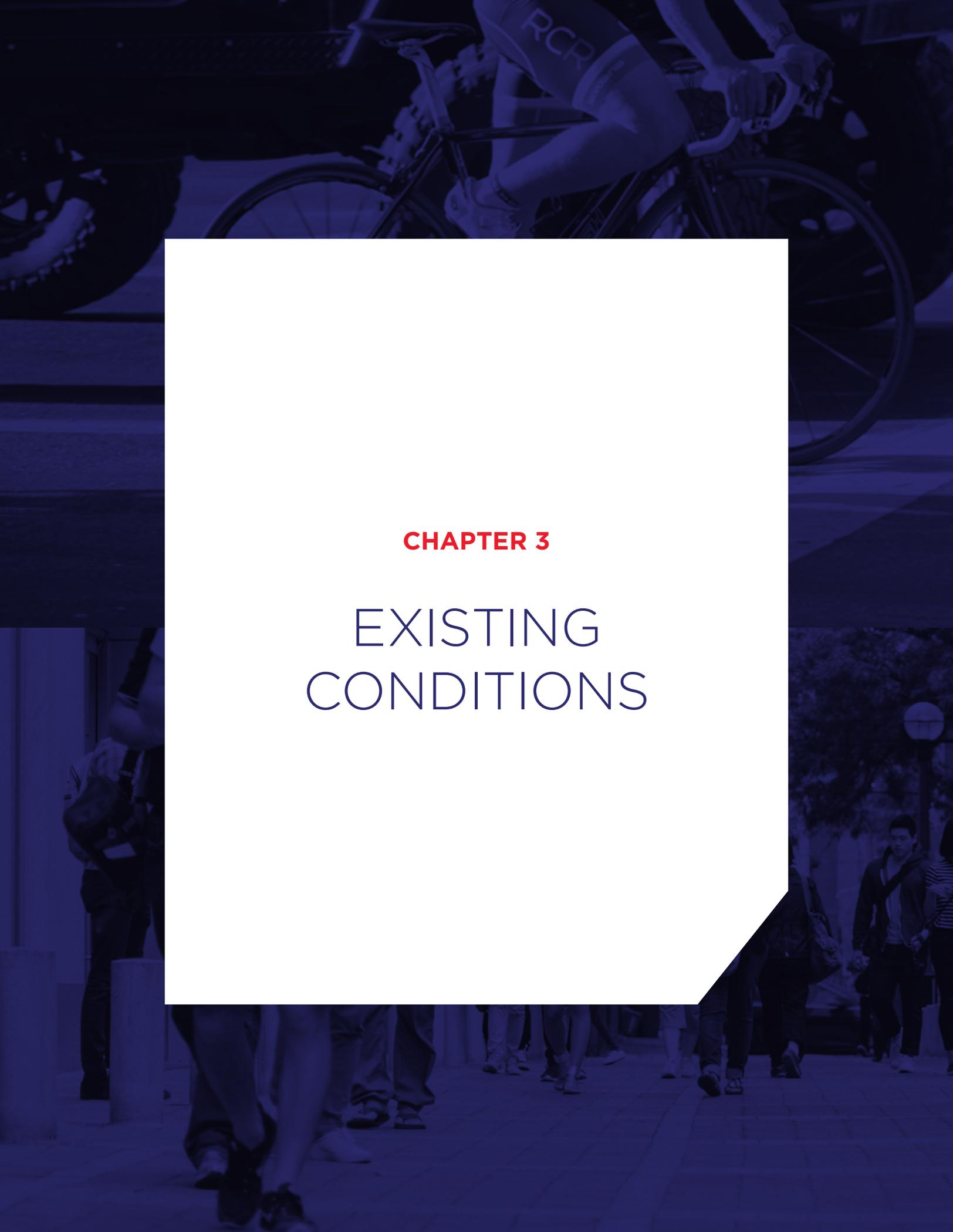
I would walk more for errands, but I live in a high traffic area and don't feel safe.

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.



The background of the page is a blue-tinted photograph. The top half shows a cyclist in a white jersey with 'RCR' on the back, riding a road bike. The bottom half shows a group of pedestrians walking on a paved sidewalk. A large white rectangular area is overlaid in the center, containing the chapter title.

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 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.



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.	Ongoing with advocacy groups like WalkBike Nashville leading the way
Offer child and adult bicycle and pedestrian education opportunities	
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

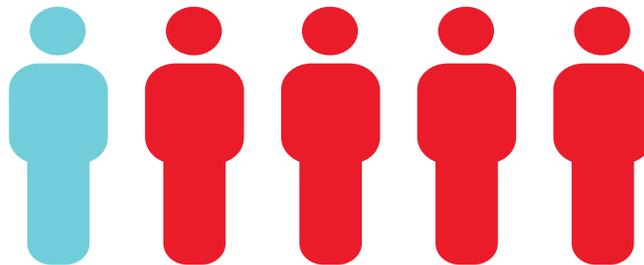
In 2002, Metro Public Works completed an extensive inventory of the existing public sidewalks in Davidson County. The purpose of this inventory was to develop a thorough sidewalk database that could be used to determine the magnitude of ADA problems for sidewalks and curb ramps.

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

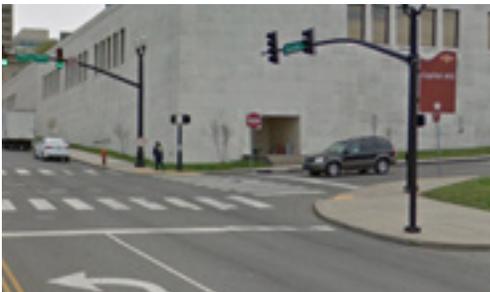


Median on Deaderick St separates the two lanes of traffic

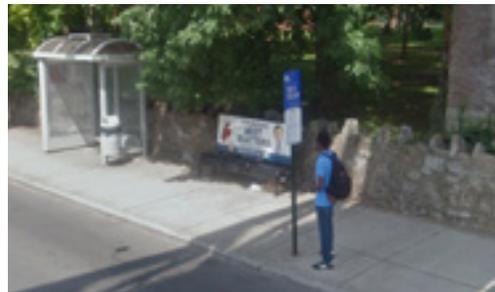


Midblock crossing on 4th Ave

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

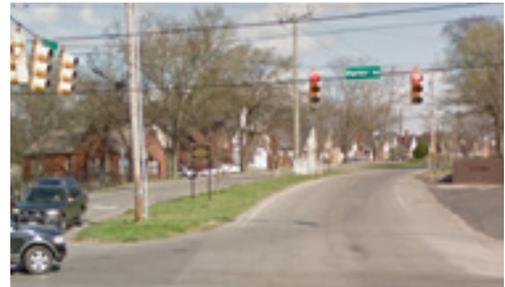


Cracks in sidewalk along 13th Ave S

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 at multiple key destinations and some in the form of public art.

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

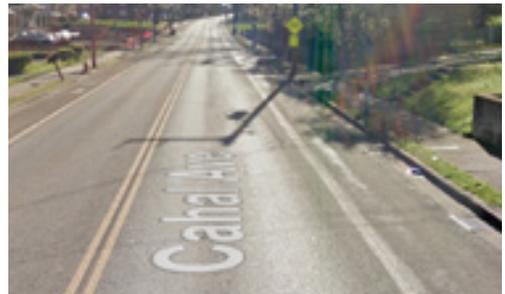


A cyclist rides on the sidewalk on 16th Ave. A contraflow bike lane could accommodate bicyclists traveling in both directions

BIKEWAY CONDITION



Faded bike lane marking on 12th Avenue South

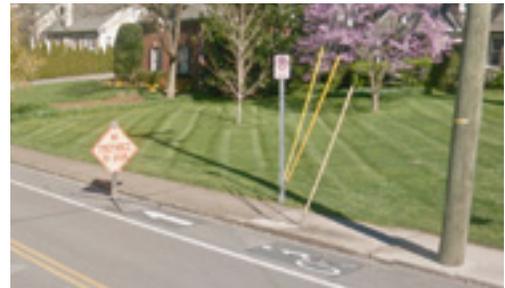


Debris and trash within bike lane along Cahal Avenue

OBSTRUCTIONS

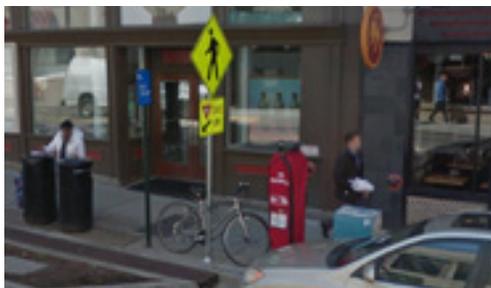


Bike lane on Charlotte Ave is blocked off during construction

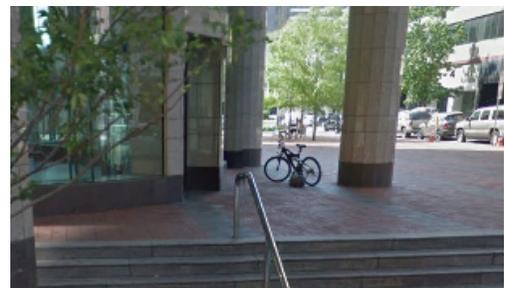


A sign is placed in the bike lane on Fairfax Ave

AMENITIES



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



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

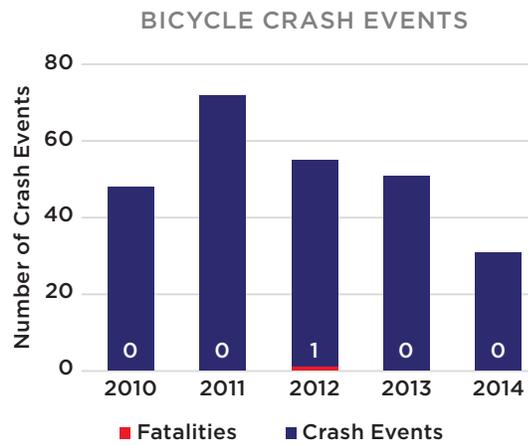
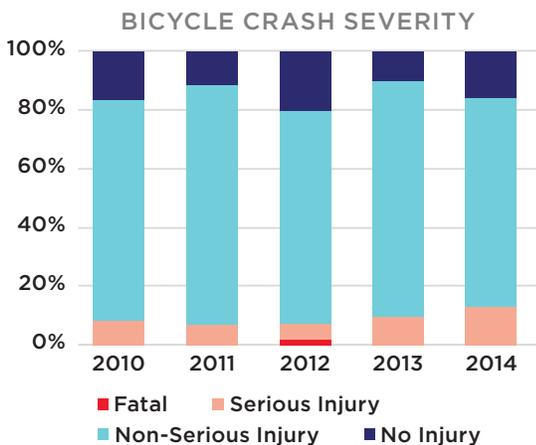
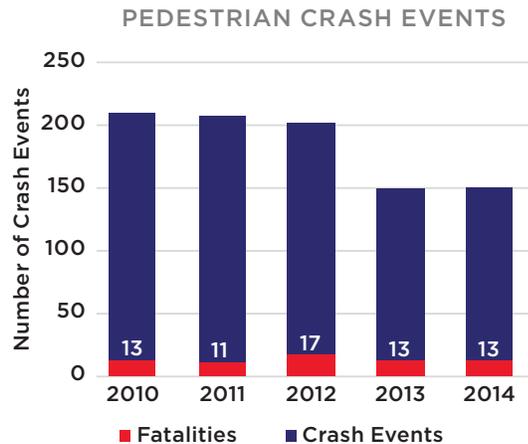
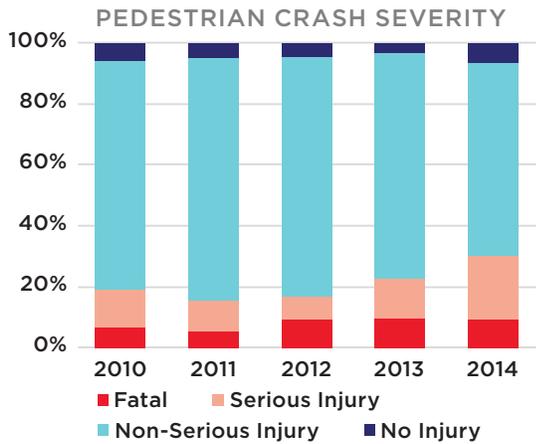
Bike and Pedestrian Crash Review

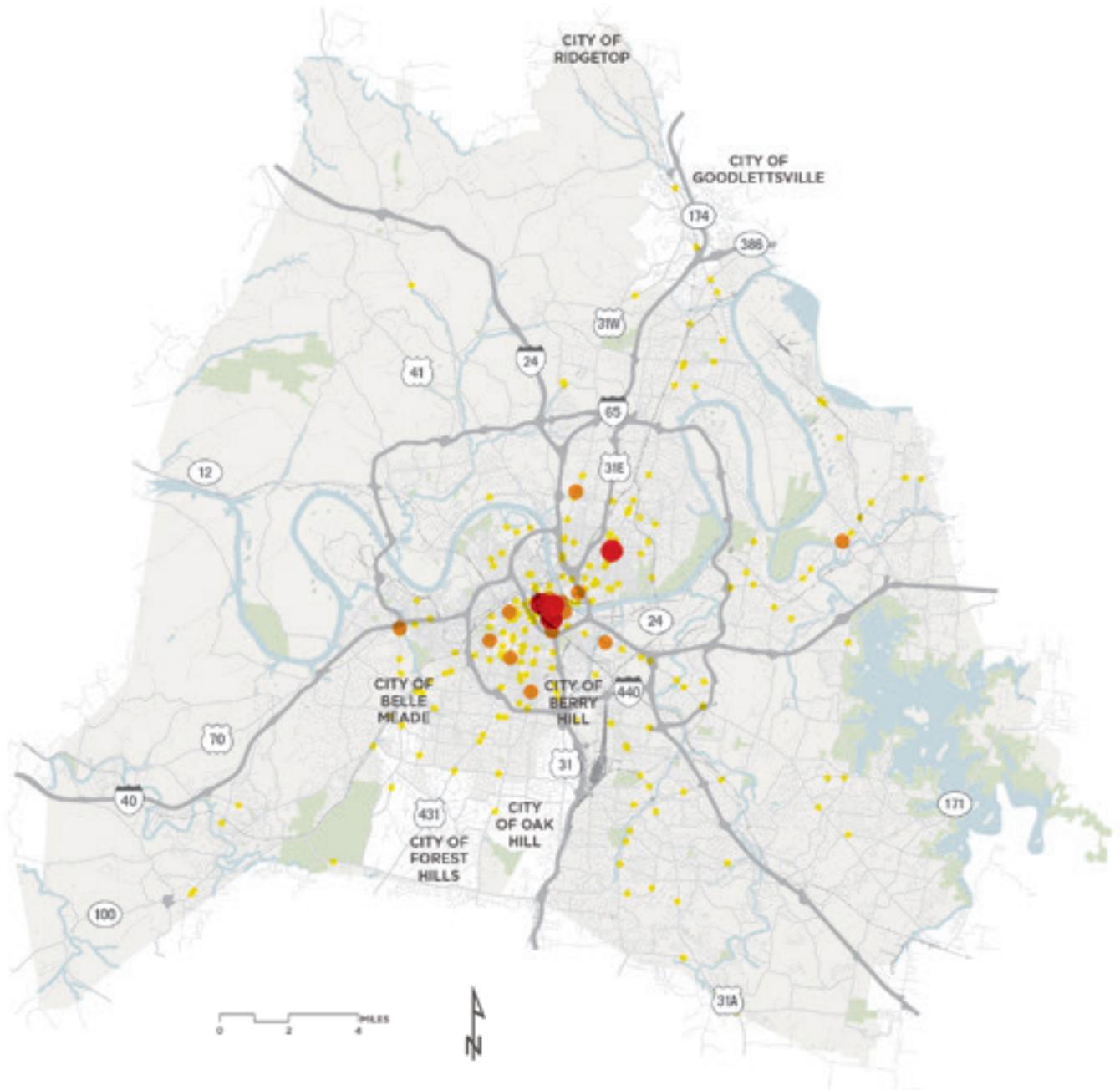
A crash analysis was conducted to review bicycle- and pedestrian-involved crashes over a five-year period (2010-2014) in Davidson County as reported by the Tennessee Department of Safety.

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



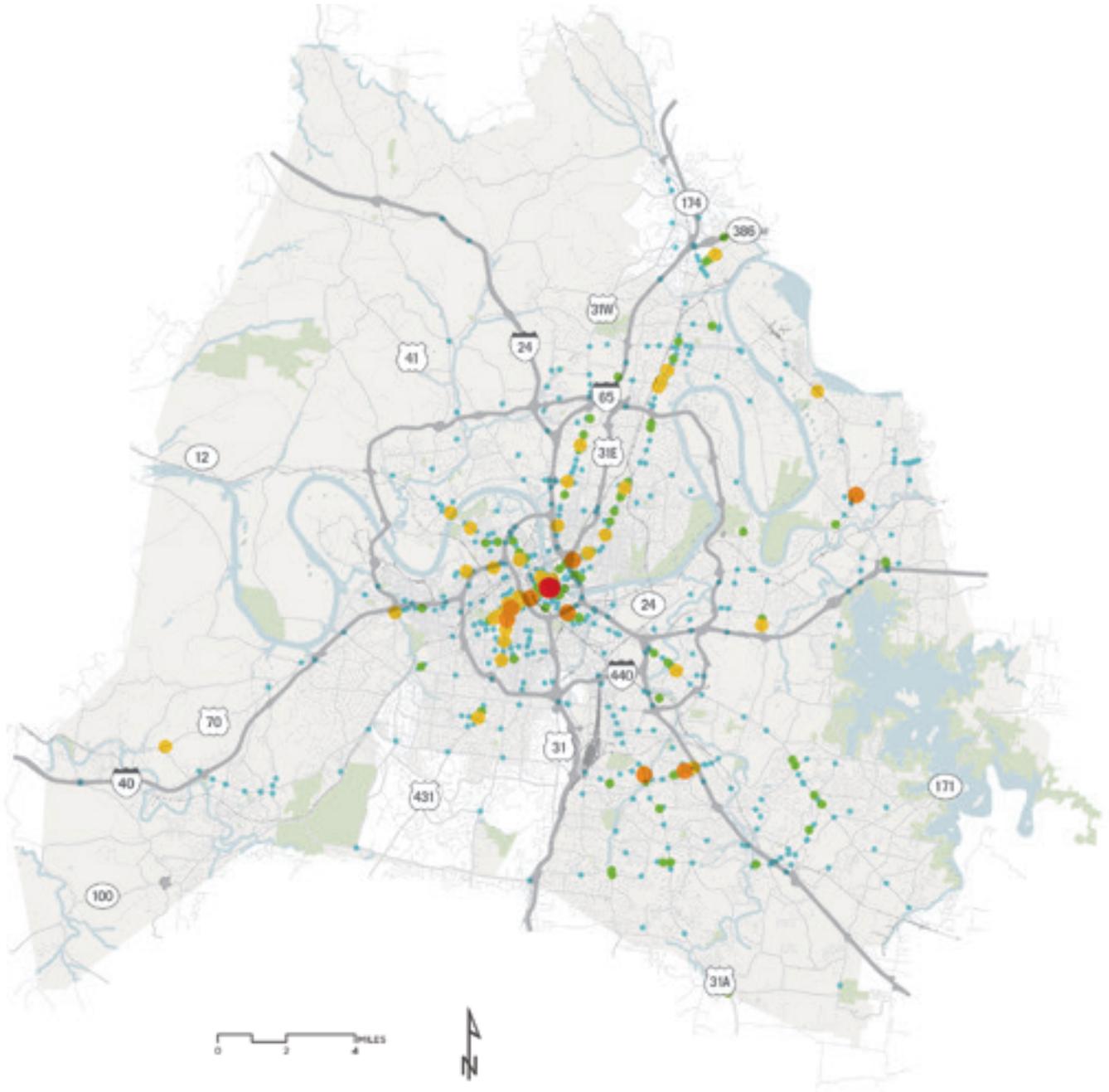


CRASH ANALYSIS

BIKE CRASH FREQUENCY

- 1
- 2
- 3

This page intentionally left blank.



CRASH ANALYSIS

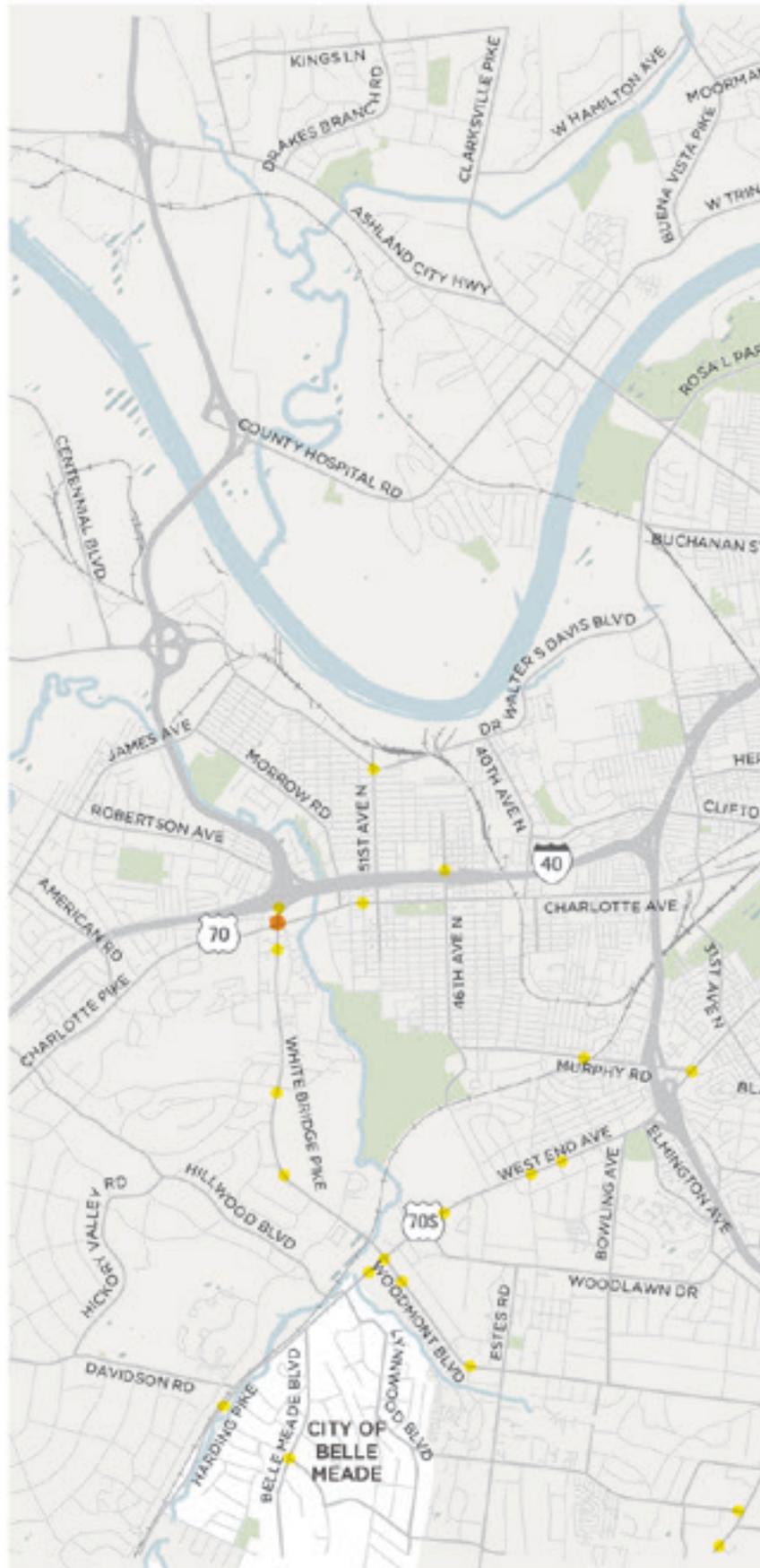
PEDESTRIAN CRASH FREQUENCY

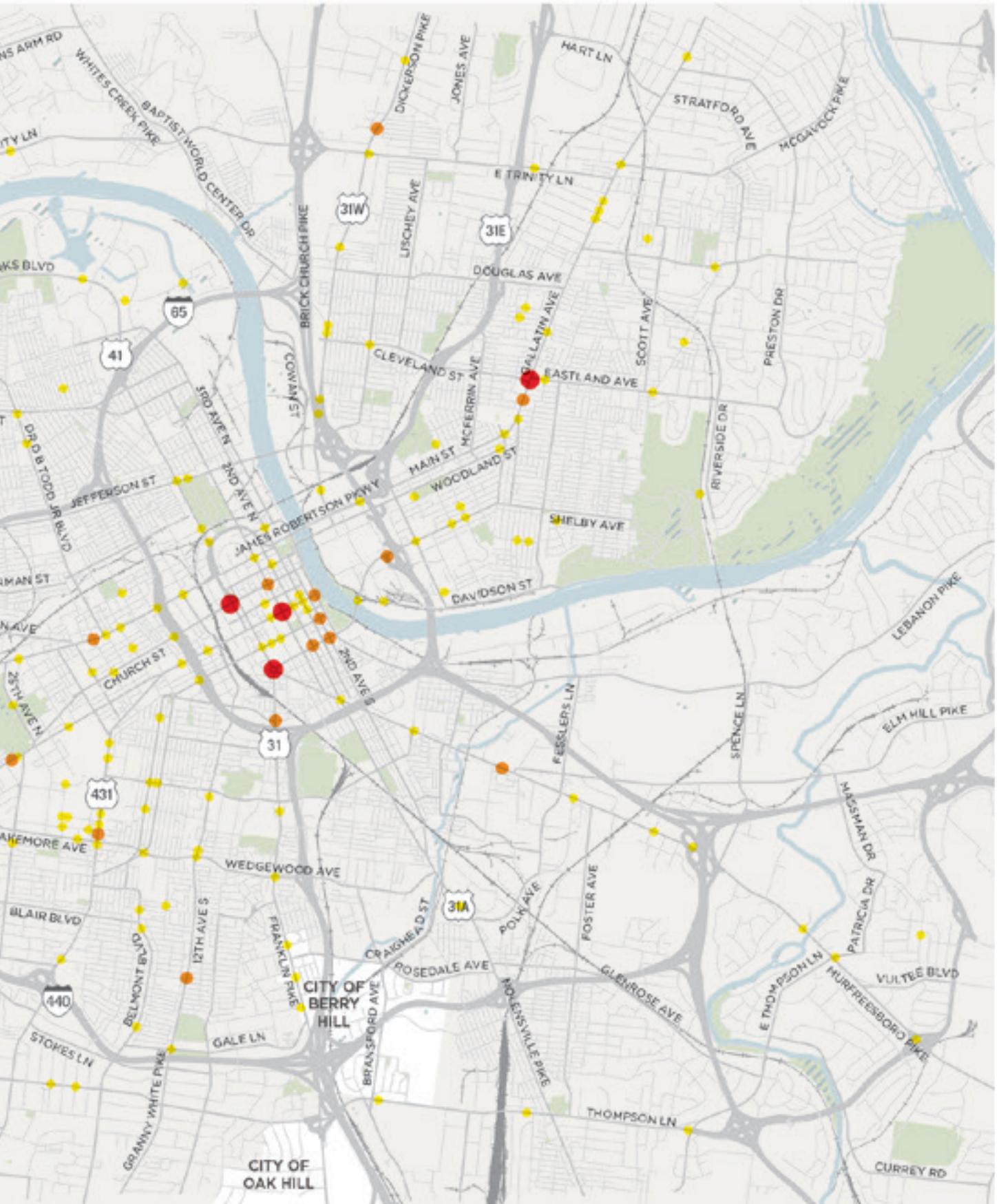
- 1
- 2
- 3-4
- 5-8
- 9-11

CRASH ANALYSIS

BIKE CRASH FREQUENCY

- 1
- 2
- 3

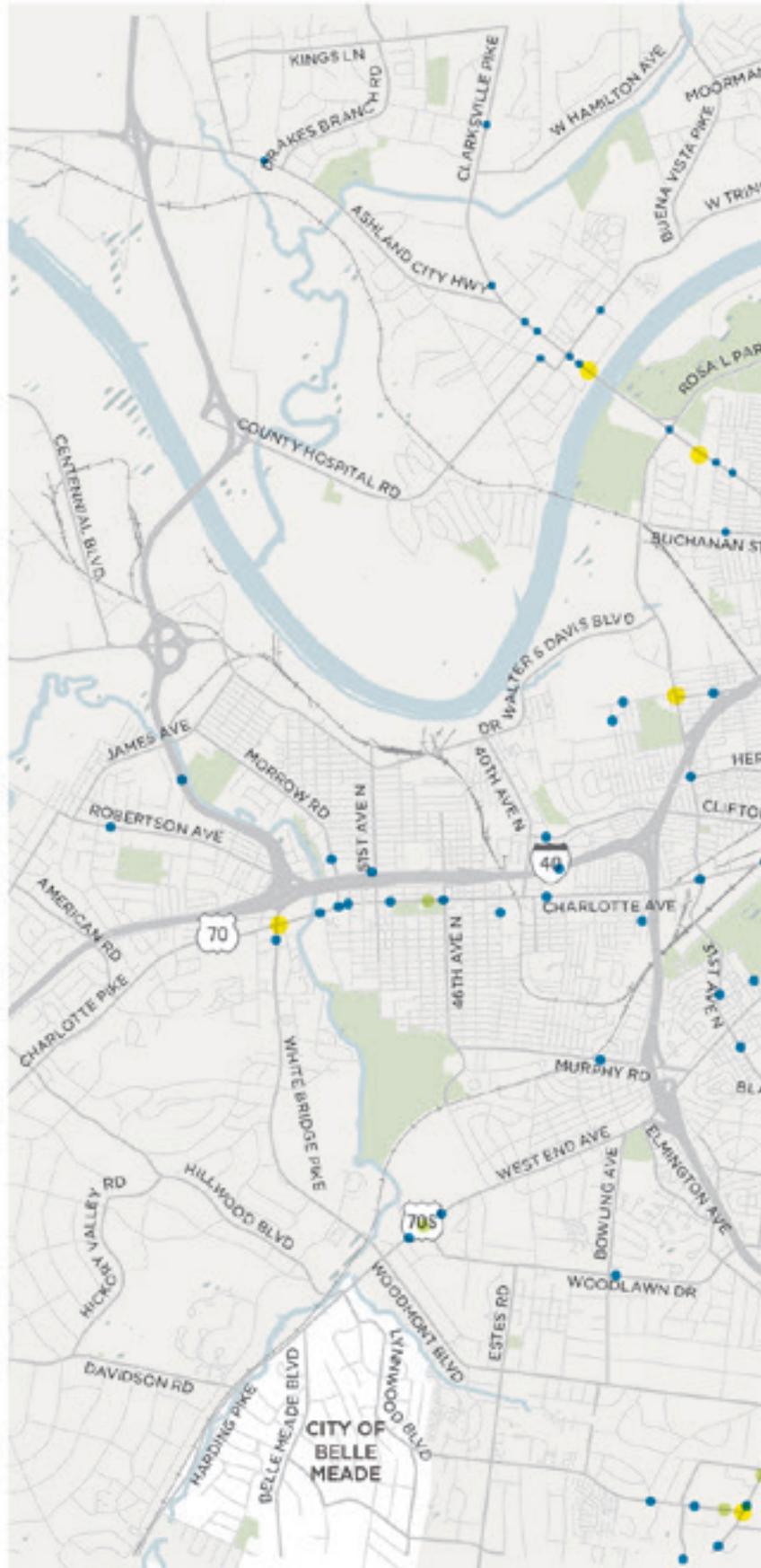


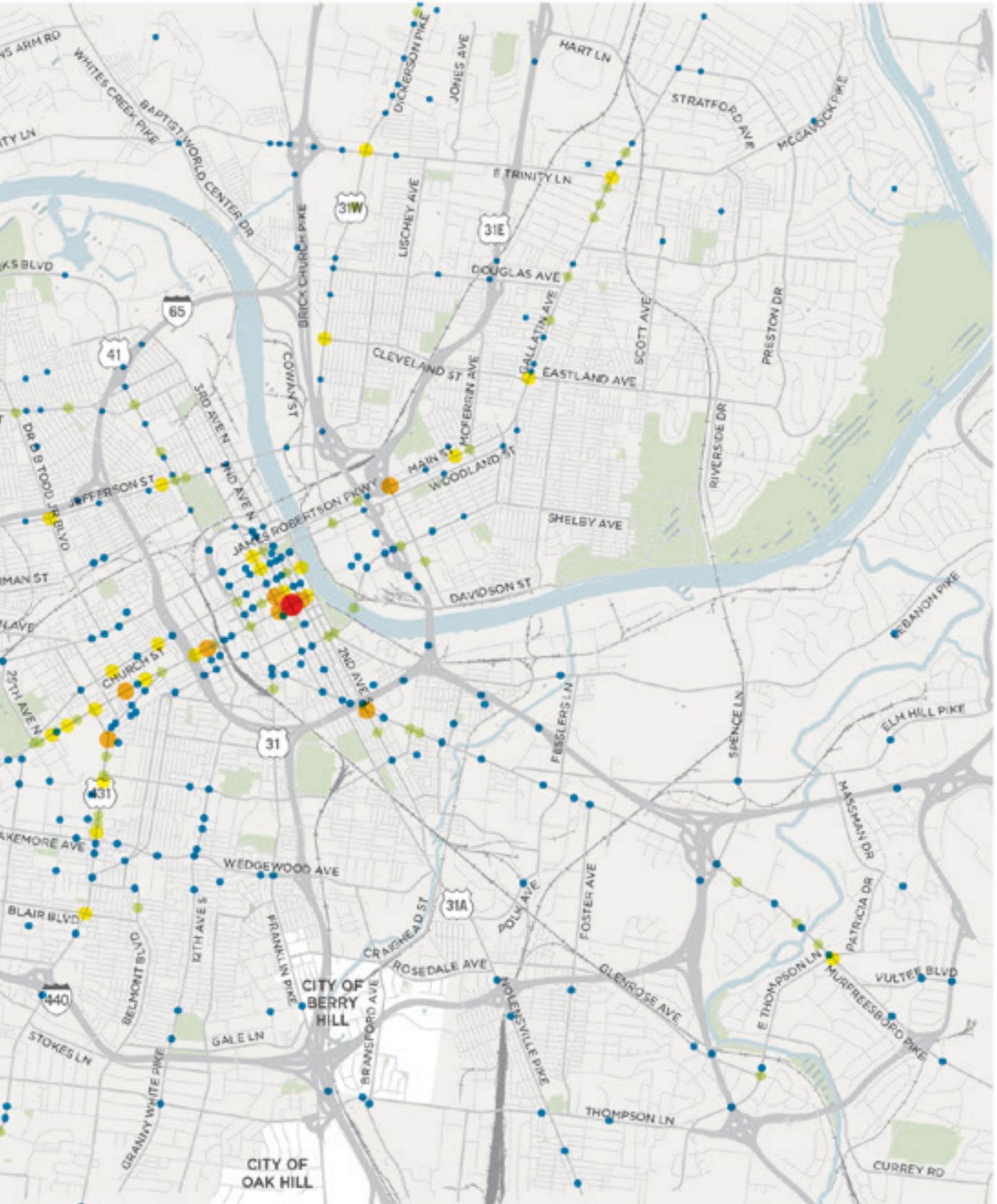


CRASH ANALYSIS

PEDESTRIAN CRASH FREQUENCY

- 1
- 2
- 3-4
- 5-8
- 9-11





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:

