

Executive Summary

Over the last year, citizens of Charlotte, the Bicycle Master Plan Stakeholder Group and City Staff have worked to update the City's Bicycle Master Plan in an effort to transform Charlotte into the premier bicycling City in the United States. The vision statement below provided the framework for this exciting and timely effort.

"Charlotte is the premier bicycling city in the United States. Policies, programs and facilities promote safe recreational and commuter cycling for those of all skill levels."

Vision Statement - Bicycle Master Plan Stakeholder Group

This Plan sets forward a blueprint for an accessible, connected and comfortable network of bicycle facilities in the City of Charlotte. The bicycle facility network should be supplemented with effective bicycle education and awareness initiatives and targeted policy revisions to continuously support and build upon the emerging bicycle network.

Charlotte is experiencing significant growth and development and is at a critical crossroads as it seeks to become a bicycle-friendly City. Its current population of around 664,000 is expected to grow by an additional 350,000 residents by 2030. There is substantial residential, commercial and office development projected throughout the City. Transportation choices will be necessary to accommodate this growth.

The Transportation Action Plan (TAP) was adopted in May of 2006 as Charlotte's first comprehensive transportation plan. By adopting the TAP, Charlotte demonstrated its commitment to "becoming the premier city in the country for integrating land use and transportation choices." Bicycle-related goals and objectives from the TAP Policy Document are included below and further described in Appendix B.

- Goal 2 - Prioritize, design, construct and maintain convenient and efficient transportation facilities to improve safety, and neighborhood livability, foster economic development, promote transportation choices and meet land use objectives. (Page 16)
- Policy 2.1.2 - The City will promote a balanced and multi-modal transportation system that serves the mobility needs of all segments of the population, accommodates all travel modes and promotes community economic development needs. (Page 16)



Mayor Patrick McCrory introducing the Bicycle Master Plan process at the first public meeting on October 9, 2007

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Figure ES-1: Public input opportunities

The TAP calls for a “Centers and Corridors” strategy to guide growth into areas where it is best served and calls for widening many roads in Charlotte over time. The City recently adopted Urban Street Design Guidelines to create “complete” streets, which provide capacity, mobility and comfort for all users including bicyclists, pedestrians, motorists and transit users, while also being more comfortable for neighborhood residents. Building on the TAP’s emphasis on transportation choice, the guidelines will ensure that most widened roads are designed with bicyclists in mind. This is especially powerful given that the City plans to widen more than 281 miles of roads by 2030. Many will include bicycle lanes as part of the widening process. The ongoing transportation planning efforts in Charlotte continue a history of forward-thinking transportation planning, which acknowledges the important role that bicycles play in Charlotte’s transportation network. Examples of recent bicycle-related initiatives are listed below.



Public input opportunities as part of the Bicycle Master Plan process

- Two public meetings attended by more than 100 people
- Online questionnaire completed by more than 800 people
- Stakeholder Group engagement
- Bicycle Advisory Committee engagement

- Bicycle projects have been included in local transportation bonds
- The City has hired a full time Bicycle Program Manager to manage the Bicycle Program and to serve as the City's bicycle advocate
- The City Council approved a bicycle parking ordinance to require bicycle parking facilities in new or substantially reconstructed developments
- The City has a procedure to provide bicycle lanes during street construction, reconstruction and resurfacing

Bicycle lanes that are added through the road widening and resurfacing process will add to the significant amount of bicycle facilities that already exist throughout Charlotte. Prior to 2000, there were no bicycle lanes in the City, but today there are over 51 miles of bicycle lanes, 20 miles of greenways, and 4 miles of signed routes through neighborhoods. A primary goal of this Plan is to present a clear vision and focused strategy for developing a

complete bicycle network that capitalizes on ongoing opportunities, eliminates gaps in the current network and incorporates facilities that will be created through the road widening and development process. This Plan builds on past planning efforts such as the 1999 Bicycle Master Plan, the TAP, the Center City Action Plan, the Urban Street Design Guidelines and the South End Bicycle and Pedestrian Connectivity Study and incorporates ongoing coordination with the Greenway Master Plan 2008 update.

Bicycle Network Map (Figure ES-2 - to be completed by 2030)

With implementation of this Plan, by 2030 the City of Charlotte will have **more than 700-miles of bicycle facilities** (see the Bicycle Route Network map on the following page). The network includes locations where specific improvements have either already been made or are proposed in the future. All routes on this map will have some type of visible cue (i.e. bicycle lane, striped shoulder, bicycle route sign, pavement marking, etc.) to indicate that accommodations have been made for bicyclists. While the network will provide primary routes for bicycling, it is important to note that, by law, bicyclists are permitted to use *all* roadways (except limited access freeways or where bicycles are otherwise prohibited). Therefore, the network will serve as a core system of major routes that can be used to access all parts of the City. Greenways will make a vital contribution to the creation of a connected bicycle network, as will neighborhood streets and transit facilities that accommodate bicyclists.

Table ES-1 below shows how this Plan will exceed the benchmark set in Objective 2.6 from the TAP, which states that “The City will complete at least 150 miles of bikeway facilities within the city by 2015, and an additional 350 miles by 2030.”

Table ES-1: 2008 to 2030 Bicycle Facilities

Bicycle Facility Type	Current (2008)	Near to Medium-Term (Total by 2015)	Long-Term (Total by 2030)
Bicycle Lanes	54	184	613
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Notes: 1. Totals do not include Proposed Shared Roadways. 2. 2015 totals include current facilities and 2030 totals include current and 2015 facilities. 3. A description of the bicycle facility types listed in the table above is provided in Chapter 7 of this Plan. 4. Implementation of the Urban Street Design Guidelines could result in a higher total of bicycle lane mileage.			

Figure ES-2: Long-Term Planned Bicycle Route Network



Immediate Action Recommendations (0 to 2 years)

Several of the project and program recommendations in this Plan should be implemented soon after it is adopted (within 2 years). These immediate action projects will improve bicycle conditions in specific areas, creating early successes for decision-makers to highlight. These immediate action projects will build momentum for the other recommendations in this Plan. Immediate action recommendations are listed below.

- Implement initial signed routes (See Figure 38)
- Update the City's existing bicycle educational and awareness video
- Actively pursue collaboration and partnerships with the new Safe Routes to School Program
- Pursue funding for on-road bicycle and greenway connection projects
- Implement initial set of shared lane markings, lane diets, road diets, proposed road widening and add striping recommendations (see Figure ES-3)



Near-term projects will help create early successes that will help build momentum for other recommendations in this Plan.

Near to Medium-Term Recommendations (To be completed by 2015)

In the near to medium-term (to be completed by 2015), the City will ensure that systems are in place to capitalize on potential opportunities to incorporate bicycle facilities in existing projects, while simultaneously pursuing a number of independent bicycle improvement projects. An important recommendation of this Plan is to enhance the collaboration and communication between the City's bicycling planning and road resurfacing efforts, while at the same time revising policies and regulations to ensure the provision of high-quality bicycle facilities as part of all new development.

Near-term bicycle facility projects include projects that are relatively inexpensive or critical to connectivity. These projects will help create early successes that will help build momentum for other recommendations in this Plan. Many of these projects are in locations where it is relatively straightforward to add bicycle lanes, climbing lanes, and shared lane markings to roadways. Near-term projects will also include some facilities that, while more challenging to implement, are critical to filling existing gaps.

Near-term bicycle facility recommendations are listed below.

- Provide an initial set of signed bicycle routes throughout the City (See Figure 38)
- Add bicycle facilities as part of the road construction and widening process
- Implement lane diets on routes identified on the Near to Medium-Term Opportunities map (see the lane diet recommendation in Figure ES-3)
- Implement the recommendations to add striping on routes identified on the Near to Medium-Term map (See the Add Striping recommendation in Figure ES-3)
- Implement the targeted road widening and sidepath construction recommendations identified on the Near to Medium-Term map (see the Proposed Road Widening and Proposed Sidepath recommendations in Figure ES-3)
- Add bicycle facilities as part of the road resurfacing process and through application of the USDG

While the long-term network will provide a dense network of bicycle facilities, the Near to Medium-Term Network will focus on the most important routes and connections in order to provide access to and between the Corridors and Centers identified in the TAP. The Near to Medium-Term Bicycle Route Network is shown as Figure ES-3 on the following page.



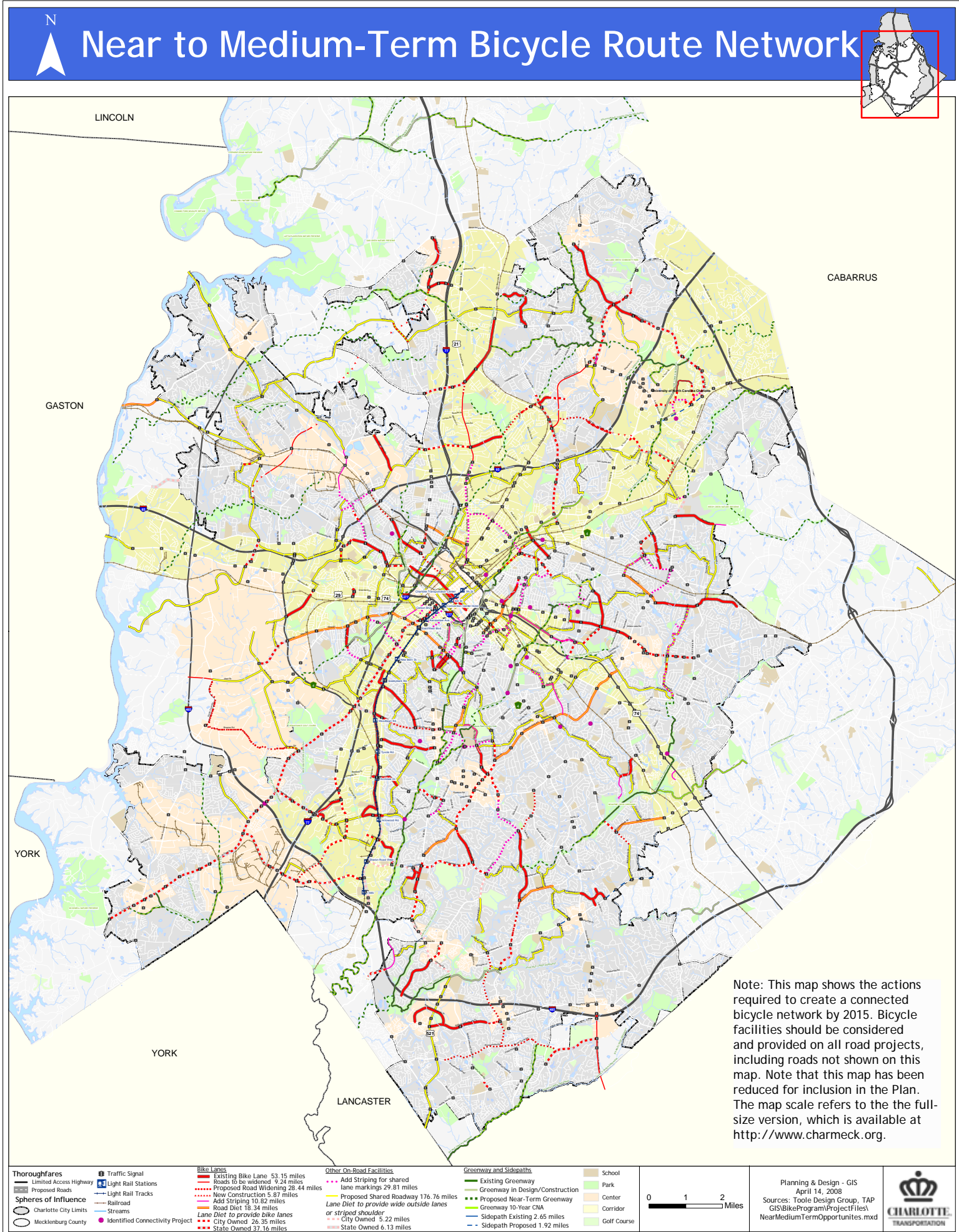
The medium-term network will focus on the most important routes and connections in order to provide access to and between the corridors and centers identified in the City's Transportation Action Plan.

The goal of the Near to Medium-Term Network is to ensure that bicyclists have an option of riding on a bicycle facility on critical routes in the City. The Near to Medium-term network relies heavily on the emerging greenway network, as well as on ongoing road widening, road resurfacing, continued application of the USDG and private-sector development. Charlotte should take advantage of opportunities that arise to implement the projects and programs sooner; however, the goal is to complete at least 150 miles of bikeway facilities within the City by 2015, per the TAP. Table ES-2 below outlines the actions that will be required to create the Near to Medium-term bicycle network by the year 2015.

Table ES-2: Action Recommendations to be Completed by 2015

Proposed Action Recommendation	Linear Miles
Road to be Widened (Planned by 2010)	9
Proposed Road Widening to Provide Bike Lanes (Recommended)	28
Add Striping to Provide Bike Lanes	11
Road Diet to Provide Bike Lanes	18
Lane Diet to Provide Bike Lanes on City-Maintained Road	26
Lane Diet to Provide Bike Lanes on State-Maintained Road	37
Add Striping to Provide Shared Lane Markings	30
Lane Diet to Provide Wide Outside Lanes or Striped Shoulders on a City and State-Maintained Road	11
Construct a Side Path	2

Figure ES-3: Near to Medium-Term Bicycle Route Network



This Plan envisions a connected network of bicycle facilities throughout Charlotte by 2015. The network will include a range of bicycle facilities depending on the nature of the roadway and its role within the transportation system. This network will depend heavily on seamless transitions between on-road bicycle facilities and greenways. Signage will also be important, as it will ensure that bicyclists have the information they need to select the best routes to reach their destination.

For the Near to Medium-Term Bicycle Route Network to function properly, specific intersections will have to be improved to provide enhanced bicycle access. Connectivity projects such as those highlighted in the Charlotte Pedestrian and Bicycle Neighborhood Connectivity Study will need to be addressed to eliminate barriers in the network. In addition, the City will need to identify, design and implement spot improvements such as adding bicycle detection at selected traffic lights and providing left-turn pockets for bicyclists, on an ongoing basis. In many cases, these improvements should be completed prior to or in tandem with signing a route.

Educational and awareness initiatives will also play a critical role in creating a safer bicycling environment and forging a higher level of understanding between bicyclists and other road and path users. Current programs and initiatives to continue are listed below.

- Continue to conduct annual BIKE Charlotte events
- Continue to implement Share the Road campaigns
- Continue to provide group presentations
- Continue to provide bicycle awareness presentations to CATS new operators classes
- Continue to update the CDOT bicycle program website
- Continue to operate booths at fairs and events
- Continue to provide bicycle stickers, posters and other promotional items
- Continue to maintain existing brochures and develop additional ones (all educational handouts such as brochures, pamphlets and flyers should be bilingual)
- Continue to provide local training webinars for engineers and planners
- Continue to conduct annual crash analysis to determine local crash characteristics
- Continue to educate cyclists on how to use bike racks on transit to promote safe usage (CATS rack and roll video, demonstration rack at events)



As the Bicycle Route Network is built and more people are encouraged to bicycle, new programs will be needed to educate bicyclists and motorists about how to safely co-exist in the roadway environment.

In addition to the current educational and awareness initiatives outlined above, the City should undertake additional programs in the near to medium term, including the following:

- Provide adult bicycle skills classes
- Provide new general information bicycle video for motorists and cyclists
- Pursue bicycle partnerships (Racks, Showers for Bike Commuters, incentives to bike to work)
- Provide “Basics of Bicycling” school curriculum at one pilot school
- Provide public service announcements
- Provide bicycle awareness in drivers’ education and licensing (within scope of CDOT)
- Provide bicycle mapping resources such as the Charlotte Cycling Guide
- Conduct specific bicycle events in addition to BIKE Charlotte (Midnight Ride, Bike to the Park, Bike to the Movies, Ride Route 88, etc)
- Provide a bicycle tour of bicycle facilities (BAC member guided. Requires training of leaders)
- Train City staff on bicycle goals and Bicycle Master Plan
- Advertise new bicycle facilities
- Conduct annual bike counts
- Provide a pilot mini-grant project (Provide small mini-grants to outside groups for bicycle education/infrastructure projects)



Side paths provide an important element of the Near to Medium-Term Bicycle Route Network.

Over time, the City should continue to implement the bicycle education and awareness programs and initiatives described above that have proven to be effective and successful. It should also add a new set of programs in the near to medium-term. It is assumed that the City may need to seek assistance to the Bike Program as well as increase its budget for educational programs. The programs that should be added in the near to medium-term are listed below.

- Public relations campaign that focuses on bicycle awareness and education (Increase visibility of bicycle transportation, safety practices, etc.)
- Regular production of videos for distribution to bike shops, bike clubs, government channel broadcast and website viewing
- Increase frequency of adult bicycle skills class
- Expand Basics of Bicycling school curriculum beyond pilot project to additional schools
- Outreach to non-English speaking populations
- Safe Routes to School contributions (through city or school SRTS program)
- Expanded bicycle events (tours, fairs, etc.)
- Host bicycle summit meeting or conference (local, state, APBP, etc)
- Partner in commuting program to assist commuters in choosing bike routes
- Seek assistance or partnerships with focus on education and awareness initiatives

Long-Term Recommendations

In the long-term, Charlotte will pursue a proactive and focused strategy to improve bicycle conditions in the City, while taking full advantage of the many roads that will be widened and resurfaced over the years. In doing so, it will exceed its goal of completing 350 miles of bicycle facilities by 2030 as set forth in the TAP. As noted, planned road widening projects will play an important role in meeting this goal.

The long-term network includes the construction of higher-volume rural roadways, the improvement of Farm to Market roads (described in Chapter 4) and development of much of the greenway trail system. While these recommendations may be included in the long-term category, there may be opportunities for implementing them sooner. For example, bicycle facilities could be included as a part of a new roadway project added to the Transportation Improvement Program (TIP) or a new bicycle project could be provided by applying for a new grant funding source. Other opportunities may arise through ongoing application of the USDG. The City should take advantage of these opportunities for implementation.

The long-term bicycle route network will include a range of bicycle facilities throughout the City to provide connected, accessible and comfortable bicycle conditions for the full range of bicyclists. Table ES-1 shows the breakdown of facility types that comprise the long-term bicycle network. These figures include the recommendations that were implemented in the near to medium term, as shown on the Near to Medium-Term Opportunities map.

Policy Recommendations

Bicycling is already supported in numerous local, regional and state policies. The additional policies and strategies outlined in this Plan will further encourage Charlotte's efforts to become a more bicycle-friendly community. The policy recommendations in this Plan are organized to accomplish the goals listed below.

1. Incorporate bicycle facilities in all transportation planning, design and construction activities.
2. Seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan.
3. Include bicycle improvements in ongoing transit and greenway planning activities.
4. Design and build new and reconstructed roadways to be bicycle-friendly.
5. Implement bicycle improvements as a part of all resurfacing and maintenance activities.
6. Provide targeted and effective educational and awareness opportunities for bicyclists and motorists.
7. Continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation.



A good bikeway system can assist with other initiatives such as Safe Routes to School, which seek to help students and staff bike or walk to school.

The policy recommendations cover areas such as regulations, internal coordination and bicycle facility design. The information in this Plan updates and adds to the policy recommendations included in the 1999 Bicycle Master Plan. Additional policies include providing connections between on-street bikeways and greenway trails, eliminating or reducing the gutter pan, implementing a curb reconstruction procedure, improving coordination between resurfacing and bicycle planning efforts and supporting the addition of bicycle safety information in the local Safety and Health Council of North Carolina driver safety courses.

Implementation and Funding

This Plan presents a near-term strategy that focuses on ensuring that systems and processes are in place to capitalize on all potential opportunities, while undertaking bicycle facility projects that are relatively straightforward and inexpensive and that will help create early successes. Wherever practical, bicycle route signs should be posted during this time period. Recommendations focus on providing the most important routes and connections to ensure that bicyclists have access to and between the corridors and centers identified in Charlotte's TAP. The near to medium-term network relies heavily on the emerging greenway network, as well as ongoing road widening, road resurfacing and private-sector development.



The existing design of many Charlotte streets is intimidating to many bicyclists

Long-term recommendations are focused on the goal of creating a connected, accessible and convenient network of bicycle facilities throughout Charlotte. Implementation of the recommendations in this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations.

Key programs for planning and implementing the bicycle recommendations in this Plan include the Bridge Program, Farm to Market Road Improvement Program, Street Connectivity Program, Street Resurfacing Program, Bicycle Program and the Urban Street Design Guidelines. Implementation of the recommendations in this Plan will also require that adequate funding is provided to additional bicycle-related programs such as the Bicycle Parking Partnership Program, Pedestrian/Bicycle Connectivity Program, Air Quality and Congestion Mitigation Program and the Centers and Corridors Implementation: Corridors Program.

Conclusion

This Plan presents a long-term vision for a connected bicycle route network and implementation strategies for realizing the Stakeholder Group's vision of Charlotte as the premier bicycling city in the United States. It highlights educational and awareness programs and policy revisions to supplement the emerging bicycle network. In doing so, it presents a clear vision for a bicycle-friendly Charlotte. By building on previous and ongoing planning efforts, it seeks to make the most of the exciting opportunities that the City has at this critical point in time.

CITY OF CHARLOTTE

BICYCLE PLAN



Approved by the Charlotte City Council
September 8, 2008

Acknowledgements

This Plan was prepared under the guidance of the City of Charlotte Department of Transportation. Support for the development of this Plan was provided by a local Stakeholder Group. Funding was provided by the North Carolina Department of Transportation's Division of Bicycle and Pedestrian Transportation, the Transportation Planning Branch and the City of Charlotte.

Prepared for:

Charlotte Department of Transportation
600 East Fourth Street
Charlotte, NC 28202
Phone: (704) 336-4119
Fax: (704) 336-4400

Project Managers: Ken Tippet and Dan Gallagher

Prepared by:

Toole Design Group, LLC
6525 Belcrest Road, Suite 400
Hyattsville, MD 20782
Phone: (301) 927-1900
www.tooledesign.com

In association with: 



The City of Charlotte would like to thank the following individuals for serving on the Charlotte Bicycle Master Plan Stakeholder Group:

Lauren Blackburn: Mecklenburg County BAC Appointee
Neal Boyd: Bicycle promoter
Jane Cacchione: Dowd YMCA
Julie Clark: Mecklenburg County Park and Recreation Department
Scott Cole: North Carolina Department of Transportation (NCDOT)
Bob Cook: Mecklenburg-Union Metropolitan Planning Organization (MUMPO)
Ann Gabrielson: Bike commuter
Paul Griffin: League Cycling Instructor (LAB)
Alan Hunt: Uptown Bicycle Commuters Support Group
Julie Jackman: Mecklenburg County Department of Public Health

Harry Johnson: Trips for Kids and former BAC member
Robert Mosher: NCDOT Division of Bicycle and Pedestrian Transportation
Ed Moyers: Uptown Bicycle Commuters Support Group
Jason Pauling: Mecklenburg County Park and Recreation Department
Rich Reichle: Real Estate and Building Coalition (REBIC)
Charlie Swanson: REBIC
Diane Thomas: Mecklenburg County Department of Public Health
Kate Usan: Mecklenburg County Department of Public Health
Dick Winters: Charlotte BAC appointee
Martin Zimmerman: Charlotte Area Bicycle Alliance

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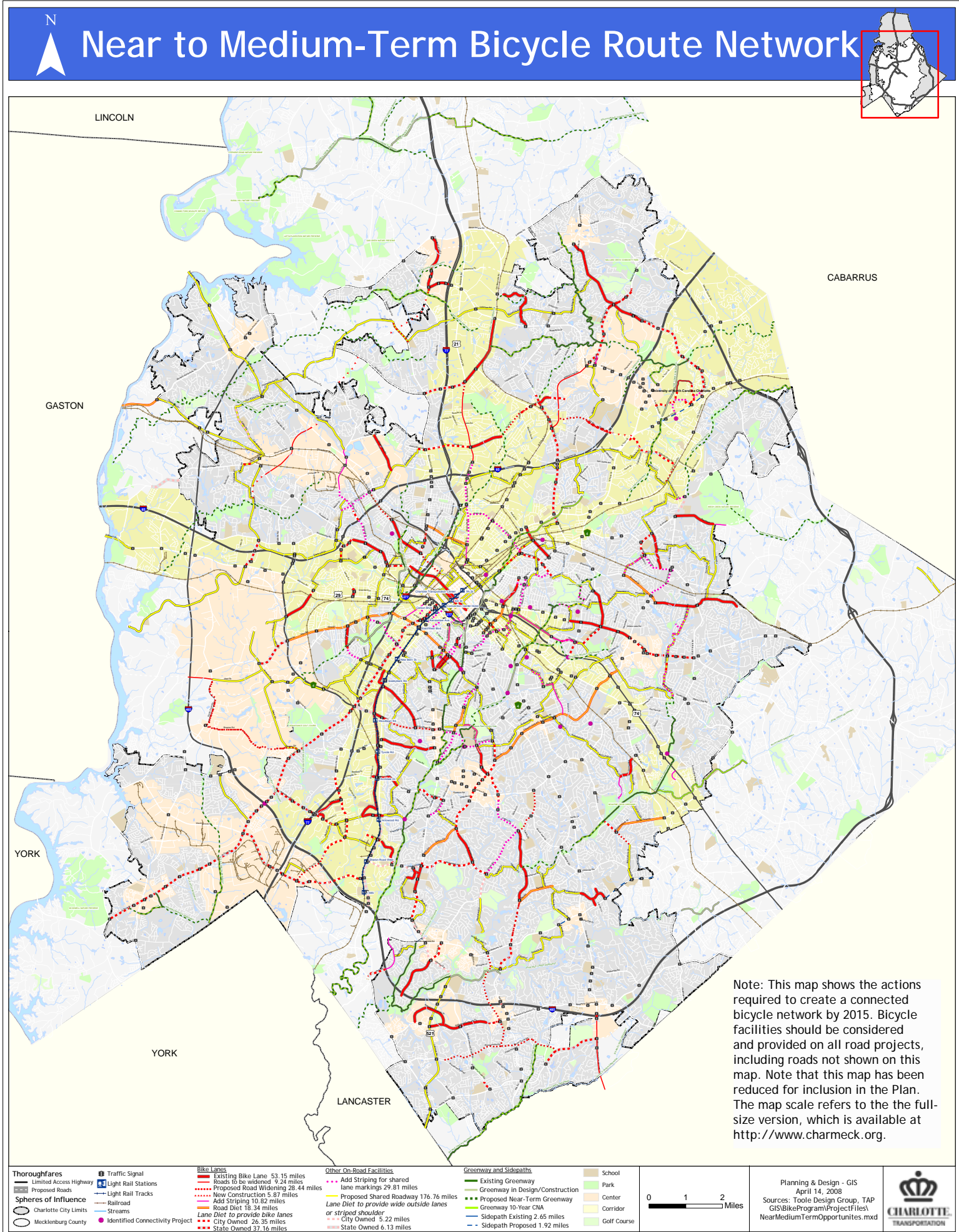
The medium-term network will focus on the most important routes and connections in order to provide access to and between the corridors and centers identified in the City's Transportation Action Plan.

