

The Bikeway Network

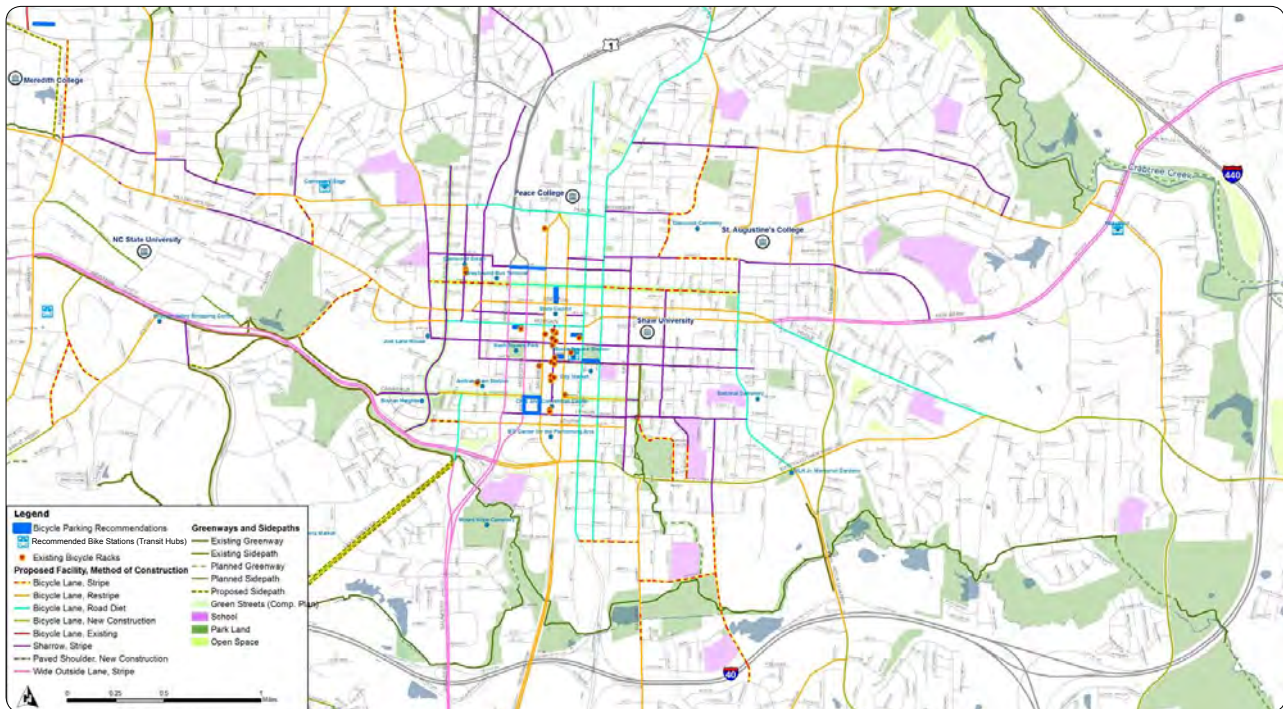
BikeRaleigh Plan

Vision: “Raleigh is a place where people of all ages and abilities bicycle comfortably and safely for transportation, fitness, and enjoyment. The BikeRaleigh network is integrated into the transportation system to connect people to where they live, work, play, and learn.”

The 2015 BikeRaleigh Plan Update broadens the existing toolbox and identifies a connected network for bicyclists of All Ages and Abilities. It uses the current best practices for creating safe streets for the entire range of people riding bicycles.

The network of the 2009 Bicycle Transportation Plan was a “comprehensive set of proposed bicycle transportation facilities.” The bicycle lane was the preferred facility at the time. In the years since, it has become clear through research and experiences in other cities that bicycle lanes do not adequately serve most potential bicyclists on most streets. This chapter describes two types of bike facilities that serve the majority of the population in street rights-of-way: separated bikeways and neighborhood bikeways. By identifying the best routes to employ these facilities, the result is a plan for a bicycle facility network where people will feel safe and comfortable riding their bicycles from their neighborhoods to any destination within the City.

This chapter also features the recommended long term bikeway network, with a discussion of facility types, bicyclist types, and network methodology. The Long Term Bikeway Plan shown in the maps at the conclusion of the chapter is a vision for a master plan.



2009 Bicycle Transportation Plan Recommended Network Map

BICYCLE NETWORK DEVELOPMENT

This plan update refines the long-term vision for a network of on-street bicycle facilities, including separated bikeways, bike lanes, and neighborhood bikeways.