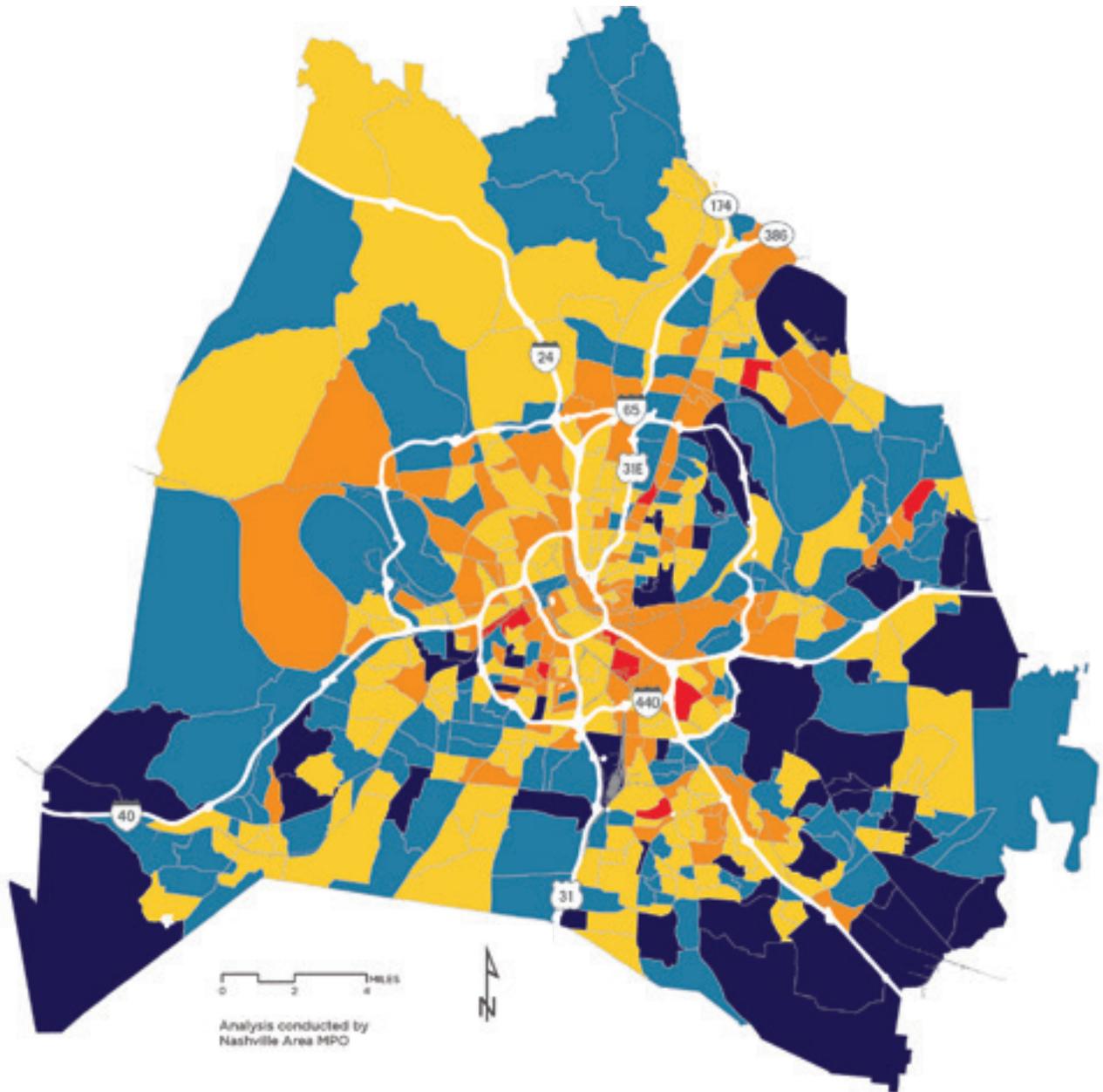
- Households in poverty
- Unemployed population
- Households without access to a vehicle
- Aging population (greater than 65 years of age)

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



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)

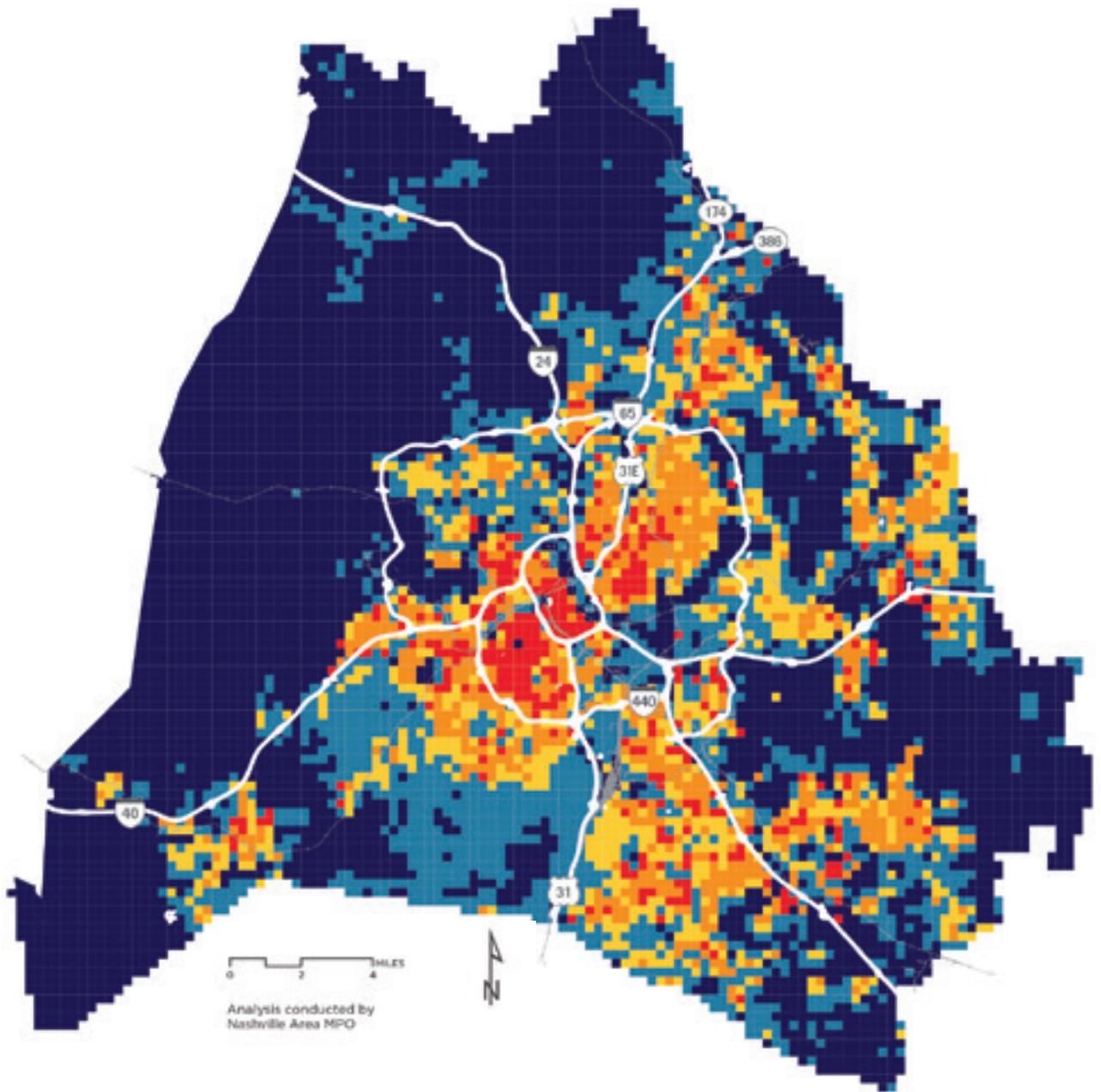
More than three-quarters of transit trips start or end with a walking trip.

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.

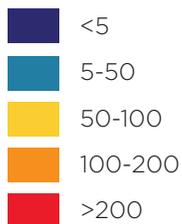
“Connecting neighborhoods to shopping, restaurants, grocery stores, etc., similar to East Nashville, would stimulate the economy (easier access to spending, jobs, etc.) and increase property values. It would be great to see this in Antioch.”

- NASHVILLE RESIDENT



NON-MOTORIZED DEMAND

2014 MPO REGIONAL BICYCLE
AND PEDESTRIAN STUDY



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 Nashville due to a higher level of sidewalk coverage.



BICYCLE TRAFFIC STRESS

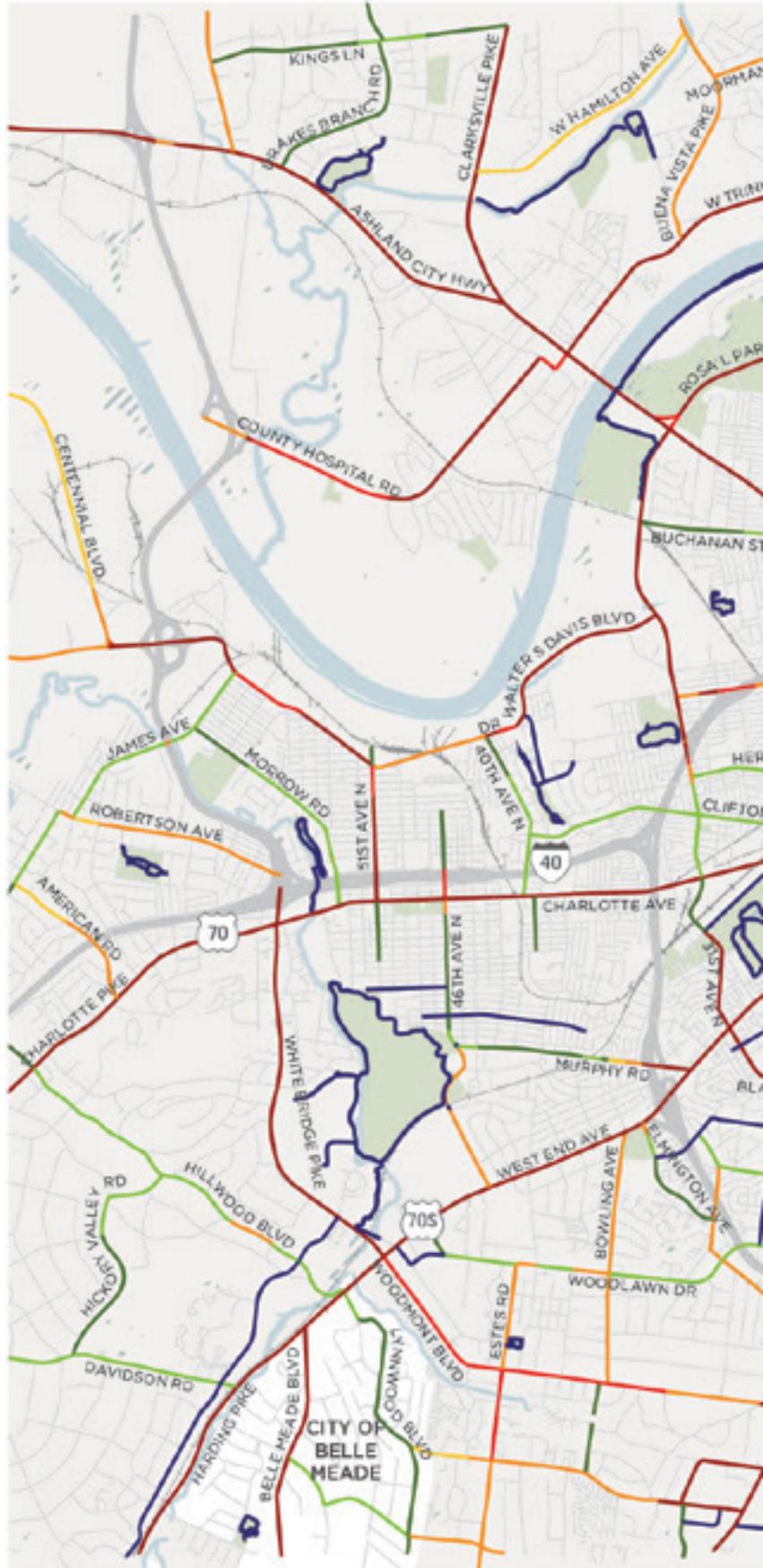
LEVEL OF TRAFFIC STRESS

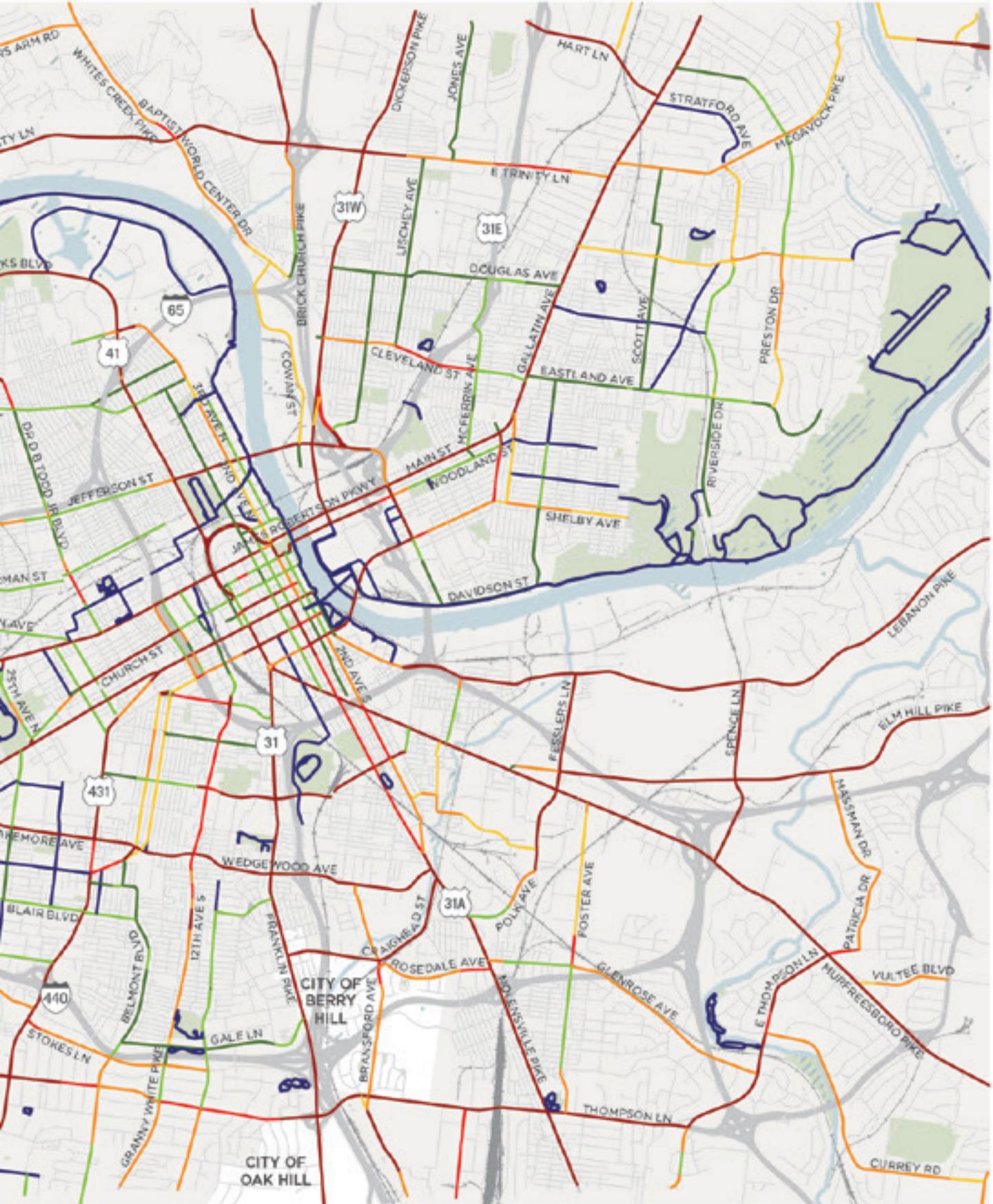
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4

BICYCLE TRAFFIC STRESS

LEVEL OF TRAFFIC STRESS

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4





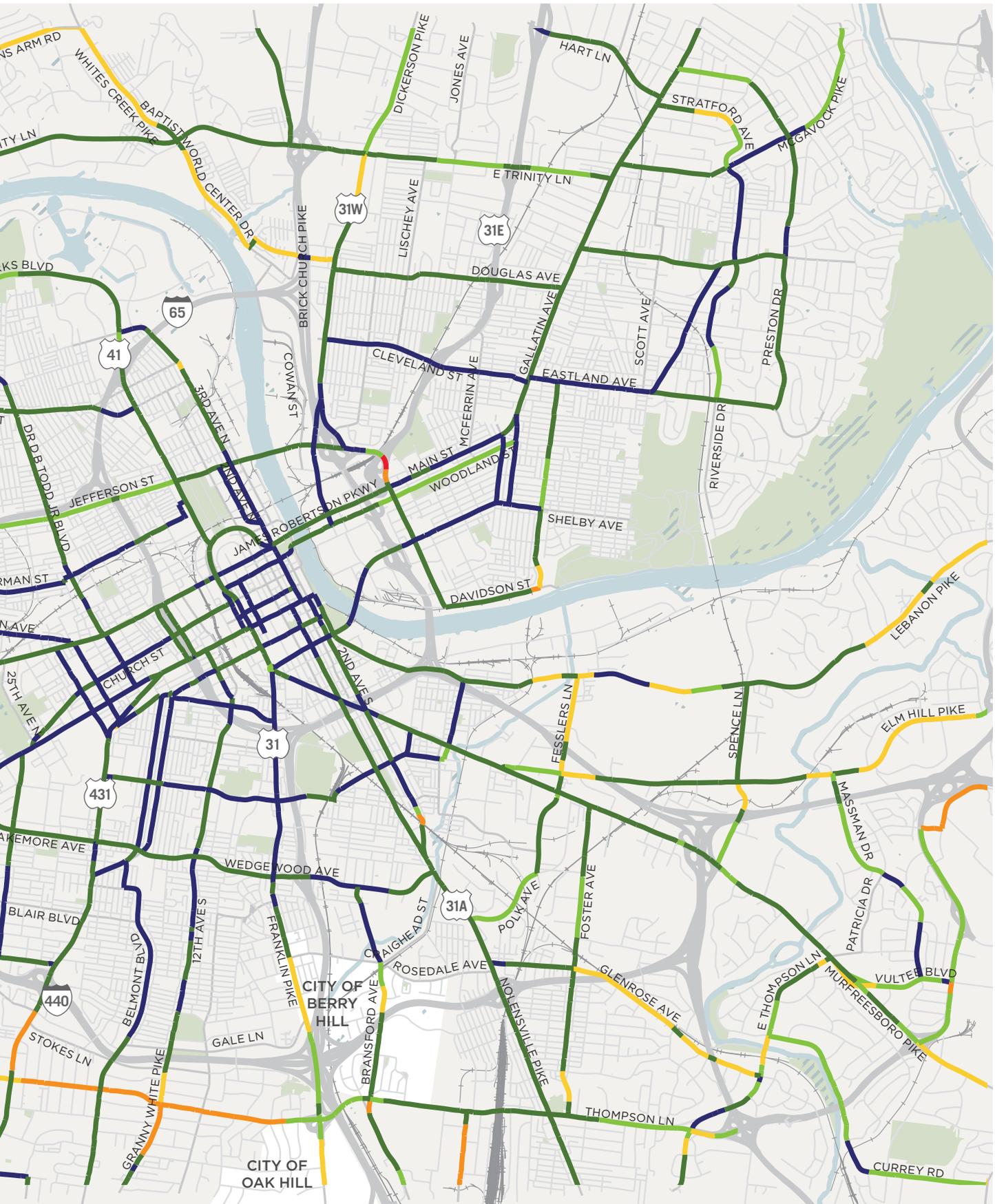
This page intentionally left blank.



PEDESTRIAN LEVEL OF SERVICE

LEVEL OF SERVICE

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



Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress Results

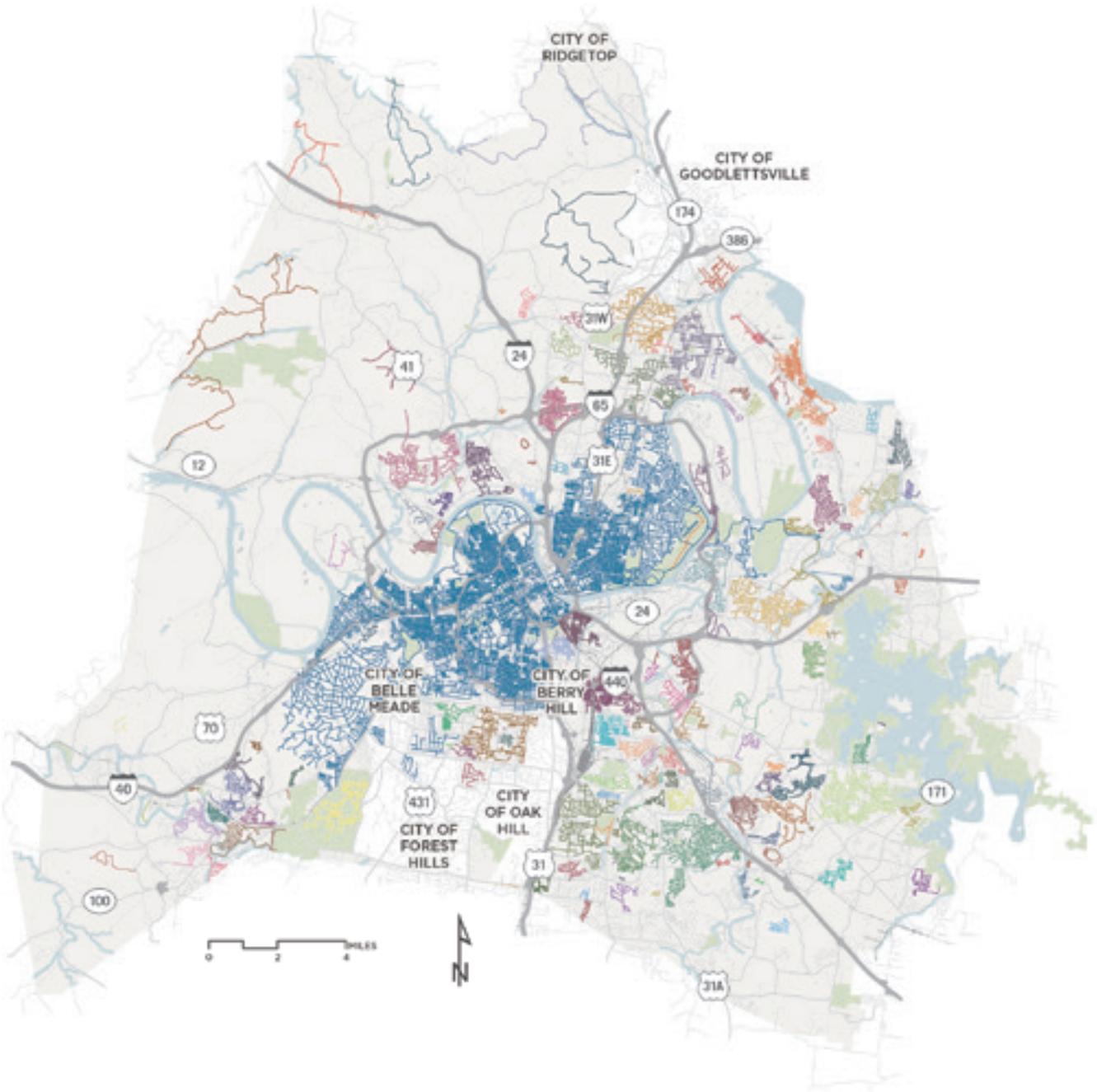
Much of the network consists of low-stress local roadways. Many collectors provide low stress connections throughout central Nashville, complementing the greenway network and local road network. However, major pikes act as barriers to comfortable bicycle travel.

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

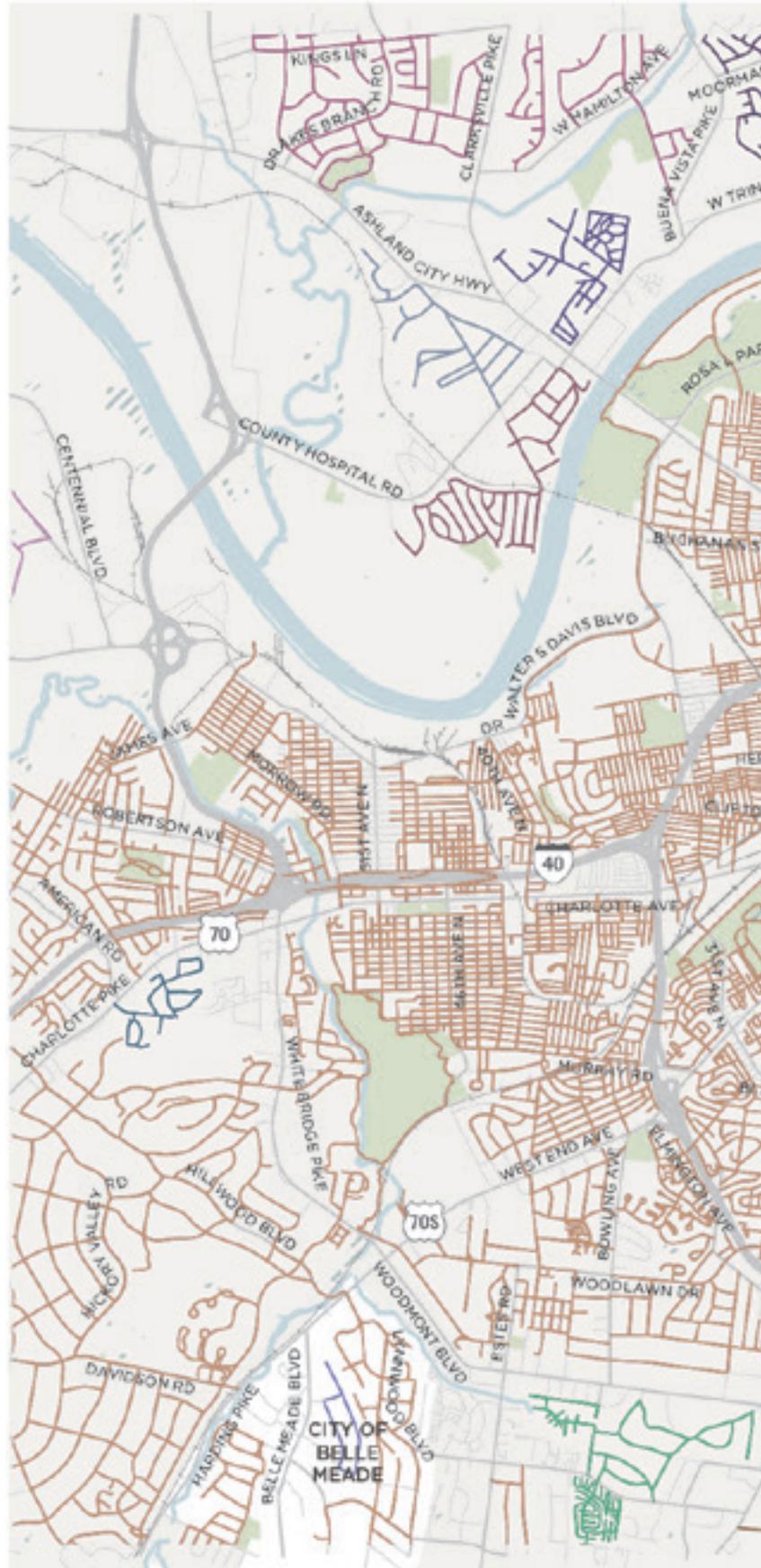
LOW STRESS ISLANDS

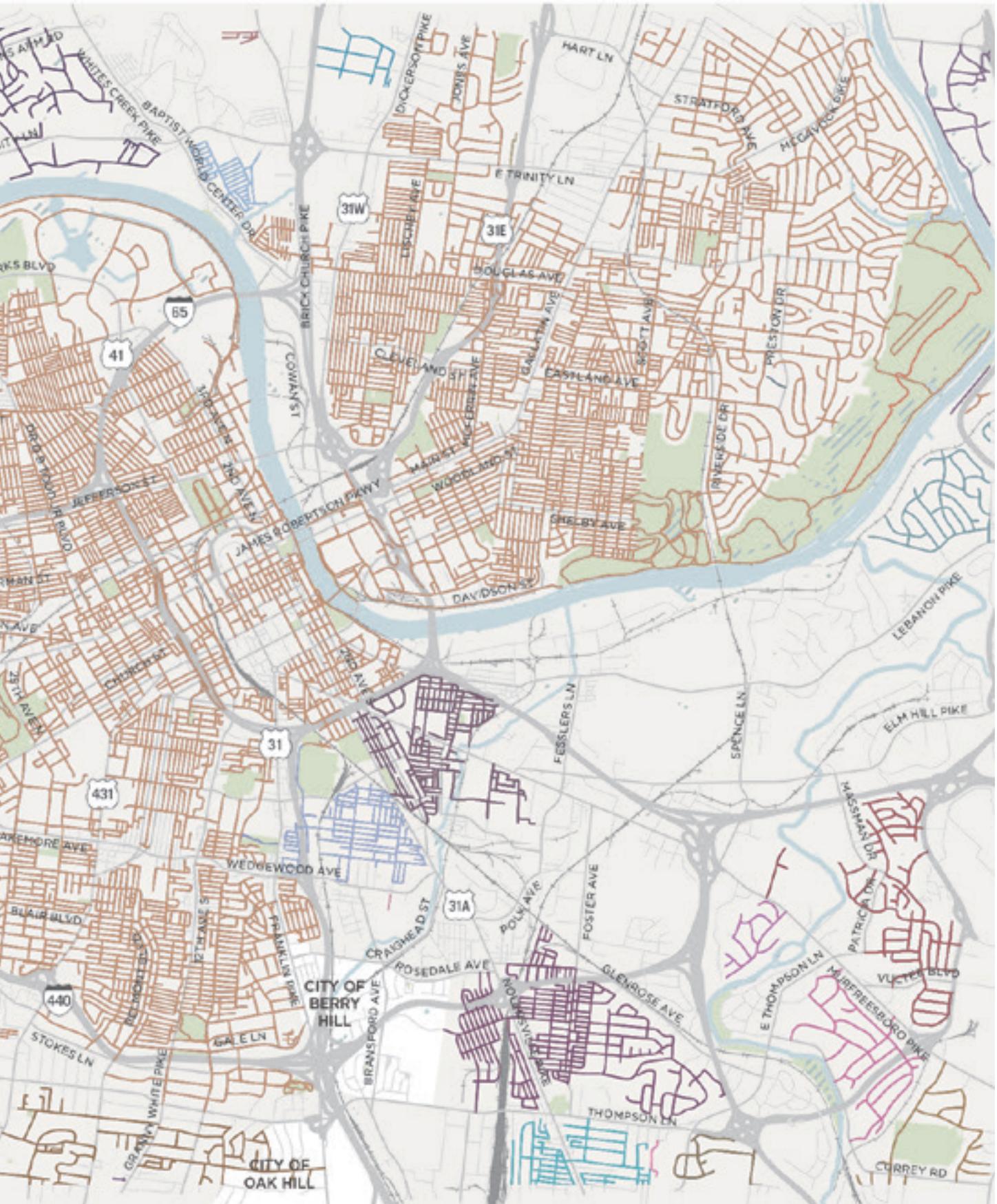
— LTS Level 1 or 2 (color varies)

LOW STRESS CONNECTIVITY

LOW STRESS ISLANDS

— LTS Level 1 or 2 (color varies)





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.