The goal of the Near to Medium-Term Network is to ensure that bicyclists have an option of riding on a bicycle facility on critical routes in the City. The Near to Medium-term network relies heavily on the emerging greenway network, as well as on ongoing road widening, road resurfacing, continued application of the USDG and private-sector development. Charlotte should take advantage of opportunities that arise to implement the projects and programs sooner; however, the goal is to complete at least 150 miles of bikeway facilities within the City by 2015, per the TAP. Table ES-2 below outlines the actions that will be required to create the Near to Medium-term bicycle network by the year 2015.

Table ES-2: Action Recommendations to be Completed by 2015

Proposed Action Recommendation	Linear Miles
Road to be Widened (Planned by 2010)	9
Proposed Road Widening to Provide Bike Lanes (Recommended)	28
Add Striping to Provide Bike Lanes	11
Road Diet to Provide Bike Lanes	18
Lane Diet to Provide Bike Lanes on City-Maintained Road	26
Lane Diet to Provide Bike Lanes on State-Maintained Road	37
Add Striping to Provide Shared Lane Markings	30
Lane Diet to Provide Wide Outside Lanes or Striped Shoulders on a City and State-Maintained Road	11
Construct a Side Path	2

Figure ES-3: Near to Medium-Term Bicycle Route Network



This Plan envisions a connected network of bicycle facilities throughout Charlotte by 2015. The network will include a range of bicycle facilities depending on the nature of the roadway and its role within the transportation system. This network will depend heavily on seamless transitions between on-road bicycle facilities and greenways. Signage will also be important, as it will ensure that bicyclists have the information they need to select the best routes to reach their destination.

For the Near to Medium-Term Bicycle Route Network to function properly, specific intersections will have to be improved to provide enhanced bicycle access. Connectivity projects such as those highlighted in the Charlotte Pedestrian and Bicycle Neighborhood Connectivity Study will need to be addressed to eliminate barriers in the network. In addition, the City will need to identify, design and implement spot improvements such as adding bicycle detection at selected traffic lights and providing left-turn pockets for bicyclists, on an ongoing basis. In many cases, these improvements should be completed prior to or in tandem with signing a route.

Educational and awareness initiatives will also play a critical role in creating a safer bicycling environment and forging a higher level of understanding between bicyclists and other road and path users. Current programs and initiatives to continue are listed below.

- Continue to conduct annual BIKE Charlotte events
- Continue to implement Share the Road campaigns
- Continue to provide group presentations
- Continue to provide bicycle awareness presentations to CATS new operators classes
- Continue to update the CDOT bicycle program website
- Continue to operate booths at fairs and events
- Continue to provide bicycle stickers, posters and other promotional items
- Continue to maintain existing brochures and develop additional ones (all educational handouts such as brochures, pamphlets and flyers should be bilingual)
- Continue to provide local training webinars for engineers and planners
- Continue to conduct annual crash analysis to determine local crash characteristics
- Continue to educate cyclists on how to use bike racks on transit to promote safe usage (CATS rack and roll video, demonstration rack at events)



As the Bicycle Route Network is built and more people are encouraged to bicycle, new programs will be needed to educate bicyclists and motorists about how to safely co-exist in the roadway environment.

In addition to the current educational and awareness initiatives outlined above, the City should undertake additional programs in the near to medium term, including the following:

- Provide adult bicycle skills classes
- Provide new general information bicycle video for motorists and cyclists
- Pursue bicycle partnerships (Racks, Showers for Bike Commuters, incentives to bike to work)
- Provide “Basics of Bicycling” school curriculum at one pilot school
- Provide public service announcements
- Provide bicycle awareness in drivers’ education and licensing (within scope of CDOT)
- Provide bicycle mapping resources such as the Charlotte Cycling Guide
- Conduct specific bicycle events in addition to BIKE Charlotte (Midnight Ride, Bike to the Park, Bike to the Movies, Ride Route 88, etc)
- Provide a bicycle tour of bicycle facilities (BAC member guided. Requires training of leaders)
- Train City staff on bicycle goals and Bicycle Master Plan
- Advertise new bicycle facilities
- Conduct annual bike counts
- Provide a pilot mini-grant project (Provide small mini-grants to outside groups for bicycle education/infrastructure projects)



Side paths provide an important element of the Near to Medium-Term Bicycle Route Network.

Over time, the City should continue to implement the bicycle education and awareness programs and initiatives described above that have proven to be effective and successful. It should also add a new set of programs in the near to medium-term. It is assumed that the City may need to seek assistance to the Bike Program as well as increase its budget for educational programs. The programs that should be added in the near to medium-term are listed below.

- Public relations campaign that focuses on bicycle awareness and education (Increase visibility of bicycle transportation, safety practices, etc.)
- Regular production of videos for distribution to bike shops, bike clubs, government channel broadcast and website viewing
- Increase frequency of adult bicycle skills class
- Expand Basics of Bicycling school curriculum beyond pilot project to additional schools
- Outreach to non-English speaking populations
- Safe Routes to School contributions (through city or school SRTS program)
- Expanded bicycle events (tours, fairs, etc.)
- Host bicycle summit meeting or conference (local, state, APBP, etc)
- Partner in commuting program to assist commuters in choosing bike routes
- Seek assistance or partnerships with focus on education and awareness initiatives

Long-Term Recommendations

In the long-term, Charlotte will pursue a proactive and focused strategy to improve bicycle conditions in the City, while taking full advantage of the many roads that will be widened and resurfaced over the years. In doing so, it will exceed its goal of completing 350 miles of bicycle facilities by 2030 as set forth in the TAP. As noted, planned road widening projects will play an important role in meeting this goal.

The long-term network includes the construction of higher-volume rural roadways, the improvement of Farm to Market roads (described in Chapter 4) and development of much of the greenway trail system. While these recommendations may be included in the long-term category, there may be opportunities for implementing them sooner. For example, bicycle facilities could be included as a part of a new roadway project added to the Transportation Improvement Program (TIP) or a new bicycle project could be provided by applying for a new grant funding source. Other opportunities may arise through ongoing application of the USDG. The City should take advantage of these opportunities for implementation.

The long-term bicycle route network will include a range of bicycle facilities throughout the City to provide connected, accessible and comfortable bicycle conditions for the full range of bicyclists. Table ES-1 shows the breakdown of facility types that comprise the long-term bicycle network. These figures include the recommendations that were implemented in the near to medium term, as shown on the Near to Medium-Term Opportunities map.

Policy Recommendations

Bicycling is already supported in numerous local, regional and state policies. The additional policies and strategies outlined in this Plan will further encourage Charlotte's efforts to become a more bicycle-friendly community. The policy recommendations in this Plan are organized to accomplish the goals listed below.

1. Incorporate bicycle facilities in all transportation planning, design and construction activities.
2. Seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan.
3. Include bicycle improvements in ongoing transit and greenway planning activities.
4. Design and build new and reconstructed roadways to be bicycle-friendly.
5. Implement bicycle improvements as a part of all resurfacing and maintenance activities.
6. Provide targeted and effective educational and awareness opportunities for bicyclists and motorists.
7. Continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation.



A good bikeway system can assist with other initiatives such as Safe Routes to School, which seek to help students and staff bike or walk to school.

The policy recommendations cover areas such as regulations, internal coordination and bicycle facility design. The information in this Plan updates and adds to the policy recommendations included in the 1999 Bicycle Master Plan. Additional policies include providing connections between on-street bikeways and greenway trails, eliminating or reducing the gutter pan, implementing a curb reconstruction procedure, improving coordination between resurfacing and bicycle planning efforts and supporting the addition of bicycle safety information in the local Safety and Health Council of North Carolina driver safety courses.

Implementation and Funding

This Plan presents a near-term strategy that focuses on ensuring that systems and processes are in place to capitalize on all potential opportunities, while undertaking bicycle facility projects that are relatively straightforward and inexpensive and that will help create early successes. Wherever practical, bicycle route signs should be posted during this time period. Recommendations focus on providing the most important routes and connections to ensure that bicyclists have access to and between the corridors and centers identified in Charlotte's TAP. The near to medium-term network relies heavily on the emerging greenway network, as well as ongoing road widening, road resurfacing and private-sector development.



The existing design of many Charlotte streets is intimidating to many bicyclists

Long-term recommendations are focused on the goal of creating a connected, accessible and convenient network of bicycle facilities throughout Charlotte. Implementation of the recommendations in this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations.

Key programs for planning and implementing the bicycle recommendations in this Plan include the Bridge Program, Farm to Market Road Improvement Program, Street Connectivity Program, Street Resurfacing Program, Bicycle Program and the Urban Street Design Guidelines. Implementation of the recommendations in this Plan will also require that adequate funding is provided to additional bicycle-related programs such as the Bicycle Parking Partnership Program, Pedestrian/Bicycle Connectivity Program, Air Quality and Congestion Mitigation Program and the Centers and Corridors Implementation: Corridors Program.

Conclusion

This Plan presents a long-term vision for a connected bicycle route network and implementation strategies for realizing the Stakeholder Group's vision of Charlotte as the premier bicycling city in the United States. It highlights educational and awareness programs and policy revisions to supplement the emerging bicycle network. In doing so, it presents a clear vision for a bicycle-friendly Charlotte. By building on previous and ongoing planning efforts, it seeks to make the most of the exciting opportunities that the City has at this critical point in time.

Chapter 1: Introduction

The Charlotte Bicycle Master Plan outlines a strategy for creating an accessible, connected and comfortable bicycle network, which is supplemented with effective education, encouragement and enforcement programs and targeted policy revisions to reinforce the emerging bicycle network. This chapter outlines the planning process for the Charlotte Bicycle Master Plan and presents an overview of the chapters to follow.

The Planning Process

Background Data Collection and Field Analysis

Background information was gathered for this Plan from previous plans and studies, existing GIS data and maps and from local government staff. Field work was conducted throughout Charlotte to document existing conditions for bicycling and to identify opportunities to improve conditions for bicyclists. Information on variables such as the number of lanes, lane and road width, speed limit and the presence of parking, bicycle lanes, sidewalks and paved shoulders was recorded in the field analysis.

Public Open Houses

A public open house was held in October 2007 and was attended by more than one-hundred people. The first public meeting was used to generate interest in the Bicycle Master Plan and to develop a vision for a bike-friendly Charlotte. Mayor Patrick McCrory introduced the Bicycle Master Plan process. The project team delivered a presentation about the opportunities to improve the bicycle transportation system and discussed measures that other communities throughout the United States are using to support bicycling. The presentation also introduced key concepts and physical improvements that will increase opportunities for bicycling in Charlotte.

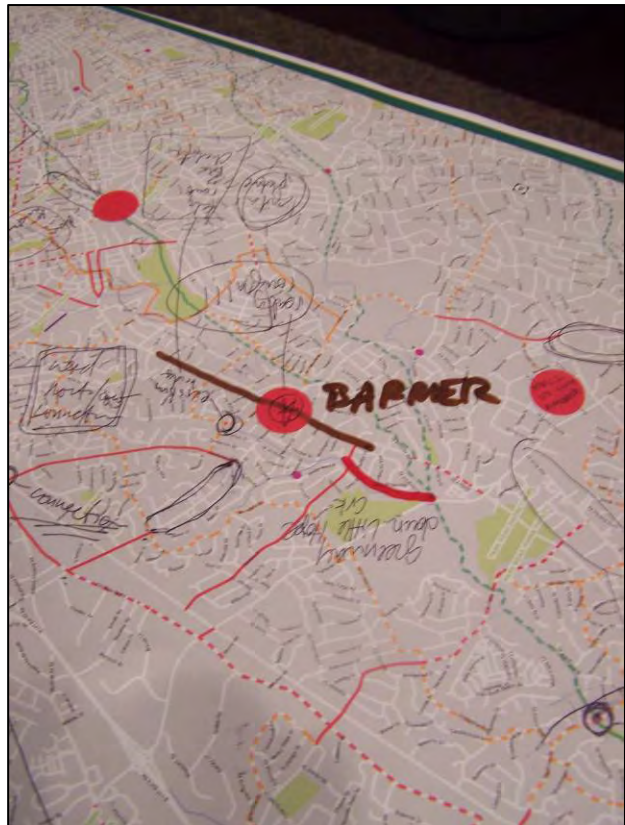
The meeting was structured to be highly interactive and to ensure that participants had the opportunity to provide feedback on critical needs, opportunities and constraints. The public was asked to provide information on specific locations where they would like to see bicycle facility improvements. City staff developed poster-sized maps for gathering public feedback at the meeting. Attendees also participated in small break-out group discussions focusing on specific issues. The topic of each group discussion is described below.



Members of the public provide feedback at the first public meeting for the Bicycle Master Plan on October 9, 2007

- **Station 1: Updated Transportation Action Plan (TAP) Map and Desired Destinations**
Objective: To ask for the public's best assessment of the routes on the Transportation Action Plan map and gather information on desired routes and destinations.
- **Station 2: Difficult Intersections/Physical Barriers to Bicycling**
Objective: Identify specific intersections or physical barriers (creeks, highways, areas unable to access directly by bicycle) in Charlotte that are difficult and uncomfortable for bicyclists to navigate and act as barriers in the bicycle network.
- **Station 3: Strengths and Weaknesses of Bicycling in Charlotte**
Objective: Gather public feedback on the strengths and weaknesses of bicycling in Charlotte by asking the public to respond to the lists that were developed by City staff, the Stakeholder Group and the Bicycle Advisory Committee.
- **Station 4: Educational Programs**
Objective: Develop a clear understanding of the educational programs that exist in Charlotte and get initial feedback on the types of educational opportunities that are needed.

A second public meeting was held on February 27, 2008. At the meeting, the project team presented the draft Near to Medium-Term and Long-Term Bicycle Route Network maps, as well as policies recommendations, design guidelines and implementation plan. Attendees were given the opportunity to ask questions and provide comments and feedback on the maps, proposed policies and all other information in the draft Plan. Comments and feedback gathered at this meeting has been incorporated into this Plan to the extent possible.



Stakeholder Group and Bicycle Advisory Committee Engagement

A Stakeholder Group was actively involved in drafting this Plan. This group included members of the Bicycle Advisory Committee, residents from various areas of the City, NCDOT representatives, City/County staff, bicycle advocacy organizations, the development community, health advocates and other special interest groups. The Stakeholder Group provided guidance and insight to the project team throughout the project. Over the course of the planning process, the following five Stakeholder Group meetings were held to solicit feedback:

Participants at the first public meeting provided feedback on existing conditions for bicycling in Charlotte and identified barriers to bicycle travel throughout the City.

Meeting 1: August 2007 - Project Kick-Off

Meeting 2: October 2007 - Mapping and Education, Encouragement and Enforcement Programs

Meeting 3: December 2007 - Review of Draft Bicycle Route Network

Meeting 4: January 2008 - Review of Draft Plan

Meeting 5: February 2008 - Review of Final Plan

As a part of this planning process, the project team also attended three Bicycle Advisory Committee meetings to provide updates and solicit feedback on key aspects of the project.

Online Questionnaire

As part of the 2008 Charlotte Bicycle Master Plan, an online public survey was conducted for two weeks in October of 2007 to supplement information gathered at the public meetings. Eight hundred surveys were completed and the results provide a snapshot of the strong support for bicycle transportation within the City of Charlotte. Response highlights are included below.

- 96% agree that making Charlotte a bicycle-friendly community is important to improving Charlotte's quality of life
- 96% agree that they wish the Charlotte area was a more comfortable place to ride a bicycle today
- 93% agree that they would ride their bicycle more often if Charlotte had more bicycle facilities
- 96% agree that Charlotte should strive to become a more bicycle-friendly city
- 77% disagree that Charlotte is a comfortable place to ride a bicycle today
- A majority of respondents do not ride their bike as often as they would like because they have to travel on busy roads (85%), feel unsafe (71%), or experience discourteous motorists (69%)

Plan Overview

The Charlotte Bicycle Master Plan envisions a safe, convenient and connected network of bicycle facilities throughout the City. The Plan includes recommendations that enhance the City's bicycle route network complemented by bicycle-friendly policies and programs that promote bicycling as a valid transportation choice.

- Chapter 1 is an overview of the planning process.
- Chapter 2 discusses the health, environmental, economic and other benefits of bicycling to lay a foundation for the information to follow.
- Chapter 3 describes the Plan vision, goals and policies and includes recommended policy enhancements to support the emerging bicycle route network. A table is included in the Appendix that notes whether each policy is being carried forward from the previous Plan as is or with substantive revisions, or if it is a new policy.
- Chapter 4 presents information on existing conditions for bicycling in the City, discussing existing facilities, programs and bicycle-related strengths and challenges.
- Chapter 5 presents a vision for future conditions and presents the future bicycle route network, detailing issues such as intersections, greenways and bicycle parking.
- Chapter 6 focuses on education and encouragement strategies to build on the emerging bicycle network.
- Chapter 7 provides design guidelines for bicycle facilities and ancillary equipment.

- Chapter 8 presents a strategy for funding and implementation of the facility, policy and program recommendations discussed in previous chapters.
- Chapter 9 brings together all of the information provided in the Plan and provides closing remarks.

This chapter outlined the planning process for the Charlotte Bicycle Master Plan and presented an overview of the chapters to follow. The following chapter presents a discussion of why Charlotte needs a bicycle plan.

Chapter 2: Why Charlotte Needs a Bicycle Plan

This chapter describes the rationale for developing a bicycle master plan. It discusses the benefits of bicycling, as well as the community support for bicycle transportation.

Overview

Charlotte is growing in population. The City's population is projected to increase by more than 50% over the next 22 years from 664,000 to almost 1,115,000. This population growth cannot be accommodated by motor vehicles alone as there are already high motor vehicle traffic volumes. Recognizing this, the City is investing in a light rail transit system. Planning for the bicycle network represents another important opportunity to plan for Charlotte's expected growth in a sustainable manner.

A comprehensive approach to bicycle planning is important because it contributes to the quality of life in Charlotte. The City has a history of progressive planning efforts that emphasize quality of life and amenities. These efforts are supported by the City, as demonstrated by its history of strong planning and regulatory efforts such as the TAP and the recently adopted Urban Street Design Guidelines. They are also supported by Charlotte's citizens, as demonstrated by a recent tax measure to support public transit. A bike-friendly environment makes an important contribution to the quality of life in Charlotte.

Safety is also an important reason to plan for bicycling in Charlotte. Currently, many streets in the City are uncomfortable for bicyclists. From January 2000 to December 2005, there were 610 reported bicycle crashes and 11 fatal bicycle crashes reported. This Bicycle Master Plan identifies problematic roads and intersections and highlights design solutions to improve conditions for bicycling. It also identifies educational opportunities for bicyclists and drivers alike. A primary goal of these planning efforts is to reduce the number of bicycle crashes occurring in the City.

Benefits of Bicycling

Bicycling has positive transportation, environmental, economic and health benefits. These benefits are discussed below.

Transportation/Environmental Benefits

Nationally, approximately 40 percent of all trips are less than two miles in length, a distance covered by bicycle in around ten minutes (1995 National Household Transportation Survey).

Figure 1: Charlotte Focus Area Plan Mission Statement



Charlotte will be the premier city in the country for integrating land use and transportation choices.

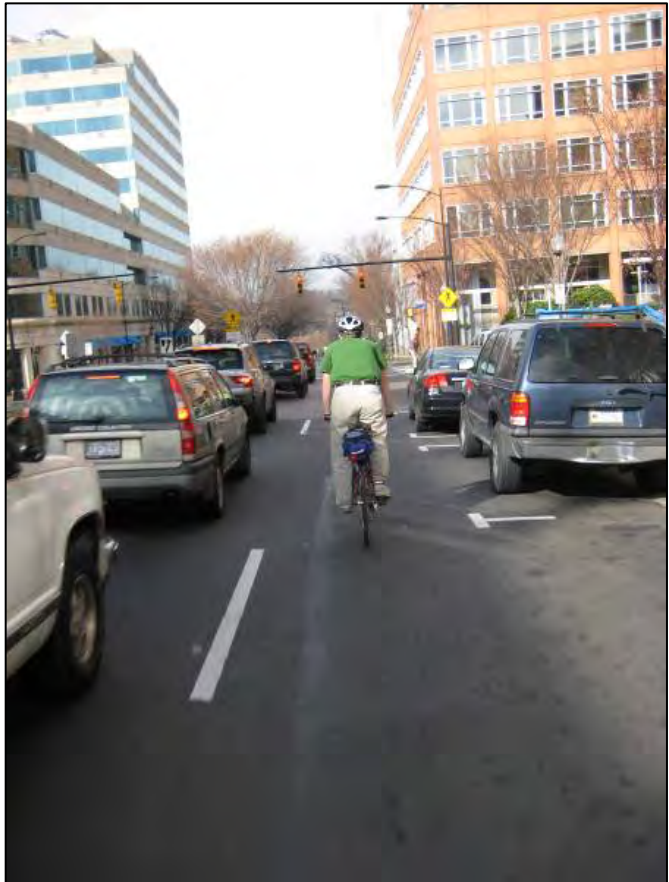
City of Charlotte Focus Area Plan,
2005

Most of these trips are made by automobile, in part due to a lack of safe walking and bicycling facilities.

In Charlotte, improved bicycling conditions can play a role in mitigating automobile traffic congestion by providing residents with the option to travel by bicycle. There is little difference in the time it takes to make a short trip by bicycle or by car. Indeed, some short trips may even take less time by bicycle, when parking and traffic congestion are considered.

Aside from reducing and avoiding traffic congestion, every automobile trip replaced by bicycle reduces air pollution and petroleum use. Charlotte is a designated non-attainment area under the Federal Clean Air Act because it violates federal air quality standards for ozone levels. Each mile of automobile travel replaced by bicycle travel reduces the emission of nitrogen oxides, an important contributor to the formation of ozone and unhealthy air quality levels in the Charlotte region.

Bicycle facility improvements also have a positive effect for motorists in terms of safety and reduced congestion. For example, many motorists like bicycle lanes because they make dealing with bicyclists less confusing - they know where bicyclists are expected to be and it is easier to pass them. Bicycle lanes establish the correct riding location for bicyclists and tend to reduce sudden swerving by both motorists and bicyclists. Bike lanes also provide for better sight distance for motorists entering the street from side streets or driveways. Better local street connectivity allows bicyclists to travel on lower-volume streets while providing motorists with route options and reduced traveling distances.



In Charlotte, improved bicycling conditions can play a role in mitigating growing automobile traffic congestion by providing residents with the option to travel by bicycle.