The project team used the 2009 bicycle network recommendations, public input, gap analysis, equity analysis, and the results of the Level of Traffic Stress (LTS) analysis (described in Chapter 2) to develop the network of separated bikeways and neighborhood bikeways. Combined with existing and planned greenway trails, these facilities form an All Ages and Ability network that is safe and comfortable for Interested but Concerned Cyclists. A “Hubs and Spokes” approach was used to identify key areas of demand (where people live and work) to link them with key destinations (where people learn, play, shop, dine, and recreate) with this All Ages and Ability network.

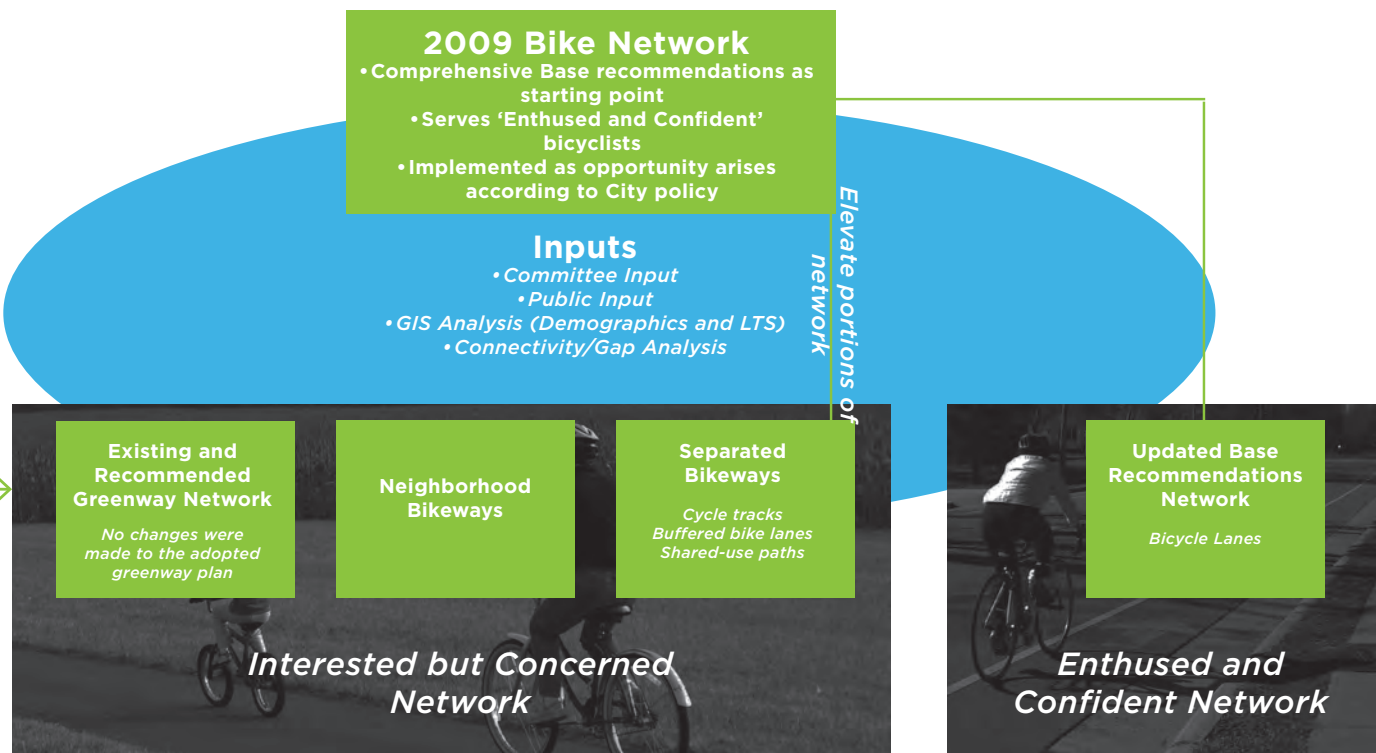
In addition to the all ages and ability network of separated and neighborhood bikeways, the plan also recommends that bicycle lanes be added to a number of streets. This is in following the city’s complete streets policy and the adopted street design standards that include bike

lanes for most non-residential street types. These designations arise from the adopted streets plan, are carried over from the previous Bicycle Transportation Plan, or are added because of the particular conditions on a particular street segment. Bicycle lanes are an important part of the network and serve an important role, but the separated bikeway and neighborhood bikeway networks will form most of the priority projects in this plan.

The Bikeway Network was developed using a "Hubs and Spokes" approach. The gray spokes include separated bikeways, bicycle lanes, and greenways.



BICYCLE NETWORK DEVELOPMENT PROCESS





Raleigh recently installed six miles of buffered bike lanes, including on Gorman St.