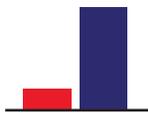
Pedestrian Suitability Analysis Results

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

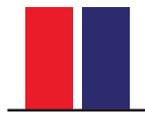
High priority routes for bikeways are concentrated in downtown, throughout southeast Nashville, and in strategic locations to the northeast and east.

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

This page intentionally left blank.



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.

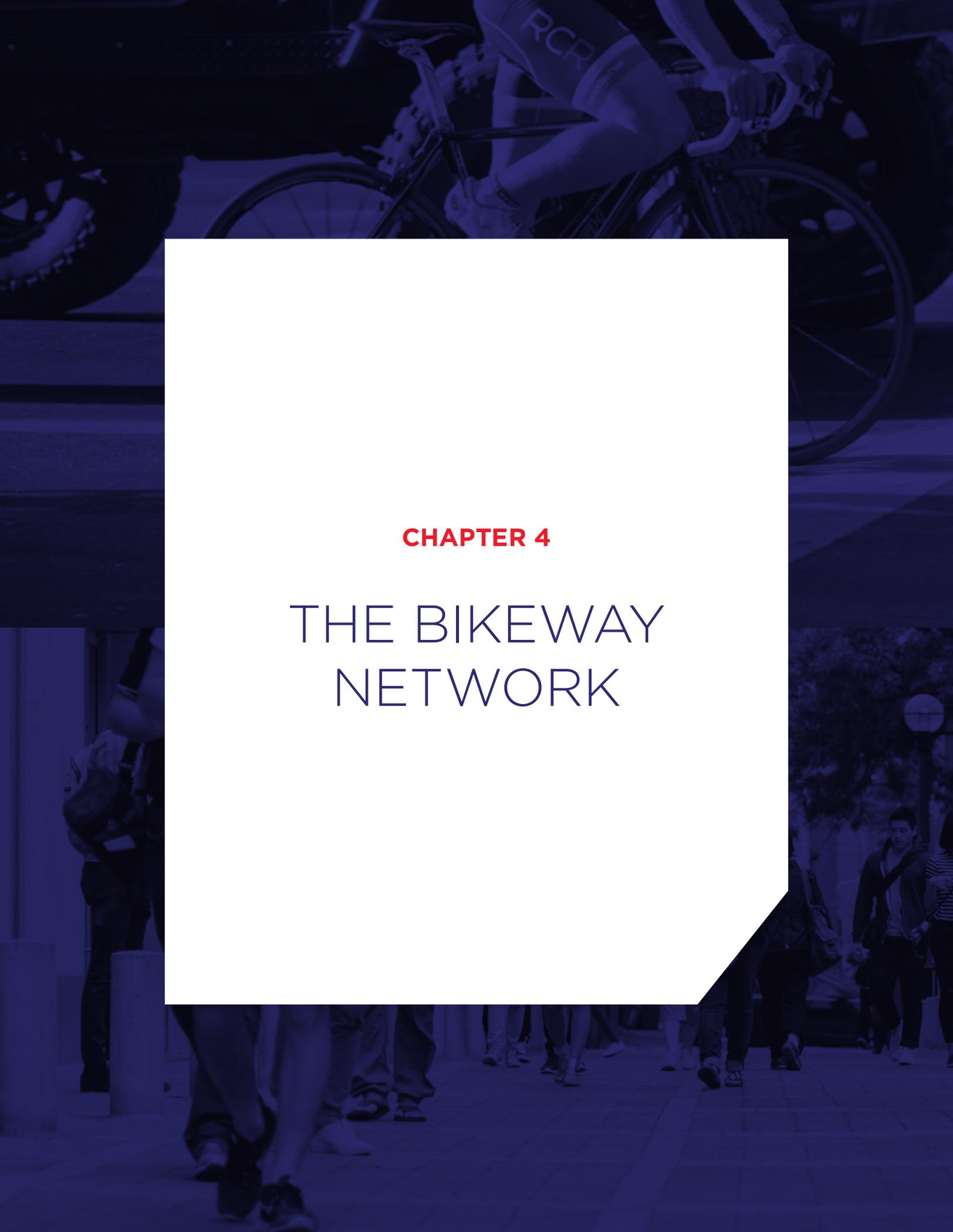
Table 3-4. Previous Planning Efforts

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 <i>Urban Street Design Guide</i> . 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."



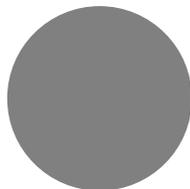
Interested but Concerned
48%

"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)
- TDOT + 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

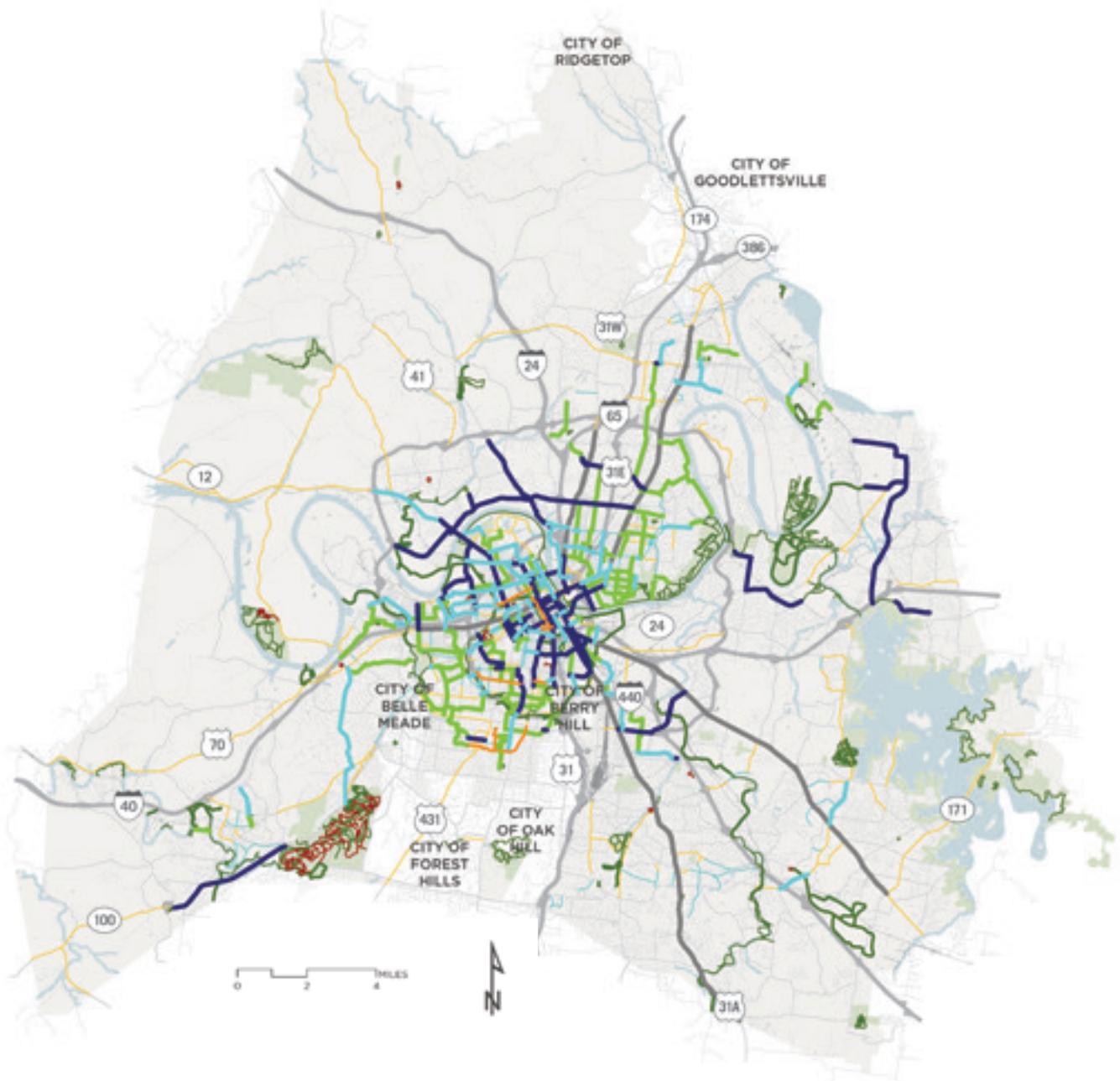
Table 4-6. Recommended Bikeway Network Breakdown

		PROPOSED NETWORK IMPROVEMENTS				Total Network	% of Total Network
		Existing Network	Upgrade to Existing Bike Facilities	New Facilities	Total New or Upgraded Facilities to Build		
Low-Stress Network	Major Separated	6.5	24	44	68	74	17%
	Minor Separated	40	11	31	41	79*	18%
	Bike Boulevard	-	10	69	79	79	18%
Other Network Recommendations	Bikeway for Experienced Cyclists	231	2.8	9.2	12	199**	46%
	Total	278	47	153	200	431	100%

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

**In some cases, existing bikeways for experienced cyclists are being recommended to be upgraded to separated bikeways.

Note: Bikeway recommendations on the High Capacity Transit Corridors were not included in proposed bikeway network due to the uncertainty of the ultimate cross-section. Once the High Capacity Transit Corridor Study is complete, the proposed network should be adjust to incorporate recommendations along those five corridors. See Chapter 7, page 227 for more information.



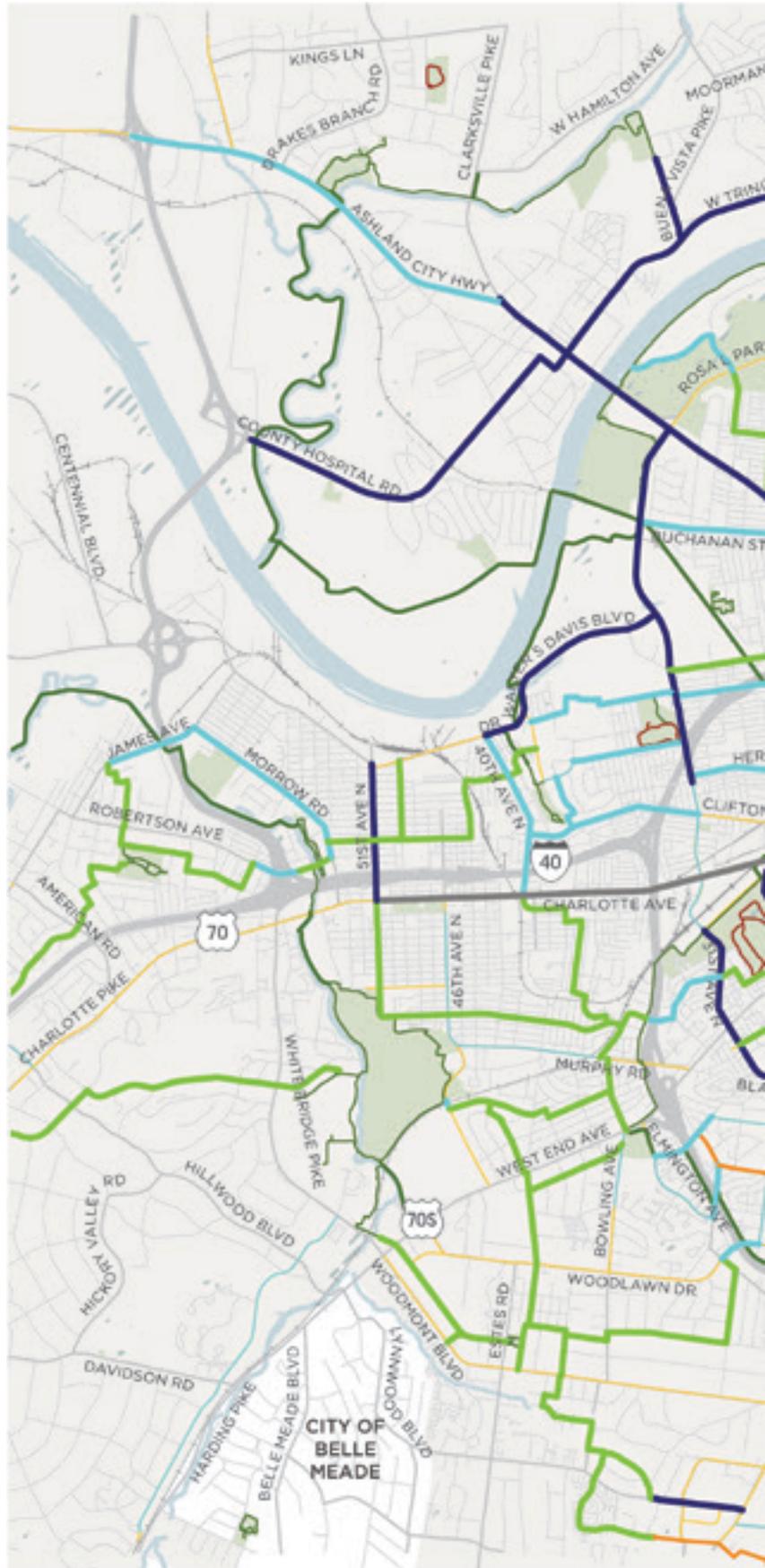
RECOMMENDED BIKEWAYS

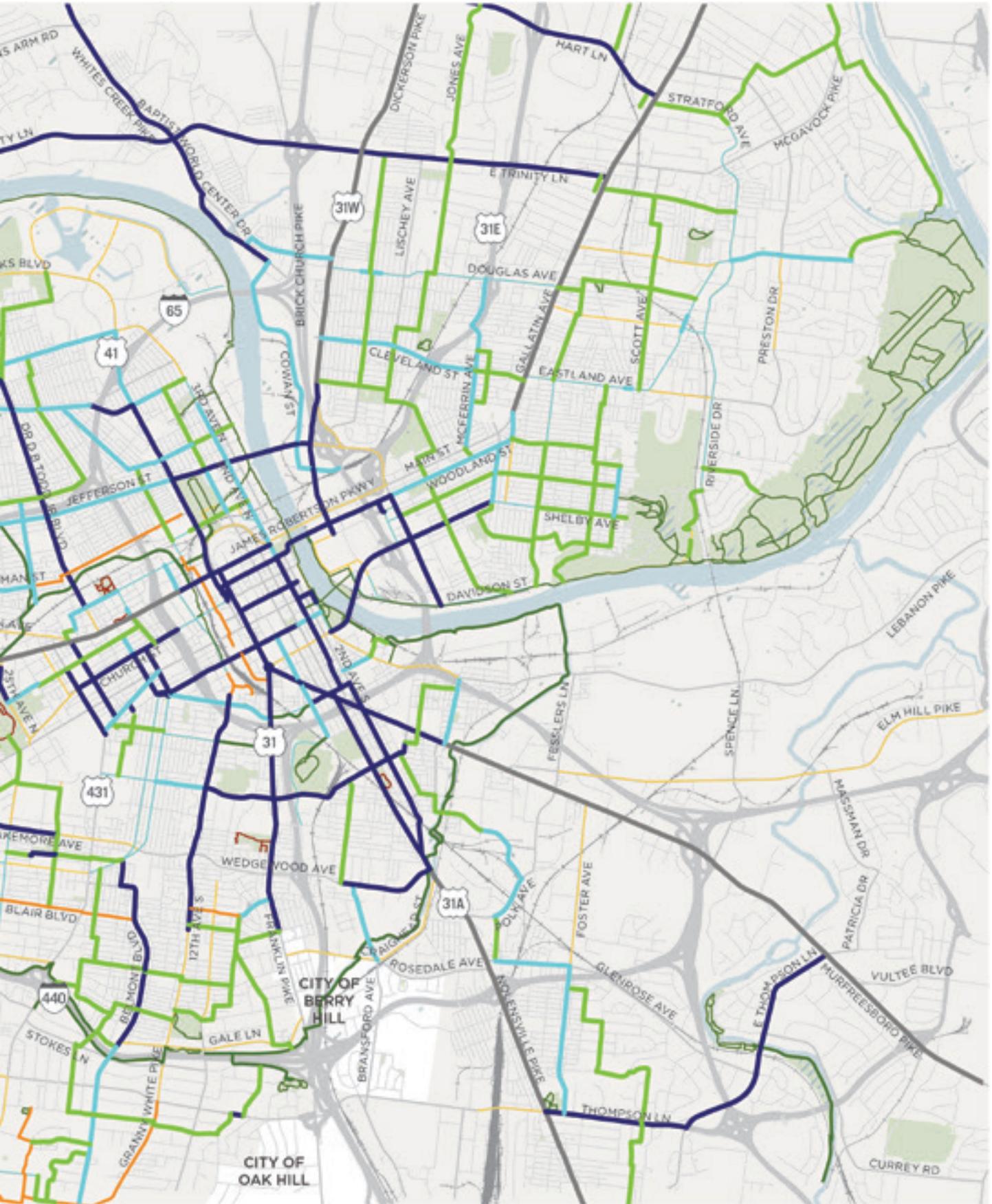
- Major separated bikeway
- Minor separated bikeway
- Bike boulevard
- Bikeway for experienced cyclists
- High capacity transit corridor
- Priority greenway (proposed in Plan to Play)
- Existing/under development greenway
- Park trail
- Existing low stress bikeway
- Existing bikeway for experienced cyclists

This page intentionally left blank.

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





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 through 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).

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.

Evaluation Process

Figure 4-2. Bikeway Evaluation Process

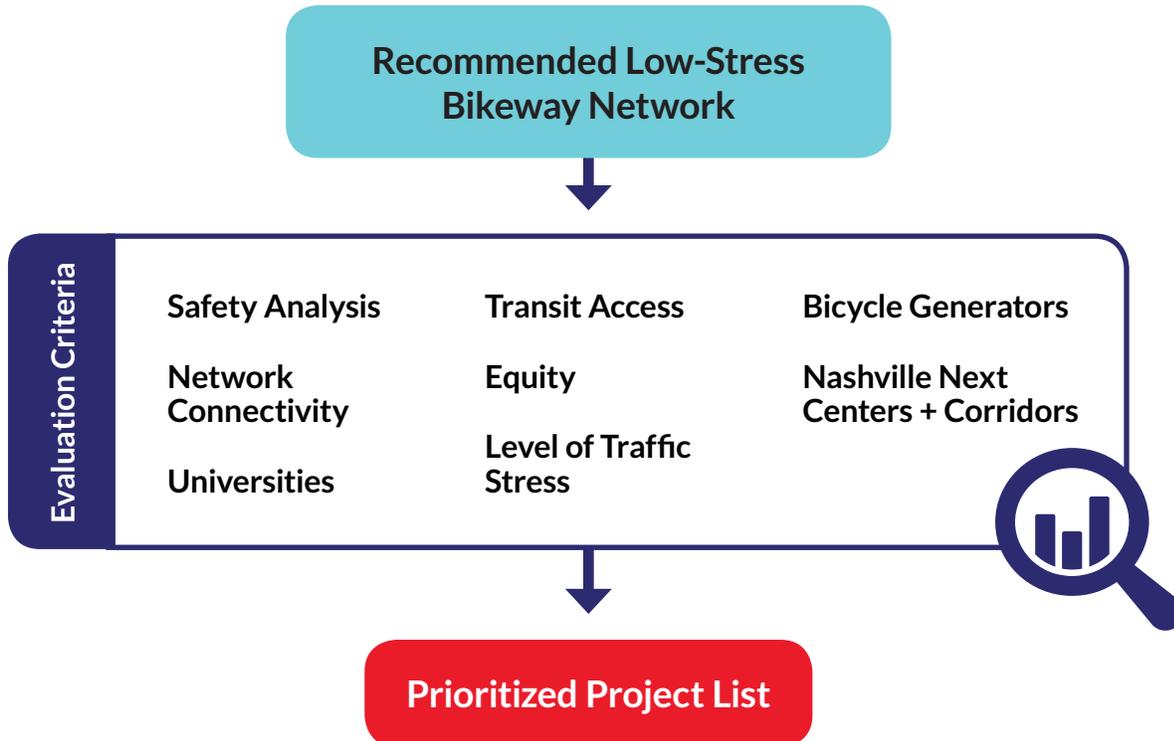


Table 4-7. Bikeway Prioritization Criteria

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 4 health priority areas	30
			Medium	Census tract is in 3 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
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	30
			Medium	Project is within 1/2 mile of a school or university	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

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

CRITERIA	DEFINITION	INPUT	RANK	MEASUREMENT	POINTS
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
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
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.

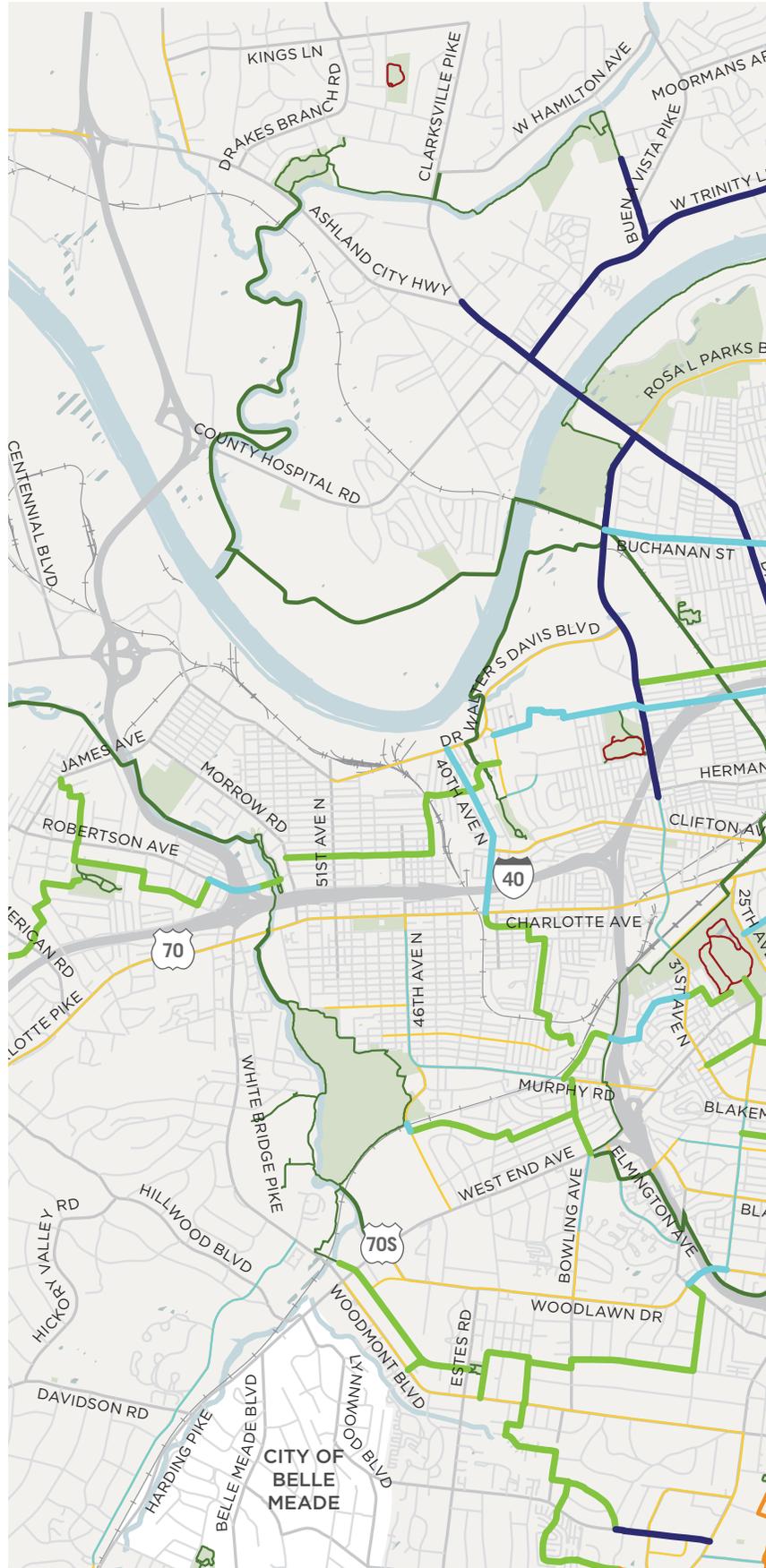
The cost estimates shown include engineering, construction, and right-of-way. Each individual bikeway segment cost will vary due to several elements including, but not limited to, existing pavement condition, pavement type, drainage basin, existing and proposed signals, and the details of bikeway design 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.

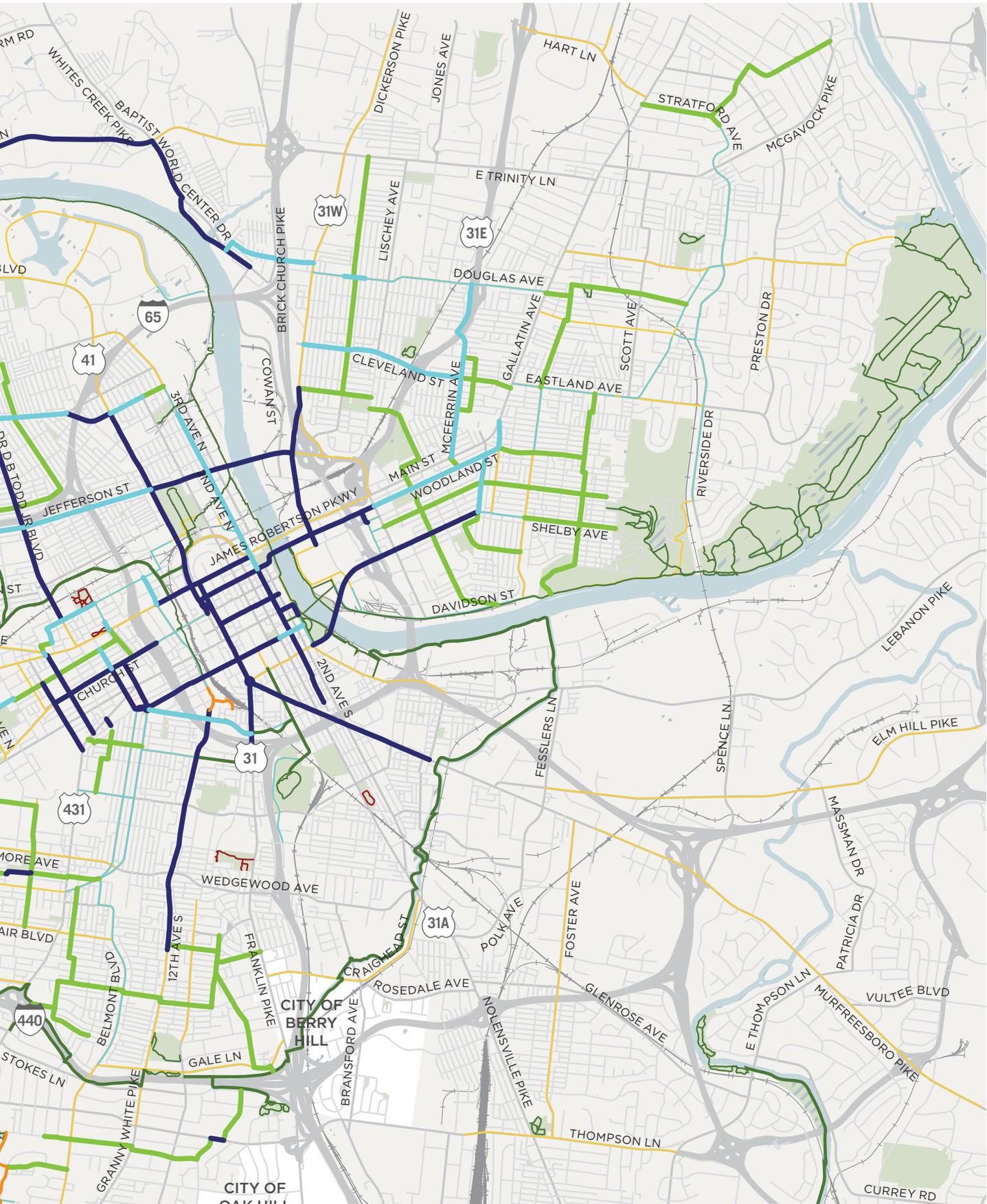
Table 4-8. Summary of Planning-Level Bikeway Cost Estimates

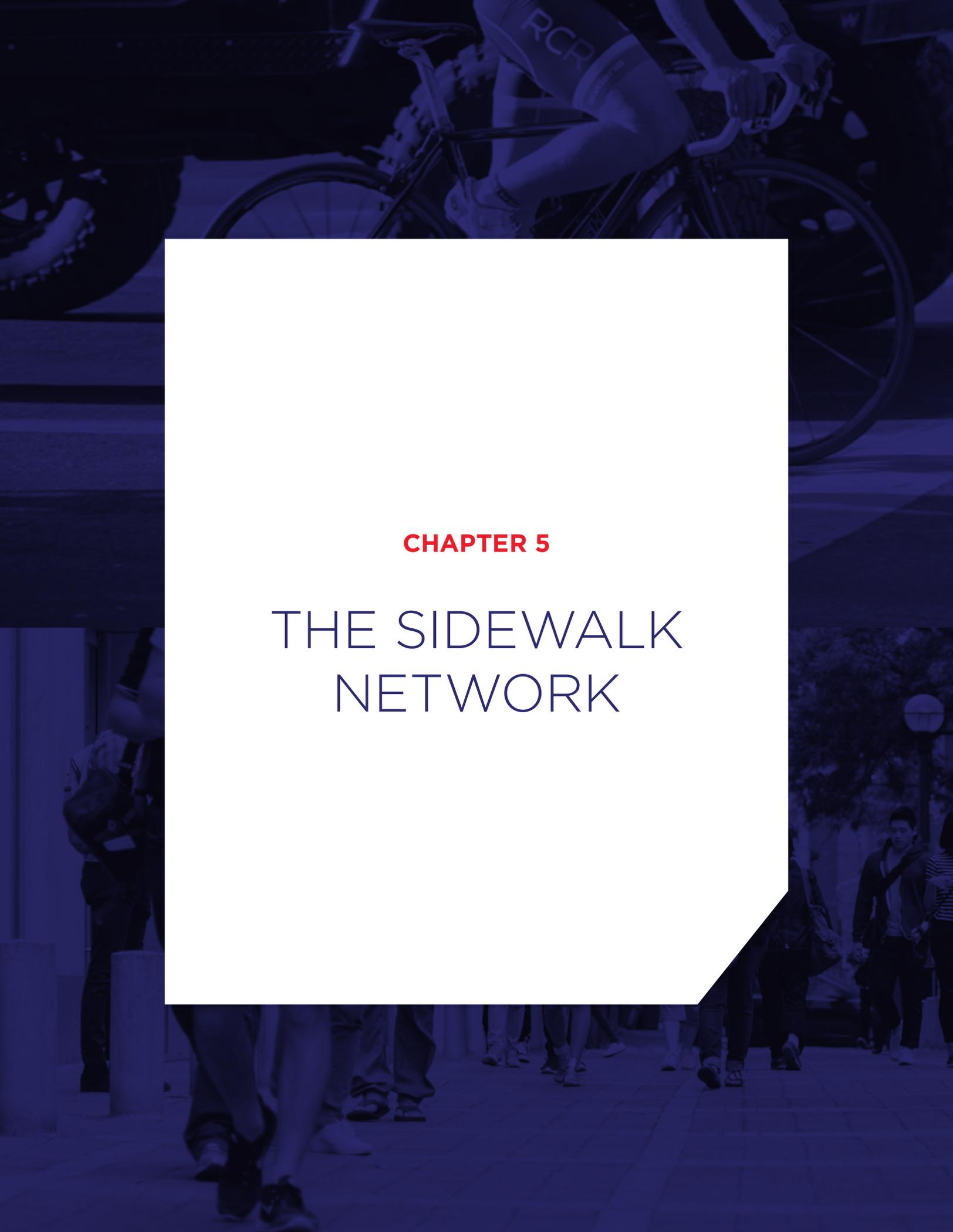
	Total Recommended Network Miles	Approximate Cost per Mile	Total Cost per Category
LOW-STRESS BIKEWAYS			
Major Separated	51	\$1,000,000	\$51,400,000
Major Separated – With Roadway Widening	2.7	\$1,500,000	\$4,000,000
Minor Separated	35	\$250,000	\$8,700,000
Minor Separated – With Roadway Widening	6.1	\$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
- Bikeway for experienced cyclists
- Priority greenway (proposed in Plan to Play)
- Existing/under development greenway
- Park trail
- Existing low stress bikeway
- Existing bikeway for experienced cyclists







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.