Quality of Life Benefits

Bicycling provides intangible benefits for the individual cyclist and the City as a whole. Some ride bicycles for simple enjoyment or recreation. It may be an activity enjoyed as a family on a summer afternoon or a way to relieve stress after work. Seventy-eight percent of bicyclists nationally ride for exercise or recreation (Bureau of Transportation Statistics, 2003). In Charlotte, the increasing popularity of recreational bicycling is unmistakable as more bicyclists are seen on the streets every year. According to data gathered in a survey by the

University of North Carolina-Charlotte Urban Institute in 1993 there were approximately 300,000 bicycles in Charlotte.

Economic Benefits

The bicycle is often an important transportation mode for those who cannot afford or do not wish to pay the costs of owning and operating an automobile. Households in the United States spent approximately 4 percent of total expenditures on gas, and 18 percent of total expenditures on transportation in 2005 (Bureau of Labor Statistics). The estimated cost of driving ranges between 47 and 62 cents per mile; the average annual cost of operating an automobile for a year is \$5,170 (AAA, 2007). Conversely, the cost of operating a bicycle for a year is estimated at only \$120 (League of American Bicyclists).

Figure 2: Positive health benefits of bicycling

Bicycling represents one opportunity to meet the recommended level of moderate physical activity, and can be obtained through recreational bicycling or a daily commute. Bicycling can produce a number of positive health benefits, including:

- Reduces the risk of dying prematurely
- Reduces the risk of dying from heart disease
- Reduces the risk of developing diabetes
- Reduces the risk of developing high blood pressure
- Helps reduce blood pressure in people who already have high blood pressure
- Helps control weight
- Helps build and maintain healthy bones, muscles, and joints
- Promotes psychological well-being

Health Benefits

The U.S Surgeon General recommends that adults should get at least 30 minutes of moderate physical activity every day of the week. Yet, more than 60 percent of American adults do not do this (Center for Disease Control). Furthermore, nearly half of adolescents are not vigorously active on a daily basis. Concurrently, national levels of obesity and the related problems of heart disease, diabetes, and other chronic conditions continue to rise, in part due to increasingly sedentary lifestyles and a reliance on automobiles for travel for even short distances. Figure 2 lists some of the ways bicycling can address these concerns. Having a viable and comfortable network of bicycle facilities can encourage individuals to take advantage of the health benefits provided through bicycling.

Community Support for Bicycle Transportation

Charlotte has an active and growing bicycling community that includes a diverse set of bicyclists and groups. Some people ride bicycles purely for recreation while others ride for transportation, to commute to work or run errands. Many people in Charlotte ride bicycles to access public transit. In 2001 there were approximately 19,000 bike on bus riders. As shown in Figure 7 in Chapter 4, this number grew to around 63,000 in 2007, highlighting the multi-modal bicycle/transit interface. Some choose to bicycle because they prefer it over other modes, while others bicycle because they have few other choices. Many bicyclists do not fit neatly into one niche; but use the bicycle for a number of purposes and reasons. Other people support bicycle transportation even though they don't bike themselves, recognizing the value of transportation choice in their community.

There are numerous bicycling organizations within Charlotte catering to the many different types of bicyclists in the community. A current list of Charlotte area bicycle advocacy groups, commuter support groups, and recreational clubs is available at the Bike Charlotte website (www.bikecharlotte.com). This website is also an excellent resource for recurring rides, special events and bicycle-related information for the Charlotte area.

Developing a Viable Bicycle Transportation System

Bicyclists are a diverse group in terms of their comfort level on various bicycle facility types, the purpose they choose to bicycle, and their ultimate destinations. Unlike motorists, who generally feel comfortable on most roadways, bicyclists can vary widely in their perception of what is a safe and acceptable bike facility. For example, an experienced, recreational bicyclist may have a preference for on-street bike facilities that allow long-distance training with limited interruptions. These bicyclists are likely to be comfortable and even prefer to travel on higher-volume, higher-speed streets in mixed motor-vehicle traffic. At the other extreme, a couple with young children who want to bicycle may have a preference for a bicycle facility that is separated from motor-vehicle traffic such as a greenway. Bicycle commuters are interested in reaching specific destinations, and typically express the desire for bicycle facilities such as bike lanes that allow them to travel comfortably during times of heavy motor-vehicle traffic.



Bicyclists can vary widely in their perception of what is a safe and acceptable bike facility

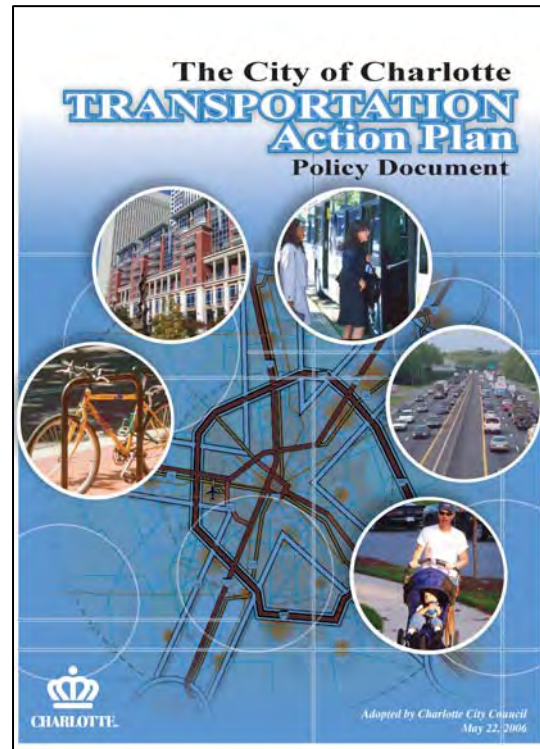
Currently, Charlotte has been implementing most bikeway projects where opportunities present themselves. Often, this is during street reconstruction, re-striping, or redevelopment, when bike lanes have been constructed from available right-of-way. This type of opportunistic bikeway construction, while cost-effective, has resulted in a “sparse and sporadic” bicycle network. Bike lanes may last only a few blocks or miles, and infrequently link with other bikeways. Greenways are intermittent and are not well-connected to on-street bicycle facilities. In significant portions of the City, bicycle-pedestrian connections between neighborhoods are limited, which makes it difficult to travel by bicycle to nearby destinations. A coordinated approach to bicycle planning is needed to develop a truly comprehensive bicycle network that allows travel throughout the city.

The following excerpt from the Transportation Action Plan explains why bicycle travel is important in Charlotte.

The City believes that Charlotte residents want travel options and to improve their quality of life. They want a less-stressful lifestyle, a cleaner environment, affordable transportation and better health for themselves and their children. Bicycling is part of the solution. Bicycle-friendly communities experience reduced traffic, better air, and improved public health. Bicycle-friendly communities, like those with good schools and vibrant downtowns, are communities that offer a good quality of life for families, which can lead to higher property values and business growth...

The City believes that by continuing to work towards an interconnected network of bicycle facilities, the City of Charlotte can increase the likelihood of a number of trips being accommodated by bicycle and by transit.

This chapter discusses the benefits of bicycling and the purpose and goals of bicycle planning. The following chapter highlights the goals, objective and policies that provide the foundation for bicycling planning efforts in Charlotte.



The TAP states that the City will require bicycle lanes designed consistent with the Urban Street Design Guidelines on all new or reconstructed roadways within the City, where feasible. (TAP Policy 2.6.1)

Chapter 3: Policy Review and Recommendations

This chapter outlines existing and proposed policies to support bicycling in Charlotte. Policies supporting bicycle transportation are fundamental to realizing the vision set forth in this Plan. The policies detailed in this chapter serve as the foundation for improving the bicycling environment. All of the necessary aspects of a comprehensive bicycle plan are reflected in these policies: institutionalization of bicycle planning efforts, appropriate design and maintenance considerations for roadways, inclusion of bicycle accommodations in other planning efforts, education and awareness initiatives and encouragement of bicycling as a viable mode of transportation. Key policies for improving the bicycling environment in Charlotte are as follows:

1. Incorporate bicycle facilities in all transportation planning, design and construction activities.
2. Seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan.
3. Include bicycle improvements in ongoing transit and greenway planning activities.
4. Design and build new and reconstructed roadways to be bicycle-friendly.
5. Implement bicycle improvements as a part of all resurfacing and maintenance activities.
6. Provide targeted and effective educational and awareness opportunities for bicyclists and motorists.
7. Continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation.

Policy 1: Incorporate bicycle facilities in all transportation planning activities.

Policy Strategy 1.1: The City and NCDOT will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative routes will be identified.

The City of Charlotte will be widening many roads in the future, and new and reconstructed roads will be part of the development process. The Urban Street Design Guidelines will play an important role in ensuring that these new roads include bicycle facilities. In doing so, they will ensure that Charlotte becomes a more bicycle-friendly City in the future.

Benchmarks: Continued implementation of the Urban Street Design Guidelines.

Policy Strategy 1.2: The City of Charlotte prefers bicycle lanes over wide outside lanes on both City and State-maintained roads.

The City of Charlotte prefers bicycle lanes over wide outside lanes. Bicycle lanes are required on most new and improved roads in the City per the Urban Street Design Guidelines. In situations where wide outside lanes are the only possible facility due to road width and other considerations, they should be provided. However, bicycle lanes are the preferred facility and should be provided on both City and State-maintained roads where feasible.

Benchmarks: Continued implementation of bicycle lanes on State and City roads.

Policy Strategy 1.3: The City will strive to complete the Near to Medium-term bicycle route network by 2015.

The City should complete the near to medium-term bicycle route network, identified on the Near to Medium Term Opportunities map, by the year 2015. In doing so, it will enable the City to exceed the goal set in the TAP to create 150 miles of bicycle facilities by 2015. This network will provide a connected network of bicycle facilities that will enable bicyclists to travel throughout the City. Actions that will be required to create this network are shown on the Near to Medium-Term Opportunities map and include lane diets, road diets, locations where striping can be added and areas where roadways will need to be widened and sidepaths will need to be constructed. The Near to Medium-term bicycle route network should be the basis for the signed route network discussed below.

Benchmarks: Completion of the Near to Medium-term bicycle route network by 2015.

Policy Strategy 1.4: The City should install a signed bicycle route system that links major destinations in Charlotte.

The City should install a signed bicycle route system as shown on the Bicycle Route Network and Near to Medium-Term Opportunities maps in this Plan. This will accomplish Policy 2.6.2 in the TAP, which states “The City will place bike route signs on selected local streets as bike routes, as needed, to provide a connected network of bikeways.” These signed bicycle routes should be on roads with favorable bicycling conditions that also provide important functional connections throughout the City. Signed routes can link major destinations such as key parks, transit stations and schools while providing information on continuous bicycle routes in the City. Signed routes also draw attention to bicycling as an efficient form of transportation. Connections between the signed routes shown on the maps in this Plan and specific destinations such as schools will require detailed study at the neighborhood level. Specific routes may need to be altered as a result of this more detailed study. Appropriate sign design and placement will be critical to the success of the signage program. The preliminary signed network is provided in Chapter 5 and recommendations on initial routes to sign in Charlotte are provided in Chapter 8 of this Plan.

Benchmarks: Completion of signed routes identified on the Near to Medium-Term Opportunities map.

Policy Strategy 1.5: The City will seek to implement the recommendations included in the Near to Mid-Term Opportunities map and the long-term Bicycle Route Network map.

By approving this Plan, the City is adopting the recommendations included in the Near to Medium-Term Opportunities map and the long-term Bicycle Route Network map as its official policy for improving bicycle transportation in the City. The projects that are recommended will require additional evaluation during the implementation process to determine if there are other factors that may either help or hinder their development. Additional corridor-level traffic analysis will be needed in some cases to determine the optimum design for specific locations. Some locations shown on the map may be determined, after more detailed analysis, to require different or more costly improvements and therefore may become longer-term projects. However, for every project, the first assumption should be that the bicycle facilities shown in the Comprehensive Bicycle Plan will be implemented.

Benchmarks: Progress implementing the recommendations in this Plan.

Policy Strategy 1.6: The City will strive to continue to fund the full-time Bicycle Program Manager position to spearhead the City's bicycle planning efforts.

The City should continue to fund the full-time Bicycle Program Manager position. The Bicycle Program Manager is the point person for bicycle planning efforts in Charlotte. The Manager

advises the City and the County on bicycle-related issues and reviews proposed plans, designs, and policies that impact bicycling. Working within the City's formal processes and supported by bicycle-friendly policies, guidelines and standards, the Bicycle Program Manager is critical to implementing the recommendations in this Plan and improving bicycle conditions in Charlotte.

Benchmarks: Continue to fund the full-time Bicycle Program Manager position.

Policy Strategy 1.7: The City should consider a variety of methods to expand and implement the recommendations in this Plan.

This Plan envisions a considerable acceleration of bicycle planning efforts in the City. The City will provide appropriate resources to implement the recommendations in this Plan, including the expanded education and awareness initiatives identified in Chapter 6 of this Plan, and to meet the goals identified in the TAP.

Benchmarks: Implementation of facility targets identified in Chapter 5 as well as education and awareness programs identified in Chapter 6.

Policy Strategy 1.8: Continue to appoint the Bicycle Program Manager to the MPO Technical Coordinating Committee.

The Bicycle Program Manager should continue to be a member of the Mecklenburg-Union Metropolitan Planning Organization's Technical Coordinating Committee (TCC). This continued appointment will ensure that bicycle issues have a voice on projects and planning initiatives at the regional level.

Benchmarks: Continued appointment of the Bicycle Program Manager to the MPO Technical Coordinating Committee.

Policy Strategy 1.9: Continue to support the Bicycle Advisory Committee's role in improving bicycling in Charlotte.

The City should continue to support the Bicycle Advisory Committee (BAC). The positions should continue to be appointed by local elected officials. The main responsibilities of the BAC should continue to be to support the Bicycle Program in its efforts and to help coordinate activities involving local advocacy groups. The committee should meet regularly to discuss current projects and upcoming opportunities.

Benchmarks: Continued support of the Bicycle Advisory Committee.

Policy Strategy 1.10: The City will require that bicycle issues be considered in all plan reviews and that the Bicycle Program Manager has a voice in all roadway construction review processes.

The Bicycle Program Manager should continue to have a voice in the City's plan review process and all roadway construction review processes. The Bicycle Program Manager should review plans to ensure future roadway projects include the appropriate bicycle accommodations and that the adopted design standards for roadway improvements with bicycle accommodations are being followed. All roadway plans should be reviewed and approved by the Bicycle Program Manager. This review will not delay the overall site plan review process.

Benchmarks: Approval of Bicycle Program Manager required in plan review Process.

Policy Strategy 1.11: The Bicycle Program Manager and/or the BAC should provide an annual briefing to the City Council regarding priority projects, ongoing concerns, etc.

Since the adoption of the 1999 Bicycle Master Plan, there has been one general briefing to the City Council. This briefing occurred in 2005 and was presented by the Chair of the BAC. A

chief purpose of the briefing was to urge the Council to fund the street resurfacing budget sufficiently to return to a 12-year repaving cycle. This recommendation was made at a time when street resurfacing was nearing a 25 to 30-year cycle. The City Council responded with an adjustment to permit 14-year resurfacing. Annual updates to the City Council should continue, to provide important information on progress in implementing the recommendations in this Plan and needs moving forward.

Benchmarks: Regular briefings to the City Council.

Policy Strategy 1.12: The City will explore ways that the Urban Street Design Guidelines and key code changes can provide for bicycle connections between residential developments and activity centers and between new roads and the existing road network. The Urban Street Design Guidelines are intended to create streets that provide capacity and mobility for motorists, while also being safer and more comfortable for pedestrians, bicyclists and neighborhood residents. The guidelines further the TAP's emphasis on transportation choice by providing design guidance for city streets that support a better bicycle network. USDG design recommendations include pedestrian and bicycle friendly intersection design, bike lanes on higher-volume and higher speed roadways, traffic-calming on neighborhood streets and a denser street network that will reduce traveling distances and provide route choices for pedestrians and bicyclists. The guidelines ensure that bicycle facilities will be provided on most roads as part of the road widening process. In the future, it will be important to ensure that bicycle facilities and connections are provided within developments and on roads connecting new developments to activity centers. It will also be important to design and plan for the connection between new roads and the existing road network.

Benchmarks: Evaluate connectivity issues arising with the implementation of the USDG's.

Policy Strategy 1.13: The City will consider amending the subdivision and zoning ordinances to incorporate provisions for on-road bicycle facilities and other bicycle-friendly amenities.

The Charlotte City Council has recently amended the Code of Ordinances to require long and short-term bicycle parking at new multi-family residential, institutional, office, business and industrial developments. The Council set a threshold where existing development undergoing renovation would be required to provide bicycle parking. In order to promote connectivity, there have been limits set on cul-de-sacs and sidewalk and street connections are required more often. Bicycle facilities may also be required in some re-zonings. However, a general review and revision of ordinances to identify additional opportunities for bicycle-friendly requirements and build upon past achievements is needed.

As a first step, the City should implement recommended policy changes to the Code of Ordinances, Charlotte Land Development Standards Manual, City of Charlotte Subdivision Ordinance, and the City of Charlotte Zoning Ordinance that are identified in the draft City of Charlotte Pedestrian Master Plan. Many of these proposed pedestrian-related changes will also benefit bicyclists. These recommendations include general issues such as clarifying bicycle and pedestrian-related requirements and adding bicycle-related definitions, as well as more specific recommendations such as requirements for crossing treatments, block lengths and connectivity.

Benchmarks: Implementation of bicycle-friendly regulatory changes.

Policy Strategy 1.14: The City will continue to incorporate prioritized bicycle improvements into the annual Transportation Improvement Program (TIP).

This Bicycle Master Plan includes a prioritized set of projects, as shown in the Near to Mid-Term Opportunities map. The BAC and the Bicycle Program Manager should select projects each year to be moved forward in the funding cycle, either through the City's Capital Improvement Program (CIP) or the State's Transportation Improvement Program (TIP) with the goal of creating the short-term bicycle network by 2015. Although the Bicycle Program Manager should lead this process, input from the BAC will be critical. The BAC should assist in the selection of projects based on realistic funding levels. All applicable guidelines for selecting projects and including them in the TIP (City or State) should be followed.

Benchmarks: Inclusion of bicycle projects in the annual Capital Improvement Program and Transportation Improvement Program.

Policy Strategy 1.15: The City should update the Bicycle Master Plan every five years in conjunction with TAP updates.

The Bicycle Master Plan has not been updated since its original adoption in 1999. The previous Plan called for updates every three years, but this is not uniform with typical timelines for other transportation-related plans. As noted in the TAP, the Bicycle Master Plan should be updated every five years at a minimum.

Benchmarks: Updates to the Bicycle Master Plan every five years.

Policy Strategy 1.16: Consider lowering the speed limit on streets that provide important bicycle connections.

Vehicle speed is one of the main factors influencing a bicyclist's perception of a roadway. The City should consider lowering the speed limit on roads that provide important connections in the bicycle network. The speed limit on many roads in the City is 40-45 miles per hour and many cars are traveling above the posted speed limit. This creates an uncomfortable environment for many bicyclists. On roads that provide important bicycle connections, the City should consider reducing the speed limit to at most 35 miles per hour. It is important to note that shared lane markings are not recommended on roadways with speed limits posted above 35mph, therefore reducing speeds may enable the use of these markings under certain circumstances. The character of the road, surrounding land-uses, existing traffic volumes, existing driveways and other issues would have to be considered when deciding whether to reduce the speed limit. The City should consider providing funding to enable the Police Department to do more enforcement to protect pedestrians and bicyclists while ensuring livable neighborhoods. The Police Department should work with the Bike, Pedestrian and Traffic Calming programs within CDOT and in other City departments to undertake targeted police work for traffic control for bicyclists.

Benchmarks: Evaluation of selected roads to be considered for speed limit reduction.

Policy Strategy 1.17: The City should continue to incorporate bicycle planning activities into its day-to-day activities.

The Bike Program should be actively involved in the ongoing efforts of the City of Charlotte's Joint-Use Task Force. The City should incorporate bicycle facility information in the GIS tool that is currently being developed. As noted above, Bike Program personnel should be involved in site plan review meetings to identify opportunities to provide bicycle facilities outlined in this Plan as part of the development process. Every site plan review should require a bicycle connectivity analysis. The City should also consider requiring bicycle facilities as part of the subdivision process. The Bike Program should continue to be involved in the conditional rezoning review process.

Benchmarks: Continuing incorporation of bicycle planning into the City's day-to-day activities.

Policy 2: Seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan.

Policy Strategy 2.1: The City will strive to provide an annual allotment for bicycle improvements in the City budget to implement bicycle projects called for in this Plan and to leverage other funds.

The recommended funding levels to fully implement this plan are detailed in Chapter 8. The City should continue to consider a consistent funding allotment for bicycle projects in the annual Capital Investment Plan. Local funds should be used to implement the physical recommendations in this Plan, as well as those involving the bicycle education and awareness initiatives outlined in Chapter 6 of this Plan.

Benchmarks: Level of annual funding from the City.

Policy Strategy 2.2: The City will implement bikeway improvements as part of all new roadway projects.

This Plan identifies a large number of bicycle projects to be implemented on existing roads by re-striping, narrowing a travel lane, removing a travel lane or widening the roadway. This Plan also identifies bicycle facilities that should be integrated with the construction of new or widened roadways. As noted above, a significant amount of new roadway construction is planned in Charlotte over the coming years. Roads that are to be widened represent an important opportunity to incorporate bicycle accommodations and implement the recommendations in this Plan. When new roadways are constructed, the bicycle accommodations specified in this Plan should be included. If a new roadway is not shown on the Bicycle Route Network map, the Bicycle Program Manager and BAC should determine the appropriate facility to be constructed.

Benchmarks: Percentage of new roadway projects that include bicycle accommodations.

Policy Strategy 2.3: The City will seek State and Federal funds for bicycle projects.

In addition to local funding sources for bicycle improvements, State and Federal funds are also available. The Bicycle Program Manager should support efforts to seek additional funds as appropriate. Major Federal and State funding sources are described later in this Plan. State and Federal funds should be pursued for the critical bicycle and greenway connector projects as noted below. Projects that address multiple modes or issues (e.g. highway and bicycle safety; bicycle and transit modes) have a better chance of being funded than lower profile projects.

Benchmarks: Funding levels obtained from State and Federal sources.

Policy Strategy 2.4: The City will seek additional funding and partnerships for planning, design and construction of critical greenway and bike connection projects.

Funding is essential for implementing the recommendations of this Plan. New on-road bikeways and greenway trails will need to be funded through various sources. It will be important for Charlotte to establish specific funding sources to support bicycle projects directly and also to use as matching funds for federal, state, and other grants. The City should actively seek additional funding and partnerships to support the goals outlined in this plan and in related plans such as the Mecklenburg County Greenway Master Plan. The City should partner with local governments and adjacent jurisdictions to develop funding sources and should also look for additional funding opportunities from the public and private sectors.

Benchmarks: Funding levels obtained from State and Federal sources to implement critical bike/greenway connector projects.

Policy Strategy 2.5: The City will seek public and private partnerships to implement bicycle improvements.

Another potential funding source is the use of public/private partnerships. Encouraging participation from local businesses and corporations will not only enable more funding to be received, but it will promote a community “buy-in” of bicycle transportation initiatives. Major local businesses should be encouraged to contribute to funding improvements that are especially helpful to their employees and the local community. An example of this is Charlotte’s existing Bicycle Parking Partnership Program. Public/private partnerships should continue to be explored particularly for improvements for end-of-trip facilities (such as parking areas, lockers, showers, etc.) and connections to the greenway system. These types of accommodations would be very visible from the private sector’s viewpoint. Private-sector participation should also be pursued in conjunction with additional education and awareness programs. Partnerships should also be explored with all of the utilities (power, gas, sewer, water, phone, cable, railroads, etc.) with the objective of providing a secondary use for utility corridors.

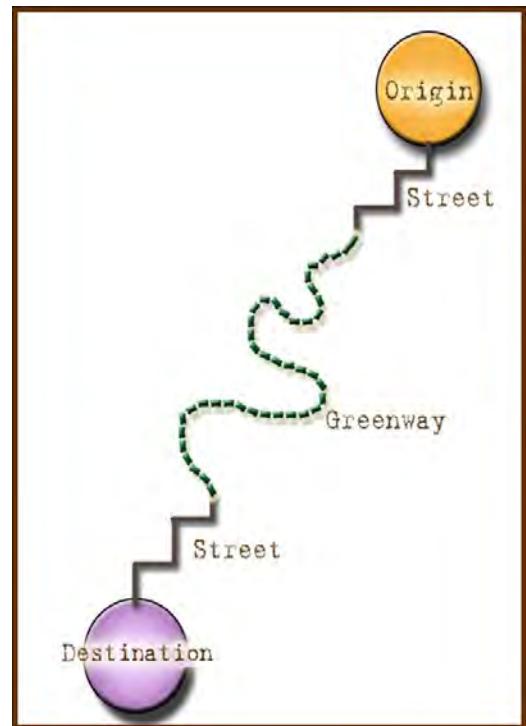
Benchmarks: Number of private companies contributing to bicycle efforts in the City.