WHAT IS A SEPARATED BIKEWAY?

SERVES “INTERESTED BUT CONCERNED” CYCLISTS

This plan update defines a separated bikeway as a bicycle facility that is physically separated from motor vehicle traffic within a street corridor. ***For this Plan, this includes cycle tracks and buffered bike lanes, in addition to the City’s shared-use path and greenway network.*** The on-road physical separation can be achieved through parked cars, curbs, medians, bollards/traffic posts, planters, or marked buffered space between the bike lane and adjacent travel lane.

WHY SEPARATED BIKEWAYS?

Raleigh’s bicycle network has been expanded significantly in recent years, and people are biking. However, not everyone feels comfortable and safe riding on a busy street, even with a bike lane. There are some parts of the city where potential bicycling demand is high, yet low-stress bikeway facilities such as trails and lower-traffic streets are not an option. Separated bikeways can be low-stress facilities that provide vital connections to key destinations.



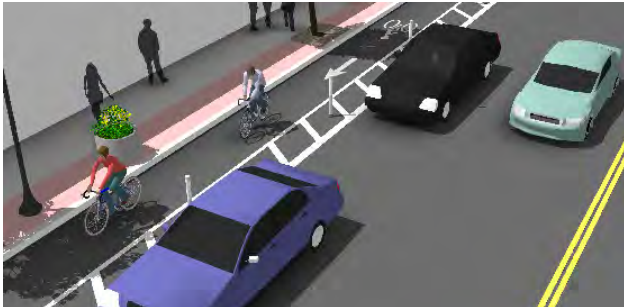
The City of Atlanta, GA installed a two-way cycle track with bollards/flexible posts along 10th Street.



An existing sidepath along Western Boulevard in Raleigh.

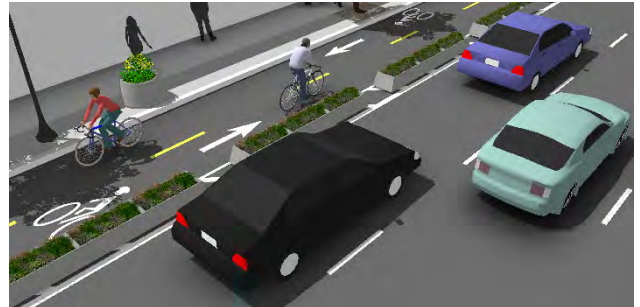
ON-ROAD SEPARATED BIKEWAY EXAMPLES

Of all on-street bicycle facilities, cycle tracks and buffered bicycle lanes offer the most protection and separation from adjacent motor vehicle traffic. Cycle tracks may be one-way or two-way, and may be at street level, or raised to the sidewalk or an intermediate level. For more detailed information, see the Design Guidelines appendix of this Plan.



ONE-WAY CYCLE TRACK

One-way cycle tracks are physically separated from motor vehicle traffic and typically provide bicycle travel in the same direction as motor vehicle traffic. They may be at street level, or distinct from the sidewalk, as a raised cycle track. In situations where on-street parking is allowed, cycle tracks are located adjacent to the curb and sidewalk, with on-street parking repositioned to buffer people on bicycles from moving vehicles.



TWO-WAY CYCLE TRACK

A two-way cycle track is an on-street bicycle facility that allows bicycle movement in both directions on one side of the street. Two-way cycle tracks must provide clear and understandable bicycle movements at intersections and drive-ways. Education is important to inform people how to travel in a safe manner.



BUFFERED BICYCLE LANE

Buffered bicycle lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. A buffered bicycle lane could potentially be converted to a cycle track.

INTERSECTION TREATMENTS FOUND IN THE DESIGN GUIDELINE APPENDIX INCLUDE:

Protected Intersections

Bicycle signal head and protected signal phase

Two-stage turn boxes

Separated bikeway mixing zone



Map 3.1: Separated Bikeway Network





WHAT IS A NEIGHBORHOOD BIKEWAY?

SERVES “INTERESTED BUT CONCERNED” CYCLISTS

Neighborhood bikeways, also known as “bicycle boulevards” in some cities, are low stress, active transportation corridors that have been optimized for bicycle travel. These corridors take advantage of the existing low-speed and low-volume local street network with enhanced crossings where routes cross major roadways. There are a wide variety of elements in a successful neighborhood bikeway, including:

WAYFINDING SIGNS & MARKINGS

Signs and pavement markings comprise the basic elements of a neighborhood bikeway. These elements differentiate the facility from other local streets and identify the bicycle boulevard as a shared street that has been optimized for bicycle and pedestrian travel. Possible tools include:

- » Warning Signage
- » Modified Street Signs
- » Wayfinding Signage
- » Pavement Markings
- » Shared Lane Markings (Sharrows)

SPEED MANAGEMENT

The closer that the operating speed of bicyclists is to motor vehicle traffic, the more comfortable it is for bicyclists. Possible treatments to reduce speed include:

- » Reduced Speed Limits
- » Horizontal and Vertical Deflection (Curb extensions, mini traffic circles, speed cushions, narrow streets, etc)

VOLUME MANAGEMENT

Maintaining motor vehicle volumes below 3,000 vehicles per day (vpd), where 1,000 - 1,500 vpd is preferred, significantly improves bicyclists' comfort. To manage volume, physical, or operational measures can be taken on routes that have been identified as a neighborhood bikeway. Possible measures include:

- » Traffic Restriction Signage
- » Choker Entrances
- » Diagonal Traffic Diverters
- » Median Diverters

Examples of neighborhood bikeway treatments from Minneapolis, MN (top photo), Los Angeles, CA (middle photo) and Milwaukee, WI (bottom photo).



Santa Monica, CA created a pop-up bicycle boulevard to test intersection treatments along Michigan Avenue.

INTERSECTION DESIGN

The level of design emphasis required at intersections along a neighborhood bikeway is dependent on whether the intersection occurs at a major or minor street and the complexity of the intersection. Striking a balance between maximizing bicyclist safety and minimizing bicyclist delay is essential. Possible design measures include:

- » Stop Sign Placement
- » Neighborhood Traffic Circles
- » Bicycle Detection at Signalized Intersections
- » Bike Boxes
- » Median Refuge Islands
- » Mid-Block Crossings
- » Bike Left-Turn Lanes

WHY NEIGHBORHOOD BIKEWAYS?

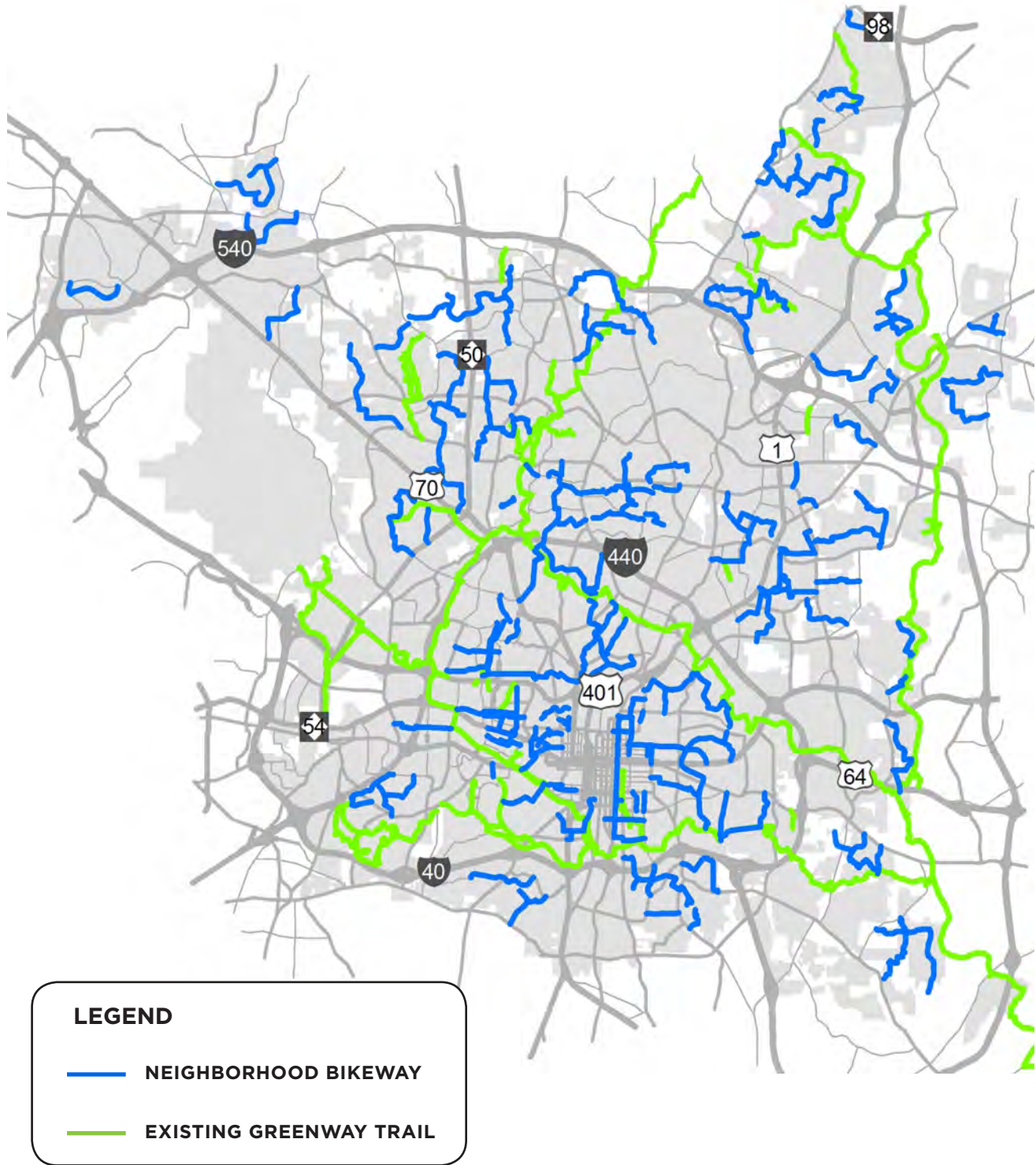
Neighborhood bikeways appeal to the widest range of bicycle users, especially the “interested but concerned” group. Benefits of neighborhood bikeways include:



An example of a neighborhood traffic circle installed along a Rochester, NY bicycle boulevard.

- » *Good for all ages, all abilities* – Many bicyclists, or people interested in bicycling, are not comfortable riding in bike lanes on major roads.
- » *Lower speeds and traffic volumes* – These bikeways are more comfortable, attractive facilities due to fewer interactions with motor vehicles and lower overall traffic speeds.
- » *Connects to destinations* – These bikeways connect cyclists to key destinations, such as greenways, while reducing the amount of time spent on bikeways along major roads.
- » *Low-cost and ease of implementation* – For relatively low investment, a neighborhood bikeway can take advantage of existing infrastructure and include spot treatments, sharrows, and signage.

Map 3.2: Neighborhood Bikeway Network



WHAT IS A MAIN STREET BIKEWAY?

SERVES “ENTHUSED AND CONFIDENT” CYCLISTS

Main street bikeways are mixed use streets with on-street parking and low design speeds, usually found downtown. These streets are designed for high pedestrian volumes and active street walls. This condition makes it appropriate for bicycles to share space with automobiles in general travel lanes. Shared lane markings, or “sharrows”, may often be placed along these bikeways to help align bicyclists properly and alert motor vehicle drivers to expect bicycle traffic. Main Street Bikeways are designated where Raleigh’s adopted street plan calls for “Main Street, Parallel Parking or Angular Parking”.



Hargett Street is categorized as a Main Street Bikeway in the long term bikeway network.

WHAT IS A BICYCLE LANE?

SERVES “ENTHUSED AND CONFIDENT” CYCLISTS

This plan update defines bicycle lanes as a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. Bicycle lanes carry bicyclists in the same direction as adjacent motor vehicle traffic. While bicycle lanes on both sides of the roadway are preferred, when space is limited, uphill bike lanes and downhill shared lane markings are an option.



Bicycle lane along Salisbury Street next to on-street parking.



Example of uphill bicycle lanes and downhill shared lane markings along North Hills Drive.

Map 3.3: Main Street Bikeways + Bicycle Lanes



THE 2015 RECOMMENDED BIKEWAY NETWORK

The 2015 long term bikeway recommendations, both low-stress and conventional, are shown by geographical sector on Maps 3-4 through 3-10 (see map key on next page). Table 3-1 shows the mileage breakdown of existing bicycle facilities, recommended network improvements by facility type, and total network miles.

The Long Term Bikeway Plan shown in the maps is a vision for a master plan. The bicycle lane and separated bikeway designations are recommended to be adopted into the Comprehensive Plan. The Long Term Bikeway Plan will be guidance for the resurfacing program, capital improvement scoping, and development-provided public improvements. Note however, that in many cases, facilities cannot be implemented without significant new development or major capital improvements that are not anticipated during this plan's life.

TABLE 3-1: 2015 BICYCLE NETWORK (SHOWN IN MILES)

Facility Type	Existing Facilities	Percent of Existing Facilities	Long Term Network	Percent of Long Term Network
Paved Greenway Trail	107	57%	130	16%
Separated Bikeway	21	11%	195	23%
Neighborhood Bikeway	0	0%	144	17%
Main Street Bikeway and Sharrows	27	14%	7	1%
Bicycle Lane, including climbing lanes	32	17%	353	43%
Total	187	100%	829	100%

MAP KEY FOR THE FOLLOWING PAGES

Map key of the seven sector maps detailing the Long Term Bikeway Plan on pages 3-15 through 3-21.