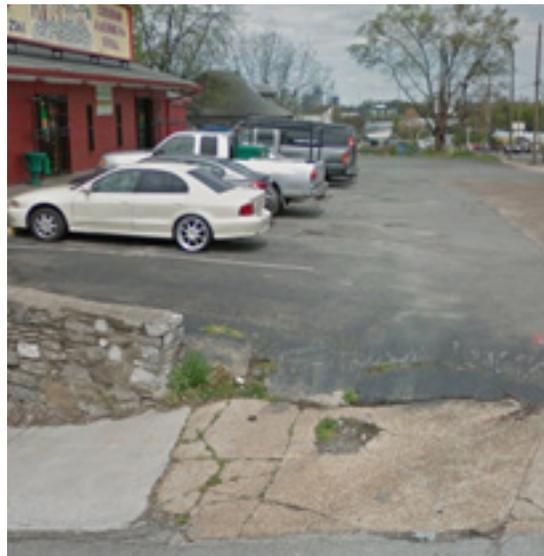
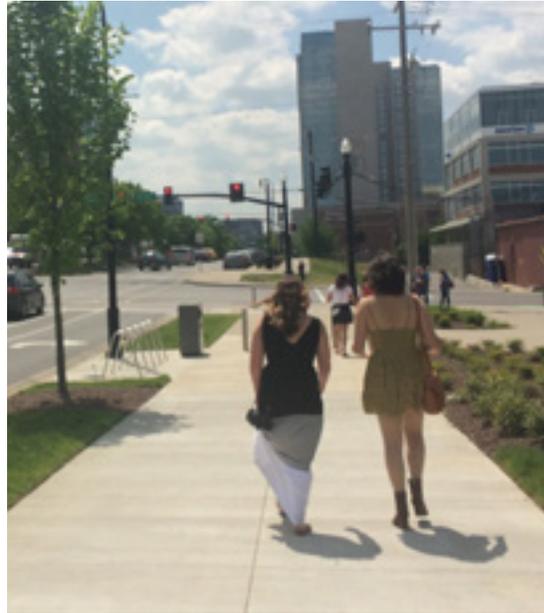
Table 5-1. Survey Respondents' Level of Comfort on Different Types of Walking Corridors

	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%

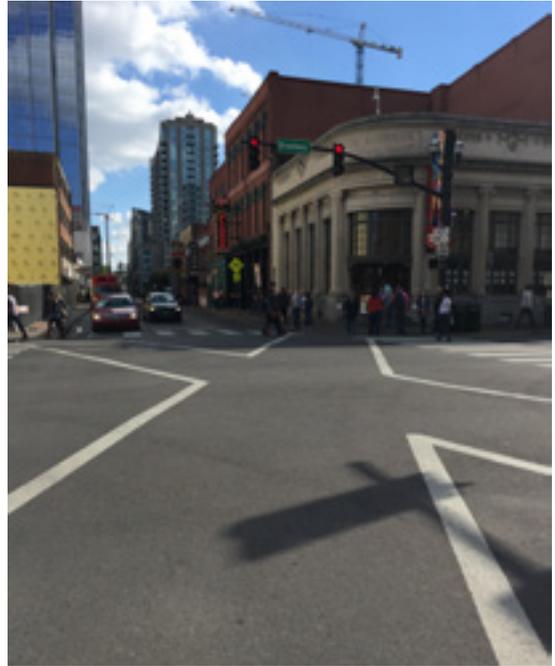
Types of Pedestrian Projects

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 suburban 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.



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

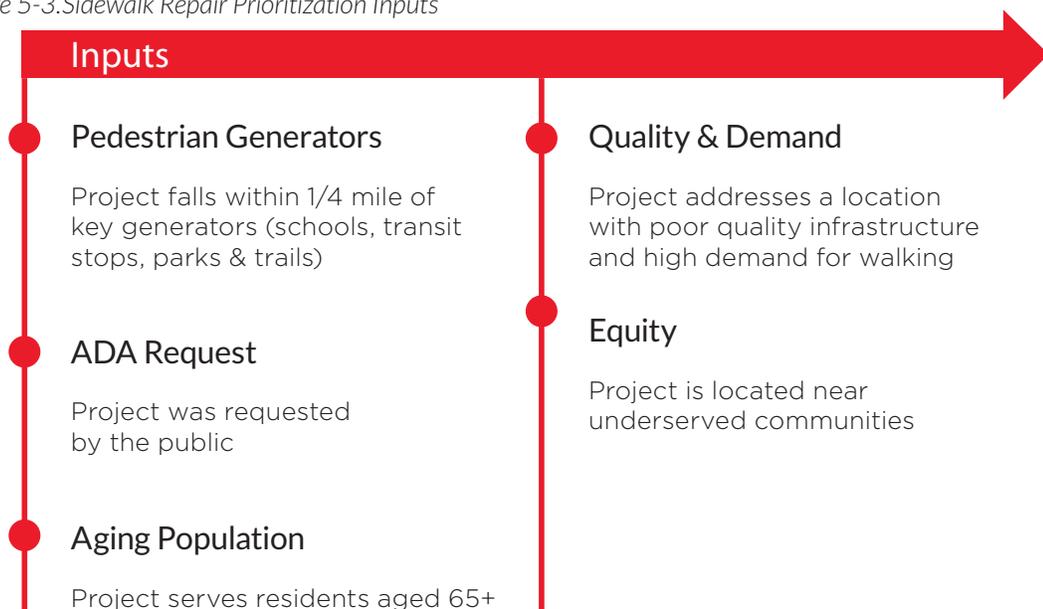
Accessible sidewalks enable people with disabilities to reach their destinations in the community and to enjoy the benefits of services, programs, and activities. Where sidewalks are provided, it is both the policy and responsibility of the Metropolitan Government of Nashville and Davidson County to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

Request for sidewalk repair are collected through Metro 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.

Figure 5-3. Sidewalk Repair Prioritization Inputs



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).

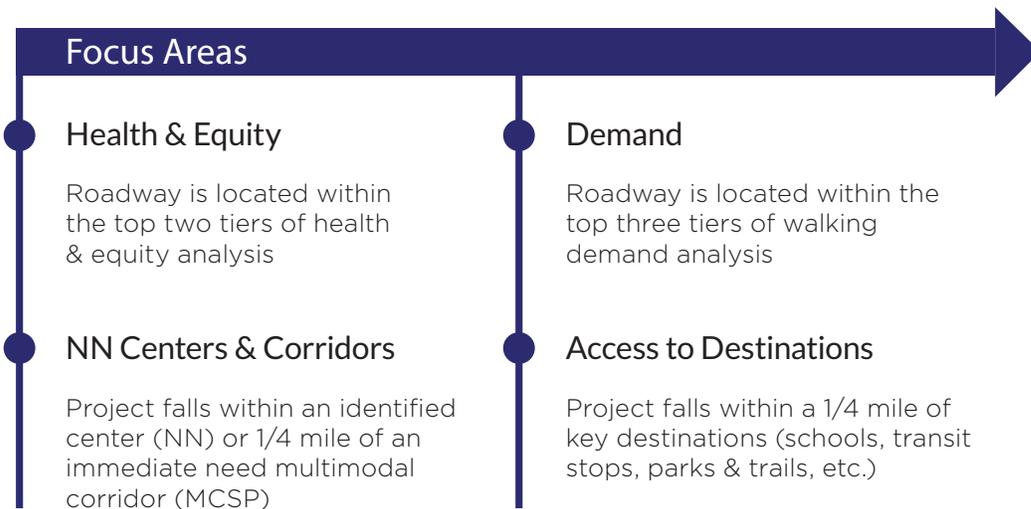
Missing Sidewalk Network

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 1,118 miles of existing sidewalks; there are 4,740 miles of missing sidewalks.

Areas with the Greatest Need

Understanding the fact that sidewalks are not needed nor desired along every roadway in Davidson County, it is recommended that implementation be focused where high pedestrian demand is expected. The following four criteria are used to determine areas in Davidson County that has the greatest need, narrowing the missing sidewalk network down to 1,900 miles of missing sidewalks was identified.

Figure 5-1. Criteria to Determine Sidewalk Need



Sidewalk Prioritization Inputs

After focusing on areas with the greatest need, 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

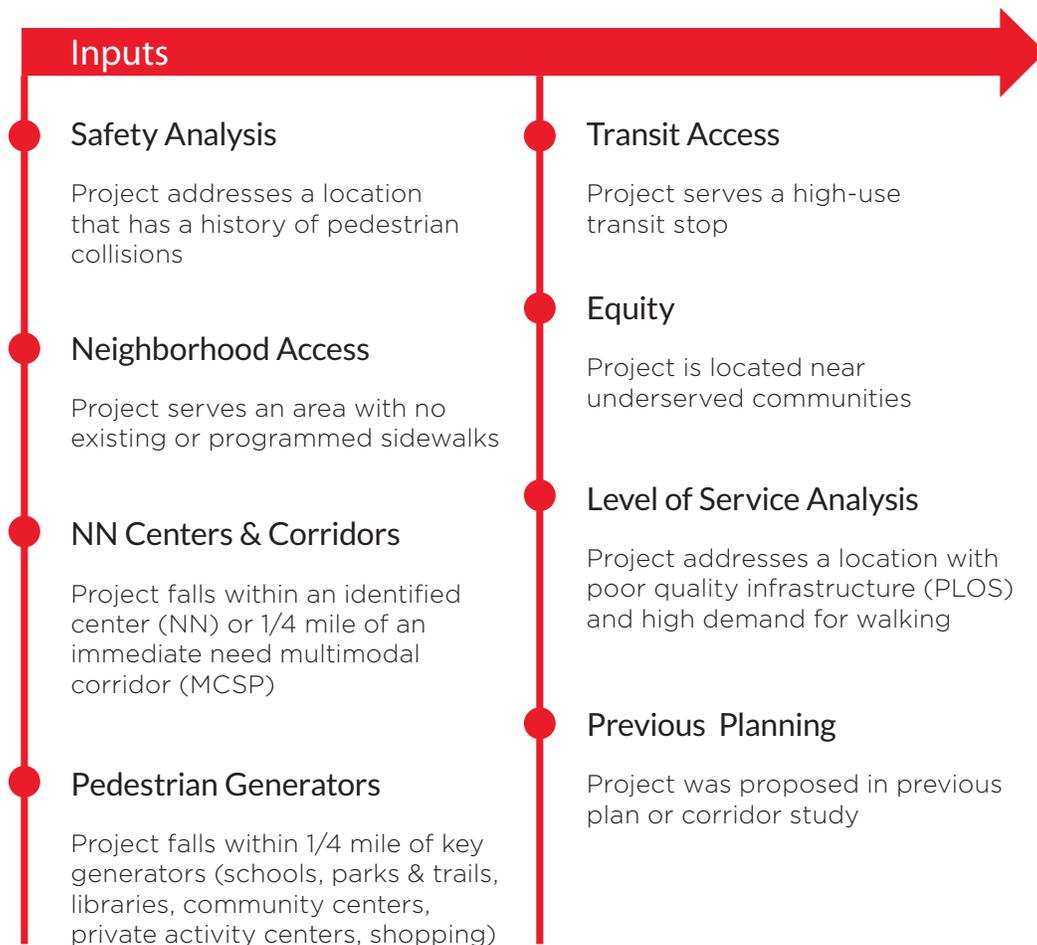


Table 5-4. Sidewalk Scoring Criteria

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	<i>Includes commuter rail, park and ride</i>
			Medium	Project is within 1/4 mile of a transit stop with 20 to 100 boardings a day	15	
Neighborhood Access	Does the project provide pedestrian access where none currently exists?	Existing and programmed sidewalk locations	High	Project is within 1/4 mile of existing sidewalk	30	
			Medium	Project is within 1/2 mile of existing sidewalk	15	
School Access	Does the project serve a school?	Locations of schools	High	Project is within 1/4 mile of a school or college	30	
			Medium	Project is within 1/2 mile of a school or college	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 corridor	10	

CRITERIA	DEFINITION	INPUT	RANK	MEASUREMENT	POINTS	
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	
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					260	

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.

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

All street segments representing potential sidewalk projects were scored and prioritized using the new prioritization process described above. High-scoring segments were identified and grouped with adjacent segments and categorized as the “Priority Sidewalk Network (PSN)”. 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. While these are included in the PSN, implementation along these corridors will wait until the ultimate cross-section is determined by the High Capacity Transit corridor study.

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

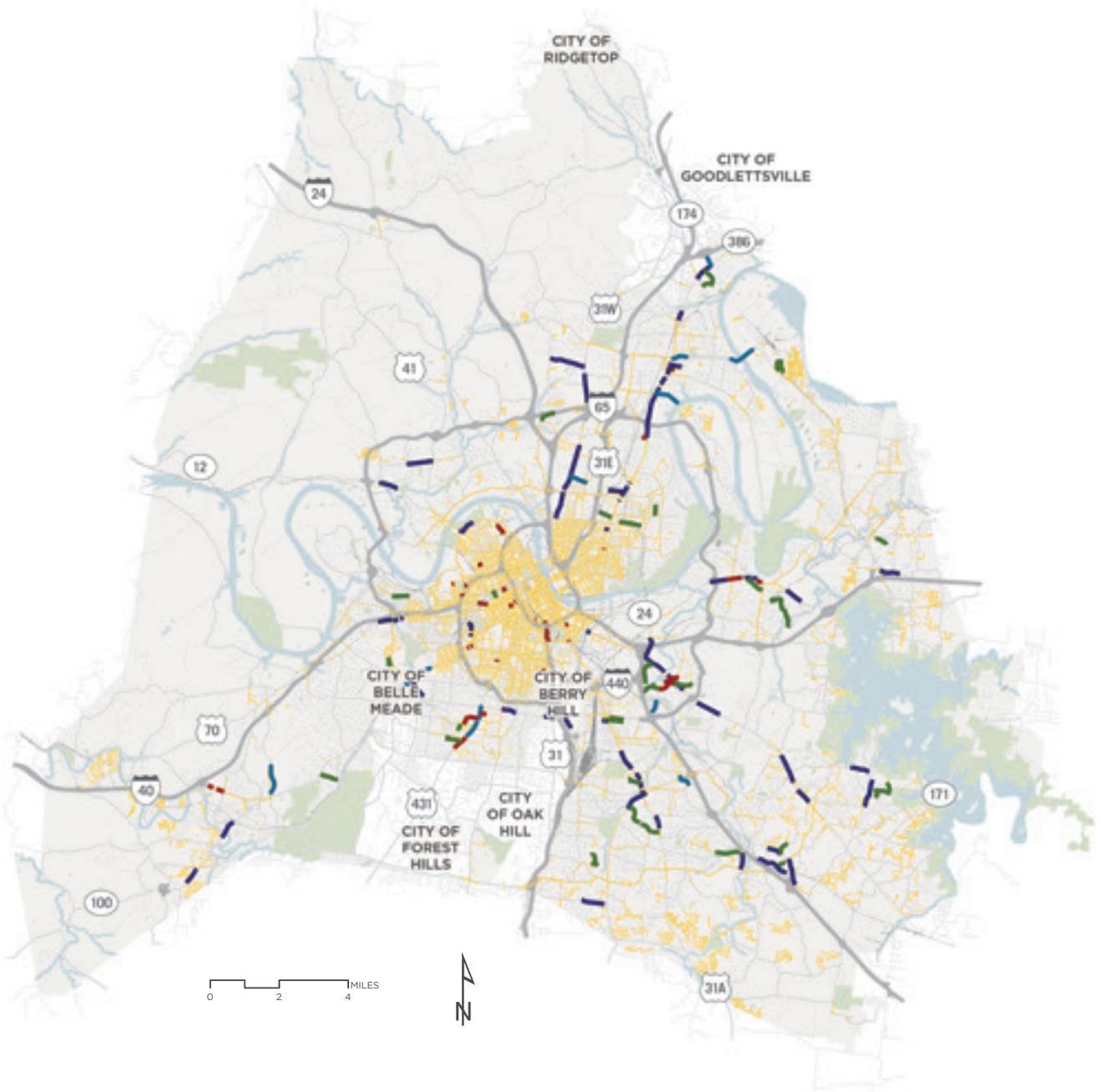


Sidewalk Gaps

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				Total Priority Network
	Destination + Transit Access	School Connections	Vision Zero	Sidewalk Gaps	
Distance in Miles	43	16	7	5	71
% of the Total Network	61%	23%	10%	6%	100%

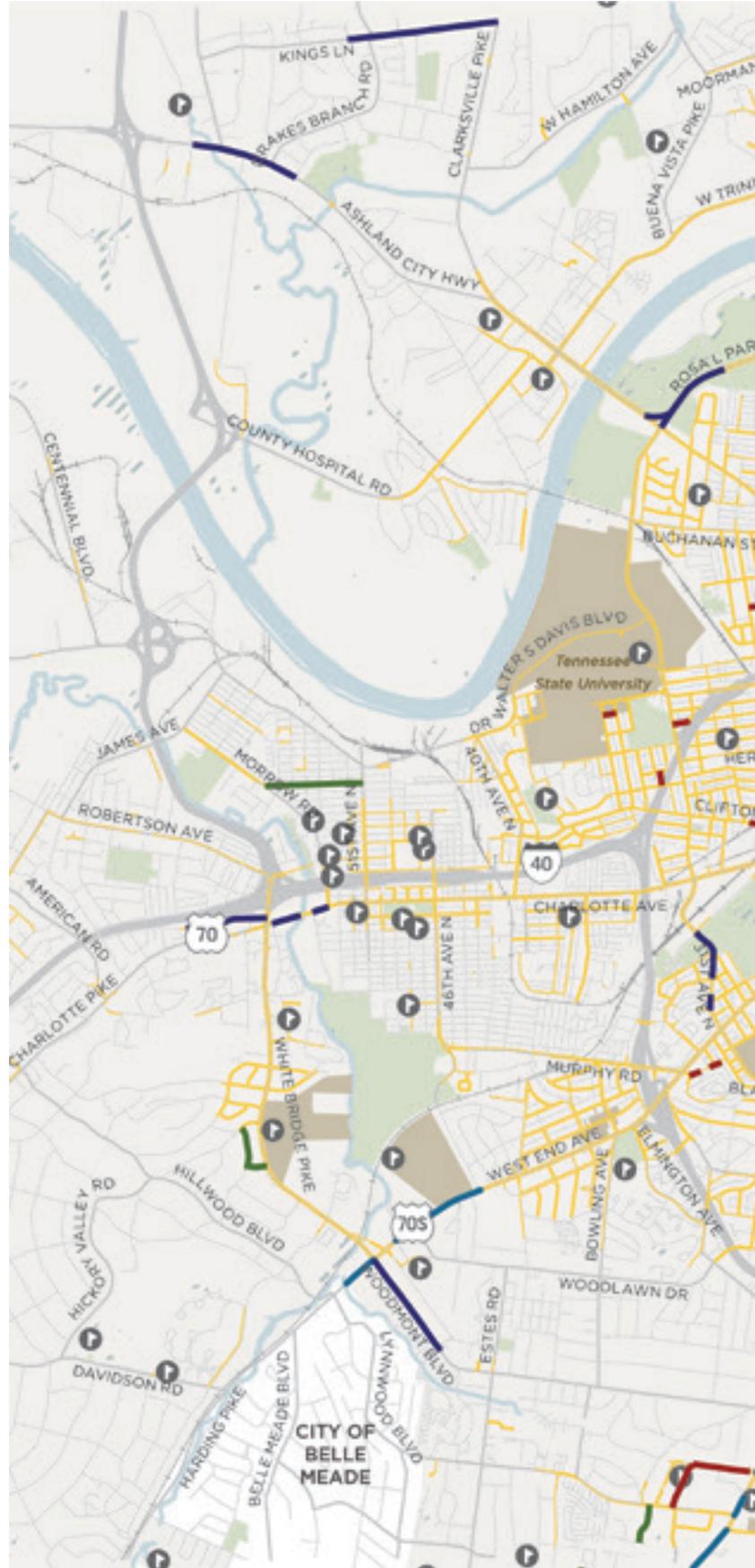


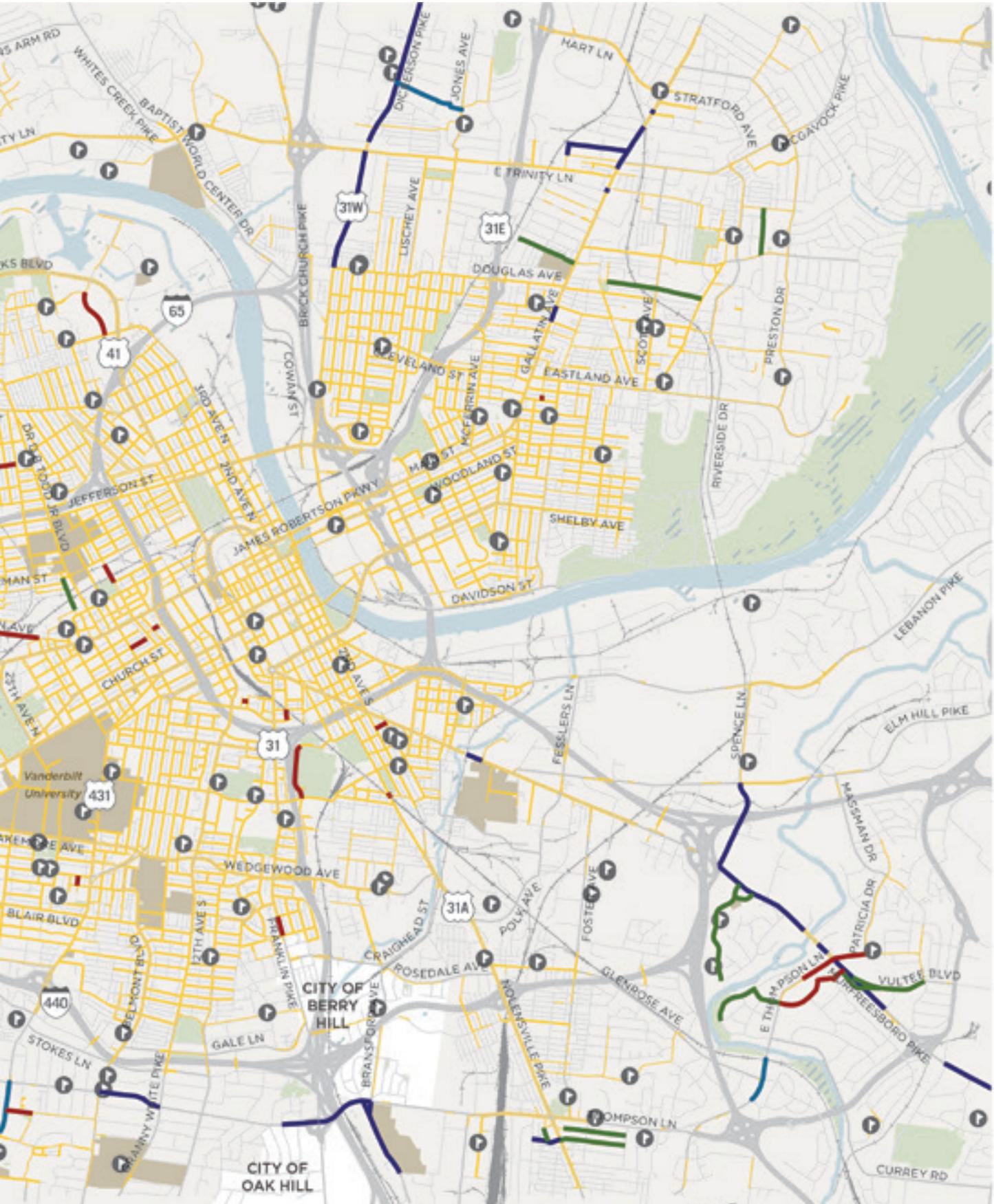
PRIORITIZED SIDEWALK NETWORK

- 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





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	Approximate Cost per Foot	Total Cost per Category
	Feet		
Local Road	87,000	\$900	\$79,000,000
Collector Avenue	47,000	\$1,200	\$57,000,000
Arterial Boulevard	240,000	\$1,350	\$324,000,000
TOTAL	480,000		\$460,000,000

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

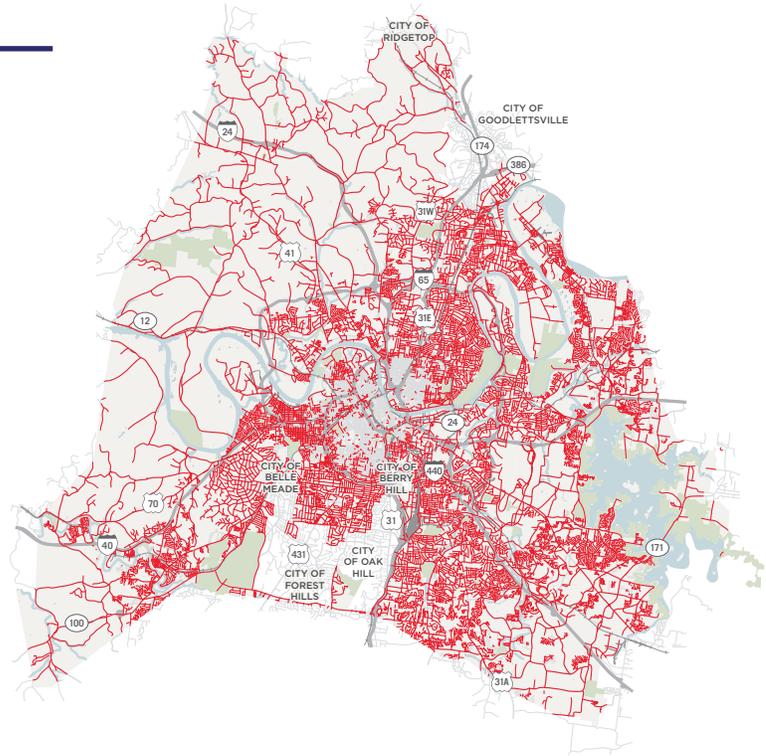
Category	Total Network for Sidewalk Repair (along one side of road)		Approximate Cost per Foot	Total Cost per Category
	Feet	Miles		
Sidewalk in 'Fair' Condition	1,380,000	261	85	\$117,000,000
Sidewalk in 'Poor' Condition	830,000	157	140	\$116,000,000
TOTAL	2,200,000	418		\$233,000,000