Policy 3: Include bicycle improvements in ongoing transit and greenway planning.

Policy Strategy 3.1: The City will consider bicycle accommodations in the planning, design and development of all rapid transit corridors, station areas and transit hubs.

On-going rapid transit planning should take bicycle accommodations into account in the station areas, along roadways leading to the stations, along the transit corridors, and on the vehicles. Options within the corridor include accommodation of bicycles on transit vehicles, a parallel bike path, an on-street bikeway, or a bikeway on an adjacent parallel roadway.

Figure 3: Bicycle and greenway connections



Source: LandDesign, Inc.

Bicycle parking and/or lockers should be provided at every station. Transit vehicles have been designed to accommodate bicycles. It is important for the City to continue to offer training on the use of transit/bike facilities to bicyclists, as well as to bus drivers and other motorists. Bicycle accommodations in connection with transit planning should not be confined to improvements along the new transit corridors. Charlotte Transit operates a vast network of buses throughout the City and into the County and this entire fleet of buses has been equipped with bicycle racks. Charlotte Transit has also developed a system of new transit hubs, and these locations, as well as park-and-ride-lots and other key stops, should continue to be equipped with bicycle racks and/or lockers.

Benchmarks: Provision of bicycle accommodations at stations, on roadways leading to stations, and in transit corridors, number of transit hubs / park-and-ride lots / major stops with bicycle parking facilities.

Policy Strategy 3.2: The City will coordinate with the Mecklenburg County Parks and Recreation Department to provide connections between on-street bikeways and greenway trails.

The integration of the Greenway Master Plan and the Bicycle Transportation Plan is crucial for an improved bicycling environment. In addition, residents have indicated that being able to bike (rather than to drive) to parks and greenways is an important objective. The Greenway Plan has the following objective: *"coordinate preparation of the Greenway Plan with that of the Charlotte-Mecklenburg Bicycle Transportation Plan to ensure that connections between greenways and bikeways are illustrated on official county maps."* This Plan highlights potential major connections between the on-road bikeway network and the greenway system. Exact locations and designs of the connections are beyond the scope of this study; however, the locations of potential connections shown on the network should be targeted for future improvements. Developers in these areas should be made aware of the potential connections, and adequate land should be reserved for this purpose. The locations shown on the map represent major connections, but smaller neighborhood connections should also be made bicycle-friendly through adequate design and signage. Continuing efforts should be made by the Bicycle Program Manager to work with Mecklenburg County Parks and Recreation to determine the locations of on-road greenway connections and connections between the greenway system and the on-road bikeway network. The Bicycle Program Manager should also maintain contact with representatives from neighboring counties to keep abreast of greenway developments in the surrounding area.

Benchmarks: Level of coordination with greenway planners.

Policy Strategy 3.3: The City will coordinate the implementation of the Greenway Master Plan and the Bicycle Master Plan.

The shared-use path (also termed "greenways" and "trails") network in Charlotte and Mecklenburg County is an important resource for the community. These paths serve a transportation purpose when they connect to destinations and they also provide recreational opportunities for bicyclists. Shared-use paths can be an appealing option for bicyclists because they offer the opportunity to ride on separate dedicated paths, away from traffic. For this reason, they can serve as an alternative to a busy road, which can be especially appealing for young and less experienced bicyclists. They can encourage people to try bicycling for the first time. Opportunities to enhance the relationship between greenways and on-road bicycle facilities should be pursued. The recommendations in this Plan and in the Greenway Master Plan should be pursued in tandem, as the facilities are mutually beneficial. Greenways have the potential to provide alternatives to difficult roads, and on-road bicycle facilities have the potential to connect gaps in the greenway network. The recommendations

in this Plan should play an important role in meeting the goals outlined in the Greenway Master Plan to provide twenty-five miles of greenway facilities in the next five years. Likewise, greenways play an important role in ensuring connectivity in the short and long-term bicycle networks outlined in this Plan.

Benchmarks: Level of coordination between the Bicycle Master Plan and Greenway Master Plan.

Policy Strategy 3.4: CDOT and Mecklenburg County Parks and Recreation Department should continue to meet regularly to provide progress updates for each individual network, capital planning projects and overland bike to greenway connectors and should consider developing a yearly summit to address departmental concerns and progress regarding non-motorized connectivity.

CDOT and the Mecklenburg County Parks and Recreation Department should continue to meet regularly to discuss progress in implementing the recommendations in the Bicycle Master Plan and the Greenway Master Plan. CDOT, County and other stakeholder should continue to identify areas where the greenway network can provide alternate routes for bicyclists and where on-road bicycle facilities can fill gaps in the greenway network. CDOT and Mecklenburg County should engage in a continuing dialogue on the planning and design of areas where greenways cross on-road bicycle facilities. To further facilitate ongoing communication, the City and County should consider a yearly summit to discuss opportunities in the upcoming year and to address potential areas of concern.

Benchmarks: Level of coordination between bicycle and greenway planning efforts.

Policy Strategy 3.5: The City will work with the County to provide 24-hour a day, seven day a week access to greenways that are used for transportation purposes in the bicycle route network.

The greenway network has the potential to provide important bicycle transportation connections in Charlotte, for example by providing an alternate route to a road that is difficult and uncomfortable. However, if a greenway is serving a transportation purpose, it is important that bicyclists are allowed to use it at all times. The City and County should ensure that 24-7 access is allowed on critical greenway segments that are serving a bicycle transportation purpose in the bicycle route network.

Benchmarks: Allowance for 24-hour a day, seven day a week access to greenways that are used for transportation purposes.

Policy Strategy 3.6: The City will develop design standards and guidelines for intersection and greenway/bike crossings.

The City should develop design standards and guidelines for intersection and greenway/bike crossings. It should develop a procedure to select appropriate intersection crossing treatments when a signed bike route or other bicycle facility crosses an arterial street. It should also develop design standards for the transitioning of bike facility types and for when bike facilities cross greenways. Different segments of the same roadway or greenway corridor may require using different types of bicycle facilities because of differences in traffic volumes, speeds, roadway widths, right-of-way availability and other characteristics. It will be important for the City and NCDOT to provide safe transitions between different facilities (such as transitioning from a bicycle lane to a shared roadway or from a bicycle lane to a shared-use path). These transitions can be made safer and more understandable for bicyclists and motorists with appropriate treatments such as signs, pavement markings, curb cuts, etc. Transitions should be addressed as a part of the bicycle facility design process.

Benchmarks: Creation of design standards and guidelines for intersection and greenway/bike crossings.

Policy 4: Design and build new and reconstructed roadways to be bicycle-friendly.

Policy Strategy 4.1: The City will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city, where feasible. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative bike routes will be identified.

The bicycle route network was designed to include proposed accommodations not only on existing roads, but also on proposed future roadways as well. The Bicycle Program Manager will be responsible for ensuring that the recommended facilities are implemented on new roadways. New roadways that are not included on the Bicycle Master Plan should include bicycle accommodations as recommended by the Bicycle Program Manager and BAC.

Benchmarks: Percentage of new roadways with bicycle accommodations as specified in the Bicycle Master Plan

Policy Strategy 4.2: The City will seek to implement a minimum 5-foot bicycle lane on all new or reconstructed bridges and overpasses depending on posted speeds and on-street parking.

The City and state should provide bicycle lanes on all new or reconstructed bridges and overpasses to ensure bicycle access and connectivity. Some bridges in Charlotte already meet the policy, such as the Providence Road Bridge over I-485, which was constructed with a bicycle lane adjacent to a 12-ft travel lane. However, other projects such as the NC-115 Bridge near Alexanderana Road were designed with only 12' lanes and no bicycle accommodation.

Benchmarks: Provision of bike lanes on new and reconstructed bridges.

Policy Strategy 4.3: The City will conduct field tests of various emerging design treatments to improve bicycling conditions in the City.

It should be the City's policy to encourage field testing of emerging planning and design techniques to improve bicycling conditions in the City. For example, these design techniques could include bike boxes, colored bicycle lanes, and lane diets. Bike boxes are installed to allow bicyclists to move in front of cars waiting at an intersection to increase their visibility and reduce conflicts with turning vehicles. They are typically used at intersections where bicyclists need to turn left and/or many vehicles turn right. During a red signal phase, bicyclists are able to better position themselves for a left turn by moving left across the bike box. The City should also consider utilizing colored bicycle lanes to highlight areas where frequent merging between motorists and bicyclists is necessary. The City should also continue to implement lane diets, a technique where narrowing automobile travel lanes creates enough space within the existing road width to provide bicycle facilities while still accommodating motor vehicles.

Benchmarks: Field tests of emerging bicycle planning and design techniques.

Policy Strategy 4.4: The City will further study how to retrofit drainage grates in a way that would accommodate paving over the gutter pan.

Many roads in Charlotte have heavy traffic volumes and high speeds on relatively narrow pavement widths. In many cases, eliminating a travel lane is impossible because of the traffic volumes. If a road provides a critical link in the bicycle network and future widening will be difficult or impossible, the City should explore the possibility of extending the pavement to

the face of the curb by paving over the two-foot gutter pan during resurfacing projects to widen the outside travel lane. This approach to achieving additional street width should be considered on a case by case basis, as it may work on some streets but not others. Many of these roads should also be analyzed for possible interior travel lane narrowing (lane diet) in addition to paving over the gutter pan to provide the widest possible outside lane and the highest bicycle level of service. There are two primary challenges to accomplishing this, which are outlined below.

- Paving over the gutter pan would require the City to raise the drainage grate so that it is flush with the pavement. This would require the City to excavate the existing inlet frames and replace them with customized taller frames to raise the inlet to be flush with the adjacent roadway surface. If feasible, relocate the catch basins to behind curb alignment.
- Paving the gutter pan would also require a determination of how the concrete/asphalt gutter pan seam will hold up over time. With a wider outside lane, it is anticipated that the vehicles will travel further from the seam, reducing the weight load applied to the joint, which should reduce cracking. Some cracking is anticipated due to the natural expansion and contraction of the different materials. As long as the cracks don't lift and are less than ¼-inch in width, bicyclists will still be able to utilize the additional space.

Benchmarks: Evaluation of the potential impact of paving over the gutter pan.

Policy Strategy 4.5: The City will consider eliminating or reducing the gutter pan to 12-inches on roadways with constrained right-of-way.

Eliminating or reducing the gutter pan is an alternative strategy to paving over the gutter pans that should be considered when roadways are reconstructed. Many of the arterial roadways that provide the most direct travel routes for bicyclists and motorists have severe right-of-way constraints. In many cases, the ability to combine a modest lane diet in combination with a 12-inch or eliminated gutter pan and improved drainage grates could widen the existing 11-12 foot outside travel to 13-15 feet in width.

This additional width will substantially improve the quality of the bicyclists' experience and reduce tensions that exist between passing motorists and bicyclists in the existing 11-12 foot travel lanes. The traditional purpose of gutter pans is to carry the full spread of stormwater collected during a typical storm event along the curb, outside of the vehicle travel way. Substituting a narrower gutter or eliminating the gutter while simultaneously widening the outside lane will still allow faster moving motor vehicles to travel outside of the typical stormwater spread. It is acknowledged that bicyclists may potentially be riding within the flowing stormwater but this is mitigated by the fact that fewer bicyclists typically travel during storm events. Also, due to the dynamics of their narrow tires, bicyclists typically do not hydroplane.

When the gutter pan is reduced to 12-inches or eliminated, the City should consider utilizing a recessed inlet or curb opening inlet to completely remove the inlet from the travel lane. The City should review NCDOT standard details 852.05 and 852.04 included as Figure 4 for locations where there is a buffered area between the sidewalk and curb. NCDOT intended this design for use along median islands; however, its use is equally applicable to roadway edges. The City should review NCDOT standard detail 840.04 for locations where the sidewalk is adjacent to the roadway.

Policy Strategy 4.7: The City and NCDOT should continue to work in close partnership on the appropriate design of bicycle facilities with the assumption that bike lanes or other facilities identified in this Plan will always be provided on new and reconstructed roads.

NCDOT should continue to play a major role in improving bicycling conditions in Charlotte. Because there are many state-maintained roads in the City, it is critical that the state and the City work collaboratively in improving bicycling conditions. NCDOT should consult the Charlotte Bicycle Master Plan when resurfacing roads and when planning additional significant road improvement projects. It should proactively replace hazardous drainage grates on state-maintained roads. The state currently only replaces grates as part of planned projects. The City of Charlotte recommends that NCDOT designate a bicycle facilities contact in its Division Office to spearhead collaborative bicycle-related efforts between the state and the City. The Charlotte Bike Program should be involved in scoping meetings between the City and NCDOT during the planning phase of all NCDOT projects.

Benchmarks: Degree of collaboration between the City and the state.

Policy 5: Implement bicycle improvements as a part of all resurfacing and maintenance activities.

Policy Strategy 5.1: The City will seek to provide the bicycle facilities identified in this Plan as part of the road resurfacing process.

Bicycle projects should be incorporated with other roadway projects to the extent feasible. Roadway projects such as resurfacing and the construction of sidewalks may enable bicycle facilities to be implemented in conjunction with the project, thus reducing the costs of a stand alone bicycle project. For this to occur, all personnel involved in road resurfacing should become familiar with the Bicycle Master Plan and the USDGs. As thoroughfares and collectors are resurfaced, there is the opportunity to re-stripe lanes to provide bikeways. If a roadway that is being resurfaced or reconstructed has a specified improvement proposed in the Bicycle Master Plan, the specified bicycle improvement should be made in conjunction with the roadway improvement. Some proposed bikeway projects require minor widening that may be feasible during routine resurfacing operations. Even if there is no specified improvement, consideration should be given to providing wide outside lanes (14-foot width) whenever feasible. If full widening to 14 feet is not feasible, outside lanes should be widened as much as possible to improve conditions for cyclists. For example, on a 44-foot cross-section with speed limits less than 40 MPH, the inside lane width would be 10 feet and the outside lane width 12 feet. On a 48-foot cross-section, the configuration would be a 10-foot inside lane and a 14-foot outside lane where speeds limits are less than 40 MPH, and an 11-foot inside lane and a 13-foot outside lane where speeds are 40 MPH or more. When narrowing of inside lanes is necessary to provide wide outside lanes, the amount of daily and peak-hour traffic and the percentage of heavy truck traffic must be taken into consideration in determining the feasibility of a wide outside lane.

Benchmarks: Recommendations in this Plan that are implemented as part of the road resurfacing process.

Policy Strategy 5.2: The City will seek to improve coordination between resurfacing and bicycle planning efforts.

As noted, ongoing transportation projects represent one of the most important opportunities for implementing the recommendations of this Plan. All roadway resurfacing, repaving and improvement projects should be evaluated to determine whether it is possible to provide the bicycle facility recommendations included in this Plan as part of a planned road project. This is true for the full range of projects, from large scale construction to basic maintenance,

repaving and resurfacing undertaken by the City and by the NCDOT Division Office. Incorporating bicycle facility projects into planned projects (NCDOT, City, developer, etc.) is typically a more effective means of creating facilities than retrofitting roads or developing bicycle facilities as stand-alone projects. The City's bicycle planning and repaving efforts are currently coordinated; however, this process can be improved as outlined below. Additional information on the coordination between bicycle planning and resurfacing efforts is included in Chapter 8 of this Plan.

- Implementation of the bicycle recommendations in this Plan should be included on the agenda of all coordination meetings between the City's bicycle planning and repaving efforts.
- Roads on the resurfacing list that are also identified as proposed bicycle routes on the Bicycle Route Network Map should be given a priority in the resurfacing process.
- The Bicycle Master Plan should guide decisions on the type of bicycle facility to be provided as part of the resurfacing process.
- Opportunities to provide bicycle facilities should be considered carefully when deciding which roads to take off of the annual resurfacing list.

Coordinating the City's bicycle planning and the NCDOT Division Office's repaving efforts is also critical. This coordination is currently occurring; however it also can be improved. The coordination-related elements listed above are also relevant to the NCDOT repaving process. The implementation of this Plan should be included in all meetings between the City and the NCDOT Division Office. Additional information on improving this process is included in Chapter 8 of this Plan.

Benchmarks: Degree of coordination between bicycle planning and resurfacing efforts.

Policy Strategy 5.3: The City should publicize the "Dial 311" system as an effective means for addressing bicycle-specific spot improvement needs.

The City should publicize its "Dial 311" system as an effective way to address bicycle-related spot improvements. The "Dial 311" system is a central number that citizens can call to report problems and seek improvements. Numerous spot-improvement requests such as bicycle lane sweeping or drainage grate replacement are received and acted upon each year through the 311 system. The City should publicize this as an important resource for identifying needed bicycle-related spot improvements and ensuring that they are addressed. The City should ensure that the menu selection as part of the online 311 system includes bicycling as a category.

Benchmarks: Number of efforts to expand awareness of the 311 system.

Policy Strategy 5.4: The City will seek to reduce the minimum vertical separation tolerance requirement to decrease the acceptable vertical distance between the gutter and the road surface.

It is standard practice in the City to repave roads without first grinding out the old pavement. This is, in part, because it is less expensive to simply pave over roads when resurfacing them. While this may allow more roads to be resurfaced with a limited budget, it potentially creates hazardous and uncomfortable situations for bicyclists. For example, if the new pavement is substantially higher than the gutter pan, this creates a "lip" that may cause bicyclists to lose control. There may also be a significant dip where new pavement has been added around an existing drainage grate, causing the grate to sit lower than the pavement and creating a dangerous hole for bicyclists. The existing practice of not milling the pavement has also had unintended consequences as some homeowners are "retrofitting" the gutter to smooth the

transition between the roadway and their driveway. This creates dams which severely compromise the safety of motorists as the water will be forced to spread into the travel lane further than intended. When resurfacing roads, the standard should be to grind or mill out the old asphalt when feasible. The asphalt should be milled uniformly from the edge of the pavement. The current maximum allowed tolerance is 1½ inches, which is not conducive to a good bicycling environment. A maximum allowed tolerance of ¼-inch vertical separation at the gutter seam is recommended. In order to implement this policy, the City should consider an annual street maintenance supplement to absorb the additional resurfacing costs associated with implementing bicycle lanes on resurfaced roadways.

Benchmarks: Reduction of maximum allowed tolerance standard to a ¼ inch vertical separation.

Policy 6: Provide targeted and effective educational and awareness opportunities for bicyclists and motorists.

Policy Strategy 6.1: The City will initiate and hold annual bike events to provide education opportunities and raise awareness of bicycling.

Educational and awareness efforts work together to improve bicycling skills and raise awareness. For example, a bike-to-work day encourages more people to use a bicycle for transportation and it also teaches urban riding skills and the importance of wearing a helmet. Teaching bicycling skills to both children and adults (through mechanisms such as bike rodeos, in-school education, and Effective Cycling courses) helps to build confidence and encourages them to ride. Annual bike events such as bike-to-work, bike-to-shop, and bike-to-school days are an effective way to build support for bicycling and encourage increased ridership. Encouragement activities should occur year-round, but special events should be emphasized in May, which is National Bike Month. A detailed listing of recommended education and awareness programs is included in Chapter 6 of this Plan.

Benchmarks: Implementation of the education and awareness programs identified in the Bicycle Master Plan.

Policy Strategy 6.2: The City will educate bicyclists on the use of bike racks on buses to promote safe usage.

As part of the linkage between bicycles and transit, bicyclists should be encouraged to use bike racks on buses. Bike racks on buses provide an important linkage for long-distance trips or portions of trips where bicycle accommodations on roadways are not provided. This is also a good alternative for bicyclists to avoid inclement weather. Bike racks on buses can be a significant bicycling encouragement technique. Education regarding the use of bike racks must be provided to users so that the racks can be properly utilized. Bus drivers must also be trained in the use of the bike racks. Training should continue to be provided by City staff.

Benchmarks: Usage levels of bicycle racks on buses

Policy Strategy 6.3: The City will work with government agencies as well as private employers to provide incentives for biking to work.

Local governments and employers should provide incentives for bicycle use. Some employers reimburse employees for parking and/or travel costs. The Bicycle Program Manager should assist the City and County governments in setting good examples for other major employers in the area. Bike parking should be visible and accessible. If possible, bicycle travel should be incorporated into all reimbursable travel expenses. It will be easier to approach private companies to adopt bicycle-friendly practices if the City and County are leading the way with

good examples. Additional incentives for biking to work include availability of lockers and showers, bike/bus passes, convenient bike parking locations and flextime for bicyclists.

Benchmarks: Incentives for biking to work provided by the City, County and private-sector.

Policy Strategy 6.4: The City will encourage Mecklenburg County Schools to implement a bicycle education curriculum in local school.

Mecklenburg County Schools should implement a bicycle education curriculum in local schools. NCDOT and Parks and Recreation staff should support and encourage this effort. Local volunteers can also be trained to instruct the teachers or actually conduct the course. It is strongly recommended that local advocates take a major role in helping to train instructors or actually teach the course. If a large number of instructors are qualified, reaching more children will become easier. Parent-Teacher Associations at local schools might also be a valuable resource in providing support for bicycle education in schools. The goals of these programs are to instruct children in basic pedestrian, bicycle, and motor vehicle occupant safety, and to encourage children to walk, ride bicycles, and use mass transit as regular means of transportation.

Benchmarks: Percentage of children receiving bicycle safety instruction in local schools.

Policy Strategy 6.5: Encourage law enforcement agencies and community organizations to improve bicycle safety through increased bicycle helmet usage.

“Wear a helmet” should be a message incorporated into any bicycle-related program. All bicycle safety education efforts, from elementary school programs to adult education courses, should consistently teach this message. Any special bicycle promotion events should also emphasize the importance of wearing a helmet. The importance of helmets was a central theme of a public forum held at Eastland Mall in Charlotte. Efforts such as these should continue, and donations from area corporations and injury prevention organizations should continue to be sought to help make free or low-cost helmets available to bicycling children, as well as adults.

Benchmarks: Increased community awareness of the importance of wearing a helmet.

Policy Strategy 6.6: The City will consider supporting the inclusion of bicycle safety information in the State of North Carolina’s Department of Motor Vehicles (DMV) procedures as part of the City’s annual legislative request and lobbying efforts.

As part of its annual legislative request, the City should advocate for the inclusion of bicycle safety, education and awareness programs into the State of North Carolina’s DMV procedures. DMV procedures, including driving tests and drivers license renewal offer an excellent opportunity to provide bicycle safety information to motorists. Recognizing that state-level action is required, the City should encourage legislative proposals to require bicycle education in DMV and other state processes through its annual legislative requests and as part of its regular lobbying efforts.

Benchmarks: Bicycle education requests included as part of the City’s annual legislative requests and lobbying efforts.

Policy Strategy 6.7: The City will support and encourage programs that promote motorist awareness of bicycle rights.

Based on bicyclists’ personal experiences recounted during public forums and in letters to the editor in local newspapers, there appears to be a misconception about the rights of bicyclists to share the road with motorists. Distribution of brochures is a step in the right direction of educating both motorists and bicyclists about bicycle rights. There are many materials available from NCDOT and other groups that emphasize rights and responsibilities and

reinforce the “share the road” message. There are also printed materials that focus on the driver. These materials need to be targeted to the general population and should be available in public libraries and in utility company mailings. Information presented should be consistent and concise, concentrating on the messages of remaining alert, being predictable, being patient, and obeying traffic laws. Efforts should not be limited strictly to brochures. Public service radio and television announcements are a good means of reaching a diverse audience. These announcements should be coordinated with the installation of additional “Share the Road” signs. NCDOT has “Share the Road” posters available that could be posted in public areas such as libraries, museums, community centers, arenas, etc. Video announcements are also effective, but obviously more costly. Both federal and state resources should be reviewed for video public service announcements suitable for the Charlotte environment. While a general message of the rights of bicyclists is important, a focused message on how motorists should interact with bicyclists is also needed.

Benchmarks: Number of outreach and awareness efforts undertaken.

Policy Strategy 6.8: The City will support and encourage programs that educate bicyclists of responsibilities and safe riding habits.

Not only do motorists need to be educated about the rights of bicyclists, but also adult bicyclists need to be reminded about their responsibility to ride safely. NCDOT and other organizations have brochures and other information focusing on this issue. Effective methods for disseminating this information include through bike shops, bike organizations, schools and universities as well as through bike rodeos. Public service announcements are also needed to target adult bicyclists that do not participate in organized events. Brochures, pamphlets, flyers and other educational and outreach material should be provided bilingually.

Benchmarks: Number of outreach and awareness efforts undertaken.

Policy Strategy 6.9: The City will consider supporting the addition of bicycle safety information in the local Safety and Health Council of North Carolina driver safety courses.

The Safety and Health Council of North Carolina is the state chapter of the National Safety Council. It is a non-profit, non-governmental safety education association serving North Carolina and the Southeast. Many Judicial Districts and Counties in North Carolina allow traffic violators to complete a National Safety Council Defensive Driving Course in exchange for a reduction in penalty. Numerous community colleges also participate in the Defensive Driving Program. The City should encourage the Safety and Health Council to incorporate bicycle safety information into the curriculum of its driver safety and defensive driving courses in Charlotte.

Benchmarks: Efforts to encourage the Safety and Health Council to incorporate bicycle safety information in its curriculum.

Policy Strategy 6.10: The City will conduct regular before and after bicycle counts and studies to evaluate the impact of the emerging bicycle network.

The City should conduct regular before and after bicycle counts and studies to evaluate the impact that the emerging bicycle network is having on the level of comfort bicyclists feel when riding in the City and the overall level of bicycle ridership. It should regularly conduct before and after studies of important design and planning techniques that are being pursued. For example, the City should conduct before and after studies of lane diets and road diets to determine their impact on bicyclists and motorists alike. New counting technologies exist that make bicycle counts easier and less expensive. The City should utilize these emerging technologies to determine how existing facilities are being used and to identify locations where additional facilities may be needed.

Benchmarks: Number of before and after studies completed.

Policy Strategy 6.11: The City will continue to conduct annual accident analyses to determine local accident characteristics.

CDOT has regularly tracked reported bicycle crashes occurring on public rights-of-way. Data is gathered to determine many of the crash statistics; however, the data gathering format uses a statewide form which is often inadequate for accurately describing crash characteristics. The City compiles these data and provides a regular annual report to the Bicycle Advisory Committee. The City should continue to gather and disseminate bicycle crash data to help identify the highest risk crash locations and behaviors. Identifying the factors common in many bicycle crashes helps to identify particularly dangerous locations and target the audience or behaviors that contribute to bicycle crashes. This data can help guide the City in physical or programmatic improvements that make Charlotte a safer place to ride a bicycle.

Benchmarks: Evaluations of crash statistics completed and level of incorporation of findings in ongoing bicycle planning efforts.

Policy 7: The City will continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation.

Policy Strategy 7.1: The City should continue to provide bicycle racks at major destinations and provide bicycle racks and lockers at major transit connections.

Many existing major destinations are exempt from the bicycle parking requirements of the zoning ordinance; however, public bicycle racks have been installed in some destinations such as the Uptown area, parks and at many major transit locations. There is bicycle parking at the Transit Center and at many Park and Ride lots, and racks and lockers are provided at most major light rail transit stops.

Bicycle parking should continue to be provided at important transit locations. Bicycle racks should be provided at all major destinations in the City. The City should continue to make bicycle racks available to private properties through a public/private partnership arrangement.

Benchmarks: The number of bike racks provided.

Policy Strategy 7.2: The City will seek to improve enforcement of the bicycle parking ordinance to ensure that parking is located close to building entrances.

The existing bicycle parking ordinance requires bicycle parking facilities to be provided close to building entrances; however, in some new developments around the City parking was observed to be far away from the building entrance. In the site plan review process, the City

Figure 6: Off-Street Parking and Loading Ordinance

City of Charlotte Zoning Ordinance, Part 2: Off-Street Parking and Loading

(b) Location. Short-term bicycle parking should be located along a major building approach line and clearly visible from the approach. The rack area should be no more than a 30-second walk (120 feet) from the entrance it serves and should preferably be within 50 feet. A rack area should be as close or closer than the nearest nonhandicap car parking space. A rack area should be clearly visible from the entrance it serves. A rack area should be provided near each actively used entrance. In general, multiple buildings should not be served with a combined, distant rack area. It is preferred to place smaller rack areas in locations that are more convenient.

should ensure the enforcement of the provision of the bicycle parking ordinance that requires bicycle parking to be placed close to building entrances. The language for the placement of bicycle facilities in new developments is included in Figure 6.

Benchmarks: Level of enforcement of the existing regulations regarding the placement of bicycle parking.

Policy Strategy 7.3: The City will provide bicycle parking in all City garages and encourage bicycle parking in private garages.

Currently, there are many parking garages in the City that do not have bicycle parking. The City should ensure that bicycle parking is allowed and facilities are provided in all of its structured parking facilities. It should encourage privately-owned garages to allow bicycle parking and provide bicycle parking facilities.

Benchmarks: Number of garages that allow and provide special accommodations for bicycle parking.

The policies outlined above serve as the foundation for improving the bicycling environment in Charlotte. These policies reflect the City's goals to institutionalize bicycle planning efforts, provide appropriate design and maintenance considerations for roadways, include bicycle accommodations in other planning efforts, provide education and awareness initiatives and encourage bicycling as a viable mode of transportation. The following chapter discusses existing conditions for bicycling in the City.

Chapter 4: Existing Conditions

The previous chapter outlined goals and recommended policies that provide the framework for bicycle planning efforts in Charlotte. This chapter discusses the current conditions for bicyclists in the City. It presents an overview of Charlotte, identifies strengths and challenges and discusses ongoing bicycle efforts.

Overview of Charlotte

Incorporated in 1768, Charlotte is the county seat of Mecklenburg, North Carolina. It was the country's second-fastest growing major city during the 1990's, surpassed only by Las Vegas. The city is situated in the heart of the Piedmont plateau region with low rolling hills and a climate characterized by hot, humid summers and mild winters. With a population of more than 664,000, Charlotte is now the 20th largest city in the United States and home to more residents than Boston, Seattle, Atlanta or Denver. Having grown from a small community situated at the junction of two Native American trading paths (modern-day Trade Street and Tryon Street), Charlotte is now the home to nine Fortune 500 companies and is the second largest banking headquarters in the United States.



Providing transportation choices is an adopted policy and a key cornerstone of the City of Charlotte transportation vision.

Charlotte experienced growing pains as it evolved into a major city during the last half-century. Like much of the United States, the City of Charlotte focused on accommodating increasing motor vehicle traffic from the late 1950's through the 1990's as the automobile became the transportation mode of choice. Planning and developing for motorists often came at the expense of other travelers, including pedestrians and bicyclists.

The resulting development is characterized by independent land uses separated by long distances, with little connectivity and a large dependence on thoroughfares to travel throughout the City. In areas of the City developed after 1950, parks, schools and shopping destinations are more likely to be farther away and less accessible to bicyclists than in Charlotte's older street-car era neighborhoods. The transportation network created in the 1950's through the 1990's provided few interconnecting streets. A disconnected local street pattern requires most people to travel on thoroughfares for even short, local-trips. In the past, Charlotte's thoroughfares were designed solely with motorists in mind; designed as high-speed, multi-lane roadways with narrow travel lanes and long spaces between signalized intersections. Bicycle-friendly design treatments were not considered in thoroughfare construction.

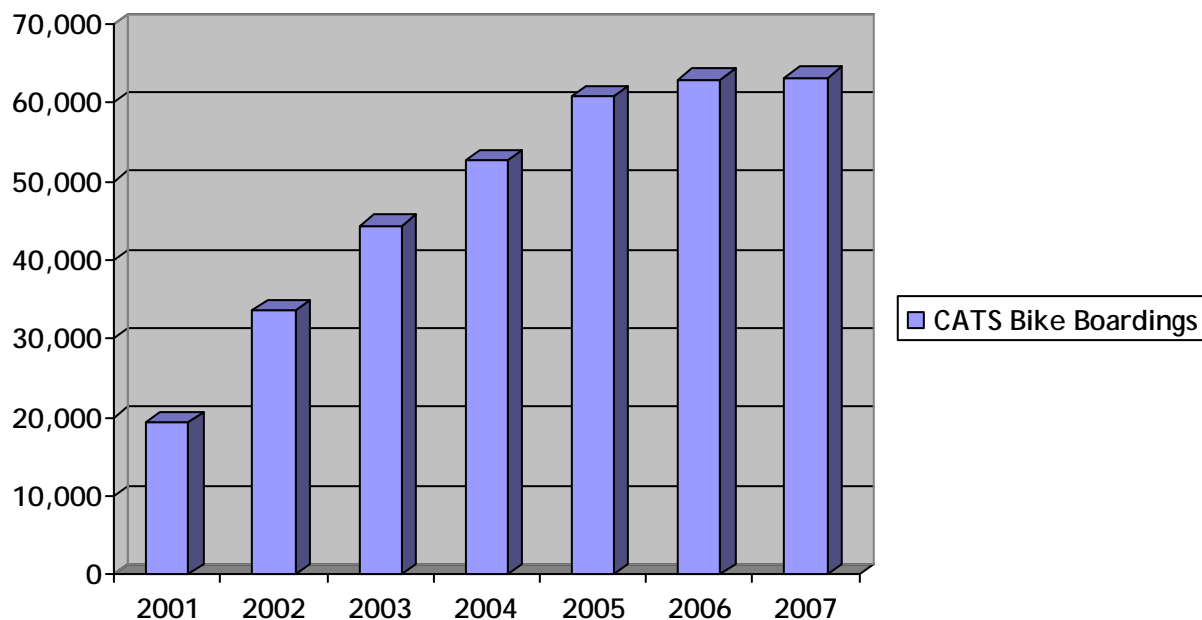
The over reliance on the automobile has resulted in higher traffic-congestion, poor air quality and limited transportation options. Today, the City of Charlotte is a dynamic and diverse city.

Significant strides have been made during the past ten years to proactively plan for growth and provide a connected transportation network that provides transportation choice. Charlotte has recently opened the Lynx light rail line, the first of five planned rapid transit corridors throughout the City.

Recent City-built street projects have emphasized a multi-modal perspective, providing sidewalks, street trees and bike lanes where appropriate. As noted, providing transportation choice is an adopted policy and a key cornerstone of Charlotte's transportation vision. The community is well-suited for this progressive transportation vision.

A random survey of Mecklenburg County residents conducted by the UNC-Charlotte Urban Institute in 2003 found that approximately 60 percent of households had bicycles available. The total estimate of bicycles within the City of Charlotte was 290,000. These figures highlight the accessible nature of bicycling, as well as the possibility of significantly increased ridership with the development of a viable bicycle transportation system. The demand for bicycle facilities is also shown by the number of residents utilizing the City's Bikes on Bus program. Charlotte Area Transit installed bike racks on every City bus as part of its Bikes on Bus program. The program has been a marked success, with increased bike boardings every year since installation. There were over 60,000 transit riders accessing transit by bike in 2007. Figure 7 below shows the total CATS Bike Boardings from 2001 to 2007.

Figure 7: CATS Bike Boardings



Source: Charlotte Area Transit System (CATS)

Thunderhead Alliance Benchmarking Report

The Thunderhead Alliance is a coalition of state and local bicycle and pedestrian advocacy organizations. Its Benchmarking Project is an ongoing effort to collect and analyze data on bicycling and walking in all fifty states and in at least the fifty most populated U.S. cities, including Charlotte. The 2007 Benchmarking Report includes information relevant to

Charlotte's existing conditions for bicycling and ongoing bicycle planning efforts. For example, the report notes that .2% of trips to work in the City are by bicycle and that the estimated mode share for all trips for bicycling is .8. These numbers are lower than the average for the fifty most populated cities in the U.S., indicating that Charlotte has significant room for improvement in these areas. However, the report also highlights Charlotte's aggressive use of Transportation Enhancement funds to provide bicycle and pedestrian facilities and its successful bicycle planning efforts such as providing bicycle parking and integrating bicycling with transit.

TAP Guidance

The City of Charlotte is committed to creating a viable bicycle transportation system by planning, designing and implementing bicycle-friendly transportation facilities. The City recognizes the value of bicycling as a viable means of transportation and an essential contribution to a City that promotes transportation choice as an important quality-of-life indicator. The Transportation Action Plan provides a clear and focused description of existing conditions for bicycling in Charlotte. This description is included below.

Charlotte, like many fast growing Sunbelt cities, spent the last several decades creating a disconnected street network and implementing roadway improvements which did not consider or accommodate bicycle travel. Hundreds of miles of new and widened streets were built with little to no thought being given to how street design would impact bicycle travel. The lack of bicycle accommodations on these roads was also compounded by reduced levels of connectivity as many communities forgot the benefits of a connected street network for all transportation users.

Many cities recognized this failure years ago, while other cities are just beginning to reverse their course on this issue. Charlotte, like many cities, is now committed to undoing these mistakes and transitioning towards becoming a bicycle-friendly community. This change will not take place overnight, but through a long-term commitment. In the future—as roads are widened, as new roads are built, as the Greenway plan is implemented and as greenfield areas are developed in a more connected fashion—Charlotte will become a bicycle-friendly community.



Recent connectivity projects seek to eliminate barriers in Charlotte's pedestrian and bicycle network

In addition to calling for an expenditure goal of \$47.5 million over a 25-year planning period, the Transportation Action Plan notes the following points to demonstrate that Charlotte is beginning to make significant progress in bicycle planning efforts:

First, the City is committed to adding bicycle facilities when roadways are widened or resurfaced. One challenge to this approach is that a number of the streets in the City are controlled by NCDOT. The City is beginning to make strides to challenge NCDOT to refine their roadway designs so that they include bicycle lane accommodations as part of their projects. In some cases the City will need NCDOT to be more flexible with regard to travel lane widths in order to accommodate bicycle lanes.

Another recent accomplishment is that the City of Charlotte passed a progressive bicycle parking ordinance that requires new development to provide convenient and secure bicycle parking.

Charlotte was given “honorable mention” recognition in 2005 by the League of American Bicyclists for the progress the city is making. However, even with these advancements, Charlotte trails cities such as Cary, Chattanooga, Denver, Orlando and Washington, D.C., who have been formally recognized as “Bicycle Friendly Communities.”

Bicycle-related strengths in Charlotte

Charlotte has unique bicycle-related strengths to build upon as it seeks to become a more bicycle-friendly community. Prior to 2000, there were no bicycle lanes in the City, but today there are over 51 miles of bicycle lanes, 20 miles of greenways, and 4 miles of signed bicycle routes through neighborhoods. The emerging greenway network is one of the City’s most important strengths as it seeks to become a more bicycle-friendly community. Existing bicycle and greenway facilities in Charlotte are shown in Figure 9.

The Greenway Master Plan presents a vision and strategic plan for providing a connected greenway network throughout the City. Particularly important bicycle and greenway segments are identified in Chapter 5 of this Plan, as well as in the Greenway Master Plan.

The recently adopted Urban Street Design Guidelines are also an important strength as they will require the provision of bicycle facilities on most roads that are planned to be widened in the future either through the implementation of the City’s CIP or through private-sector development projects. This is a particularly significant requirement given the relatively large amount of roads that are planned to be widened in Charlotte. Figure 10 shows the City and State-maintained roads that are planned to be widened through 2030. Table 1 below shows the total mileage of State and City-maintained roads that are planned to be widened in the short, medium and long-term.

Table: 1: Planned road widening projects on state and City-maintained roads by horizon year

	Near Term (2010)	Medium-Term (2020)	Long-Term (2030)	Total
City-Maintained	13 miles	45 miles	69 miles	127 miles
State-Maintained	40 miles	67 miles	47 miles	154 miles
Total	53 miles	112 miles	116 miles	281 miles

Additional strengths include City support for bicycle planning, a history of strong plans and policies, existing resources and facilities, an engaged community and existing outreach, education and awareness initiatives. Additional strengths are listed below. Strengths identified by the Stakeholder Group are listed in Figure 8.

- Strong local multi-modal transportation planning environment
- Highly livable city
- High aspirations
- Strong economic engine and major development Downtown
- Good climate and relatively flat terrain
- Dedicated full-time Bicycle Program Manager
- Planning and construction of local and regional greenways
- Good bicycle transportation system inside Route 4
- Bicycle racks on public transit buses and existing bicycle rack program

Figure 8: Strengths Identified by the Stakeholder Group

Charlotte's Strengths as Identified by the Stakeholder Group

- Pro-bicycling attitudes in the City leadership
- Strong economic engine
- Greenways (existing and planned)
- Major development occurring Downtown
- Climate and relatively flat terrain
- Charlotte-Mecklenburg was recently awarded a "Fit Community" designation
- Regional greenway/trail efforts (Carolina Thread Trail)
- Heightened bicycle awareness through bus decals, share the roads signs, etc.
- Growing number of volunteer organizations
- Criterion race and "24 hours of booty" increases awareness
- Strong local planning environment
- Existing plans and policies
- Highly livable city
- The City has high aspirations
- There is a bicycle rack program

Figure 9: Existing Bicycle and Greenway Facilities

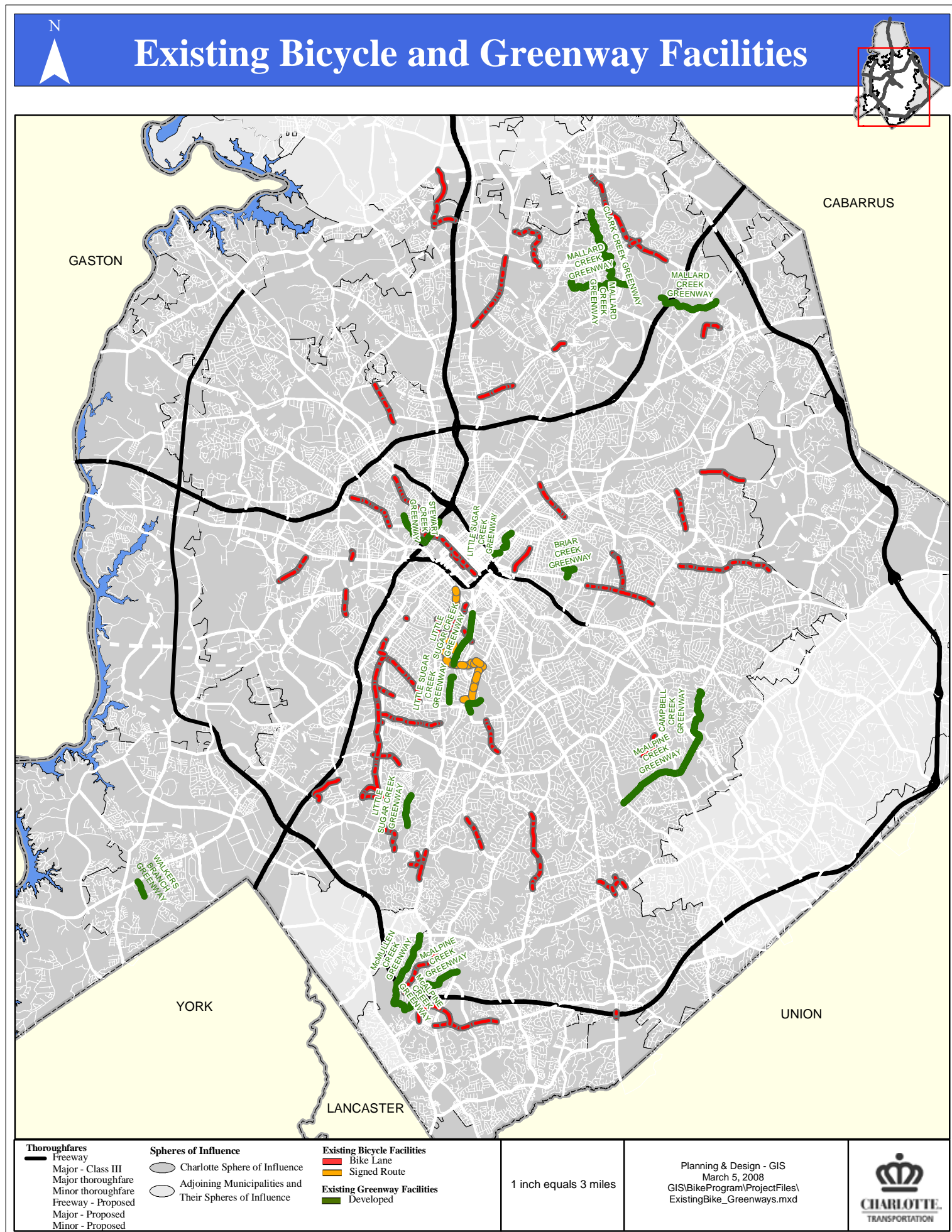
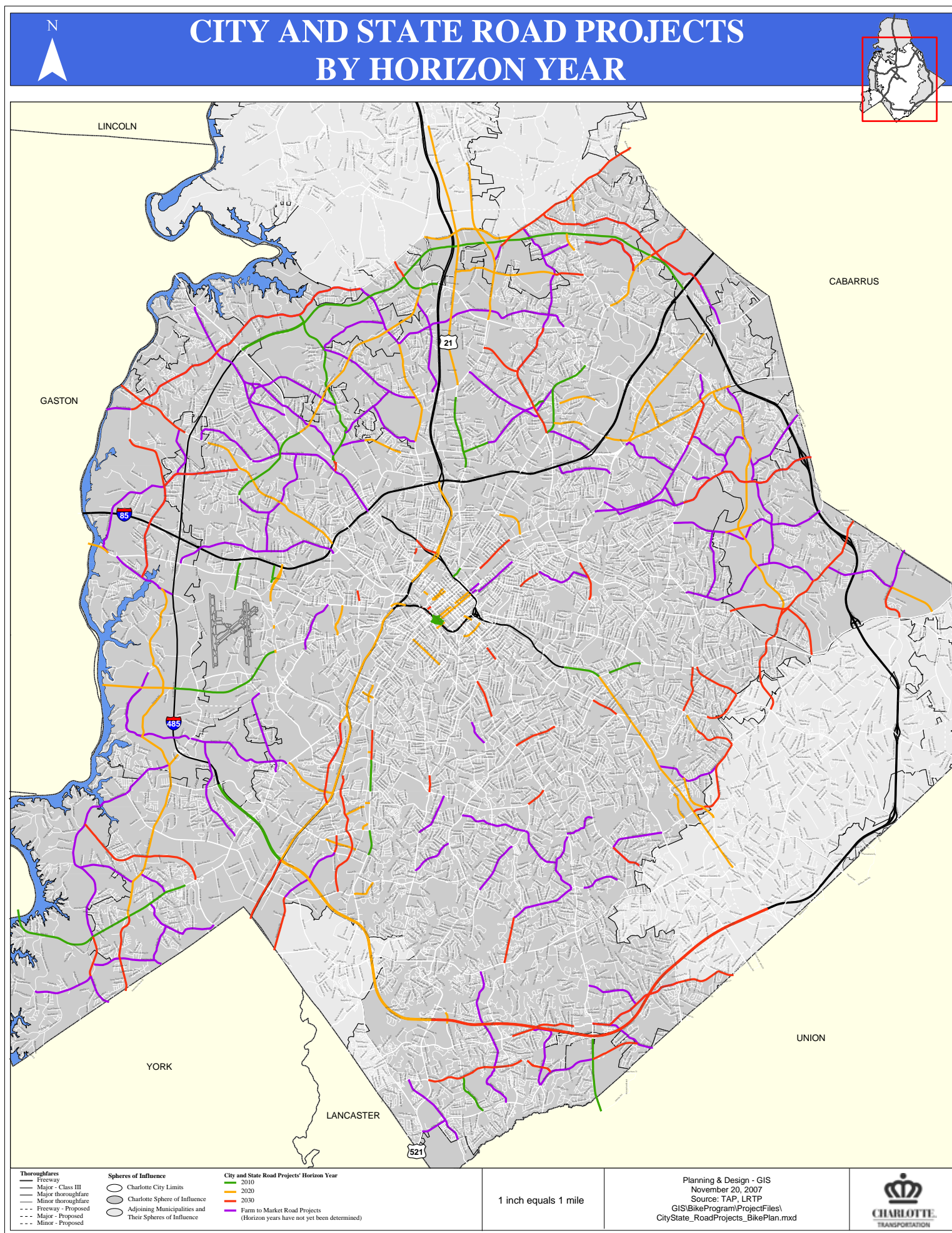


Figure 10: City and State Road Projects by Horizon Year



Challenges of bicycling in Charlotte

There are also many challenges to bicycling in Charlotte. These include safety, connectivity, need for additional education and awareness programs, City and State coordination, implementation and funding.

According to the Transportation Action Plan, based on the City's intersection Levels of Service (LOS) methodology, 100% of the City's top fifty (50) most congested intersections have a bicycle LOS of E-F. This is a direct result of little attention being given to bicycle accommodations when intersections have been widened in the past. In order to be a bicycle-friendly city, Charlotte will need to include bicycle accommodations when intersections are widened and retrofit select intersections to better accommodate bicyclists. Additional information on recommended intersection improvements is included in Chapters 5, 7 and 8 of this Plan. The location of several interstate highways contributes to the City's connectivity challenges as they serve as a barrier to access and mobility for many bicyclists. The interstate network is shown in Figure 11 on the following page. Another challenge are the many narrow roads that serve as the primary routes for developing areas in the City.