Visual Priority Sidewalk Network Development

Step 1

Identify All Missing
Sidewalk Segments

4,700 MILES

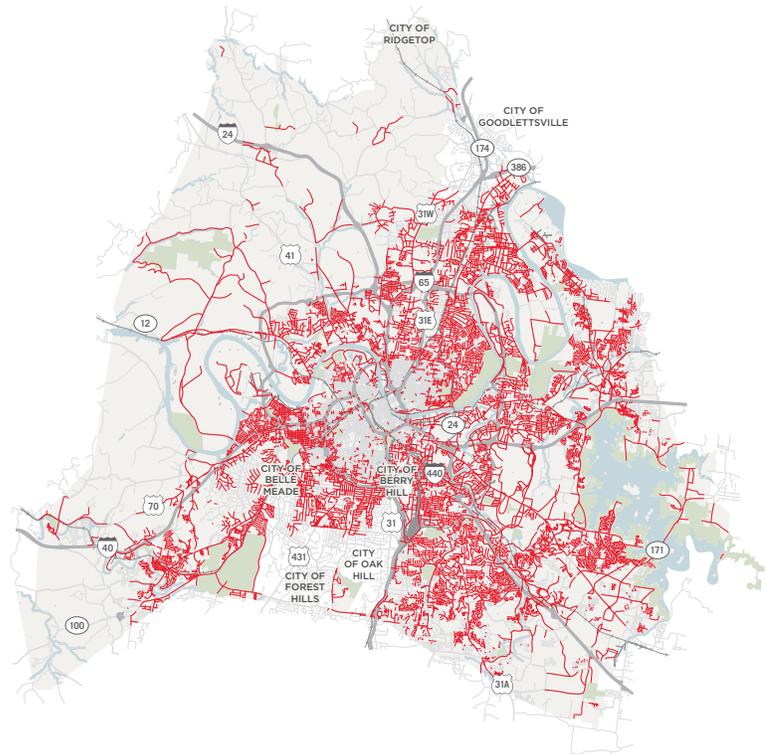


Step 2

Areas with Greatest Need

1,900 MILES

\$10.3 BILLION



Step 3

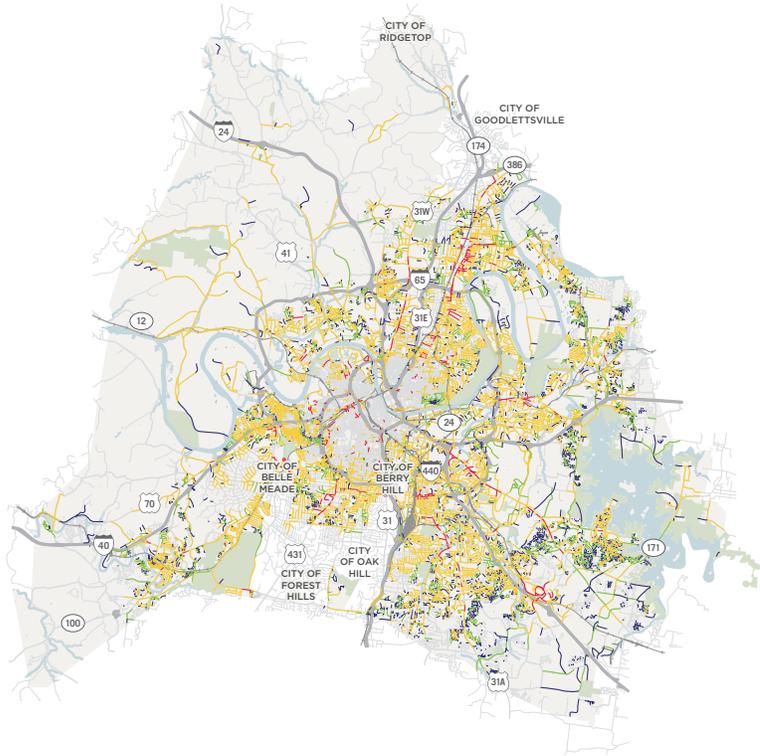
Prioritize Projects

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

71 MILES

\$460,000,000

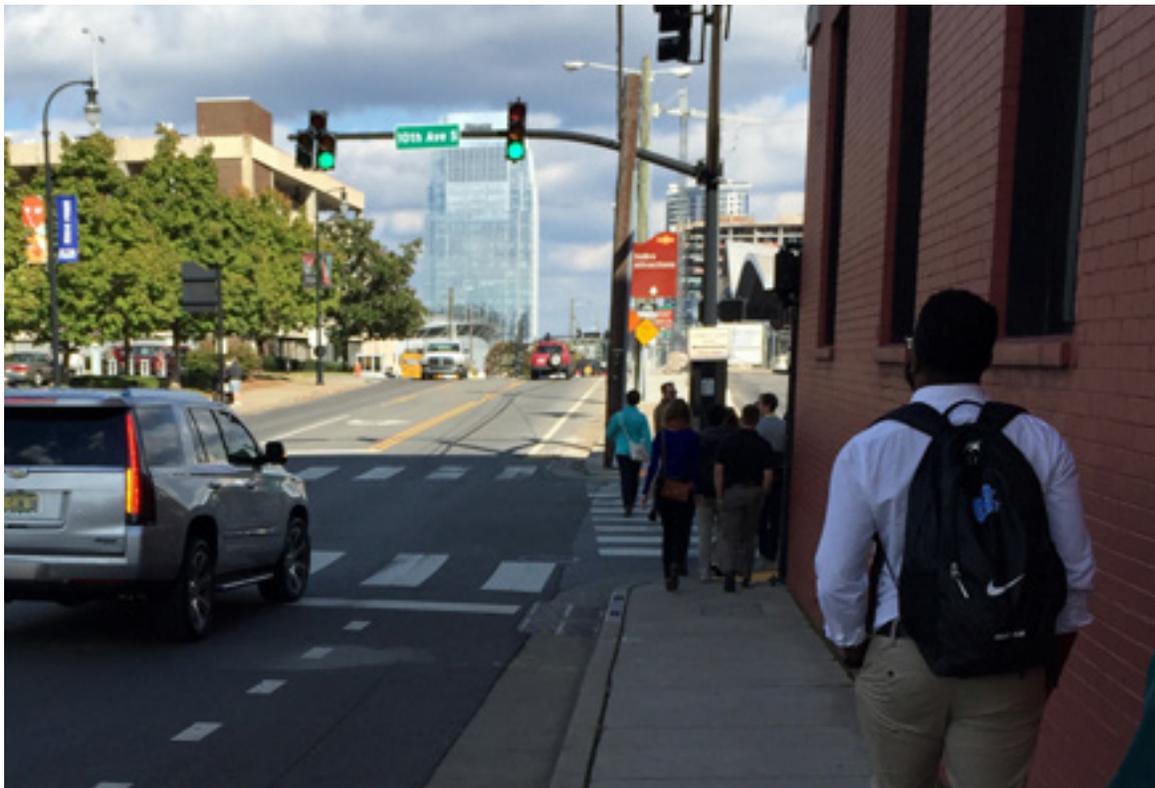


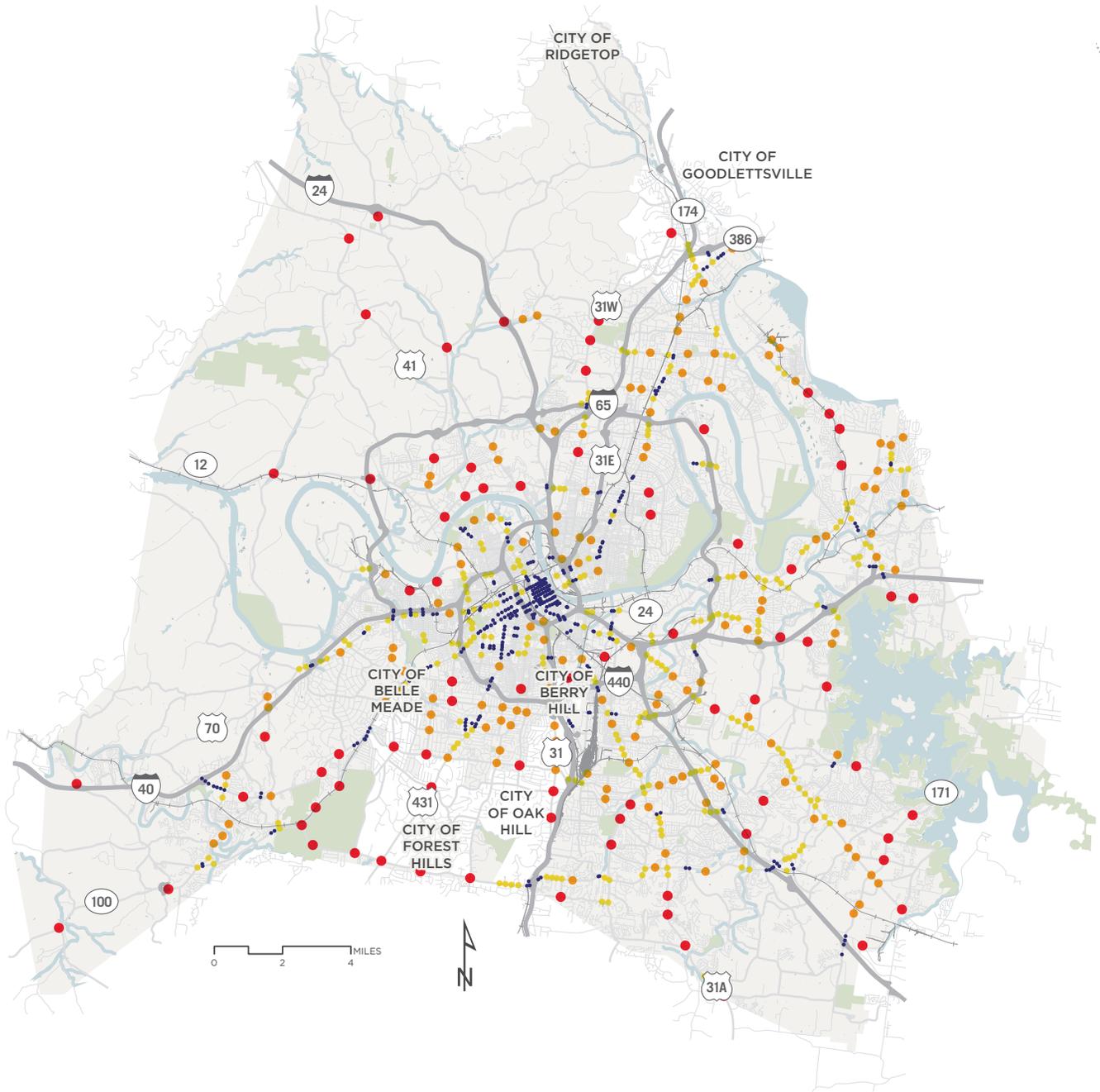
Intersection Priorities

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.

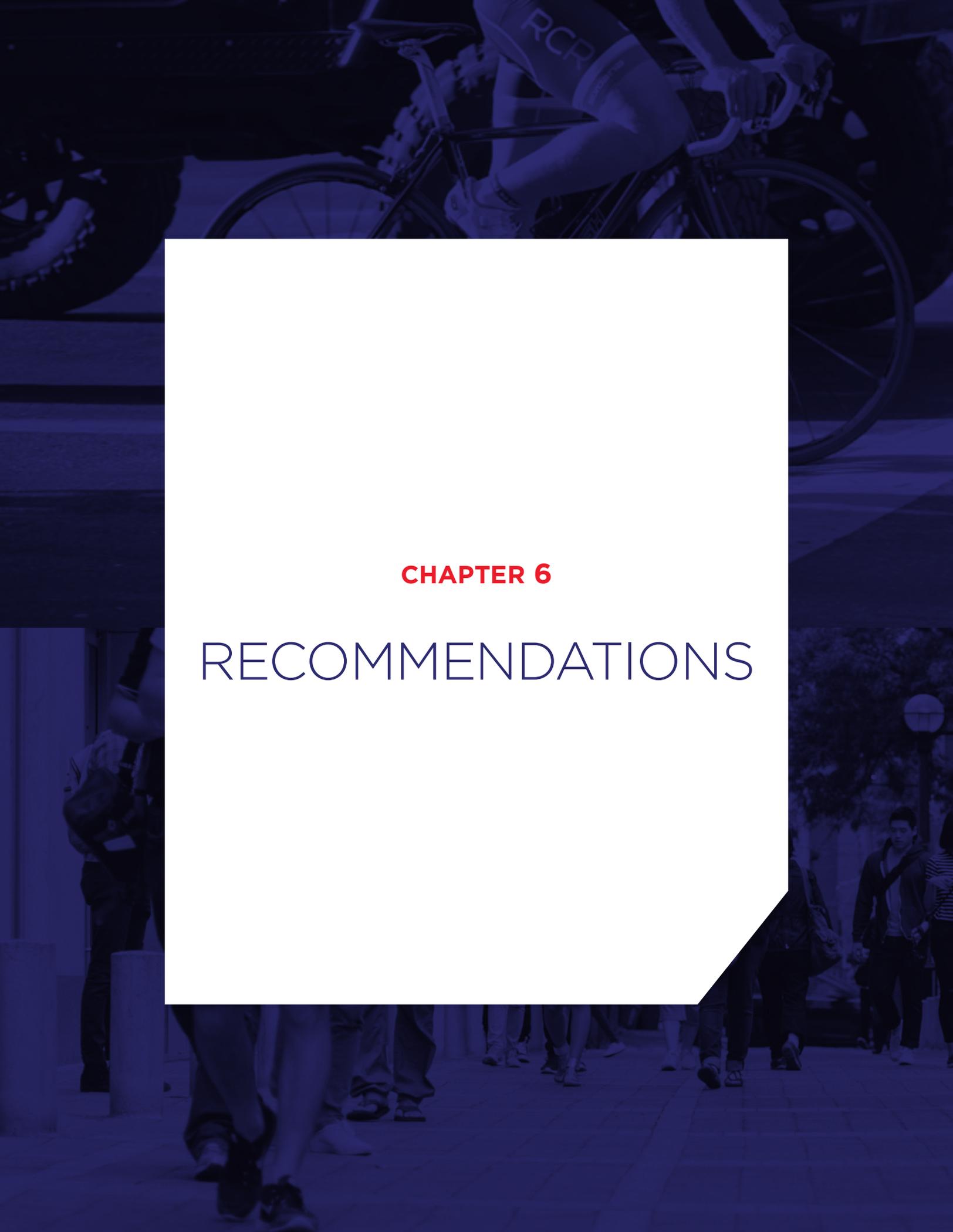
These roadways act as barriers between neighborhoods and can lead pedestrians to make unsafe crossings. A controlled crossing spacing analysis was conducted to highlight problematic areas along major corridors in Nashville. The results can be used to identify mid-block crossing needs to be addressed 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

The background of the page is a blue-tinted photograph. The top half shows a cyclist in a white jersey with 'RCR' on the back, riding a road bike. The bottom half shows a group of pedestrians walking on a paved path. A large white rectangle is centered on the page, containing the chapter title.

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.

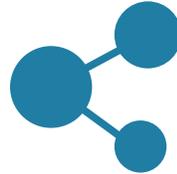
In this chapter, rationale is provided for why each recommendation is needed as well as specific guidance and key action steps. Case studies and lessons learned from cities across the U.S. are also included as part of the recommendations. Each recommendation is designed as a cut-sheet so that it can 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.

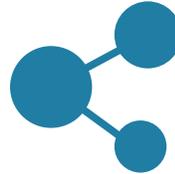
Input from the WalknBike Design Practices Subcommittee informed design recommendations.



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 	151-152
Bike parking 	153-154
Traffic calming and speed reduction policy    	155-156
Bike and pedestrian access during closures  	157-158
Regional Collaboration    	159-160
Street Trees   	161-162
Public Art    	163-164

Programmatic Topic	Page number
Staffing for bike and pedestrian planning & programs  	165-166
Transportation Demand Management (TDM)    	167-168
Safety campaign    	169-170
Implement Vision Zero Policy and Plan    	171-172
Bike and Pedestrian Counts Program  	173-174
Wayfinding System  	175-176



Design Topic	Page number
Design resources	177-178
Midblock crossings 	179-182
Traffic calming for pedestrians 	183-184
Bike boulevards 	185-186
Separated bikeways 	187-190
Protected intersections 	191-192



Implementation Topic	Page number
Bikeway maintenance 	193-194
Batched bikeway projects 	195-196
Bike facility selection 	197
Utility and fixed object coordination 	199-200
Tactical urbanism approach to pedestrian & bike infrastructure 	201-202
Transit first/last mile 	203-204
NACTO involvement 	205-206



Bike Share Integration



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	Ongoing
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
Develop a public-private partnership to sponsor and fund bikeshare expansion and maintenance.	NDP, Public Works, Metro Council	2020



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



Bike Parking Program

MODE



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



Bike corral in Raleigh, NC

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

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.

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

- SHORT-TERM**
- MID-TERM**
- LONG-TERM**

Funding Needs

- LOW**
- 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.

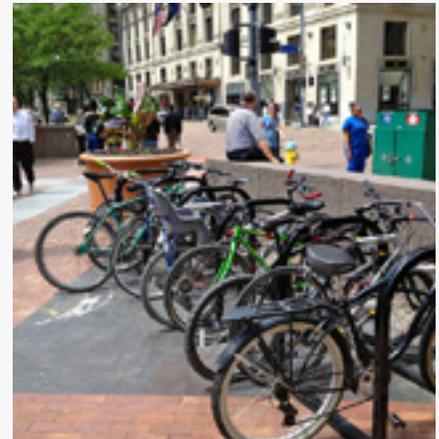
Seattle, WA

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

Part III. Action Steps

Action Steps	Person(s)/ Organization(s) Responsible	Target Completion Date
Propose policy amendment	Planning, Public Works, Metro Council	Mid-year 2017
Develop program and design standards for owner-supplied bike racks in right of way	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

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.



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)

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



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
- Identify funding implications of reducing 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

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, Metro Council



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

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

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	Planning, Public Works	End of 2017
Develop a phasing plan to 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, Metro Council	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)



Bike and Pedestrian Access in Construction Zones

MODE



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 permitted closures. Sidewalk

closures, especially in high traffic areas, should be the last option and only allowed on a temporary basis. Transportation closures that impact bicyclists and pedestrians along key transportation routes like Seigenthaler Pedestrian Bridge and greenways near high traffic events like Ascend Amphitheater and First Tennessee Ballpark should be minimized.

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.

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 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, Metro Council



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

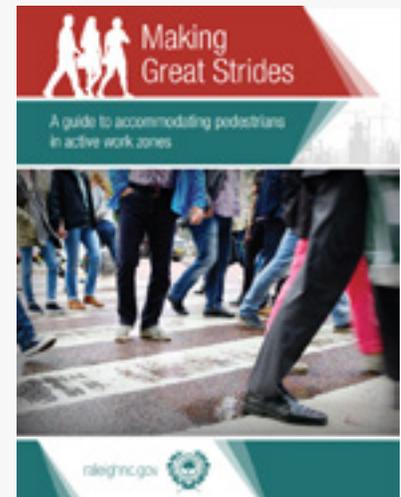
The City of Seattle instituted the Construction Hub Coordination Program in 2014 to address construction impacts to sidewalks. The program was initiated as a response to the access challenges experienced during the unprecedented growth and development of the city. The hub team of project and on-site 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.

Part III. Action Steps

Action Steps	Person(s)/ Organization(s) Responsible	Target Completion Date
Evaluate existing fees and fee increases	Public Works, Planning, Metro Council	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

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>



Regional Collaboration to Implement Projects

MODE



Part I. Background

As Metro Nashville implements WalknBike recommendations and ongoing bikeway and pedestrian improvements, it is important that satellite cities within Davidson County are involved in the process. Davidson County includes the satellite cities of Forest Hills, Oak Hill, and Goodlettsville. Even if a bikeway ends at a jurisdictional boundary, it is important to consider the connections to and from this bikeway.

Collaborating across jurisdictional boundaries is important to ensuring connectivity and accessibility of pedestrian and bike facilities. Metro Nashville will gain a better understanding of pedestrian and bike needs by collaborating with satellite cities. Furthermore, some residents of neighboring cities may be traveling to

Nashville for differing reasons, such as for employment or to obtain services. Connectivity for satellite cities' residents is also important so that they can bike or walk safely to and from their destinations.

The Nashville Area MPO can serve as convener and a forum for collaboration among local communities. The MPO can bring together different jurisdictions to better plan for facilities that cross city and county lines. As grant opportunities arise to fund new facilities, Metro Nashville will need to continuously engage with the satellite cities, surrounding counties, and Nashville Area MPO on priorities.

RECOMMENDATION:



Coordinate with satellite cities on bikeway and pedestrian projects

Part II. Details

Timeframe

SHORT-TERM

MID-TERM

LONG-TERM

Funding Needs

LOW

MEDIUM

HIGH

Responsible Party

LEAD ROLE

Nashville MPO

SUPPORT ROLE

Metro Planning, Public Works, Mayor's Office, Satellite Cities' Administrators, Metro Council



Case Study

Oakland, CA

Telegraph Avenue in Oakland, California, is a key corridor for transit services, shopping and retail, restaurants, and bars. Telegraph Avenue starts at the University of California, Berkeley and terminates in downtown Oakland and is therefore one of the only direct connections between downtown Oakland, North Oakland, and Berkeley. Telegraph Avenue was chosen for Complete Streets improvements due to the high volume of users of all types of modes as well as because it is a high injury corridor.

Since the adoption of the Complete Streets Plan in November 2014, the City of Oakland has successfully applied for funding and has been implementing the recommendations from the plan. The plan calls for a redesign of Telegraph Avenue to be a Complete Street that improves safety and accessibility of all modes, which includes pedestrians, bicyclists, transit users, and motorists. Improvements will be carried out in phases and includes traffic signal upgrades, parking protected bicycle lanes, pedestrian crossing improvements, and relocated transit stops.

Part III. Action Steps

Action Steps	Person(s)/ Organization(s) Responsible	Target Completion Date
Coordinate with satellite cities on bikeway and pedestrian projects	Public Works, Planning, Nashville MPO, Satellite Cities, Metro Council	Ongoing
Work with municipalities to build development regulations and zoning codes that encourage or require land dedication or easements for the development of sidewalks	Planning, Nashville MPO, Metro Council	Ongoing
Work with municipalities to leverage partner funding and strengthen funding requests or grant applications for sidewalk and bikeway development	Public Works, Planning, Mayor's Office, Satellite Cities	Ongoing
If needed, provide additional updates to WalknBike to reflect priorities and needs identified through regional collaboration	Public Works, Planning, Mayor's Office	As necessary

The proposed Complete Streets improvements end at the Oakland/Berkeley border but Telegraph Avenue continues north to the University of California, Berkeley. The City of Oakland has been coordinating with the Alameda County Transportation Commission (ACTC) to work with the City of Berkeley to make improvements that would extend all the way north on Telegraph Avenue.

Even as the plan is being implemented, additional community outreach is being conducted. The Alameda County Transportation Commission (ACTC) is funding a joint Oakland/Berkeley plan, beginning at 41st Street in Oakland, continuing through the Temescal District, and into the City of Berkeley.



A bicyclist using the parking protected bike lane on Telegraph Avenue (Source: Bike East Bay)



Street Trees Policy

MODE



Part I. Background

Shade from street trees provides comfort for pedestrians and therefore, encourages walking. Street trees also provide a multitude of other benefits relating to storm water, air quality, urban heat island, and economic development. Providing trees on Nashville's streets is consistent with the Mayor's Executive Order No. 031 for Complete and Green Streets.

The Major Collector and Street Plan calls for "green zones" and "street tree guidelines." However, no requirements for street trees exist outside of the Downtown Code areas (DTC). The Metro Zoning Code Chapter 17.24 does not account for any planting provided within the right-of-way to count toward the landscape requirements for the parcel. As a result, many private developers do not routinely provide street trees.

Updating the policy would allow for private development to

support the city's goal of making sidewalks and streetscapes more comfortable for walking while also contributing to sustainability measures and economic development. It would encourage private development to provide and maintain street trees by allowing them to count those trees for ordinance credit. This provision also places the responsibility of maintaining street trees onto the business owner rather than on the city.

Mayor Barry's Livable Nashville Committee is working to develop a shared vision for protecting and enhancing Nashville's livability and environmental quality. A key target of the draft recommendations is to stop net tree-loss by 2020 and to plant 50,000 trees during the first term and increase active transportation mode share by 7% by 2020. Adding street trees to areas with expected pedestrian demand can help to meet both targets.

RECOMMENDATION:

- Add the ability and requirement for development to provide street trees along all public streets and to receive credit for the installation and maintenance for those trees under Metro Zoning Code, Landscape Ordinance (Chapter 17.24)
- Coordinate new tree planting locations in areas with the highest pedestrian demand to maximize shading benefits to pedestrians

Part II. Details

Timeframe

- SHORT-TERM
- MID-TERM
- LONG-TERM

Funding Needs

- LOW
- MEDIUM
- HIGH

Responsible Party

LEAD ROLE

Planning

SUPPORT ROLE

Metro Pubic Works, Metro Codes, Metro Landscape Coordination Program, Metro Tree Advisory Committee, nonprofits and organizations with an environmental focus, Metro Council



Case Study

Many cities require street trees (planted within the right-of-way) and allow them to count toward landscape requirements. Language from other cities' code of ordinances could serve as models for Nashville. These cities include Miami, Houston, Fort Worth, and Savannah. The District of Columbia has an Urban Forestry Administration under the District Department of Transportation that manages the city's street tree program. A portion of the Miami code as it relates to street trees is displayed below.

MIAMI 21 ARTICLE 9.
LANDSCAPE REQUIREMENTS
AS ADOPTED - MAY 2010
IX.13

m. When trees are planted within the right-of-way, the owners of land adjacent to the areas where street trees are planted must maintain those areas including the trees, plants and sod, using pruning methods specified in this Code. A covenant executed by those owners is required, or a special taxing district must be created to maintain these areas. Where the State, County or municipality determines that the planting of trees and other landscape material is not appropriate in the public right-of-way, they may require that said trees and landscape material be placed on private property.

Part III. Action Steps

Action Steps	Person(s)/ Organization(s) Responsible	Target Completion Date
Amend zoning code to allow for and/or require street trees	Planning, Metro Council	End of 2017
Monitor whether street trees are planted around new development	Public Works, Codes	Ongoing
Cross reference tree canopy needs with sidewalk needs to determine where priorities align	Planning	End of 2017
Allow flexibility in the MCSP to preserve mature trees during the design process	Planning, Public Works,	Ongoing
Identify funding opportunities to increase street tree maintenance	Public Works, Planning, Mayors Office, Metro Council	End of 2018



Street trees and planting strip along a street in Nashville



Public Art Policy

MODE



Part I. Background

Public art is an essential component to creating livable streets. Art has the ability to unify neighborhoods by creating themes or gateways. For pedestrians and cyclists, art provides visual interest during their commute trips.

Metro Nashville adopted a one percent for art ordinance in May 2000 (BL2000-250). The ordinance dedicates 1% of the net proceeds of any general obligation bond issued for construction projects to fund public art. A construction project signifies the building or erection of any public building, structure, park, or parking facility and will also include the reconstruction, replacement, extension, repair, betterment or improvement of any public building, structure, park or parking facility where the cost of the improvement exceeds 50% of the value of the existing entity. The goals for the public art guidelines and ordinance are to enhance the civic environment and enrich the lives of citizens and visitors through the integration of public art into the built environment.

RECOMMENDATION:



Incorporate public art elements into all Metro Nashville construction projects within the public right-of-way

Public artwork installations typically require greater coordination and outreach for key issues such as safety, maintenance, constructability, longevity, and functionality.

Metro Arts is the designated driver and facilitator of programs, policies, and practices that support public arts and cultural vibrancy in Nashville. Metro should evaluate their current practices to determine how best to incorporate public art in the public right-of-way.

Part II. Details

Timeframe

- SHORT-TERM**
- MID-TERM**
- LONG-TERM**

Funding Needs

- LOW**
- MEDIUM**
- HIGH**

Responsible Party

LEAD ROLE

Public Works

SUPPORT ROLE

Metro Arts Commission, Metro Planning



Cumberland Park



Case Study

Denver’s P.S. You are Here (PSYAH) program launched in 2014 and is a city-wide, creative placemaking and neighborhood revitalization program that cultivates collaborative, community-driven, outdoor projects in Denver, Colorado’s public spaces.

As part of its mission, PSYAH encourages “place-based, grassroots involvement from residents, artists, neighborhood associations, non-and for-profit organizations and businesses to claim, initiate and drive the creation of temporary, authentic demonstrations and activation of outdoor public spaces. These creative, short-term, physical improvement projects in public spaces like streets and sidewalks can transform underutilized spaces, increase collaboration, honor heritage, build civic engagement, beautify neighborhoods, enrich communities and foster healthier communities.

For more information about the PSYAH program, go to: <http://artsandvenuesdenver.com/>



Hand painted school bus stop developed through Denver’s PSYAH program.

Part III. Action Steps

Action Steps	Person(s)/ Organization(s) Responsible	Target Completion Date
Develop design standards and guidelines for public art incorporation into public right-of-way projects	Public Works, Metro Arts	Mid-year 2018
Develop toolbox for public art or placemaking projects integrated into transportation infrastructure	Metro Arts, Metro Public Works, Metro Planning	Mid-year 2018
Recommend exploration of Public Works funding for public art/placemaking projects outside of the percent for art fund or outside of Metro Arts managed projects	Public Works, Metro Council, Metro Arts, Metro Planning	End of 2018
Develop pre-qualified artist rosters for community groups, other Metro agencies, and private developers to access for projects	Metro Arts, Metro Planning	End of 2018

Seattle’s Department of Transportation developed an Art Plan to be both critical and visionary. The plan details how Seattle can become a national leader in creating a more humane, layered, beautiful and relevant transportation system. The structure of the plan was developed into three distinct books, each with its own audience and intent:

- » **Book I: The Diagnosis** - the big picture of art in the right-of-way.
- » **Book II: The Toolkit** - a reference for project managers and special projects ideas
- » **Book III: Sidewalk Survey** - a visual encyclopedia of creativity in the right-of-way

Implementation of the Art Plan has resulted in several new programs and public art initiatives to make Seattle streets and sidewalks more creative and interesting. The sidewalk stamping program allows for unique designs that form the library of stamps to be applied to wet concrete of sidewalks during construction. In some cases, local neighborhood groups are involved in the stamp design selection.



Seattle sidewalk stamp examples. For more information on the SDOT Art Plan, go to: <https://www.seattle.gov/transportation/artplan.htm>

Staffing for Bike and Pedestrian Planning & Programs



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:

- Provide dedicated staff for bike and pedestrian projects
- 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
- The Bicycle and Pedestrian Division should utilize the Mayor’s BPAC to provide direction and feedback for certain programming and policy decisions

Part II. Details

Timeframe

- SHORT-TERM**
- MID-TERM**
- LONG-TERM**

Funding Needs

- 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

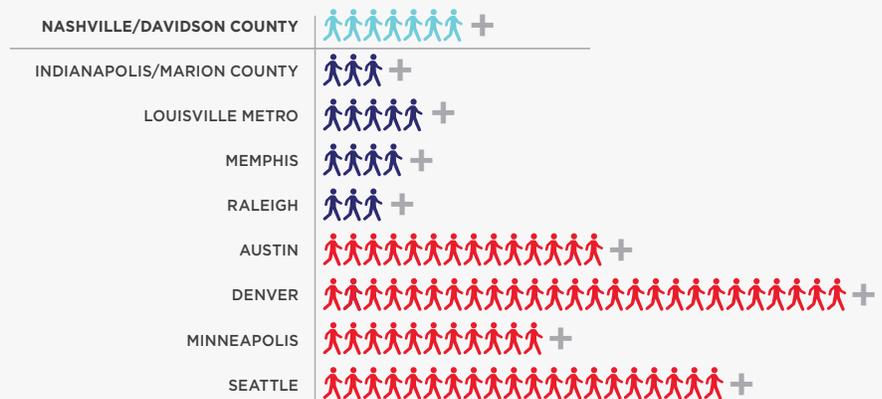
The City of Austin’s Active Transportation Division is housed within its Department of Transportation. The division, which was created in 2014, is responsible for the planning, design, and implementation of pedestrian and bicycle facilities as well as programs and services that promote walking and biking. 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 MTA, Parks, 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, Parks, MTA, 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, Metro Council	Ongoing
Apply for Bicycle Friendly Community (BFC) Silver Designation and Walk Friendly Community (WFC) designation	Bicycle and Pedestrian Division, Mayor’s BPAC	Early 2018
Regurally update Mayor’s BPAC on issues as the division evolves	Public Works, Planning, MTA	Ongoing

BICYCLE & PEDESTRIAN STAFFING



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)



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.

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 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

MTA, Public Works, WalkBike Nashville, Chamber of Commerce



Case Study

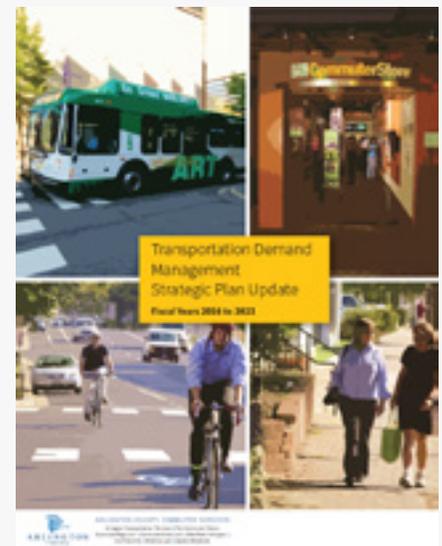
Arlington County, Virginia incorporated an integrated TDM approach to accommodate an increase in its resident and worker population with nearly no increase in road infrastructure or vehicular traffic. Due to its TDM efforts, the share of both Arlington residents and Arlington workers who report driving 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,

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

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.



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

Safety Campaign

MODE



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. WalkBike 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. Bellshire Elementary, Napier Elementary, Neelys Bend Elementary, and Percy Priest Elementary are a few examples of schools that have incorporated Safe Routes to School program elements. A safety campaign should expand current Safe Routes to School efforts and identify funding options. Furthermore, a Metro funded and supported safe routes to school program will help support the goal to achieve silver-level bicycle friendly community status.

RECOMMENDATION:

- Implement a comprehensive safety campaign that includes education, encouragement, and enforcement components
- Implement safety campaign in conjunction with Vision Zero efforts and include current Safe Routes to School programming
- Elevate Nashville's Safe Routes to School activities with WalkBike Nashville and Metro Nashville Public Schools to integrate the program in more schools

Part II. Details

Timeframe

- SHORT-TERM**
- MID-TERM**
- LONG-TERM**

Funding Needs

- LOW**
- 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



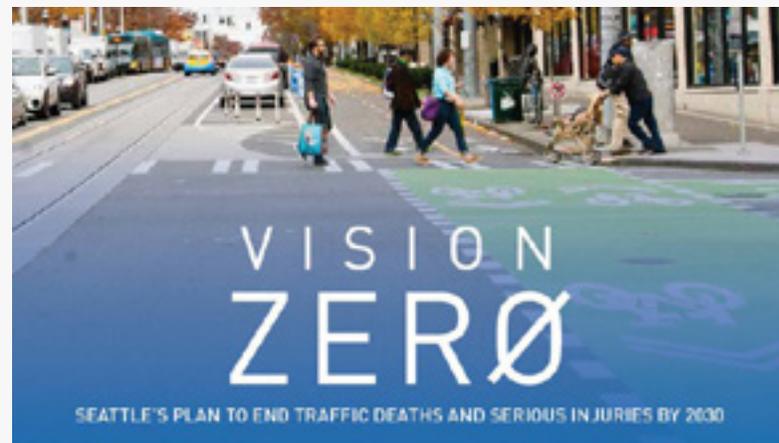
Case Study

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 aggressive and implementation 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



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

RECOMMENDATION:

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

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
- MID-TERM
- LONG-TERM

Funding Needs

- LOW
- 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.

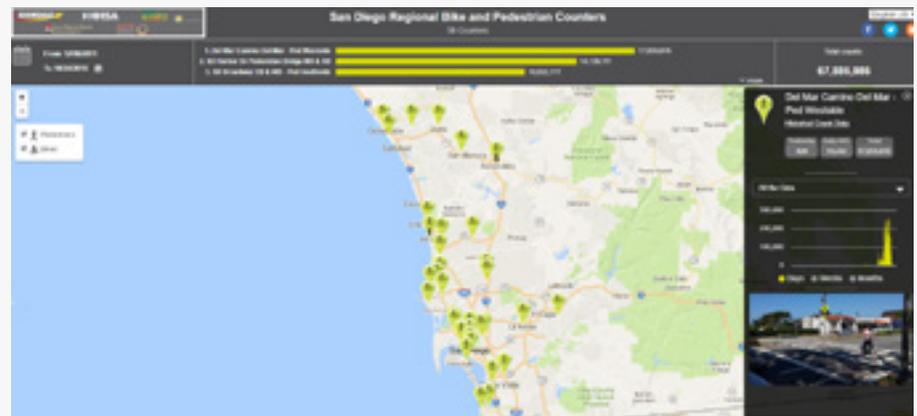
The initial network of counters was installed in 2012. Currently, 54 counters have been installed at 37 sites across 15 jurisdictions in the San Diego region. Three types of counters are dispersed throughout the region: those that count people biking, those that count people walking, and counters that 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



Part I. Background

Wayfinding elements such as signage and mile markers will help to draw visitors, help users to identify the best routes, 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.

RECOMMENDATION:

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

Part II. Details

Timeframe

- SHORT-TERM
- MID-TERM
- LONG-TERM

Funding Needs

- LOW
- 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

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

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, similar to existing wayfinding signs in Nashville. WalkNYC maps are installed at all subway stations, Staten Island Railway stations, and Citi Bike station kiosks.



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
- ✓ Regularly update Metro Complete Streets policy based on best practices outlined in WalknBike

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 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 that a bicycle has the legal status of a vehicle. The full list of laws can be found at: <http://www.tn.gov/tdot/article/bikeped-bikelaws>

Tennessee Pedestrian Laws - The TDOT website also provides a comprehensive list of Tennessee pedestrian laws. In Tennessee, pedestrians have the right of way at all intersections and driveways. The full list of laws can be reviewed at: <http://www.tn.gov/tdot/article/bikeped-pedestrian-laws>

Local Guidance

METRO NASHVILLE GREEN AND COMPLETE STREETS PROGRAM (EXECUTIVE ORDER NO. 31)

Mayor Barry signed the *Green and Complete Streets* policy in 2016 which expanded Metro's commitment to green and complete streets. The expanded policy establishes Access Nashville and the Major and Collector Street Plan as design guidance, possible exceptions to the policy, and the establishment of performance measures. Metro should continue to monitor state and national guidance and update policies contained in the Major and Collector Street Plan and Metro Public Works Engineering and Design Specifications to reflect this guidance as it evolves.

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



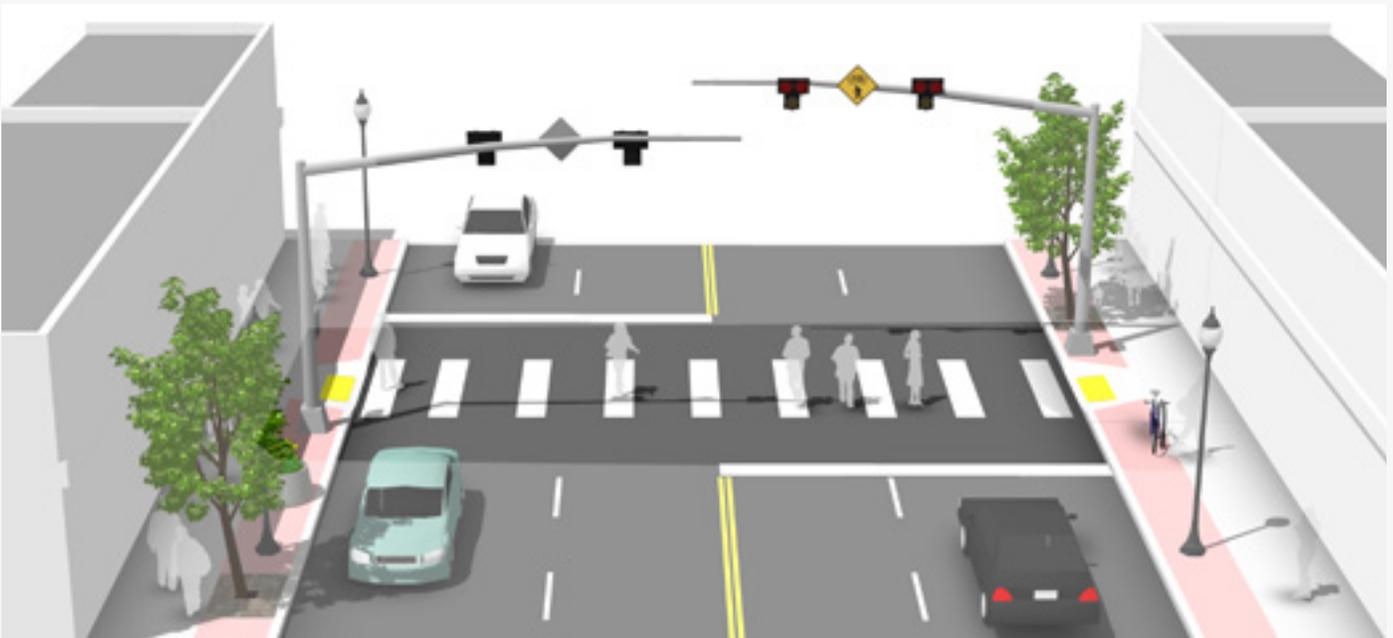
Hybrid beacon/HAWK beacon

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:

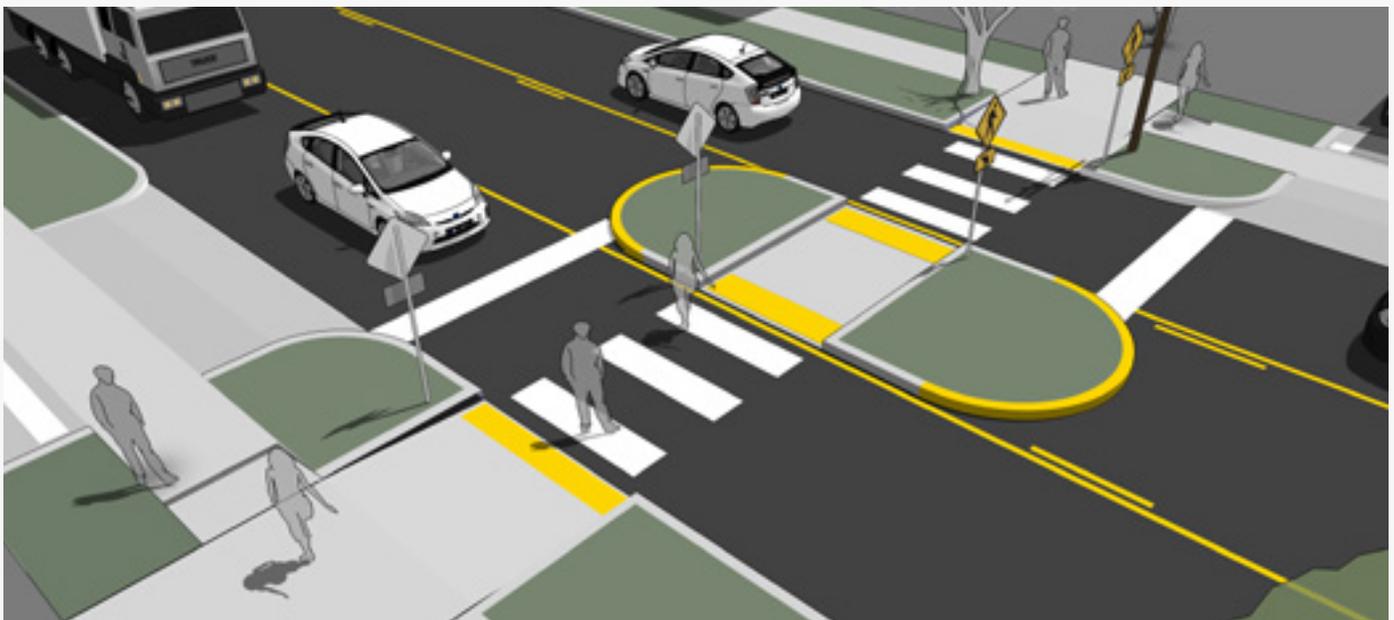
- Can be applied on any roadway with a left turn center lane or median that is at least 6 feet wide
- May be appropriate on multi-lane roadways depending on speeds and volumes. Consider configuration with active warning beacons for improved yielding compliance.
- Appropriate at signalized or unsignalized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

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.

RECOMMENDATION:



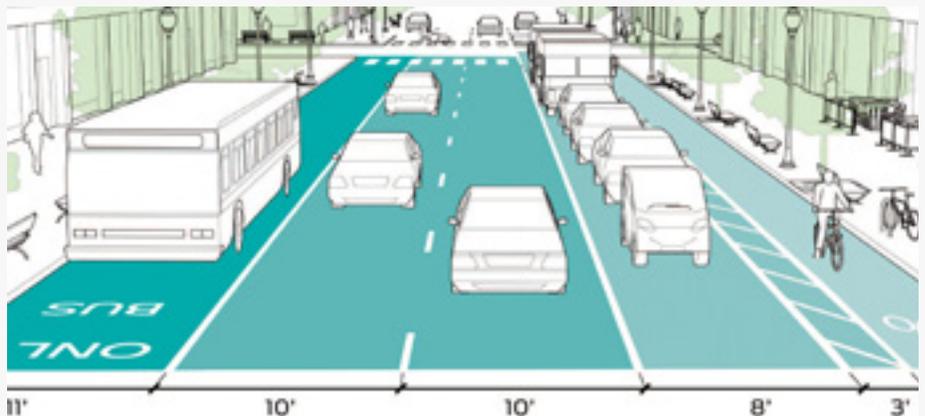
Utilize traffic calming measures to improve safety for pedestrians

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.

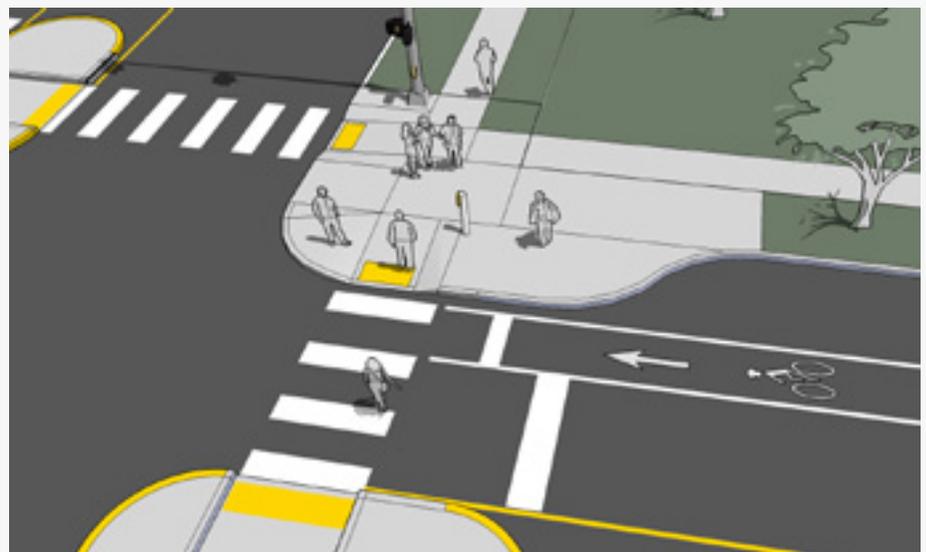
- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway
- Approaches to the raised crosswalk may be designed to be similar to speed humps
- May be unsuitable on emergency response routes



Raised crosswalk in San Francisco, CA



Curb extension



Curb extension

Bike Boulevards

MODE


Background

Bike boulevards, neighborhood bikeways or quiet streets, are an integral part of the low-stress bike network. These streets are intended to move slower and be more comfortable for walking and biking. 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

RECOMMENDATION:



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

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 2,000 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 cyclists
- 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

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 major separated bikeways with a vertical separation or minor separated bikeways with no vertical delineation 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.

RECOMMENDATION:

-  Evaluate opportunities to implement major and minor separated bikeways to increase cyclist safety and comfort



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

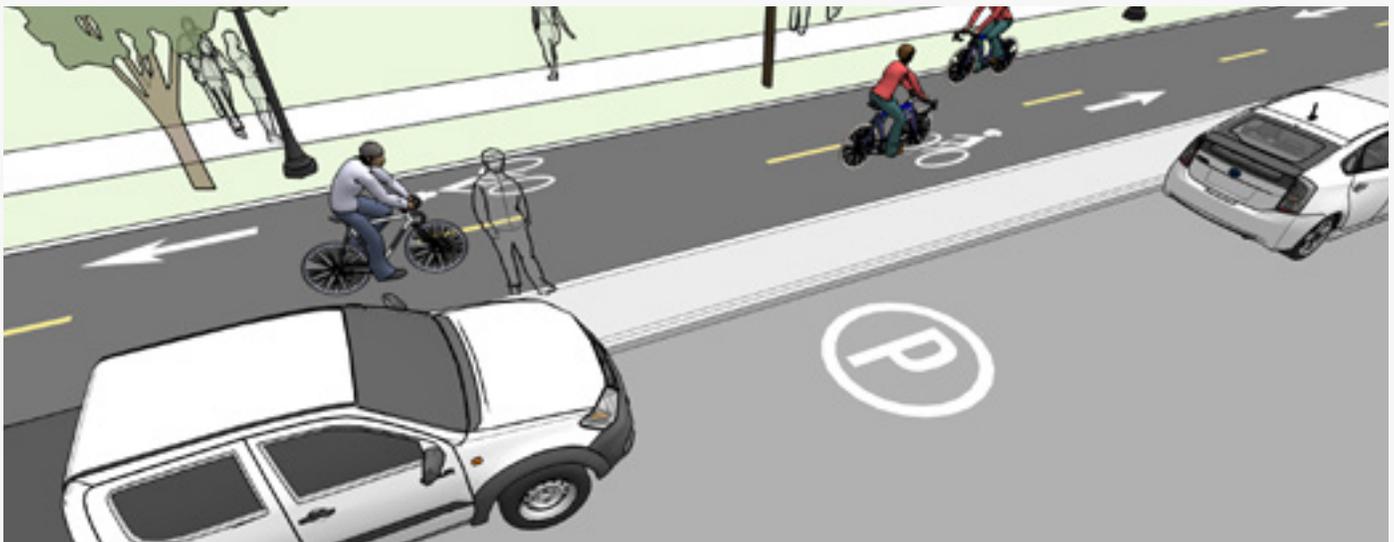
- 12-foot operating width preferred (10 ft. minimum) width for two-way facility
- In constrained environment, an 8-foot operating width may be considered
- Adjacent to on-street parking, a 3-foot minimum width channelized buffer or island shall be provided to accommodate opening doors
- Additional signalization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

This page intentionally left blank.



Protected Intersections

MODE



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 right 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.

RECOMMENDATION:



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

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



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.

RECOMMENDATION:



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

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

SHORT-TERM

MID-TERM

LONG-TERM

Funding Needs

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



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.

RECOMMENDATION:

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

Part II. Details

Timeframe

- SHORT-TERM
- MID-TERM
- LONG-TERM

Funding Needs

- 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

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

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.



Hampline in Memphis, TN

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>



Bike Facility Selection

MODE



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

RECOMMENDATION:

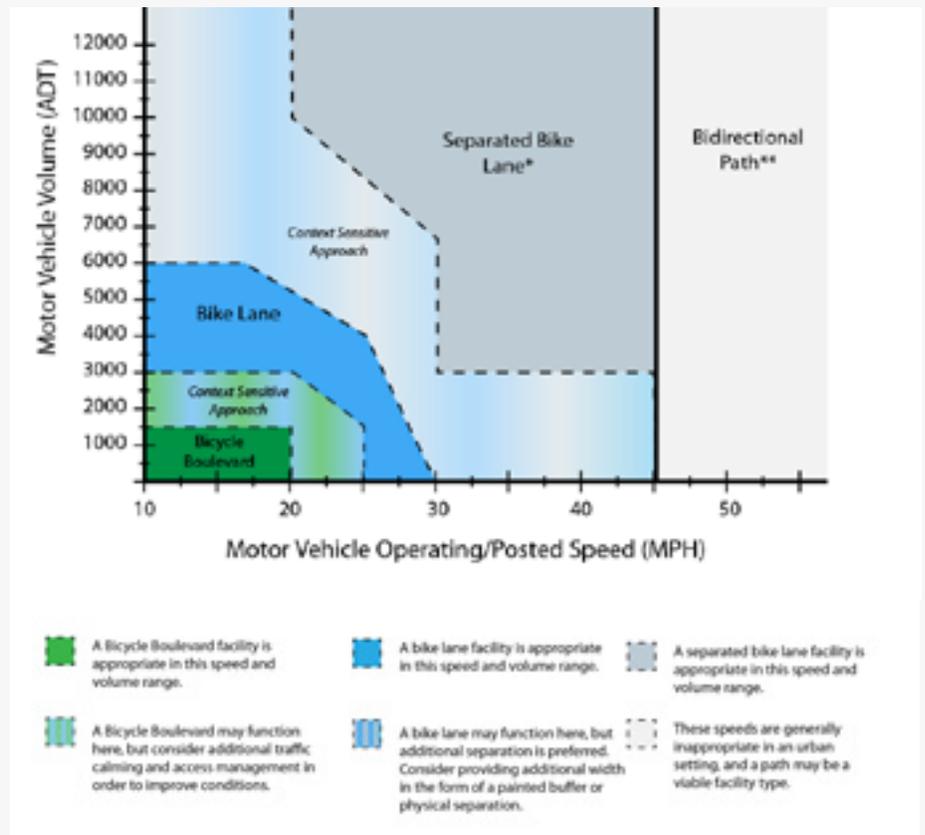


Utilize the bike facility selection matrix to assist Metro in determining appropriate treatments for minor and major separated bikeway facility types

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.



This page intentionally left blank.



Utility and Fixed Object Coordination

MODE



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.

RECOMMENDATION:

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

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
- MID-TERM
- LONG-TERM

Funding Needs

- LOW
- 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

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

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



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

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

repairing sidewalks, leverage existing development to incentivize building better pedestrian environments, and update Seattle Department of Transportation's tools for tracking sidewalk conditions.

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



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

RECOMMENDATION:

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

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
- MID-TERM
- LONG-TERM

Funding Needs

- LOW
- MEDIUM
- HIGH

Responsible Party

LEAD ROLE

MTA, RTA

SUPPORT ROLE

Public Works, Planning

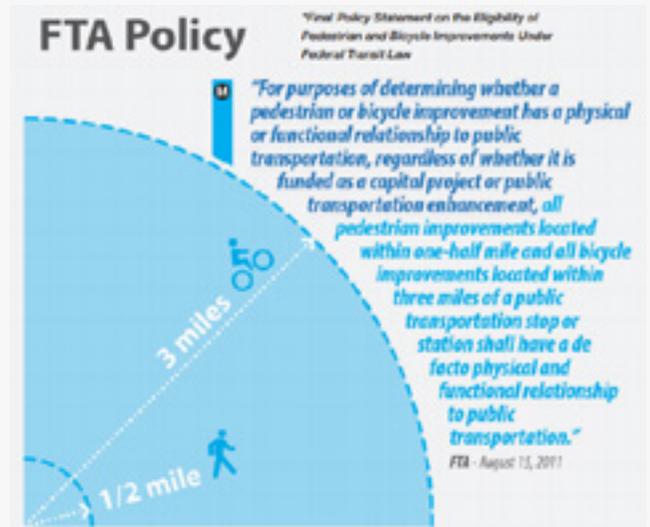


Key transit amenities to promote walking and biking at transit stops are (refer to illustration below):

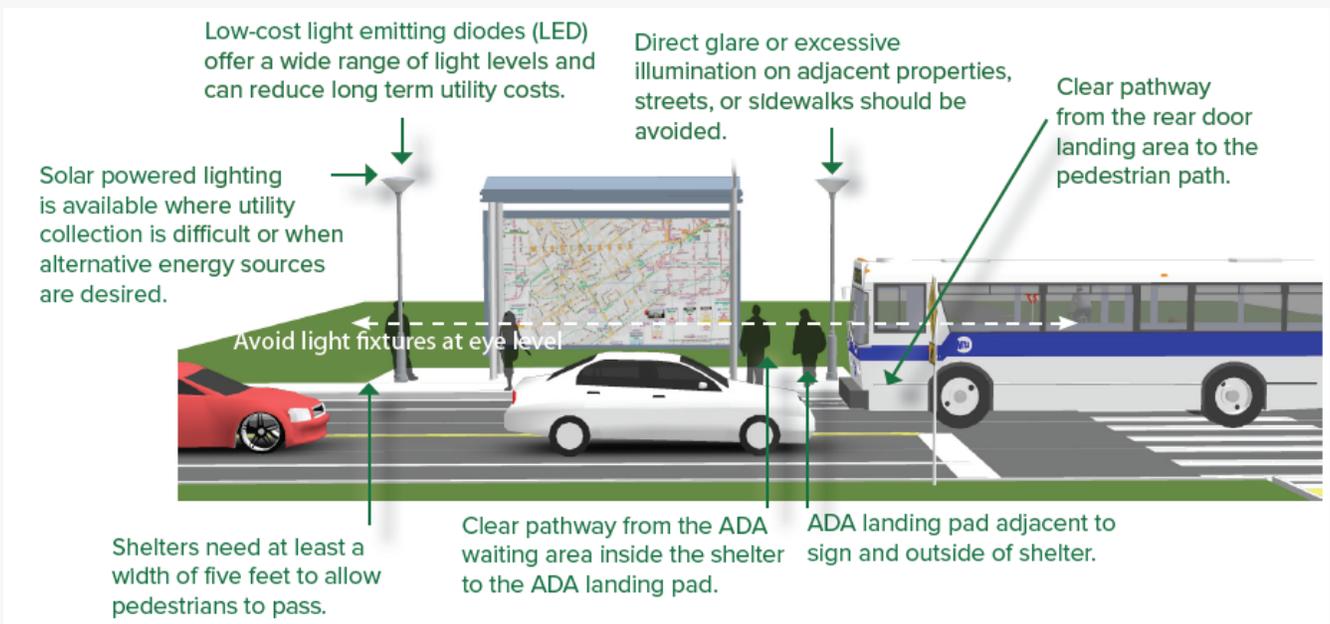
- ADA compliant curb ramps and ADA landing pad
- Bench
- Lighting
- Bus route information
- Bus shelter
- Bike parking
- Public art
- Trash receptacles

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:

- Join NACTO
- Formally adopt NACTO guidelines as defacto design standards with exceptions as noted in the Complete Streets Executive Order
- 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

- SHORT-TERM**
- MID-TERM**
- LONG-TERM**

Funding Needs

- LOW**
- MEDIUM**
- HIGH**

Responsible Party

LEAD ROLE

Public Works, Mayor's Office

SUPPORT ROLE

Planning, MTA/RTA



Peer and Aspirational City Membership

Member Cities:

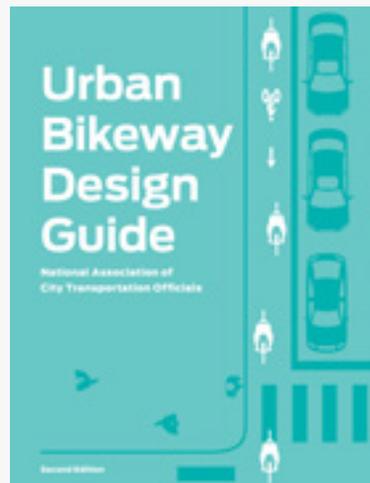
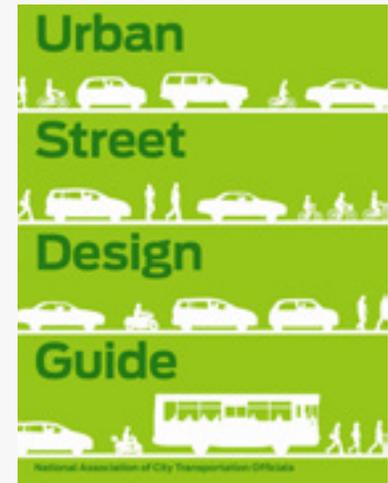
- Austin, TX
- Minneapolis, MN
- Seattle, WA
- Denver, CO

Affiliate Member Cities:

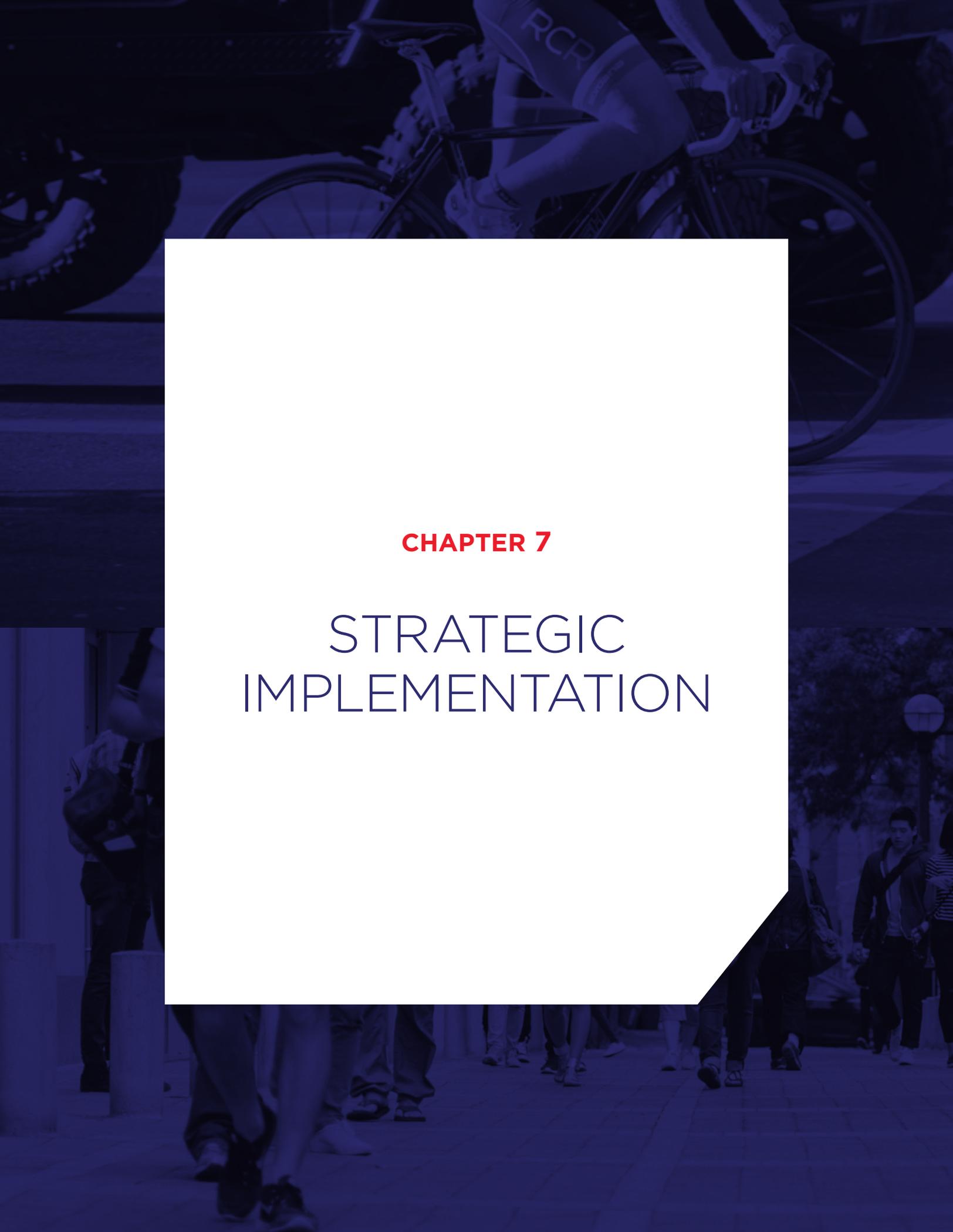
- Indianapolis, IN
- Louisville, KY
- Memphis, TN

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

The background of the slide is a blue-tinted photograph. The top portion shows a cyclist in a white jersey with 'RCR' on the back, riding a road bike. The bottom portion shows a group of pedestrians walking on a paved path. A large white rectangle is centered on the slide, containing the chapter title.

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 210-211 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.

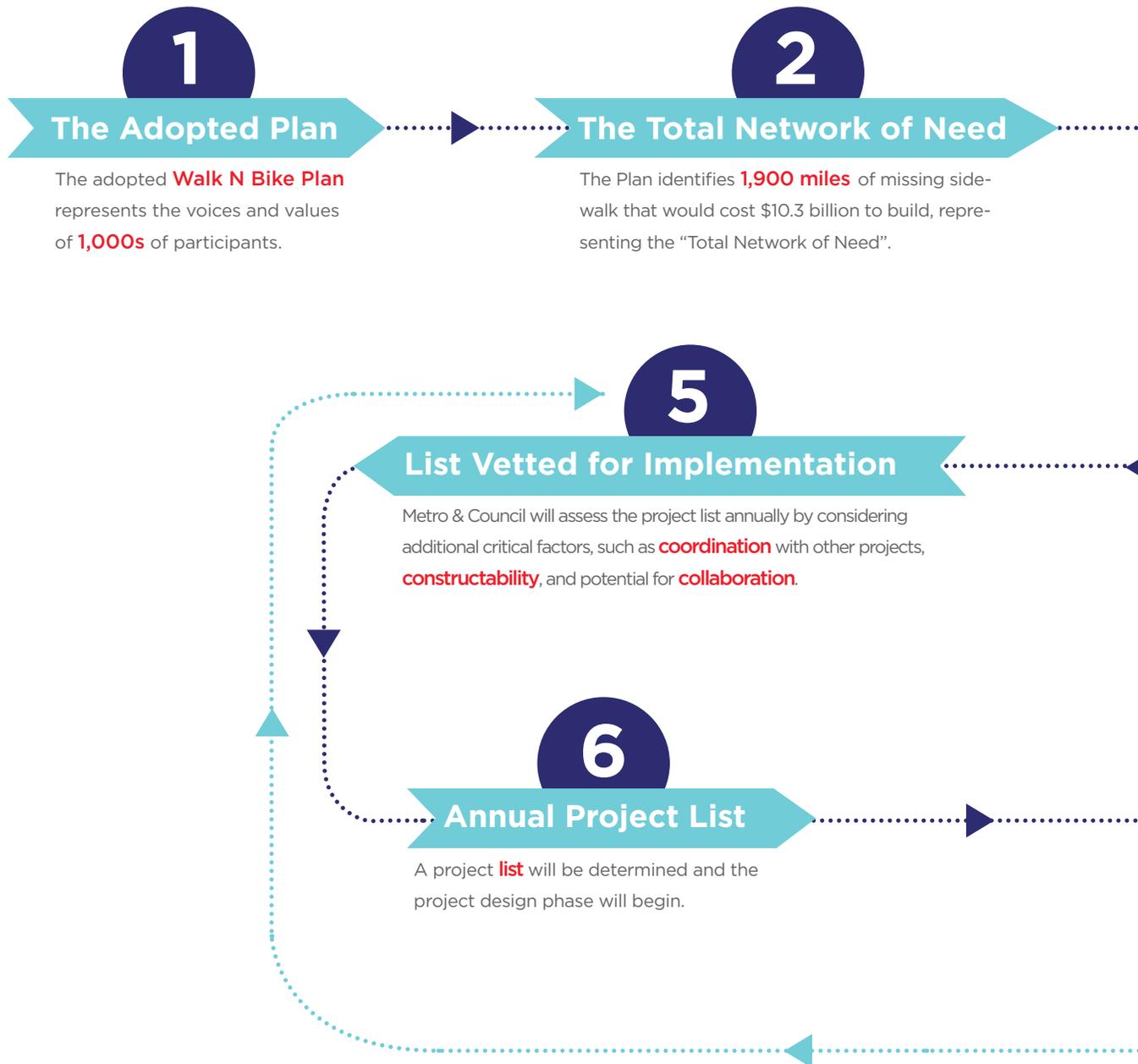


Mayor Barry re-established by Executive Order the Mayor's Bicycle and Pedestrian Advisory Committee to promote walking and biking as forms of transportation. BPAC provides citizens with a way to engage with Metro staff and leaders about all things relating to bicycle and pedestrian transportation.