Located within the Charlotte city limits, these Farm-to-Market roads serve as the primary routes for developing areas of the City. They quickly become overburdened by traffic resulting in significant congestion and sometimes unsafe conditions. These roads are shown in Figure 10. Improvements that are needed on them include new curb-and-gutter, new sidewalks, additional lane width, and turning lanes to improve traffic flow. The City has a Farm to Market program. The TAP notes that this program requires a funding level of \$190 million over the 25-year planning period to fund approximately 65 miles of improved roadways and the installation of 375 miles of new curb and-gutter along existing streets.

Ongoing coordination with NCDOT is an important challenge as the City seeks to improve bicycling conditions. Figure 12 shows State versus City-maintained roads in Charlotte. Many of these are interstate highways and/or limited access roads such as the Billy Graham Parkway. However, many also serve important roles in the bicycle network. For this reason, these roads are included on the Near to Medium-Term and Long-Term Bicycle Route Network maps in this Plan. Ongoing discussion between the City and NCDOT will be required on a case by case basis as bicycle facilities are considered for specific roadways. The City and NCDOT should coordinate to ensure that bicycle accommodations are provided in all road improvement projects and that all opportunities to provide bicycle facilities, for example through the resurfacing process, are fully captured. Additional information on how this coordination can occur is included in Chapter 8 of this Plan.

Safety concerns were expressed often at the public meetings as an important challenge to improving bicycle conditions in the City. Crash statistics reiterate this concern; in fact from January 2000 to December 2005, there were 11 fatal bicycle crashes and 610 bicycle crashes. Corridors with high numbers of bike crashes include South Boulevard, Central Avenue, The Plaza, North and South Tryon Street, Albemarle Road and Freedom Drive. Additional core challenges identified by the Stakeholder Group are listed in Figure 13.

Figure 11: Barriers to Bicycle Access and Mobility

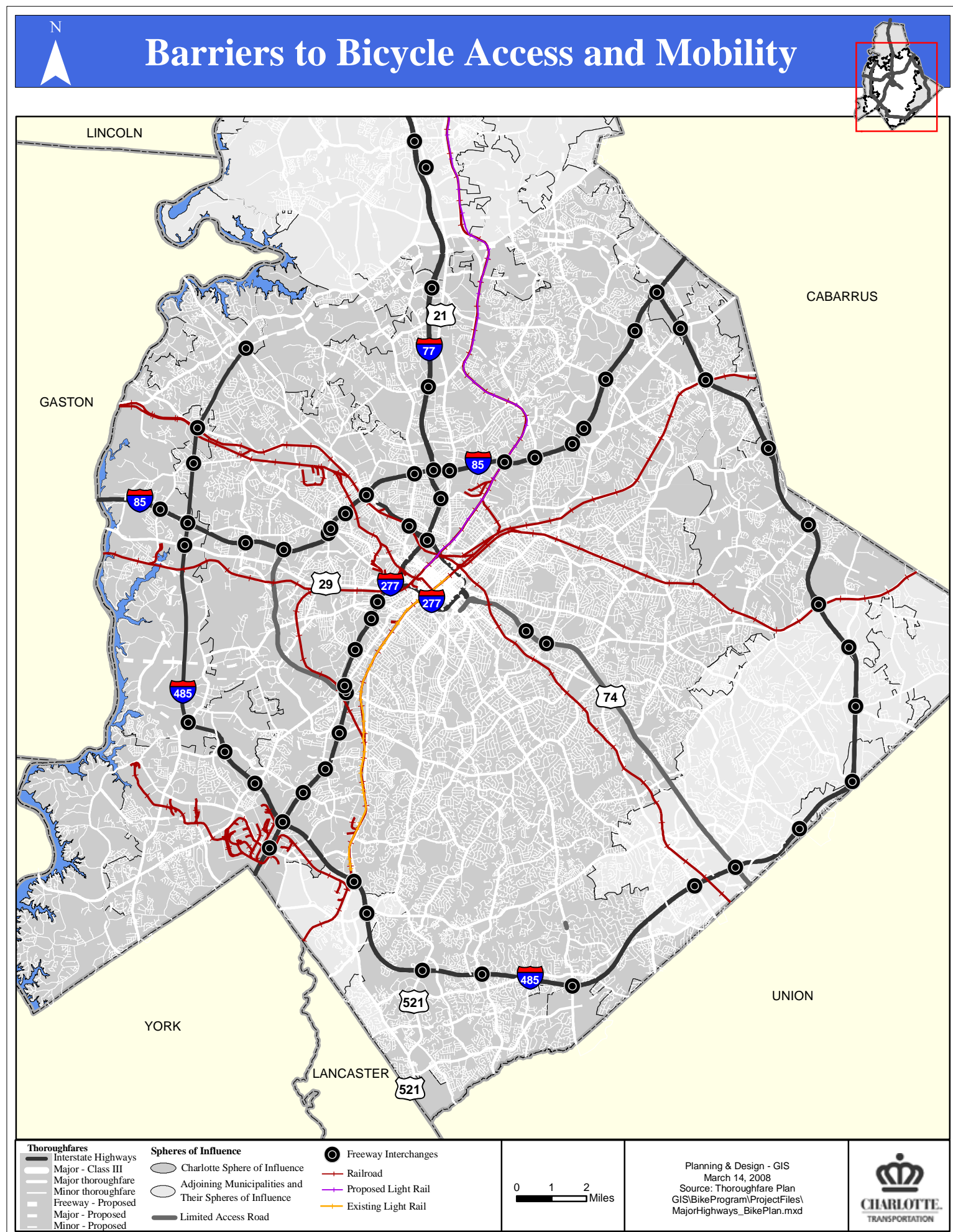


Figure 12: State-Maintained Roads in the City of Charlotte

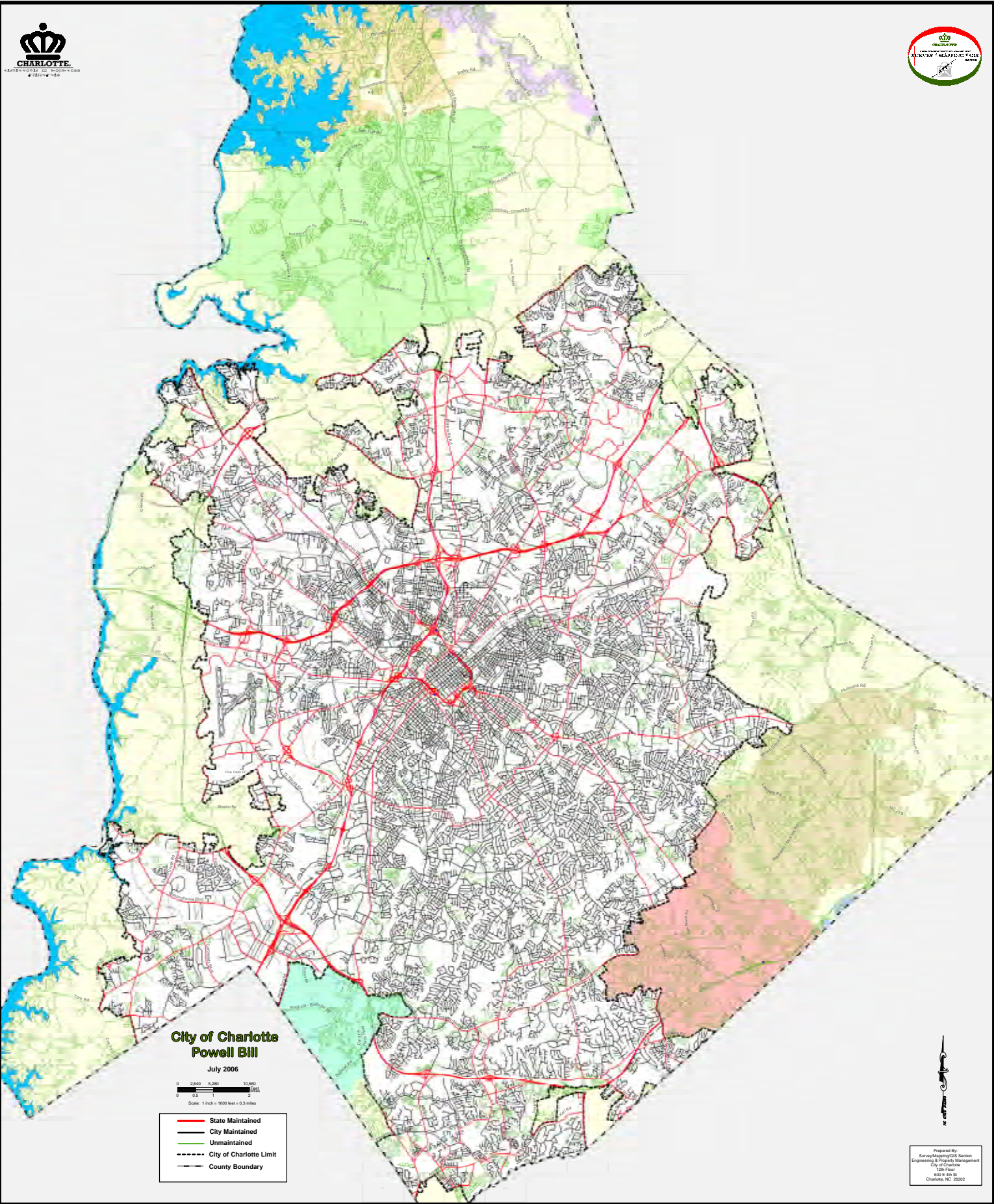


Figure 13: Challenges identified by the Stakeholder Group

Challenges Identified by the Stakeholder Group

- Creating a network that is safe, convenient and connected
- Creating equitable change
- Finding engineering solutions to greenways and on-road facility connections
- Addressing areas that are presently dangerous and intimidating
- Accounting for wide variation in mentality between different areas of town
- Funding
- Approval
- Timing
- Logistics
- Education (how to use facilities and interact with traffic, proper riding technique, account for language differences, etc.)
- Staff resources
- Public perception of bicycling
- Outreach to all bicycling communities
- Agency coordination
- Communication
- Crossing arterial roads on existing and proposed signed bike routes
- Schools discourage/prohibit walking and bicycling to school
- Connecting greenways
- Implementation

Past Efforts and Current Initiatives

Charlotte directly addressed bicycling for the first time in the Charlotte-Mecklenburg Bicycle Transportation Plan, adopted in September of 1999. This process solicited public input, analyzed current bicycling conditions and developed a Bikeway Improvement Plan that served as the blueprint for ongoing bicycle projects and programs in Charlotte. The City has accomplished many of the goals outlined in the 1999 Plan. For example, the City has hired a full-time bicycle coordinator, established a locally-appointed Bicycle Advisory Committee, and implemented bikeway improvements as part of new roadway projects - all recommendations of the 1999 Plan.

The Bicycle Program was created for the purpose of implementing the recommendations of the Charlotte-Mecklenburg Bicycle Transportation Plan and improving bicycling conditions within Charlotte. The program is involved in a



Members of the public provide feedback on existing bicycle conditions in Charlotte.

wide range of activities. The program reviews development plans, re-zonings, and public roadway projects for potential bikeway facility construction. In recent years, it has been involved in a number of initiatives such as:

- Development of the Transportation Action Plan and the Urban Street Design Guidelines
- Charlotte Pedestrian and Bicycle Neighborhood Connectivity Study and ongoing bicycle education of new CATS drivers
- Bicycle/Transit Coordination including the Rack and Ride Program
- Reviewing and commenting on site plans

By adopting the Charlotte-Mecklenburg Bicycle Transportation Plan, Charlotte's City Council also created the Bicycle Advisory Council (BAC). The BAC is an advisory body to City Council. The committee reviews the Charlotte-Mecklenburg Bicycle Transportation Plan and makes recommendations on implementing policies and strategies. The BAC also recommends appropriate action to the City Council and County Commission on bicycle transportation issues. Members of the BAC must be residents of Mecklenburg County and have an interest in bicycling as a form of transportation.

At the first public meeting the public was asked to comment on the existing and past programs and initiatives in Charlotte. The existing City-based and non-City-based programs that were cited most often by the public are listed below.

- Share The Road Campaign (Video, signage and bus decals)
- Group presentations -community outreach
- Annual bicycle week, including Mayor's ride, T-shirts etc.
- Answer Guy bicycle safety television segment
- Safe Kids (child bicycle safety)

Additional programs that were discussed at the public meeting included: Annual Bike!Charlotte event, bicycle facility design training workshop and webinars for local engineers, planners and others; Bicycle awareness presentation to CATS new operator classes; CDOT bicycle program website; Signs on Bikes campaign; Participation booths at fairs and events; Bumper and bicycle stickers, posters; Bicycle to Healthy Living brochure; Bicycle rodeos; CATS rack and roll bicycles on bus brochure and web video

Existing non City-based educational and awareness initiatives cited most often at the public meeting are listed below.

- Efforts to get bicycle education incorporated into the driver's ed curriculum
- Mecklenburg/Union Bicycle Suitability Map
- Street bicycling classes (Bicycling classes offered by Paul Griffin and John Ciccarelli and Alan Hunt's Commuter/Bike Mentor Program)
- SRTS efforts at various schools

Additional programs that were discussed at the public meeting included: 24 hours of Booty annual fundraiser for Cancer Foundation; CMPD bike patrol that covers the uptown and South Park areas; Annual midnight group ride for all levels of bicyclists; Weekly club rides through most of the local bike shops and other groups; Trips for Kids' free Saturday trail riding; Clear

the Air Challenge; Ozone Awareness kickoff week 3; Recycle a Bicycle program through Trip for Kids; Tarheel Trailblazers; Non-city websites such as CABA, Uptown commuters group, etc.; Uptown Commuters Bicycle Mentors Program; CATS sponsored bike-rack education with a portable bike-on-bus rack at various clean air events; Bike commuter challenge; Bicycling in Charlotte website at www.bikecharlotte.com; Earn-a-bike program through the Re-cyclery/Trips for Kids; The Re-cyclery's donated bikes; The Dirt Divas mountain biking club; REI bicycling workshops on commuting, gear and bike maintenance; Safe Kids program through the Fire Department and Health Department; Charlotte Area Bicycle Alliance bicycle valet parking during Charlotte Shout; Charlotte BIKETOWN designation by Bicycling magazine; Non-city sponsored bicycle rodeos; Tandem Tailwinds

This chapter discussed current conditions for bicycling in the City. It presented an overview of Charlotte, its bicycle-related strengths and challenges and ongoing bicycle efforts. The following chapter presents a future vision for a connected and accessible bicycle route network.

Chapter 5: Future Conditions

This Plan envisions an accessible, connected and comfortable bicycle network in Charlotte that is supplemented with effective bicycle education programs and targeted policy revisions. The previous chapter discussed existing conditions for bicyclists. This chapter presents a vision of future bicycling conditions in the City.

The future of Charlotte's bicycling environment

This Plan sets forward a blueprint for the future of Charlotte's bicycling environment. It presents a strategy for meeting and exceeding goals outlined in the TAP. It outlines detailed facility recommendations as well as education, awareness and policy goals to realize the Stakeholder Group's vision of Charlotte as the premier bicycling City in the United States. A discussion of the City's understanding of the word "premier" is provided below.

The Premier Bicycling City in the United States

In order to reach its goal of being the premier bicycling City in the United States, Charlotte will need to realize the goals that are presented in Chapter 3 of this Plan. It will become the premier bicycling City by fully incorporating bicycle facilities in all transportation planning activities. It will seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan, while include bicycle improvements in ongoing transit and greenway planning activities. It will design and build new and reconstructed roadways to be bicycle-friendly. It will implement bicycle improvements as a part of all resurfacing and maintenance activities. The City will also provide targeted and effective educational and awareness opportunities for bicyclists and motorists and will continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation. When the City meets and exceeds these goals, it will be the premier bicycling City in the U.S.

These elements are the foundation for the City's understanding of the word "premier" and so are used to organize the specific policy recommendations in Chapter 3. The City also recognizes that other elements serve an important role in defining the concept of the premier bicycling City, which are discussed briefly below.

A network to serve the full range of bicyclists

The future bicycle network will serve the full range of bicyclists. A viable bicycle transportation system is one that accommodates the many purposes for bicycling, the various destinations, the wide range of comfort-levels with motor vehicle traffic and the corresponding range of preferences for different bicycle facility types. This means a network of on-and off-street bicycle facilities throughout Charlotte that provide bicyclists and potential bicyclists with bikeways that fit a wide range of comfort levels and provide convenient access to activity centers and neighborhoods throughout the City.

Proactive and strategic bicycle planning

Bicycle planning efforts will be increasingly proactive and strategic. Currently, Charlotte has been obtaining most bikeway projects where opportunities present themselves. During street reconstruction, re-striping, or redevelopment, bicycle lanes have been constructed when enough right-of-way existed or was easily obtained. This type of opportunistic bikeway

construction, while cost-effective, has resulted in a “sparse and sporadic” bicycle network. Bicycle lanes may last only a few blocks or miles, infrequently link with other bikeways and greenways are intermittent. Additionally, bicycle-pedestrian connections between neighborhoods are limited. To develop a truly comprehensive bicycle network that allows travel throughout the City, Charlotte will need to embark on more challenging and strategic bicycle projects in order to provide connections.

Effective educational and awareness opportunities

The emerging bicycle route network will be reinforced with a range of effective educational opportunities that serve both bicyclists and motorists. Bikeway construction is not the only essential part of a viable bicycle transportation system. Education - of motorists and bicyclists - will play an important role in informing the traveling public on the importance of sharing the road. For motorists, this means education informing them of a bicyclist’s legal right to safely use to road. For bicyclists, this means informing them of the proper, safe, and legal way to ride in mixed traffic.

Coordinated bicycle and greenway planning

Charlotte will build off of the dynamic relationship between the emerging bicycle and greenway networks. Opportunities to enhance the relationship between greenways and on-road bicycle facilities should be pursued. The recommendations in this Plan and in the Greenway Master Plan should be implemented in tandem, as the facilities are mutually beneficial. Greenways have the potential to provide alternatives to difficult roads and on-road bicycle facilities have the potential to connect gaps in the greenway network. Priority bicycle/greenway network connector projects are provided in Chapter 8 of this Plan.

Connections to key destinations

The on and off-road bicycle network should also provide connections to key destinations in the City, as well as to facilities and amenities in the region. Examples of key destinations that should be accessible by bicycle include Reedy Creek Nature Preserve, UNC Charlotte, Freedom Park Nature Center, Verizon Pavilion, Mint Museum of Art, U.S. National Whitewater Center, Southpark Mall, Eastland Mall, Carolina Pavilion/Carolina Place Mall, Northlake Mall, South End and CarolinasPlex

In addition to the destinations listed above, bicycle access should be provided to the proposed Carolina Thread Trail, a regional trail network that will eventually reach 15 counties and over 2 million people. Bicycle access should also be provided that connects to the Lake Norman Bicycle Route and other regional bicycle routes. The signed route network will play an important role in connecting these destinations. The signs should provide functional connections to link key destinations, while also providing directional and wayfinding information. Additional information on the signed route network is included in Chapter 8 of this Plan.

Bicycle Route Network

Implementation of this Plan will create more than 700 miles of bicycle facilities throughout Charlotte. The specific type of facility that is recommended on each segment of the network depends on a wide range of factors, including:

- Surrounding land uses and connectivity to destinations
- Existing right-of-way space
- Number of travel lanes

- Travel lane width
- Road width
- Traffic volume
- Traffic speed
- Traffic composition (presence of buses and large trucks)
- Presence of on-street parking

The section below outlines how this network was developed and describes the bicycle facility types that it includes.

Public input, field work and methodology

A public open house was held in October 2007 and was attended by more than one-hundred people. Participants provided feedback on critical needs, opportunities and constraints. The public was asked to provide information on specific locations where they would like to see bicycle improvements. A Stakeholder Group composed of key stakeholders including members of the Bicycle Advisory Committee, residents from various areas of the City, NCDOT representatives, City/County staff, bicycle advocacy organizations, the development community and other special interest groups was actively involved in creating this Plan. The Stakeholder Group provided guidance and insight to the project team throughout the project. As part of the 2008 Charlotte Bicycle Master Plan, an online public survey was also conducted for two weeks in October of 2007 to supplement information gathered at the public meetings. Eight hundred people completed surveys.

In addition to the public outreach described above, field work was conducted throughout Charlotte to document existing conditions for bicycling and to identify opportunities to improve conditions for bicyclists. Information on variables such as the number of lanes, lane and road width, speed limit and the presence of parking, bicycle lanes, sidewalks and paved shoulders was recorded in the field analysis. Through this analysis in the field, recommendations for facility types were developed for many roads in the City, as were recommendations for the actions that would be required to create the recommended facility. Informed by public comment and first hand observation, the goal was to identify the best bicycle facility on each individual road.

The Bicycle Facility Network includes a variety of bicycle facilities. On-road bicycle facilities serve several purposes, including designating roadway space for bicyclists, channelizing motor vehicles and bicyclists, making bicyclist movements more predictable, indicating the proper direction for bicyclists to travel on the roadway, and indicating the optimal location on the street for riding at mid-block locations and when approaching intersections. Off-road bicycle facilities, including multi-purpose trails, provide a space for bicyclists to be physically separated from roadway traffic.

On-Street Bicycle Facilities

On-street bicycle facilities can include a range of design treatments such as bicycle lanes, striped shoulders and shared lane markings. The goal of on-street facilities is to improve bicycling conditions on roadways while providing a visible reminder that motorists should share the road with bicyclists. On busy streets, an important purpose of these facilities is to provide lateral separation between bicyclists and motor vehicles and to encourage proper

behavior among bicyclists and motorists. For these reasons, on-street facilities are recommended for roads in Charlotte with higher traffic volumes.

Factors that impact safety and comfort for on-street facilities are noted below.

- Amount of lateral separation between bicycles and motor vehicles (more space is needed when traffic speeds increase)
- Motor vehicle traffic volumes on the roadway
- Speed of the traffic on the roadway
- Percent of heavy vehicles on the roadway
- Presence of on-street parking
- Pavement surface condition

The Bicycle facilities that are recommended in the Bicycle Route Network are influenced by the road characteristics described above. Additional information on each type of facility recommendation is provided in Chapter 7 of this Plan. These recommendations include the following:

- *Bicycle Lanes:* A bike lane is a portion of the roadway that has been designated by striping, signing and/or pavement markings for the preferential or exclusive use of bicyclists.
- *Climbing Lanes:* A bicycle lane on one side of the road (climbing lane) and a shared lane marking on the other side, can provide additional space for riders climbing a hill while providing shared roadway notification to cars and bicyclists coming down the hill.
- *Greenway Trails:* While this Plan focuses on the on-road bicycle network, it fully supports current and future greenway trail development efforts. Greenways have the potential to provide connections and therefore opportunities to enhance the relationship between greenways and on-road bicycle facilities should be pursued.
- *Sidepaths:* Sidepaths are essentially trails that are located on the side of a roadway. Sidepaths are often located only on one side of a road and are intended to provide two-way bicycle and pedestrian travel.
- *Shared Lane Markings:* Motor vehicle/bicycle sharing of the travel space can be emphasized by using special shared roadway pavement markings called shared lane markings (sometimes referred to as “sharrows”).
- *Shared Roadways:* Shared roadways are streets and roads where bicyclists can be served by sharing the travel lanes with motor vehicles.
- *Signed-Shared Roadways:* A signed-shared roadway is a shared roadway, which has been designated by signing as a preferred route for bicycle use.
- *Striped Shoulders:* Striped/paved shoulders can provide bicyclists with extra riding space to increase their comfort when traveling adjacent to motor vehicle traffic.
- *Wide Outside Lanes:* Wide outside travel lanes are typically designed to be 13- to 15-feet wide, which allows most motor vehicles to pass cyclists within the travel lane.

The Long-Term Bicycle Route Network is shown on the Bicycle Network Map as Figure 14 on the following page. Detailed route maps for each quadrant of the City (e.g. northeast, northwest, southeast, southwest) are provided as Figures 15 through 18 on the pages that follow. The network is composed of locations where specific improvements have either already been made or are proposed in the future. All segments will have some type of visible cue (i.e. bike lane, striped shoulder, bike route sign, pavement marking, etc.) to indicate

that special accommodations have been made for bicyclists. While the network will provide primary routes for bicycling, it is important to note that, by law, bicyclists are permitted to use *all* roadways (except limited access freeways or where bicycles are otherwise prohibited). Therefore, the network will serve as a core system of major routes that can be used to access all parts of the City. As noted, greenways will also contribute to the creation of a connected bicycle network.