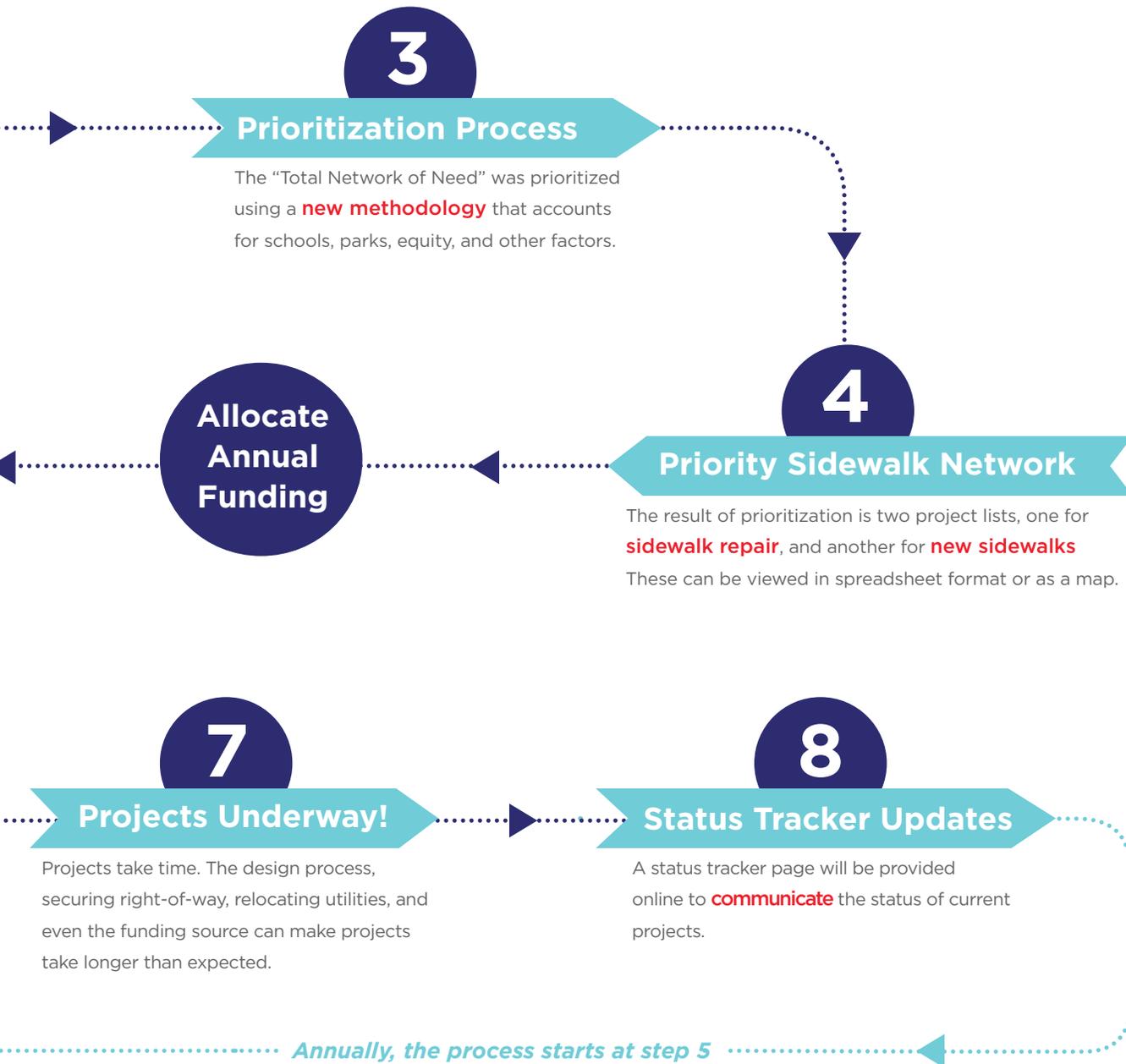


Walk Bike Nashville works to build a more walkable and bikeable Nashville by offering educational programs on safety and skills as well as participating in advocacy efforts

Implementation Flowchart for Sidewalk Projects



Implementation Flowchart for Sidewalk Projects



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.



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. Successful pilots have been implemented by community groups and Metro along with improved bus shelters along Nolensville Pike, temporary crosswalks and art in East Nashville, plaza space and parklets on Lower Broadway, and temporary traffic circles in the Belmont Hillsboro neighborhood. These types of pilot projects can inform and help institutionalize quick build projects in Nashville.

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

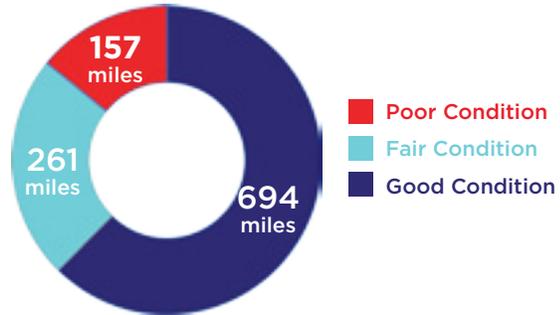
The goal of the Metro sidewalk repair program is to ensure that all sidewalks are safe and accessible for all pedestrians.

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

This page intentionally left blank.

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

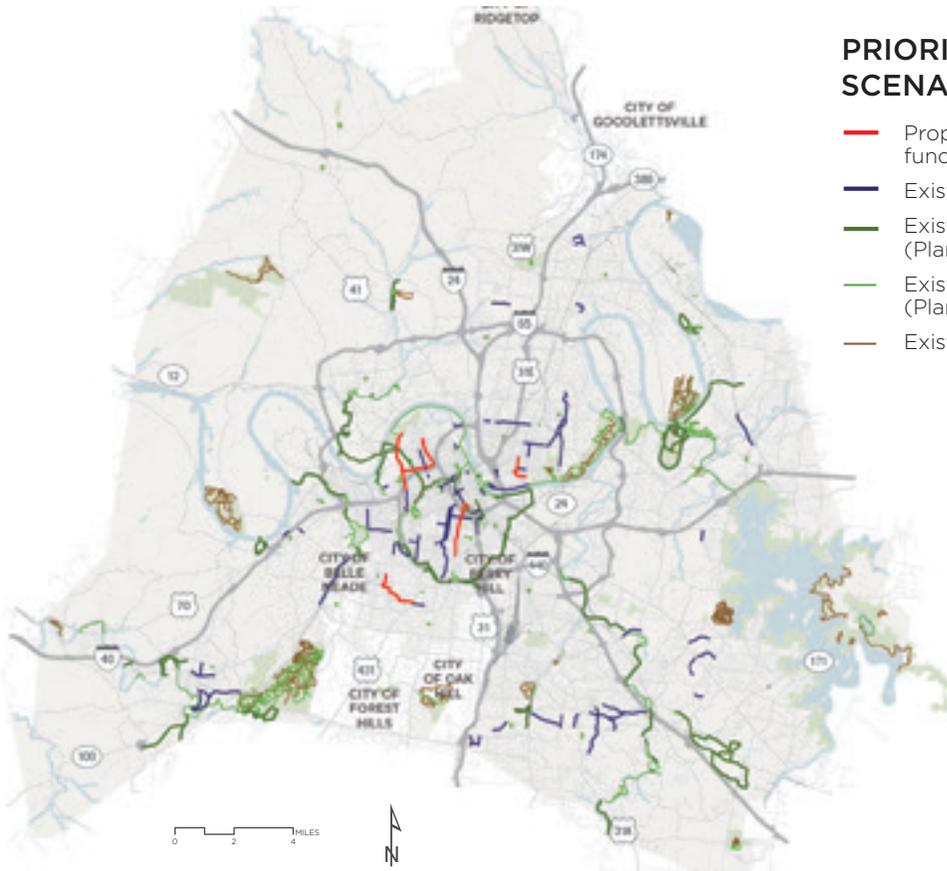


Raleigh received a \$1.1 million federal Congestion Mitigation and Air Quality (CMAQ) grant to install 27 miles of on-road bikeways. The grant required a \$225,000 local contribution.



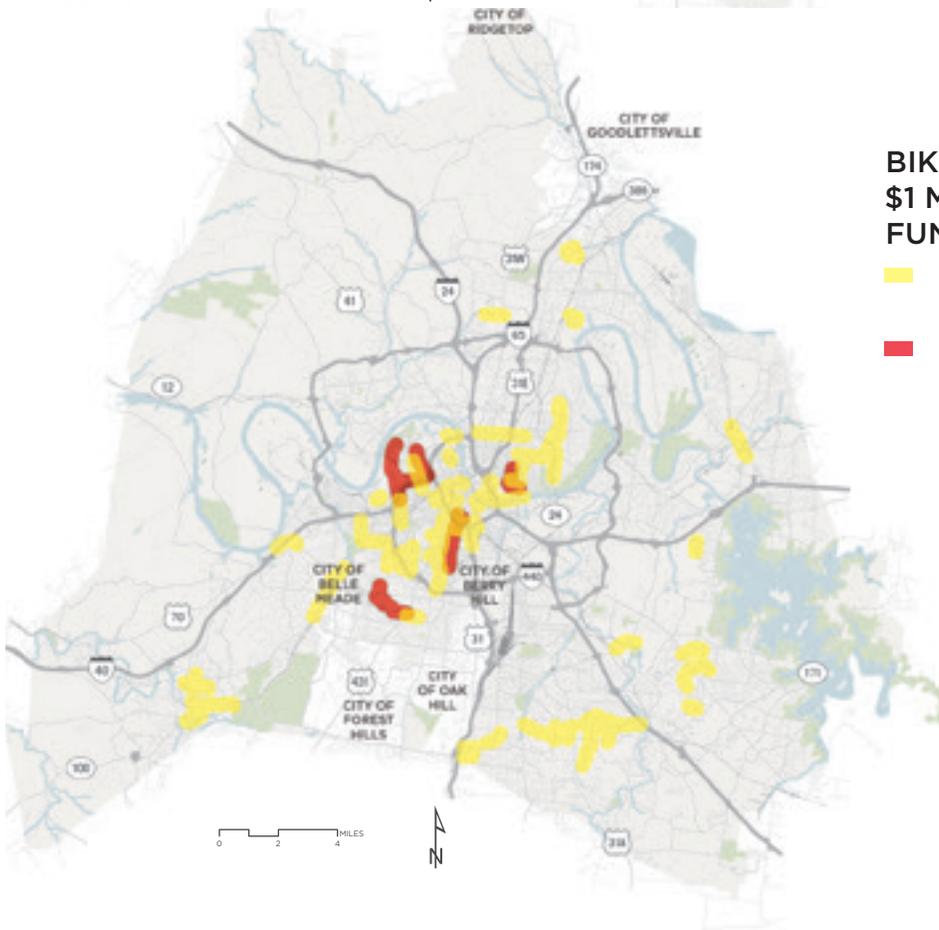
Portland, OR
America’s *Bike Capital* has installed 94 miles of low-stress bikeways and has an existing network of 350 miles of bikeways with a value of \$60 million.





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

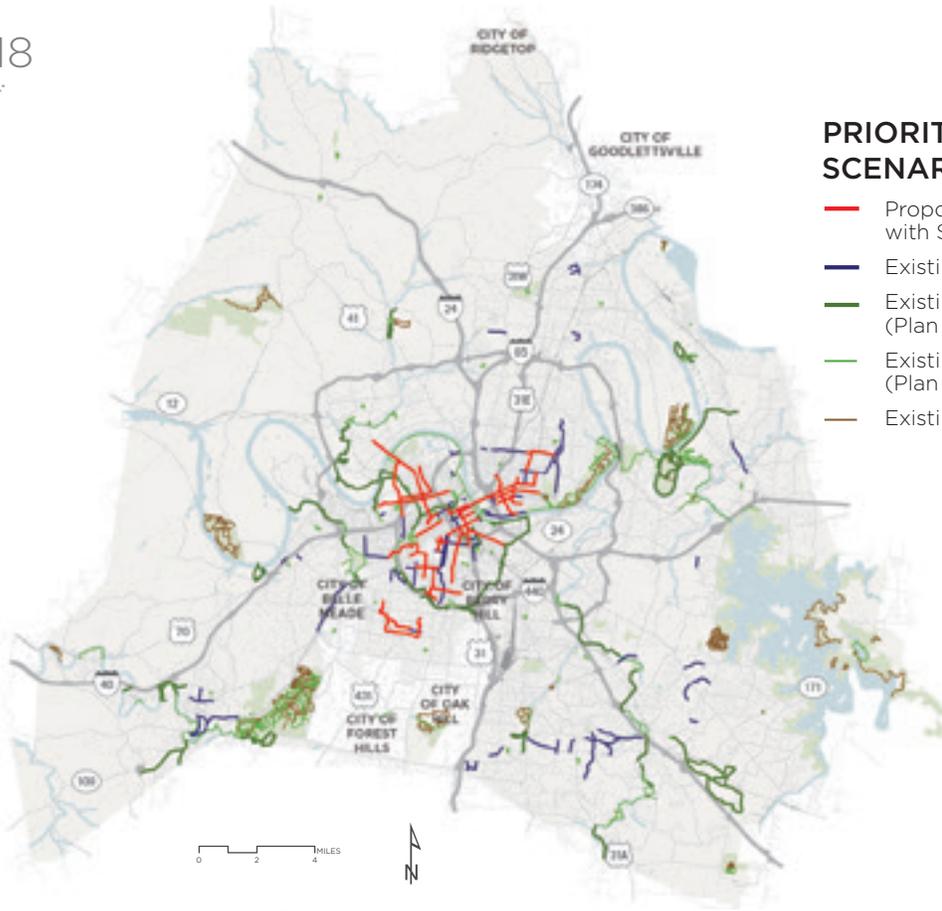


BIKEWAY NETWORK ACCESS: \$1 MILLION/ 5 YEARS FUNDING SCENARIO

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

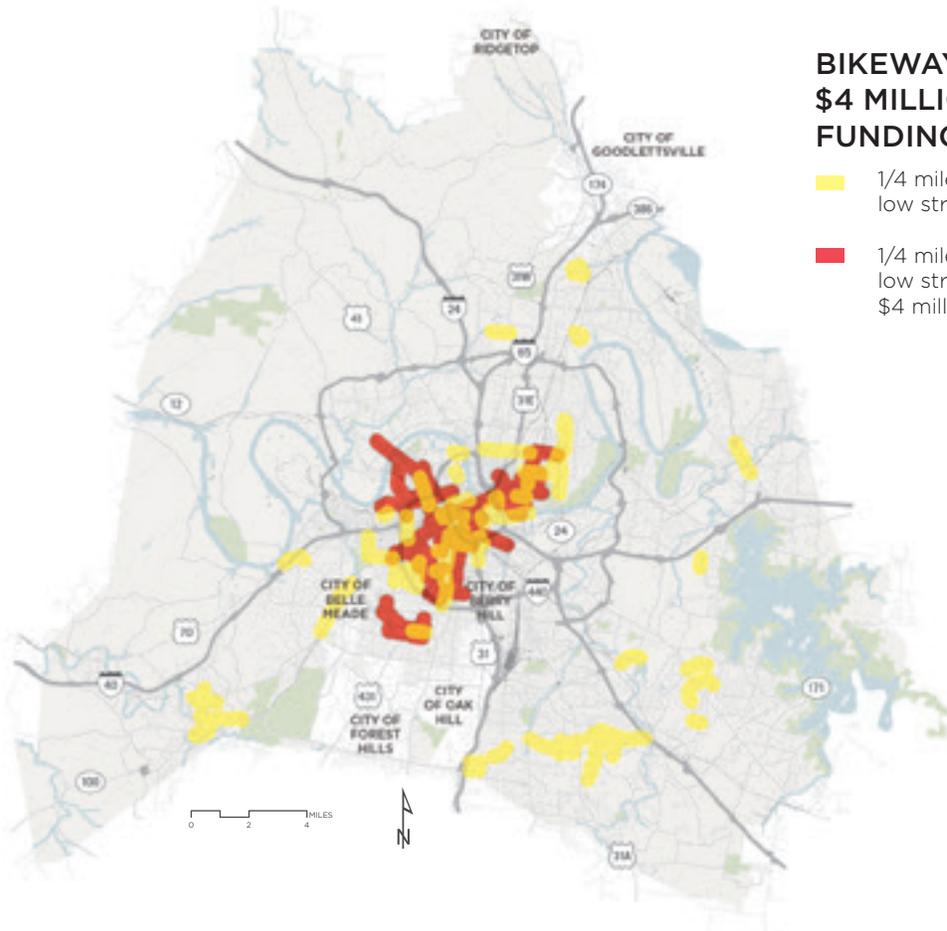
PRIORITY BIKEWAY FUNDING SCENARIO: \$4 MILLION/5-YEARS

- 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

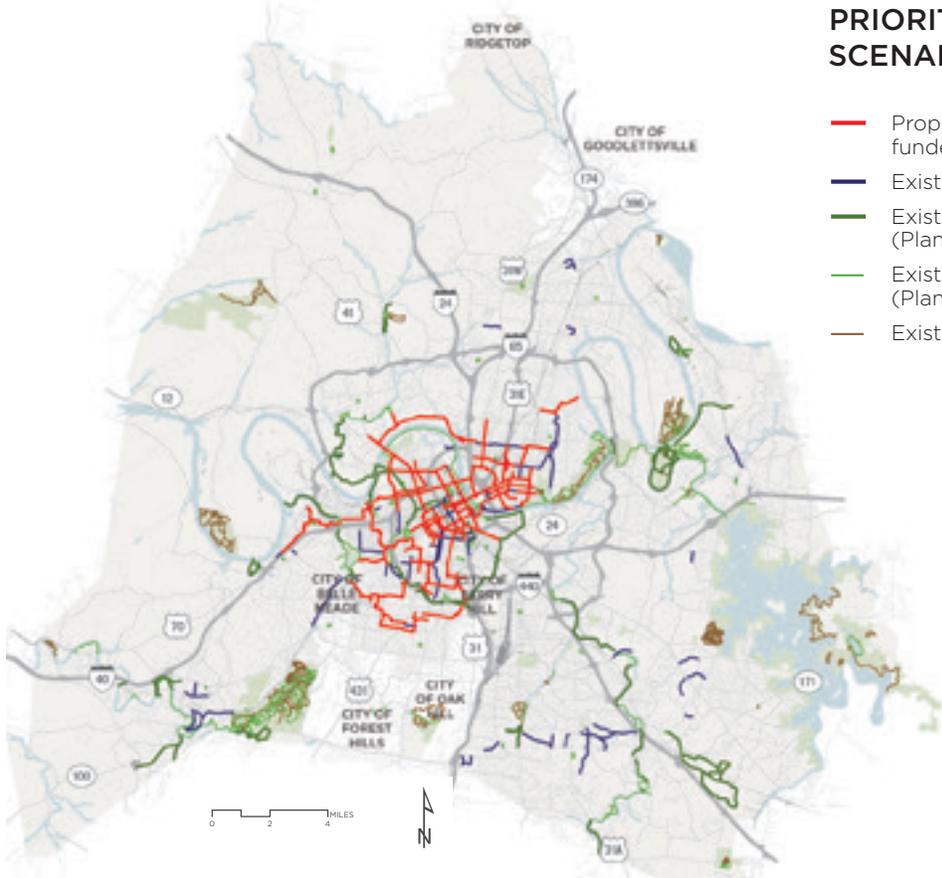


BIKEWAY NETWORK ACCESS: \$4 MILLION/5-YEARS FUNDING SCENARIO

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

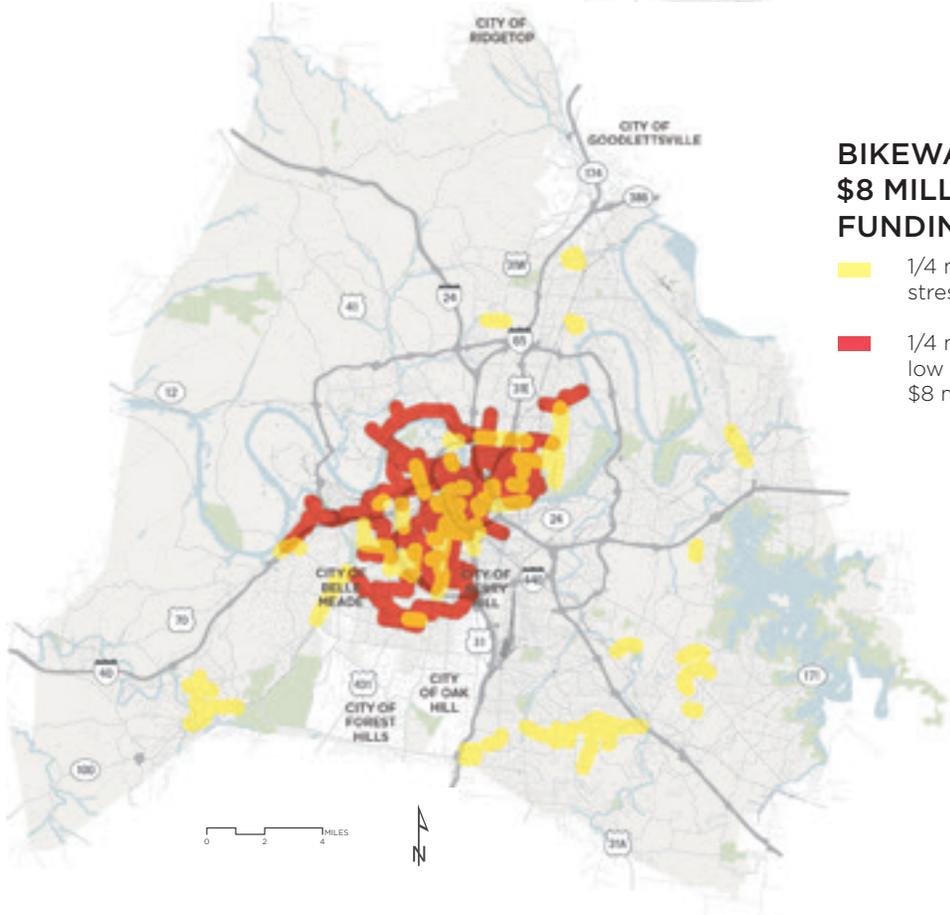


PRIORITY BIKEWAYS FUNDING SCENARIO: \$8 MILLION/5-YEARS



- 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

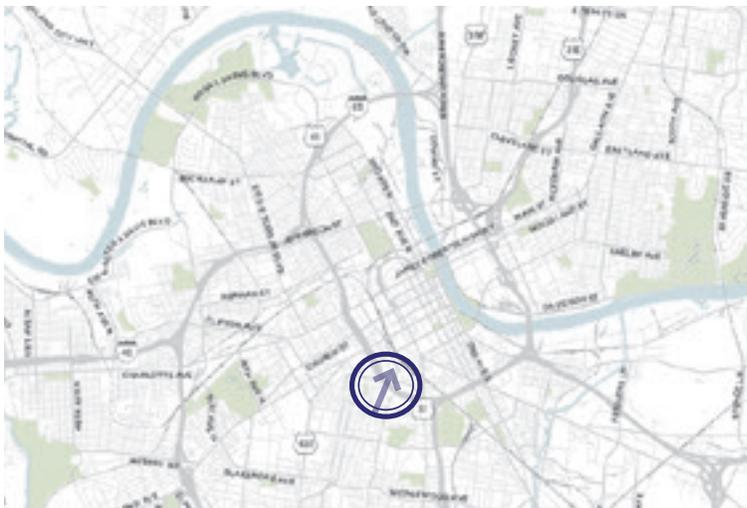


- 1/4 mile bikeshed for existing low stress bikeways
- 1/4 mile bikeshed for proposed low stress bikeways funded with \$8 million/year

Photo Simulation Example of Potential Bikeway Implementation

12th AVENUE

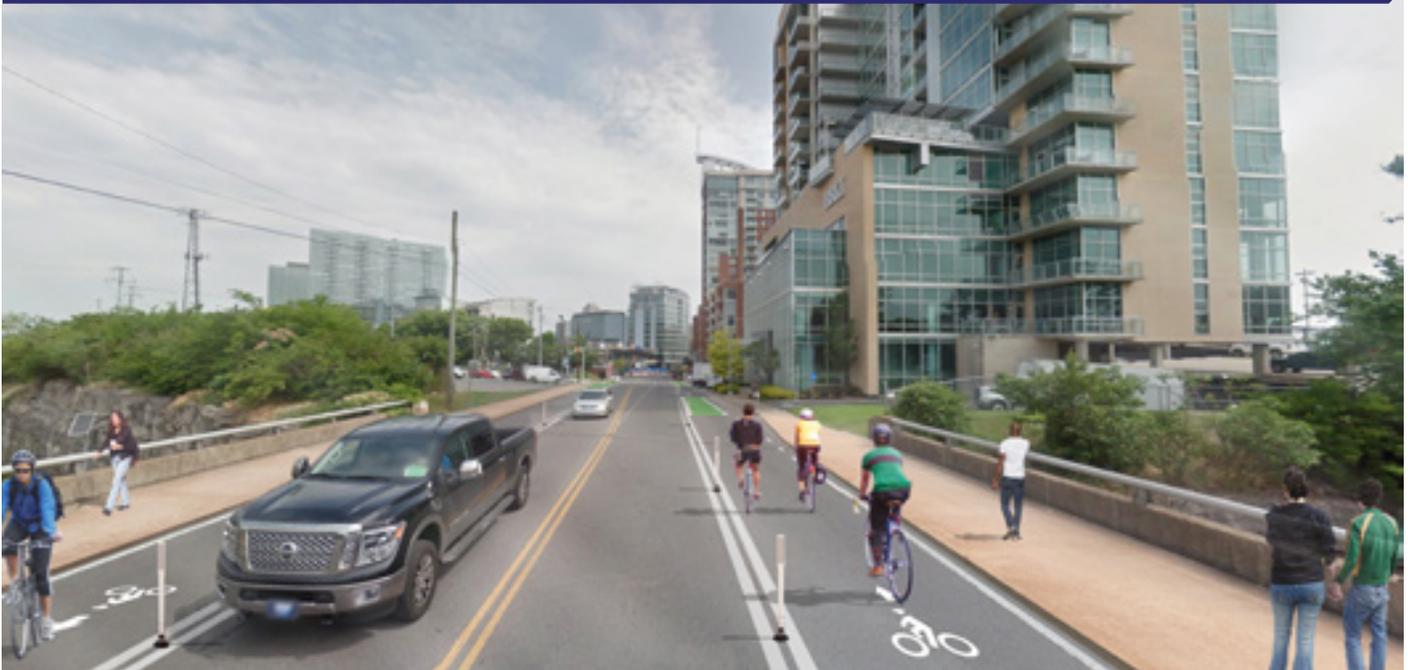
EXISTING CONDITIONS



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.

- Existing Sidewalks
- Missing Sidewalks



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



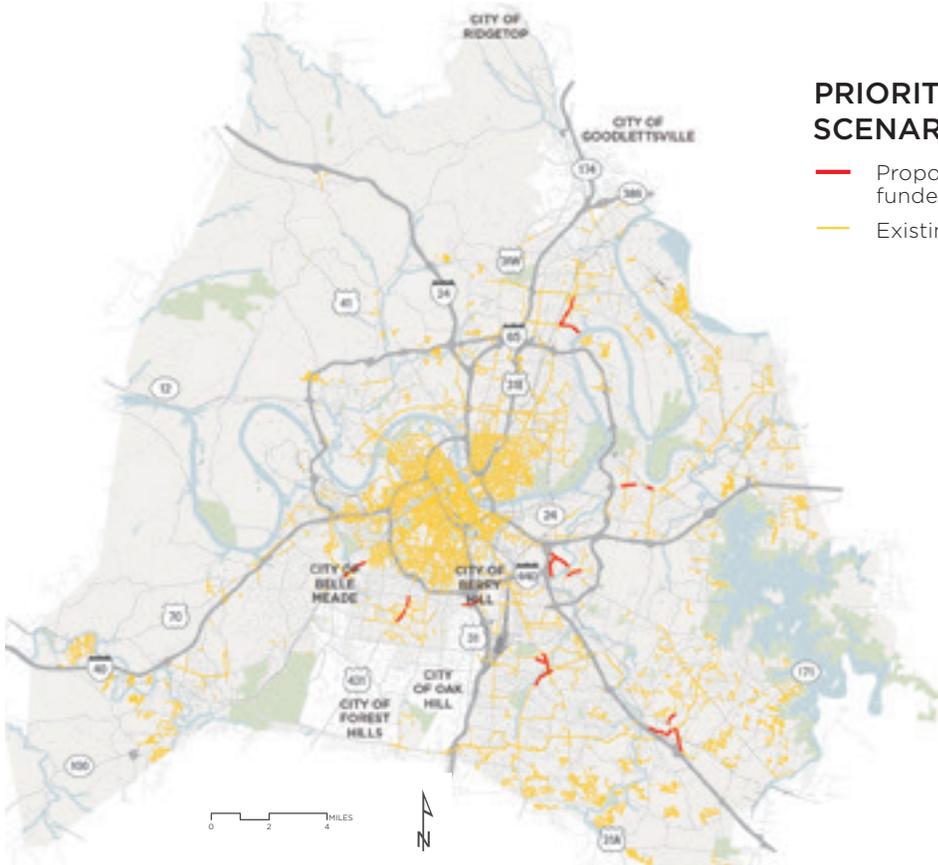
71% of all streets in **Seattle** have sidewalks.