Figure 14: Long-Term Planned Bicycle Route Network



Figure 15: Long-Term Bicycle Route Network - Northeast Quadrant

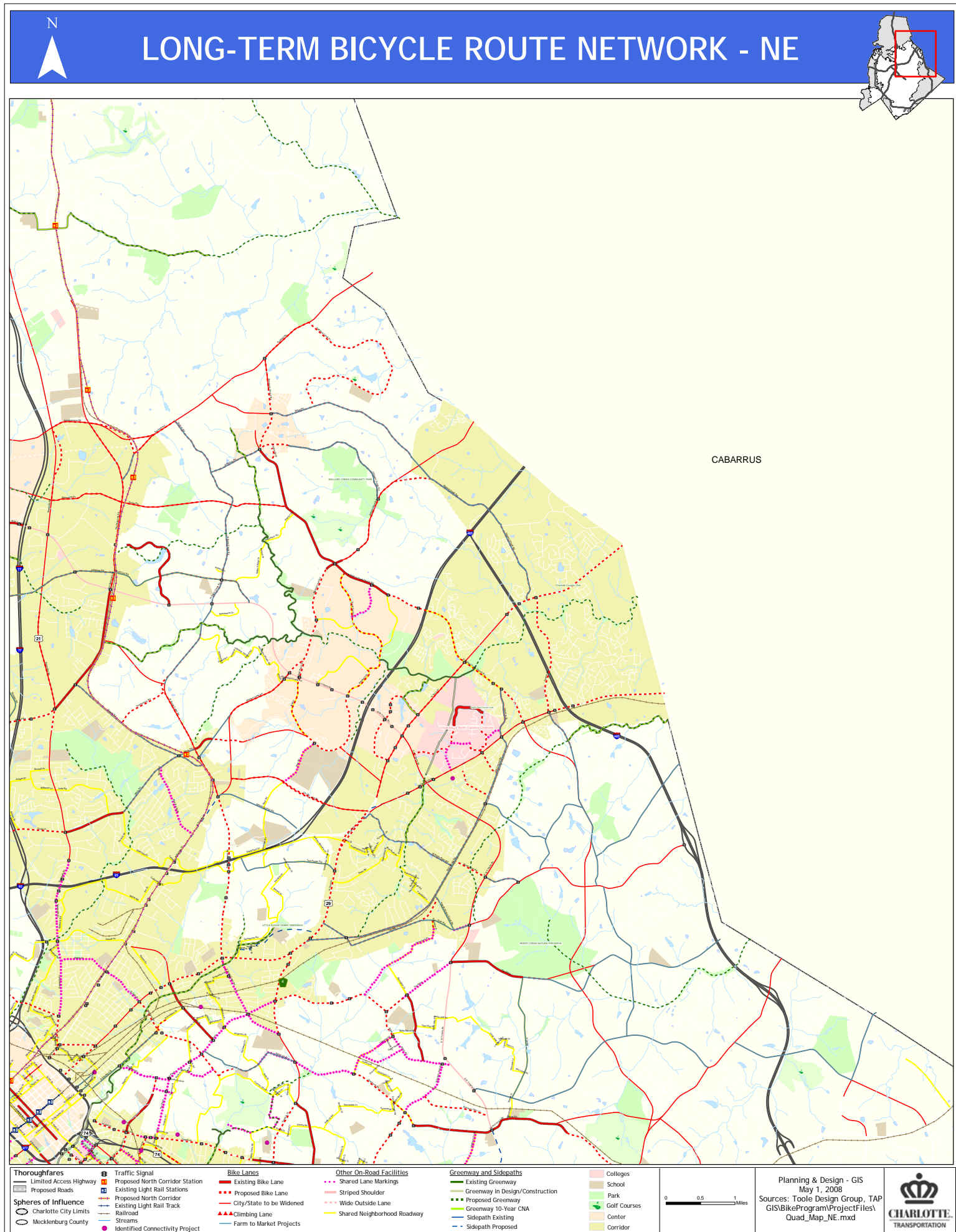


Figure 16: Long-Term Bicycle Route Network - Northwest Quadrant

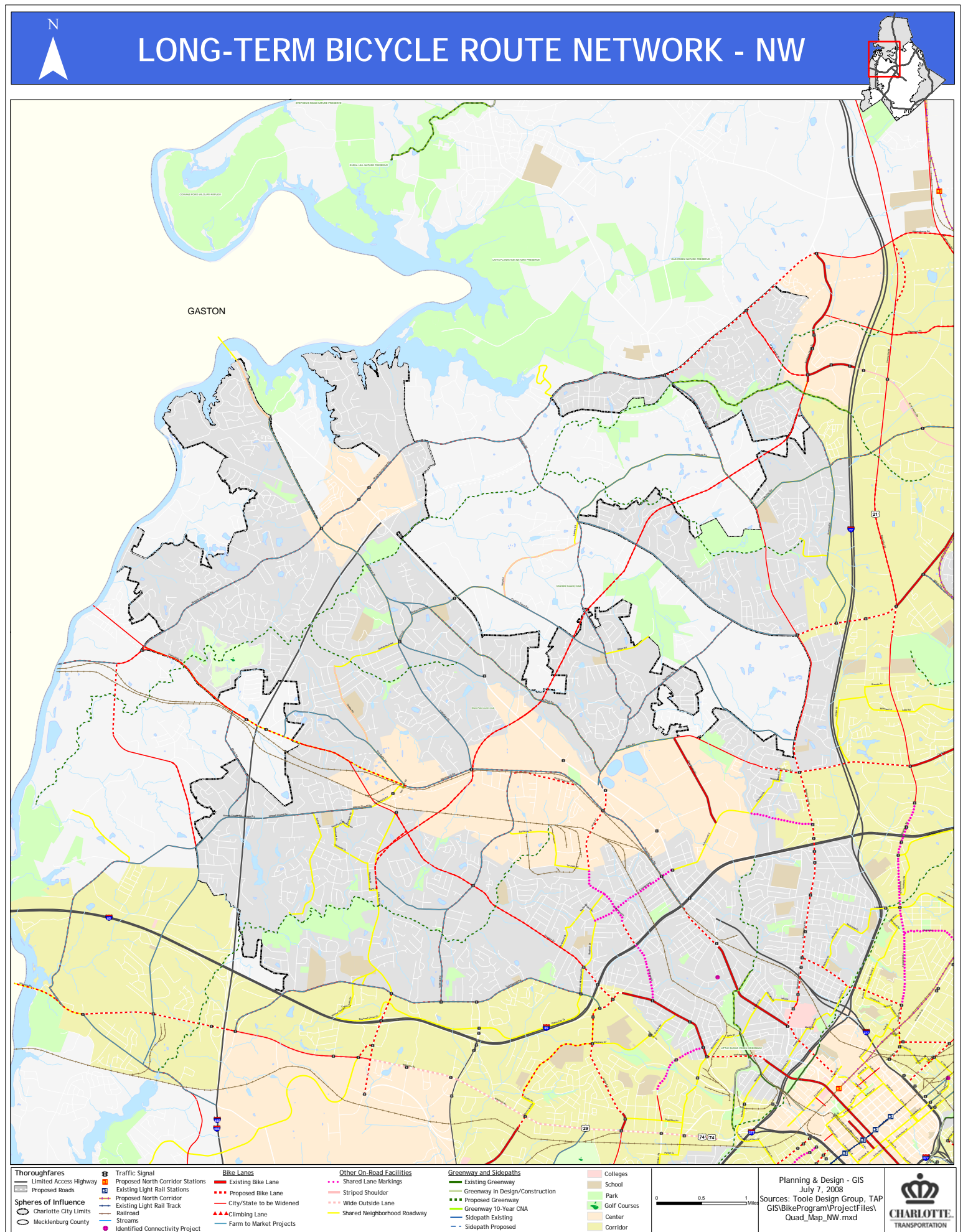


Figure 17: Long-Term Bicycle Route Network - Southeast Quadrant

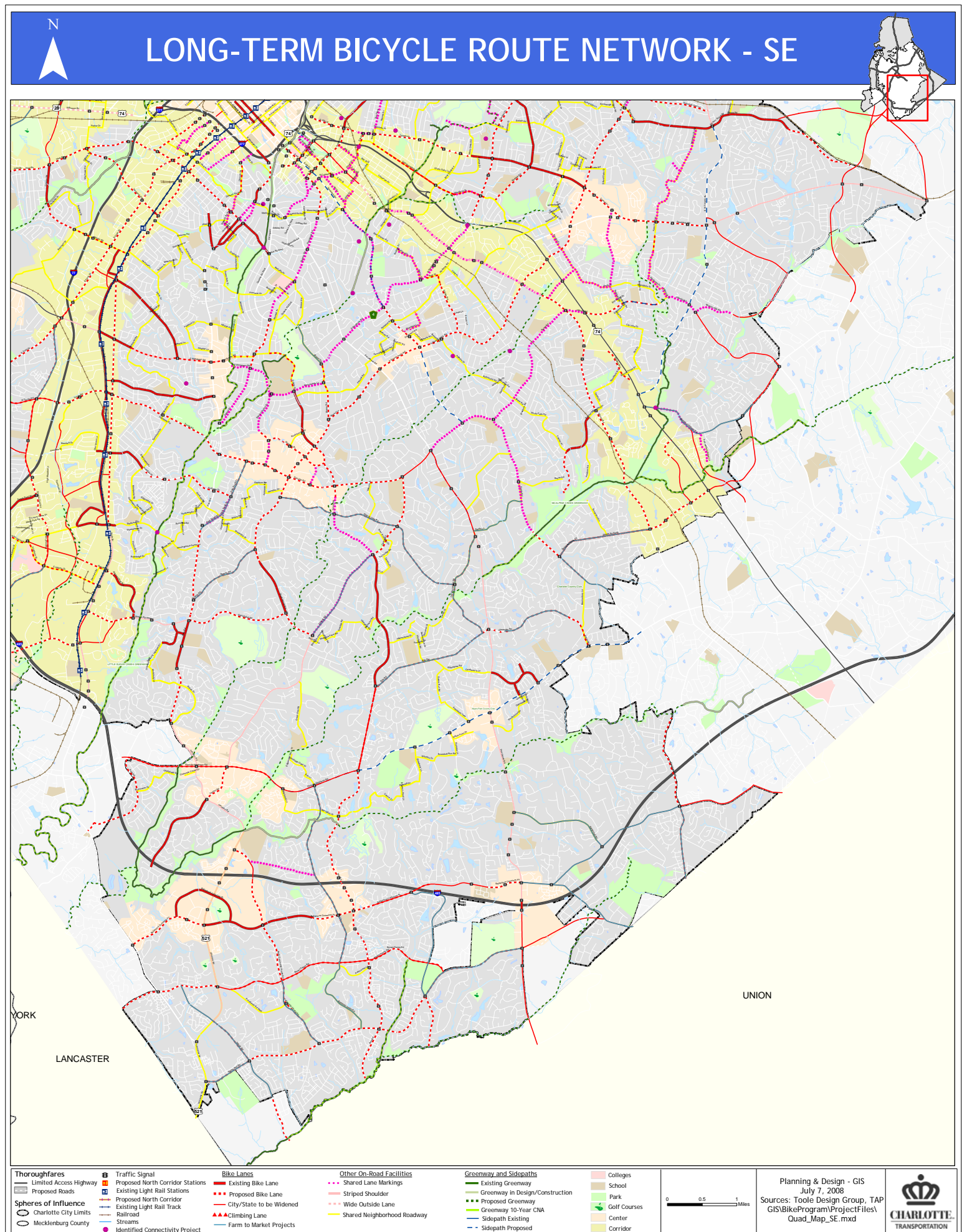


Figure 18: Long-Term Bicycle Route Network - Southwest Quadrant

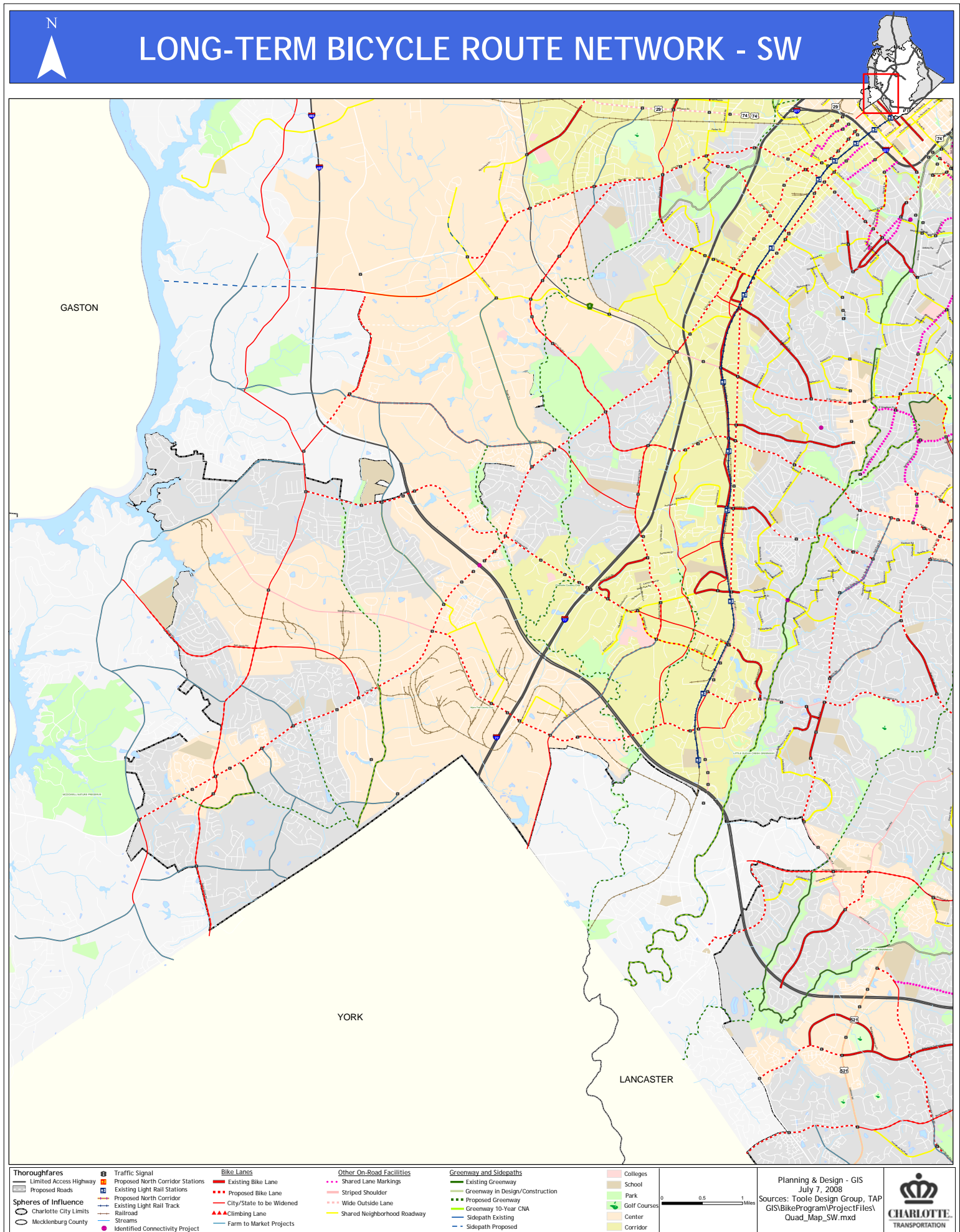


Table 2 below shows the make-up of the proposed bicycle route network.

Table 2: Proposed bicycle route network components

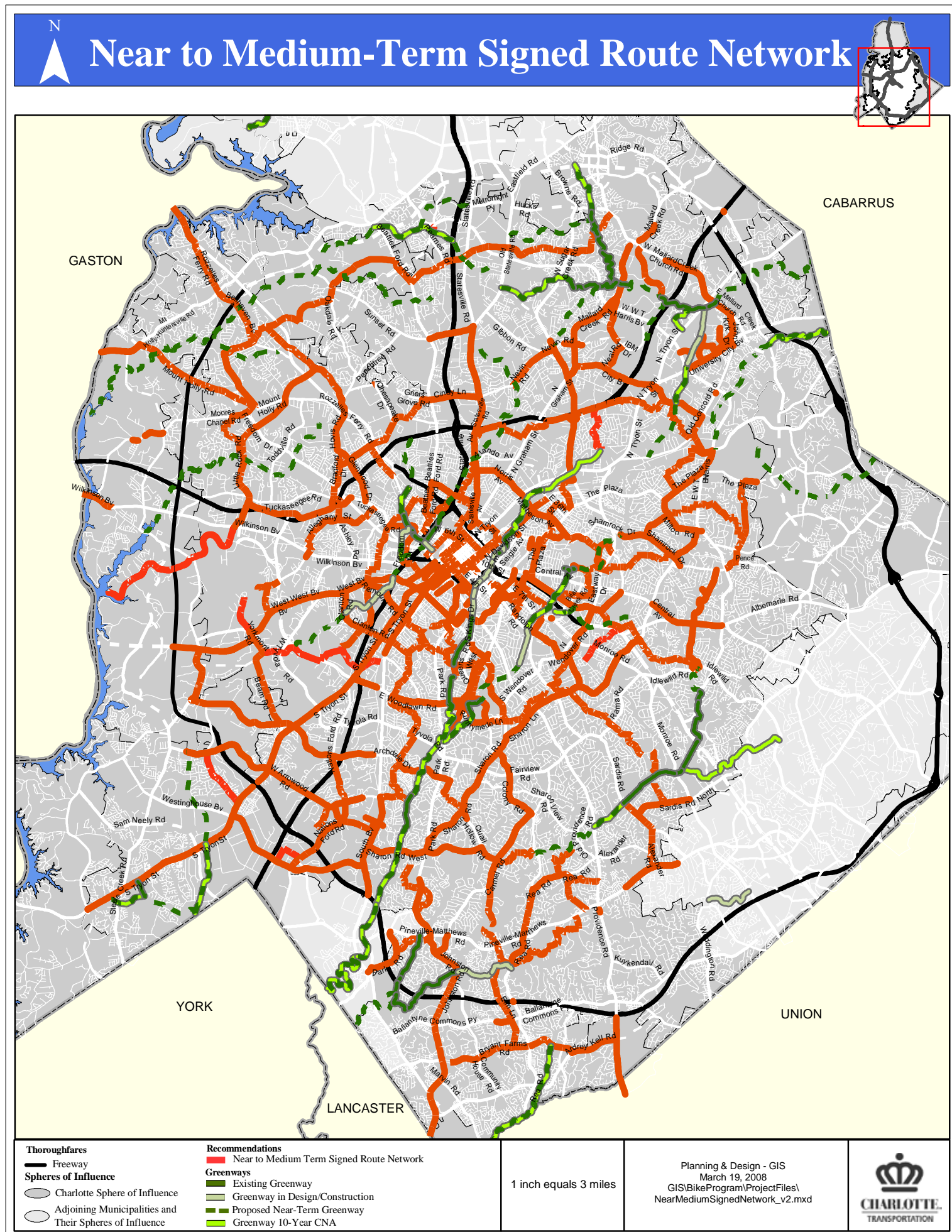
Bicycle Facility Type	Long-Term (2030) Existing + Proposed
Bicycle Lanes	613
Shared Lane Markings	64
Proposed Shared Roadways	269
Wide Outside Lanes or Striped Shoulders	63
Sidepaths	43
Total	783
Note: 1. Bicycle facility type descriptions are provided in Chapter 7. 2. Totals do not include Proposed Shared Roadways.	

Signed Routes

This Plan supports the recommendation in the TAP to create a signed route system that provides a connected network of bikeways. The Near to Medium-Term Bicycle Route Network identified in this Plan should serve as the framework for Charlotte's signed route system. Figure 19 on the following page shows this framework. This route provides a logical and efficient network of facilities throughout the City to encourage bicycling as a viable mode of transportation.

Connections between the Near to Medium-Term Network and specific signed routes and between specific destinations may need to be altered as a result of a more detailed study. In order for the signed route network to function well, signs should provide directional and wayfinding information. The signs should provide functional connections to link key destinations such as schools, greenways and shopping centers. Proposed initial segments in Charlotte's signed route system are detailed in Chapter 8 of this Plan. These segments should be signed in the Near to Medium-Term after a detailed design and engineering study of each route has been completed and, if necessary, intersection and spot improvements along the route have been completed. These initial segments should serve as the skeleton of the emerging signed route system. Additional signed segments should be added over time that connect to and branch off of the initial signed routes so that in the future Charlotte's signed route system connects the entire City.

Figure 19: Near to Medium-Term Signed Route Network



On-Road Bicycle and Greenway Connections

The long-term bicycle network will depend heavily on seamless transitions between on-road bicycle facilities and greenways. Charlotte should build off of the dynamic relationship between the emerging bicycle and greenway networks. Opportunities to enhance the relationship between greenways and on-road bicycle facilities should be pursued. The recommendations in this Plan and in the Greenway Master Plan should be implemented in tandem, as the facilities are mutually beneficial. Greenways have the potential to provide alternatives to difficult roads and on-road bicycle facilities have the potential to connect gaps in the greenway network. Priority bicycle/greenway network connector projects are highlighted in Chapter 8 of this Plan.

Barriers to Bicycle Movement

Charlotte will become the premier bicycling City by providing a connected and comfortable network of bicycle facilities, which is supported by educational and awareness programs to encourage bicycling. In order for it to meet its goals, the City will also need to proactively address barriers to bicycling, such as difficult intersections, connectivity issues and a lack of bicycling parking. The reduction and eventual elimination of barriers to bicycle access is a defining aspect of the vision for future bicycle conditions in Charlotte. These barriers to bicycling in the City are discussed below.

Difficult Intersections and Spot Improvements

Improvements are needed at many arterial roadway crossings in the bicycle network to provide bicyclists with continuous, safe routes between destinations. Charlotte has a number of streets that carry high-speed, high-volume traffic. Many other arterial streets are also challenging to cross, particularly during peak travel periods. In order to make it possible for bicyclists to travel throughout the City, there should be safe places to cross these major streets. Recommended improvements include treatments such as traffic signals, median crossing islands, curb extensions combined with signs and/or markings. For a detailed discussion of specific intersection treatments and considerations, see Chapter 7 of this Plan. Included below is a list of some of the most important intersections in the short-to mid-term bicycle network; however, it does not represent a complete inventory of the City's intersections. Important intersections in the near to medium-term network are listed below.

- North Tryon Street and Mallard Creek Church Road
- Mallard Creek Road and West Mallard Creek Church Road
- Mallard Creek Road and WT Harris Boulevard
- Old Statesville Road and Lakeview Road
- University City Boulevard and WT Harris Boulevard
- West Sugar Creek Road and I-85
- Statesville Road and I-85
- North Sharon Amity Road and Walker Road
- Bryant Farms Road and Elm Lane
- Ballantyne Commons Parkway and Elm Lane
- Carmel Road and Quail Hollow Road
- Park Road and Archdale Drive
- South Boulevard and Archdale Drive
- Old Pineville Road and East Woodlawn Road

- South Boulevard and Clanton Road
- Clanton Road and I-277
- Clanton Road and West Boulevard
- North Graham Street and I-77

Additional intersections identified by the Stakeholder Group include the following:

- Summit/Morehead/Freedom/I-277 Flyover
- Highway 29 (north)/I-485
- Kenilworth/Charlottetown
- Highway 49 South/I-485
- Wilkinson Boulevard (Highways 29 and 74) and Morehead Street West
- South Boulevard/I-485
- Summit Avenue/I-77 flyover
- McDowell/I-277

The City should evaluate the bicycle route network map for other potential bicycle crossing improvements. The first priority should be to improve intersections where existing bicycle facilities cross arterial roadways, intersections along near-term proposed signed bicycle routes and intersections where on-road bicycle facilities cross existing and proposed greenways. Other key crossings should be considered as each new segment of the bicycle network is implemented. In addition, all roadway improvement projects should address bicycle crossing needs as a routine part of the design process.

Bicycle Parking

Bicycle parking is an important but often overlooked part of a bicycle-friendly community. A bicycle network is not complete unless there is a place to safely, securely and conveniently park at the end of a trip. Bicycle parking is a unique part of the bicycle network in that it often does not occur in the public right-of-way. Where bike parking can be provided within the public right-of-way, the Bicycle Program has taken steps to provide bicycle parking. For example, bicycle racks have been installed in Uptown, a major activity center and popular bicycling destination. The Urban Street Design Guidelines also recommend the creation of an amenity zone between the street and sidewalk for larger streets in highly urban areas, creating an opportunity to install more bike racks in the public right-of-way where appropriate.

In lower-density areas where buildings are set back from the street, and in areas with constrained right-of-way, cooperation with private development is critical to ensure bicycle parking is provided in a safe, secure, and convenient location. The City of Charlotte took a significant step toward ensuring adequate bicycle parking is provided in new developments by adopting a Bicycle Parking Ordinance in March of 2005. The ordinance requires the installation of short-term and long-term bicycle parking spaces in new development. The ordinance outlines the required number and design of short and long-term bicycle parking spaces based on the number of automobile spaces required and the size of the development. Unfortunately, Charlotte has a large number of existing developments that do not provide bicycle parking. Charlotte's Bicycle Program is working to retrofit these existing developments through the Bicycle Parking Partnership Program. This program offers the use of City-owned bicycle racks free of charge to businesses on the condition that they are installed and maintained privately.