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

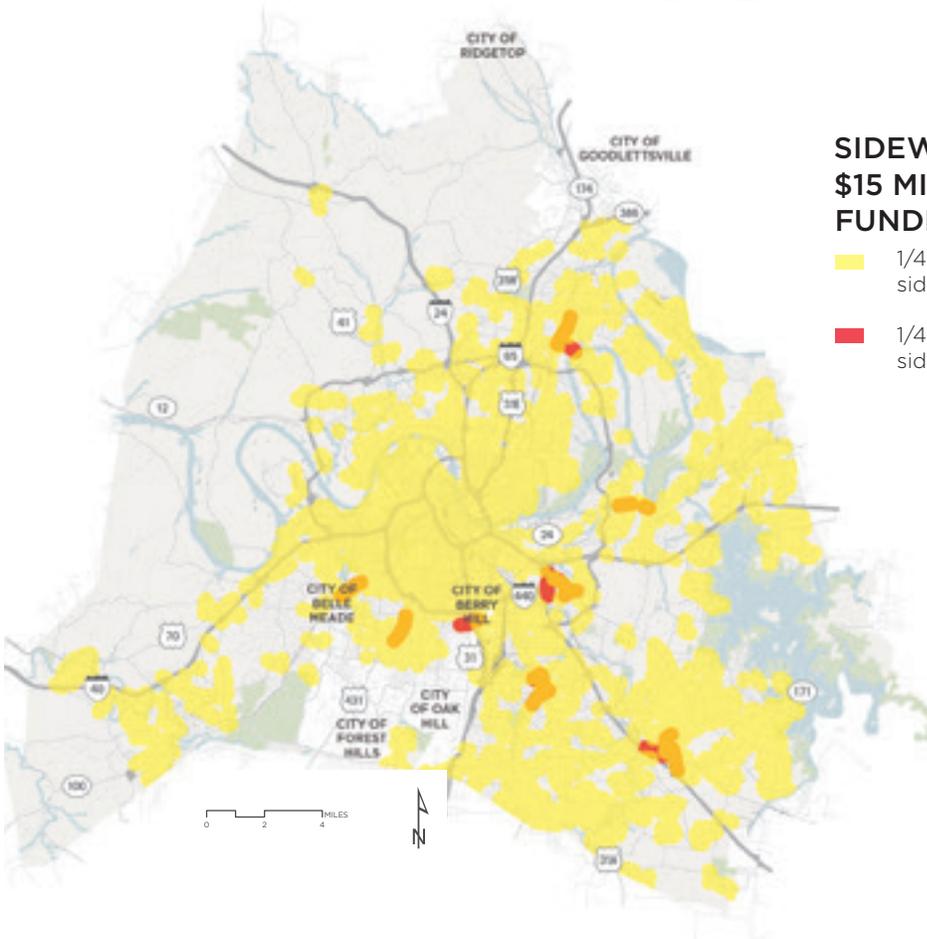
Table 7-3. Sidewalk Funding Scenarios

Annual Funding Allocation	Years to Complete Priority Sidewalk Network
\$15,000,000	35 years
\$30,000,000	20 years
\$92,000,000	5 years



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

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

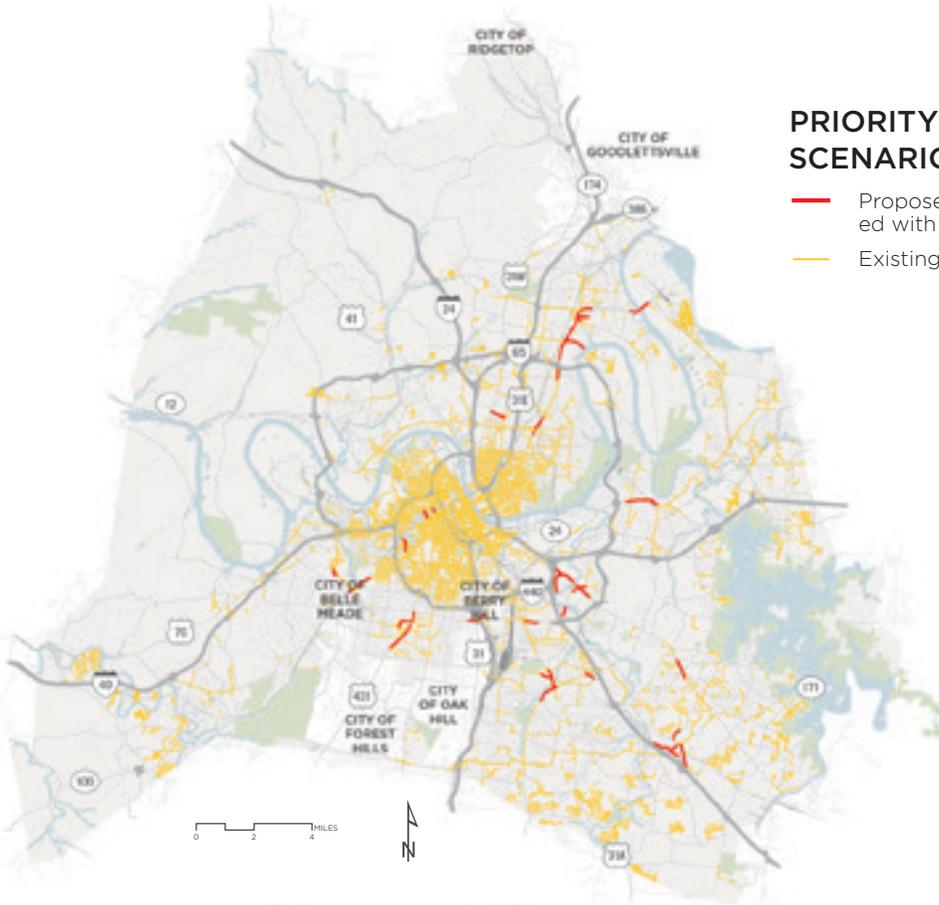


SIDEWALK NETWORK ACCESS: \$15 MILLION/5-YEARS FUNDING SCENARIO

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

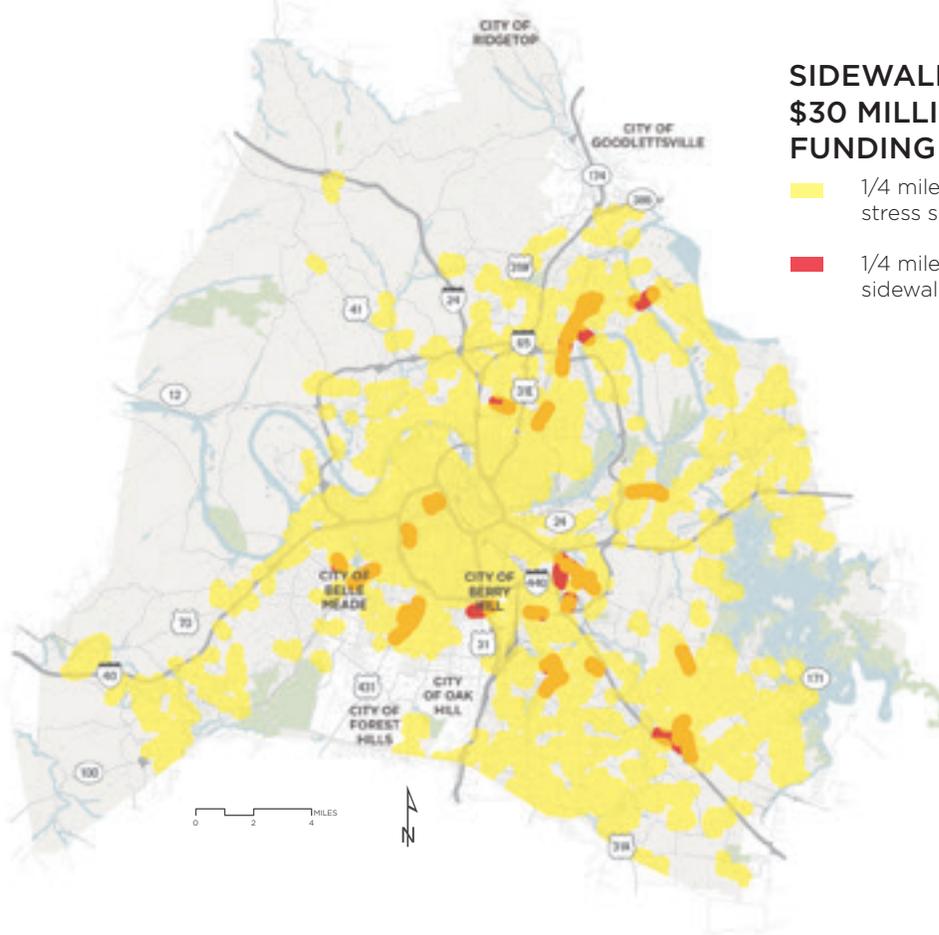
PRIORITY SIDEWALK FUNDING SCENARIO: \$30 MILLION/5-YEARS

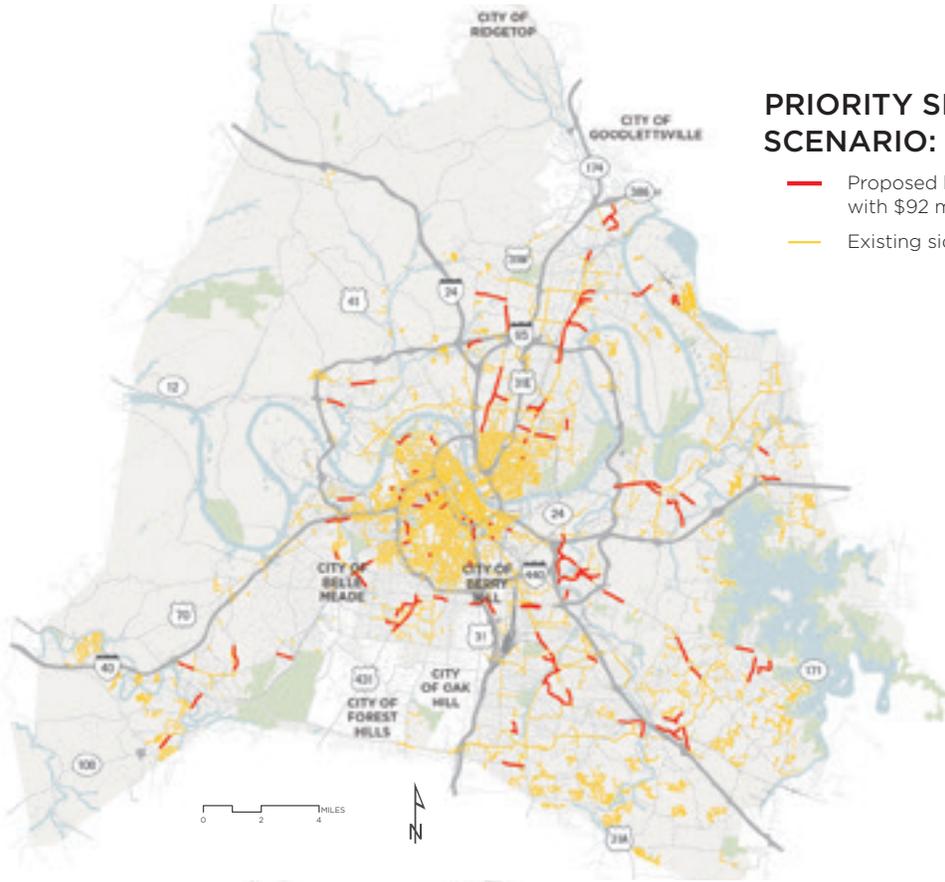
- Proposed high priority sidewalks funded with \$30 million/year
- Existing sidewalks



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

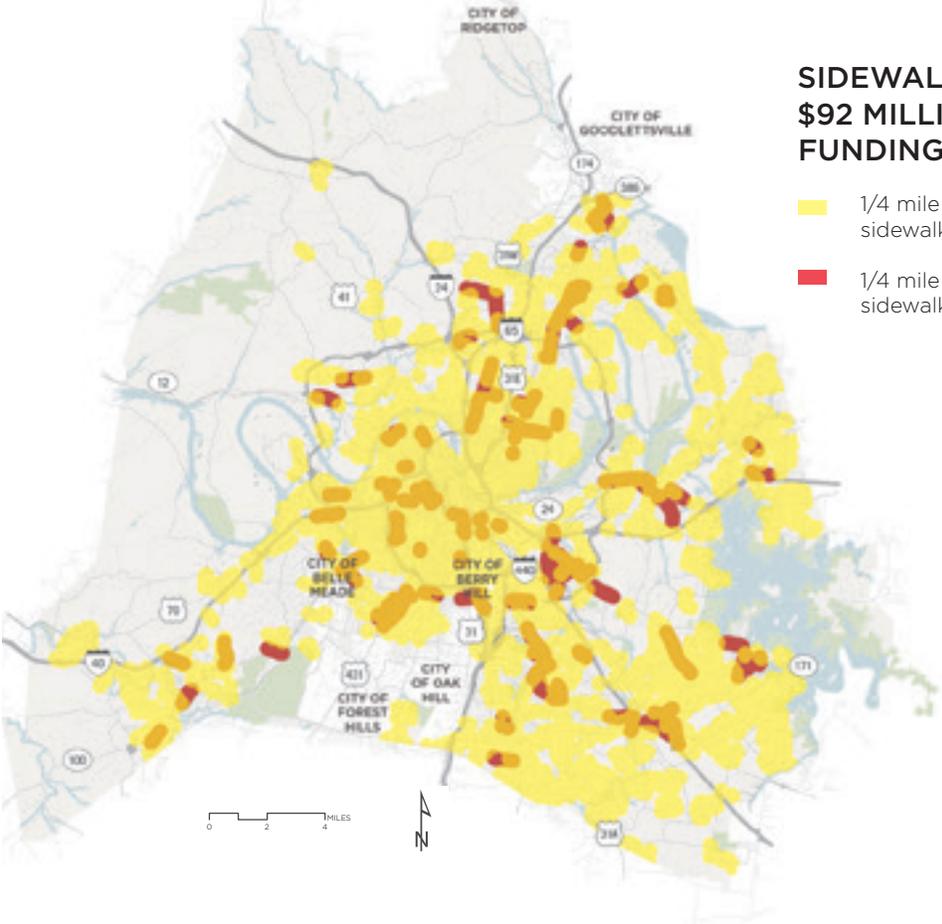
- 1/4 mile walkshed for existing low stress sidewalks
- 1/4 mile walkshed for proposed sidewalks with \$30 million/year





PRIORITY SIDEWALK FUNDING SCENARIO: \$92 MILLION/5-YEARS

- Proposed high priority sidewalks funded with \$92 million/year
- Existing sidewalks



SIDEWALK NETWORK ACCESS: \$92 MILLION/5-YEARS FUNDING SCENARIO

- 1/4 mile walkshed for existing sidewalks
- 1/4 mile walkshed for proposed sidewalks with \$92 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

Item	Roadway Type		
	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

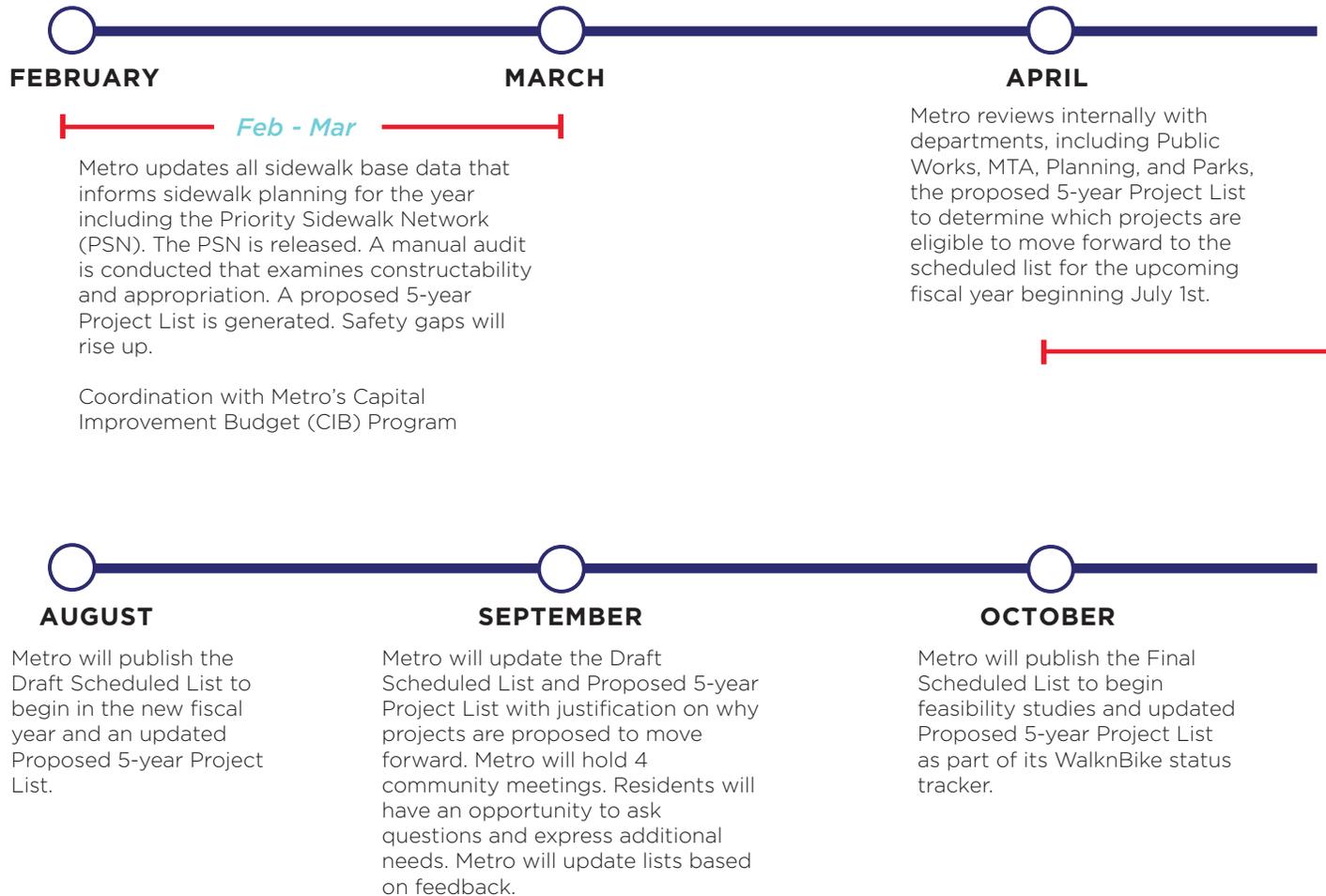
How Can Nashville Residents Track Sidewalk Project Development?

Metro will develop a WalknBike status tracker to publicize sidewalk projects that are moving forward to construction. Residents will have an opportunity to submit an e-mail address to alert them when information is updated.

In addition to Metro Council budget hearings, community meetings will be held annually to review the entire sidewalk program and review project selections.

As projects are undertaken, community meetings will be conducted with impacted property owners within the project’s construction area.

The figure below illustrates how a project moves from the Priority Sidewalk Network to a scheduled project.



Metro’s Capital Improvement Budget sets aside amounts for construction of sidewalk and bikeway projects over a seven-year period. The process for development of this budget runs concurrently with that of the Operating Budget.

Metro’s Capital Spending Plan denotes spending amounts for each forthcoming year on the sidewalk and bikeway programs, and typically is also developed concurrently with the Capital and Operating Budgets.



Metro budget is typically adopted by Metro Council which finalizes the sidewalk program funds for the fiscal year. This funding amount is used to finalize a Draft Scheduled List.

Apr - June

Mayor and Metro Council hold budget meetings and hearings. Residents can voice concerns about funding amounts for next fiscal year’s sidewalk program.



The WalknBike status tracker will be updated with information on each project on the scheduled list. As the status of a project changes, information will be updated. If projects are stalled, information will be provided. Other projects may be bumped up to continue utilizing programmed funding. These decisions will be documented in the status tracker.

Projects continue to be updated and the engagement process for moving sidewalks from proposed to scheduled is repeated annually.

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

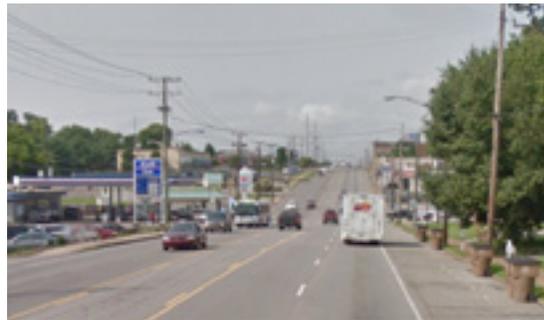
High Capacity Transit (HCT) corridors represent the five primary travel corridors serving all trip types and all modes. For the purposes of this plan, the five HCT corridors do not have a specific bikeway recommendation. Instead, the bikeway network will need to be updated once the final cross-section is developed for each corridor. Several segments of these corridors are identified in the priority sidewalk network.

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.



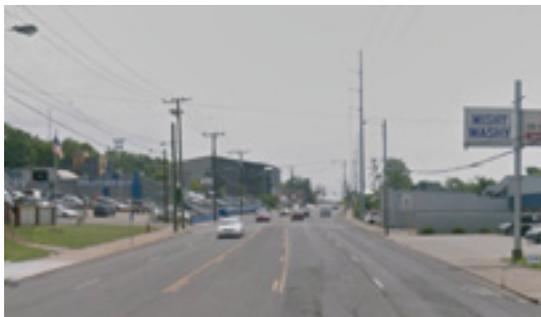
Dickerson Pike



Gallatin Pike



Murfreesboro Pike



Charlotte Pike



Nolensville Pike

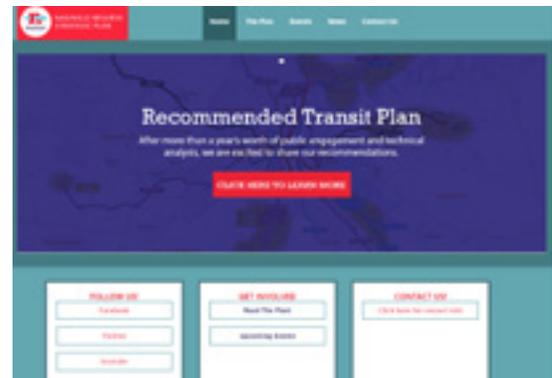
As MTA kicks-off their 2017 High Capacity Transit Corridor Study to analyze each corridor in more detail, it is important all modes be accommodated along the same street. Because these 5 corridors are being studied further, WalknBike does not include specific recommendations along these corridors. **However, 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:

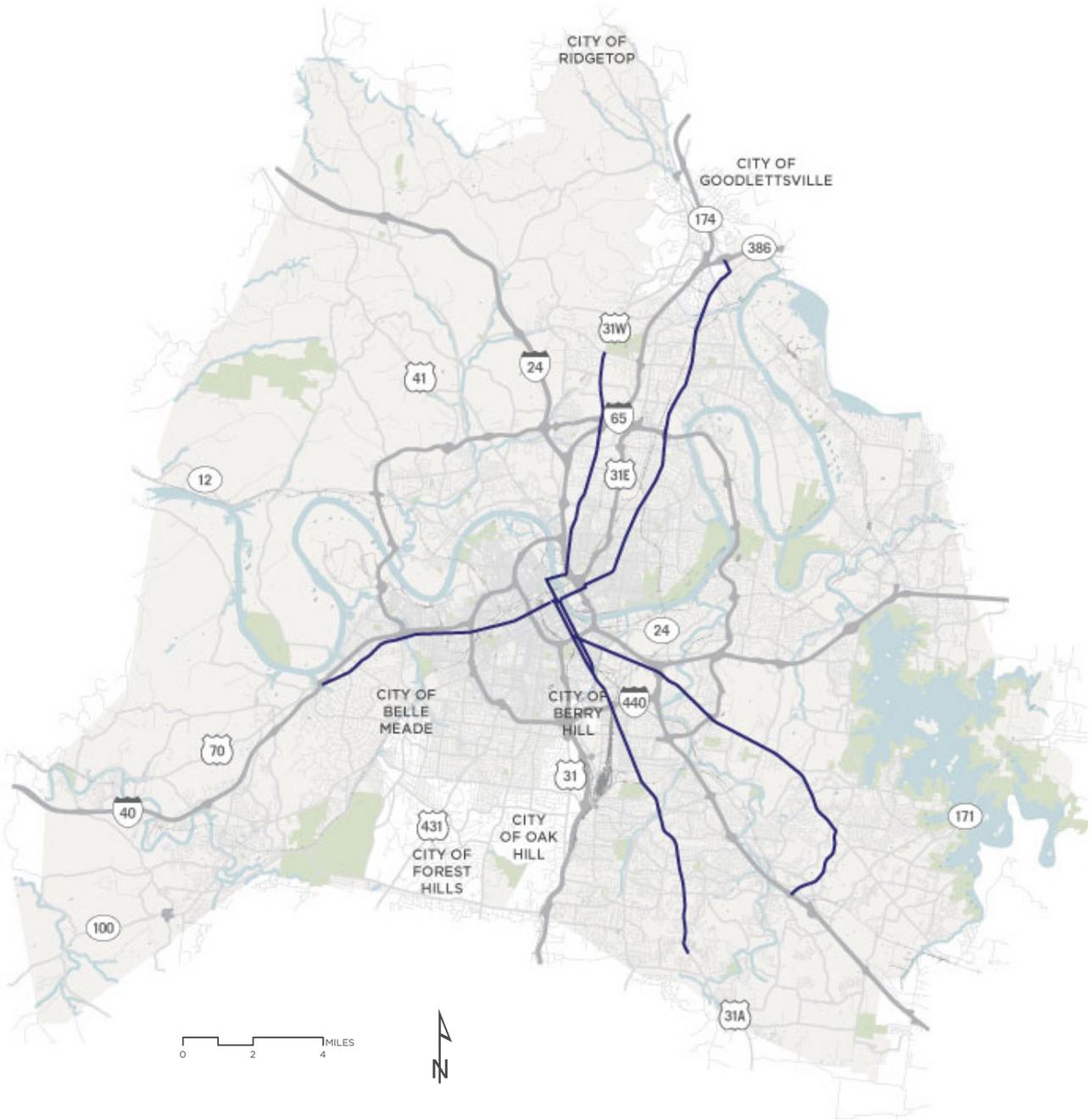
- Can each mode run on primary street safely, comfortably, and with enough space/person capacity?
- Is a parallel route option available?
- Does the corridor primarily serve inter-neighborhood or regional through trips?
- Can the existing roadway cross-section be changed?
- Can person capacity be added?



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	1-40 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

This page intentionally left blank.

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 Program (STBG)	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 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, 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 to 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	<ul style="list-style-type: none"> State bike and pedestrian grants State multi-modal access grants State Safe Routes to School (SRTS) funds
Local or regional	<ul style="list-style-type: none"> Business Improvement District (BID) funds General obligation bonds Local Capital Improvement Programs (CIP) Regional bike and pedestrian program funds Tax increment financing (TIF) Unspecified city funds Voter-approved sales taxes or other levies Transit agency funding (operating) Speeding infraction revenue
Private	<ul style="list-style-type: none"> Developers Hospitals Philanthropy/ foundations 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. Cities typically use commute mode share data provided by the U.S. Census Bureau to gauge how many people are walking and biking. While this data only captures work trips, it is the most consistent and reliable data source for walking and biking trips. 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 and increased investment in programs and policies 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. The benefits analysis utilizes a standard methodology for calculating health-, environmental-, and transportation-related benefits. All projections are based on American Community Survey (ACS) 2011-2015 five-year estimates from the U.S. Census Bureau, which are then extrapolated through the use

of various multipliers derived from national studies and quantified in terms of monetary value where appropriate. 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.

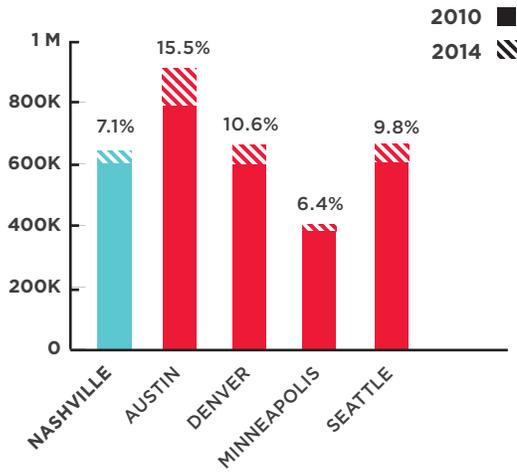
BFC DESIGNATION

NASHVILLE	<i>Bronze</i>
AUSTIN	<i>Gold</i>
DENVER	<i>Silver</i>
MINNEAPOLIS	<i>Gold</i>
SEATTLE	<i>Gold</i>

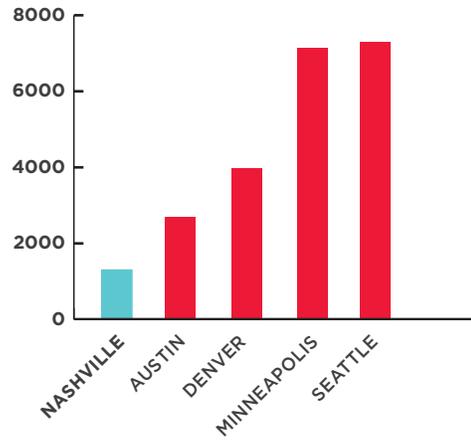
CONSOLIDATED GOVERNMENT?

	<i>yes</i>	<i>no</i>
NASHVILLE	<input checked="" type="radio"/>	<input type="radio"/>
AUSTIN	<input type="radio"/>	<input checked="" type="radio"/>
DENVER	<input checked="" type="radio"/>	<input type="radio"/>
MINNEAPOLIS	<input type="radio"/>	<input checked="" type="radio"/>
SEATTLE	<input type="radio"/>	<input checked="" type="radio"/>

POPULATION GROWTH 2010-2014



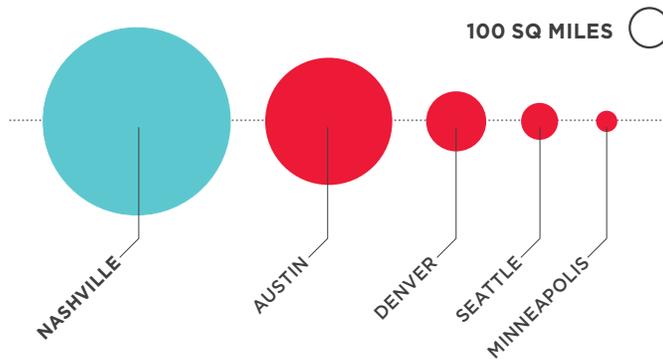
POPULATION DENSITY (per sq. miles)



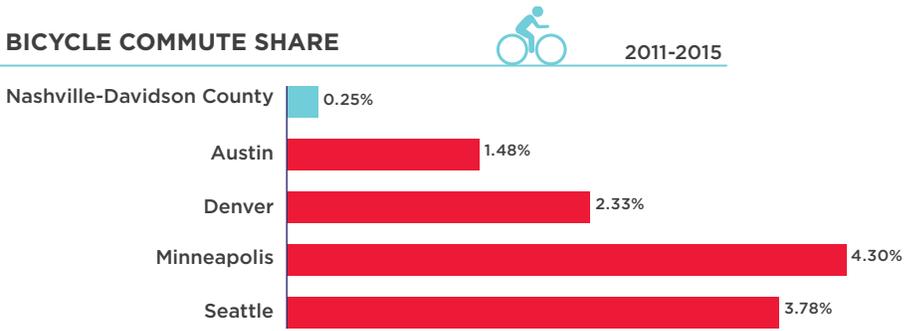
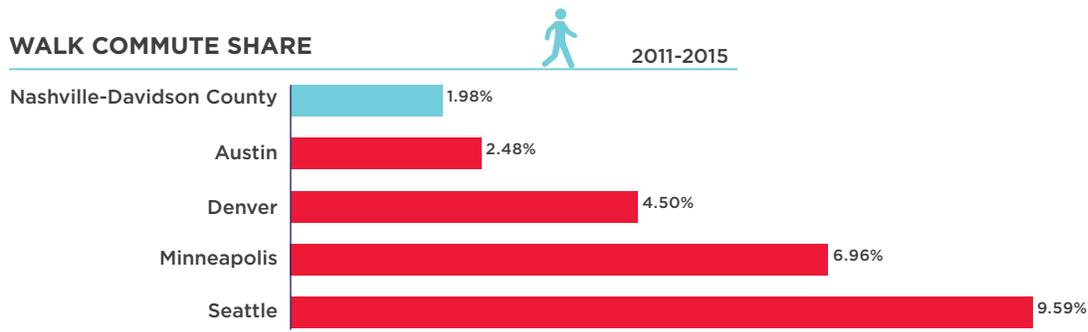
NASHVILLE ■

ASPIRATIONAL CITY ■

AREA (sq. miles)



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 25th percentile of existing bike commute mode shares in Austin, Denver, Minneapolis, and Seattle. In terms of walking, Nashville should strive for a walk commute mode share of 4% within 5 years. This is also based on the 25th percentile of current walk mode shares of aspirational cities.

Based on these goals for walking and biking as a means of transportation to and from work, the project team estimated the potential benefits that Nashville could experience. These benefits fall in three categories: health, environmental, and transportation. The benefits analysis 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. 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%

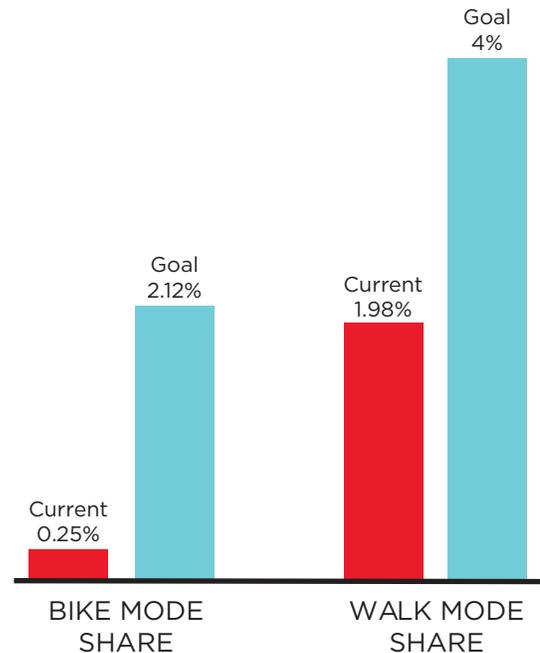


Table 7-9. Anticipated Health, Environmental, and Transportation Benefits Per Year

Benefits	Current Mode Share		Commute Mode Share Goal (25th percentile of aspirational cities' commute mode shares)	
	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	

*This analysis does not include potential economic investment from development or the maintenance/replacement costs for infrastructure.



**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.



Nashville could achieve national recognition by applying to become a Walk Friendly and re-applying to elevate the existing Bike Friendly Community status to a silver-level designation.

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