Connectivity Projects

Projects identified in the City of Charlotte Pedestrian and Bicycle Connectivity Study also present significant barriers in the bicycle network. In Chapter 8 of this Plan, the projects identified in the Connectivity Study that are located within the near to medium-term bicycle route network are highlighted. All connectivity issues should be addressed to ensure that bicycling is a viable mode of transportation. However, the projects that fall within the Near to Medium-Term Bicycle Route Network should be considered a priority for improving bicycle transportation in Charlotte. The costs for undertaking these improvements have been added to the cost estimates included in Chapter 8 of this Plan.

This chapter presents a vision of future bicycling conditions in the City. The City will develop a network of facilities, provide education and awareness opportunities and pursue policy revisions in an effort to become the premier bicycling City. As it accomplishes this objective, it should be recognized as such, for example by being designated with a top ranking by the League of American Bicyclists. The following chapter discusses the educational and awareness programs and initiatives that should be implemented in coordination with the emerging bikeway system.

Chapter 6: Bicycle Education and Encouragement

In addition to the construction of bicycle facility infrastructure, it is important that steps be taken to raise the awareness level of the rights and responsibilities of bicyclists. Such steps can make a strong contribution to creating a safer bicycling environment and forging a higher level of understanding between bicyclists and other road and path users.

Near to Medium-Term Educational and Awareness Initiatives

The City is currently spearheading a range of bicycle education and awareness initiatives. In the near-term, it should sustain the programs that have proven to be the most successful and popular over the years. Current programs that should be continued using existing funding are listed below.

Current programs and initiatives to continue in the near-term

- Continue to conduct annual BIKE Charlotte events
- Continue to implement Share the Road campaigns
- Continue to provide group presentations
- Continue to provide bicycle awareness presentations to CATS new operators classes
- Continue to update the CDOT bicycle program website
- Continue to operate booths at fairs and events
- Continue to provide bicycle stickers, posters and other promotional items
- Continue to maintain existing brochures and develop additional ones (all educational handouts such as brochures, pamphlets and flyers should be bilingual)
- Continue to provide local training webinars for engineers and planners
- Continue to conduct annual crash analysis to determine local crash characteristics
- Continue to educate cyclists on how to use bike racks on transit to promote safe usage (CATS rack and roll video, demonstration rack at events)

In addition to the current educational and awareness initiatives outlined above, the City should undertake additional new programs in the near-term. To support this effort, the City should partner with organizations such as the Safe Routes to School Program, YMCA, Charlotte Area Bicycle Alliance, MS Society, League of American Bicyclists and other related organizations. Programs that should be added in the near-term to the City's ongoing efforts are listed below.



Bicycle education and encouragement efforts can make a strong contribution to creating a safer bicycling environment and forging a higher level of understanding between bicyclists and other road/path users.

New programs and initiatives to implement in the near-term

- Provide adult bicycle skills classes
- Provide new general information bicycle video for motorists and cyclists
- Pursue bicycle partnerships (Racks, Showers for Bike Commuters, incentives to bike to work)
- Provide “Basics of Bicycling” school curriculum at one pilot school
- Provide public service announcements
- Provide bicycle awareness in drivers’ education and licensing (within scope of CDOT)
- Provide bicycle mapping resources such as the Charlotte Cycling Guide
- Conduct specific bicycle events in addition to BIKE Charlotte (Midnight Ride, Bike to the Park, Bike to the Movies, Ride Route 88, etc)
- Provide a bicycle tour of bicycle facilities (BAC member guided. Requires training of leaders)
- Train City staff on bicycle goals and Bicycle Master Plan
- Advertise new bicycle facilities
- Conduct annual bike counts
- Provide a pilot mini-grant project (Provide small mini-grants to outside groups for bicycle education/infrastructure projects)

Note: Some projects may require temporary part time staffing or outside contracting.

In the medium-term, the City should continue to implement all of the bicycle education and awareness programs and initiatives identified in the near-term recommendations section that have, over time, proven to be effective and successful. It should also add a new set of programs in the medium-term. It is assumed that the City may need to seek assistance to the Bike Program as well as increase its budget for educational programs. The programs that should be added in the medium-term are listed below.



New programs to add in the medium-term

- Public relations campaign that focuses on bicycle awareness and education (Increase visibility of bicycle transportation, safety practices, etc.)
- Regular production of videos for distribution to bike shops, bike clubs, government channel broadcast and website viewing
- Increase frequency of adult bicycle skills class
- Expand Basics of Bicycling school curriculum beyond pilot project to additional schools
- Outreach to non-English speaking populations
- Safe Routes to School contributions (through city or school SRTS program)
- Expanded bicycle events (tours, fairs, etc.)
- Host bicycle summit meeting or conference (local, state, APBP, etc)
- Partner in commuting program to assist commuters in choosing bike routes
- Seek assistance or partnerships with focus on education and awareness initiatives

Education and awareness goals

This Plan sets specific and measurable goals for the provision of new bicycle infrastructure throughout Charlotte in the coming years. The City should also identify opportunities to track its progress in pursuing the educational and awareness goals identified in this Plan. Tracking the programs underway will document the successful bicycle education and awareness resources currently offered in Charlotte. For example, bicycle safety programs are currently offered to new CATS drivers throughout the year.

Tracking existing educational programs will establish a benchmark that will enable the City to demonstrate the success of the expanded range of education and awareness programs envisioned in this Plan. Where feasible, tracking the numbers will enable the City to clearly show the outcome and results of the increased funding for bicycle education programs that are recommended in this Plan. Having documented and measurable data to show this progress will be especially helpful in ensuring ongoing support for bicycle education and awareness programs. Examples of data that would be helpful to track on an annual basis are listed in Table 3 below.

Table 3: Education and awareness program measures

Program	Benchmark
Bicycle safety training for CATS drivers	Number of CATS trainings offered per year
Web-based training courses for City staff	Number of courses offered and departments provided with training
Group presentations	Number of group presentations provided and audiences targeted
Brochures, pamphlets, stickers, posters and other material	Number of brochures, pamphlets, posters, etc. created and made available
Updated educational video	Creation of updated video and venues where it was shown
Updated website	Additional information provided on the website and frequency of website updates
Booths, fairs and events	Number of booths, fairs and events attended and populations reached
Crash analysis	Analysis undertaken and distribution of results
Adult and child bicycle skills courses	Number of classes offered
Pursuing partnerships	Organizations partnered with and results of partnership
Public service announcements	Number of announcements created/run and audiences targeted

Included below is a discussion of some of the important educational and awareness initiatives listed above.

Educating the Cyclist

It is estimated that there are approximately 300,000 bicycles within the City of Charlotte, and the National Bicycling and Walking Study of the Federal Highway Administration determined that sixty-three percent of all trips are under five miles, and over a quarter are under one mile. Coupled together these factors represent a significant potential for increasing the mode share of bicycle transportation. However, many Charlotte bicycle owners report a fear or intimidation of bicycling due primarily to traffic conditions such as speeding and high volumes. This perception is further reinforced through stories of harassment by motorists and media coverage of serious crashes involving bicycles.

These issues can be addressed through educational programs to help the bicyclist understand how to avoid the true risks involved and to gain the skills needed to become more comfortable in selecting routes and sharing the road with traffic. Most Charlotte area bicyclists have had little if any exposure to training in bicycle skills and behavior. Many have dangerous misperceptions, such as a belief that it is safer to ride in the lane facing traffic. Other bicyclists choose to purposely ignore traffic laws, partly due to a belief that doing so has no ramifications for them personally or local bicycling in general.

It is therefore imperative that efforts be undertaken to help educate all bicyclists to avoid those practices which are dangerous and to learn and adopt skills which make bicycling safer, more efficient and more pleasurable. Educational opportunities should be provided in both English and Spanish. Policies that encourage bicycle education for bicyclists are included in Chapter 3 of this Plan.

Educating the Non-cyclist

In addition to the bicyclists, it is just as important that the City pursue initiatives to educate non-cyclists of bicycle rights. Many people believe that roads are built for motor vehicles and that bicyclists are infringing on streets whose construction, maintenance and servicing are paid in total by motoring fees such as gasoline taxes. Because bicycling has typically remained a small fraction of the total transportation mode share, many people are unaccustomed to sharing the road with bicyclists and are not aware of proper road sharing behavior. Bicycle awareness is not typically taught in drivers' education classes nor included on driver licensing exams.

For Charlotte to become a City where bicycling is embraced, it is necessary that local motorists become more aware of the presence of bicyclists and to learn correct behavior when encountering bicyclists on the road. Broadcasting public service announcements, displaying messages in the print media, pursuing marketing campaigns and providing bicycle education and awareness material in water bill inserts are all ways in which the City can educate the general public and help achieve a higher level of awareness of the presence of bicyclists and the positive benefits bicycling can provide the City. The City should provide these resources in both English and Spanish. Policies that encourage bicycle education for motorists and other non-bicyclists are included in Chapter 3 of this Plan.

Past City Efforts

The City has already engaged in measures devoted to the education of both bicyclists and non-cyclists. These measures include:

Annual BIKE Charlotte

Recommendation: Continue

BIKE Charlotte is an annual week of a variety of bicycle related activities designed to appeal to a broad range of bicyclists and to raise the public awareness of bicycling. The Mayor of Charlotte typically kicks off the week's events with a highly publicized and well-attended ride into Charlotte's Uptown. Throughout the week, Charlotte residents are provided an opportunity to participate in various bicycling events as participants and spectators such as bike-related workshops, kids bicycle safety rodeos, encouragement to bicycle to destinations such as museums through free admission to bicyclists, local bicycle tours, races, group rides, club socials, bike commuting competitions, etc.

Share the Road Campaigns

Recommendation: Continue

The City has initiated projects to help get out the Share the Road message. Among these efforts have been:

- The installation of Share the Road signs in various locations throughout the City, intended to raise awareness among motorists that it is likely they will encounter bicyclists along the roadway.
- The production of a short video with the Share the Road message. Using local participants and filmed in Charlotte locales, the video is primarily intended for students in drivers education classes to help them understand the rights and responsibilities of a motorist when sharing the road with bicyclists.
- Share the Road decals have been affixed to the rear of all CATS buses. These decals serve as a moving billboard among the numerous City bus routes to reinforce the Share the Road message.



Share the roads signs are intended to raise awareness among motorists that it is likely they will encounter bicyclists along the roadway.

Group Presentations

Recommendation: Continue

The Bicycle Program Manager periodically makes presentations focusing on the purposes behind the City's efforts to become more friendly to bicycles and the mechanisms for achieving the City's bicycle goals. In addition to bicycle clubs, these presentations are delivered to various civic and professional groups. The presentations provide the opportunity to foster better awareness of bicycling among non-cycling audiences.

Bicycle Safety Television Spot
Recommendation: Continue

The Answer Guy was a locally produced television program which sought to inform the general public about a variety of City issues. The program used humor as an approach to help hold the interest of the viewing audience. One such occasion was the filming of a bicycle safety segment focusing on bicyclist behavior and how that can help reduce bicyclist exposure to risk while bicycling on streets in Charlotte. There were repeat broadcasts of this program over the course of the year. Unfortunately, this program will no longer be available. However, the City should continue to utilize television opportunities to advance bicycle safety messages.

Bicycle Awareness Presentations to CATS New Operators Classes
Recommendation: Continue

CATS has provided an opportunity for the CDOT bicycle program to make a presentation to training classes for bus operators. This is an opportunity to help raise awareness among drivers of the wide variety of bicyclists and the different behaviors typically associated with each and how to operate their vehicles properly when encountering bicyclists both as fellow roadway users and as CATS passengers. The courses are currently offered to new drivers; however, ongoing education of existing drivers should also be considered.

CDOT Bicycle Program Website
Recommendation: Enhance

CDOT provides a website for its bicycle program. This website offers a 24-hour, seven-days-a-week opportunity for distributing information of local bicycling interest, including upcoming events, safety information, bicycling tips, etc. that can be viewed by anyone with internet access. The City should consider adding features such as hit counters and email list generation tools to enhance the functionality of the website, provide more information and help to build the bicycling community in the City.

Participation booths at fairs and events
Recommendation: Continue

The CDOT bicycle program has participated by sponsoring a display booth at annual fairs and events. The booths provide an opportunity to discuss local bicycling and the city's efforts with those that attend the event. This includes distributing bicycle related brochures and other materials.

Bicycle stickers and posters
Recommendation: Continue

The CDOT bicycle program distributes posters and automobile and bicycle stickers displaying bicycle-related messages. The intent is to help raise awareness.

Bicycle facility design training workshop and local internet-based training programs
Recommendation: Continue

The City worked in conjunction with NCDOT to provide a professionally-led workshop devoted to the training of local engineers and planners on the proper design, construction and purpose of various types of bicycle facilities. Planners, engineers and designers of local governments in Mecklenburg County were provided an opportunity to attend the workshops free of charge, which was also made available to the private-sector and bicycle advocates for a nominal fee. In addition, the City has provided opportunities for its staff to participate in a variety of web based programs dedicated to the design and construction of bicycle facilities.

Conduct annual crash analysis to determine local crash characteristics
Recommendation: Continue

CDOT has regularly tracked reported bicycle crashes occurring on public rights-of-way. Data are gathered to determine crash statistics; however, the data gathering format uses a statewide form which is often inadequate for accurately describing crash characteristics. The City compiles these data and provides a regular annual report to the Bicycle Advisory Committee. The City should continue to gather and disseminate bicycle crash data to help identify the highest risk crash locations and behaviors. Identifying the factors common in many bicycle crashes helps to identify particularly dangerous locations and target the audience or behaviors that contribute to bicycle crashes. This data can help guide the City in physical or programmatic improvements that make Charlotte a safer place to ride a bicycle.

CATS Rack and Roll
Recommendation: Continue

The Charlotte transit agency has developed a brochure and web video which offer instruction on the proper way to utilize the bicycle racks on both bus and rail transit systems. Many bicyclists have reported being hesitant to combine bicycle trips with transit service for fear of delaying the service while attempting to learn how to use the bicycle racks. These materials make it possible to orient the potential user at their leisure so that actual use of the rack will be quickly mastered in practice.

Bicycling to Healthy Living brochure
Recommendation: Continue

Recognizing that most trips are of short length and could easily be accommodated by the bicycle, the bicycle program developed a guide to help people more easily identify how they can incorporate bicycling into their daily routine.

Bicycle rodeos
Recommendation: Continue



A bicycle rodeo is an event in which children are taught, often for the first time, the proper skills of riding bicycles.

The Bike Program has sponsored bicycle rodeos for children of all ages. The bicycle rodeo is an event in which children are taught the proper skills of riding bicycles in order to increase safety and predictability. Many of these rodeos attract significant numbers of children and are often the first opportunity to experience a formalized bicycle training event.

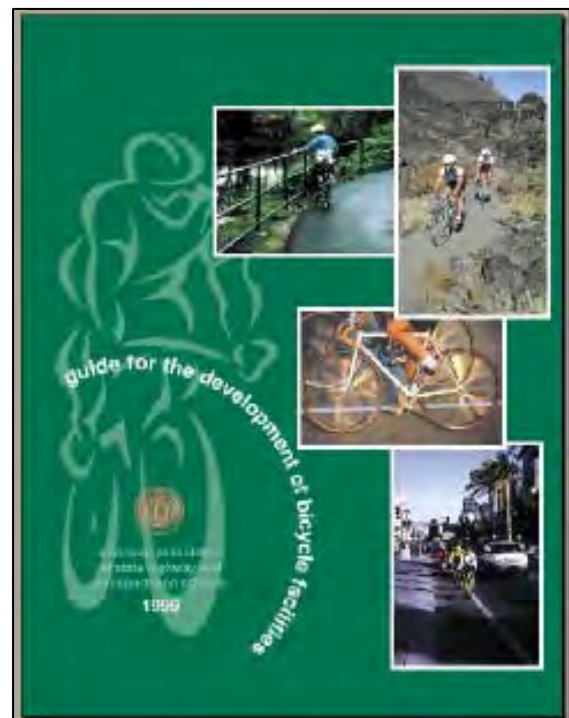
This chapter highlighted existing and recommended bicycle education and awareness programs to supplement the physical bicycle network. The following chapter provides information on the design of various bicycle-related facilities.

Chapter 7: Bicycle Facility Engineering and Maintenance Design Guidelines

As Charlotte strives to become a premier city in the nation for bicycling, it will be critical that bicycle facilities and design solutions are chosen that are appropriate for the user and existing space. This chapter provides guidance on design solutions for situations that currently exist or that are likely to develop in Charlotte.

The following publications should be referenced for greater detail on the design of bicycle facilities:

- Guide to the Development of Bicycle Facilities. The American Association of State Highway Transportation Officials (AASHTO). Updated in 1999. Available from AASHTO at www.aashto.org/bookstore/abs.html.
- Manual on Uniform Traffic Control Devices (MUTCD). Published by the U. S. Department of Transportation, Washington, DC, 2001. The manual is available at <http://mutcd.fhwa.dot.gov>.
- Americans with Disabilities Act Accessibility Guidelines. U.S. Department of Justice, United States Access Board. Guidelines are available at <http://www.access-board.gov/adaag/html/adaag.htm>
- Designing Sidewalks and Trails for Access: Part Two - Best Practices Design Guide. Published by U.S. Department of Transportation, Washington, DC, 2001.
- International Building Code. Published by International Code Council (ICC), 2006.
- North Carolina Bicycle Facilities Planning and Design Guidelines. Published by the State of North Carolina Department of Transportation, 1994.



AASHTO Guide to the Development of Bicycle Facilities
Photo Credit: AASHTO

All pedestrian and bicycle facilities should be designed to meet State and Federal design guidance and standards, as defined by the American Association of State Highway Transportation Officials (AASHTO), the Americans with Disabilities Act, and the Manual on Uniform Traffic Control Devices (MUTCD). If the national standards are revised in the future, the new national standards should be followed.

Charlotte will be creating a comprehensive bicycle network by implementing a variety of bicycle facilities. The following pages provide design considerations for each of the following facility types:

- Shared Roadways
- Striped/Paved Shoulders
- Bicycle Lanes
- Shared Lane Markings
- Climbing Lanes
- Road Diets
- Signed Bicycle Routes
- Bicycles on Bridges
- Greenway Facilities
- Share the Road Signs
- Bicycle Detection and Signal Timing at Intersections
- Bicycle Parking
- Railroad Crossings
- Bicycle Safe Drainage Grates
- Pedestrian Hybrid Signals

On-Street Bicycle Facilities

On-street bicycle facilities can include a range of design treatments such as bicycle lanes, striped shoulders and shared lane markings. The goal of on-street facilities is to improve bicycling conditions on roadways while providing a visible reminder that motorists should share the road with bicyclists. Multiple studies¹ have found that bicyclists are at much greater risk of a crash if they ride on the sidewalk. A second cause of crashes for bicyclists is wrong way bicycle riding. On-roadway treatments such as bicycle lanes and shared lane markings have been shown to be effective at inducing bicyclists to ride in the roadway and to ride with traffic.



Pierson Drive at Albemarle Road

A bicyclist riding on a sidewalk against the flow of traffic is at greater risk of a crash than a bicyclists riding with traffic on the roadway.

On busy streets, an important purpose of these facilities is to provide lateral separation between bicyclists and motor vehicles and to encourage predictable operating behavior by bicyclists and motorists. For these reasons, on-street facilities are recommended for roads in Charlotte with higher traffic volumes.

Factors that impact safety and comfort for on-street facilities are noted below.

- Amount of lateral separation between bicycles and motor vehicles (more space is needed when traffic speeds increase)
- Motor vehicle traffic volumes on the roadway
- Speed of the traffic on the roadway
- Percent of heavy vehicles on the roadway
- Presence of on-street parking
- Pavement surface condition

Shared Roadways

Shared roadways are typically streets with low traffic volumes and/or low vehicular speeds, which do not need special bicycle accommodations in order to be bicycle-friendly. Roadways can be retrofitted with bicycle friendly traffic calming treatments to facilitate lower vehicular speeds or to divert traffic to create a bicycle compatible shared roadway. There are many low-volume local and rural roadways in Charlotte that are excellent for bicycling in their current condition and need no further improvement to be bicycle compatible.

¹ Bicycle Lanes vs. Wide Curb Lanes: Operational and Safety Findings and Countermeasures Recommendations, Publication No. FHWA-RD-99-035, Federal Highway Administration, McLean, Virginia, 1999.

Pedestrian and Bicycle Crash Types of the Early 1990's, Publication No. FHWA-RD-95-163, Federal Highway Administration, McLean, Virginia, 1996.

Striped/Paved Shoulders

Striped/paved shoulders are another treatment that can be considered for roads in Charlotte with higher traffic volumes and speeds. These facilities increase the comfort of bicyclists by providing greater lateral separation between automobiles and bicycles along streets without curb and gutter. The width of the shoulder can vary, but at least four feet is preferred. NCDOT guidelines require a 4 foot minimum width to be a designated facility and provide guidance on when that should be exceeded. It is important to note that at intersections, additional symbols and arrows may be needed to provide direction to bicyclists and reduce potential conflicts between bicyclists and turning cars.

Bicycle Lanes

Bicycle lanes are portions of the roadway that have been designated for the preferential or exclusive use of bicyclists through striping, signage and other pavement markings. On two-way streets, bike lanes should be provided on both sides of the road so that bicyclists can ride in the same direction as adjacent motor vehicle traffic. Bike lanes should be at least four feet wide on roadways with curb and gutter. The bicycle lane must provide at least 3 feet of rideable surface. The gutter pan does not contribute to the rideable surface measurement. Wider bicycle lanes (i.e. 6') may be considered on roadways with high motor vehicle traffic volumes and/or narrow outside vehicular lanes.

Bicyclists still have the right to use the travel lanes on streets with bicycle lanes.

Where bicycle lanes are adjacent to parking, the minimum recommended width is 5 feet.

Bicycle lanes can provide the following benefits:

- Increase the comfort of bicyclists and motorists on roadways
- Increase the amount of lateral separation between motor vehicles and bicycles
- Indicate the appropriate location to ride on the roadway with respect to moving traffic and parked cars, both at mid-block locations and approaching intersections
- Increase the capacity of roadways that carry mixed bicycle and motor vehicle traffic
- Increase predictability of bicyclist and motorist movements
- Increase drivers' awareness of bicyclists while driving and when opening doors from an on-street parking space



Bicycle Lane on roadway with traffic calming treatments

The following points are offered to guide bicycle lane striping at intersections:

- A through bicycle lane shall not be positioned to the right of a right turn only lane.
- When the right through lane is dropped to become a right turn only lane, the bicycle lane markings should stop at least 100 feet before the beginning of the right turn lane. Through bicycle lane markings should be placed to the left of the right turn only lane.
- An optional through-right turn lane next to a right turn only lane should not be used where there is a through bicycle lane. If a capacity analysis indicates the need for an optional through-right turn lane, the bicycle lane should be discontinued at the intersection approach. Preference should be given to developing designs that keep bicyclists to the left of right turning vehicles.
- Posts or raised pavement markers should not be used to separate bicycle lanes from adjacent travel lanes.



Figure 20:
R4-4

In locations where motorists frequently weave across a bicycle lane to enter a dedicated right turn lane, the BEGIN RIGHT TURN YIELD TO BIKES (R4-4) sign should be used (as shown in Figure 20). This sign is not intended for use at low volume residential driveways.

The MUTCD provides an optional WRONG WAY sign (R5-1b) that can be used in locations with a high level of wrong way riding. This sign should be placed facing wrong-way bicycle traffic, such as on the left side of the roadway, and may be mounted back-to-back with other existing signs to minimize visibility to other traffic. The MUTCD also provides an optional RIDE WITH TRAFFIC subplate sign (R9-3c) which can be placed beneath the WRONG WAY sign (as shown in Figure 21). The WRONG WAY sign need not be placed on roadways with bicycle lanes.



Figure 21:
R5-1b with
subplate R9-3c

For additional information, see the MUTCD and the AASHTO Bicycle Design Guide.

Bicycle Lane Pavement Markings

The City of Charlotte will utilize the bicycle lane symbol shown in the figure at right. Bicycle lane pavement markings should only be used in conjunction with a solid and/or dashed white stripe that delineates the bicycle lane from the motor vehicle travel lane. The MUTCD offers the following additional guidance on marking and signing bike lanes:

- The bicycle lane symbol marking shall be placed immediately after an intersection and at other locations as needed.
- The bicycle lane symbol marking shall be white.

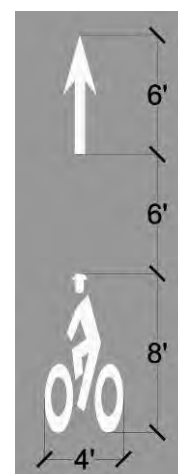
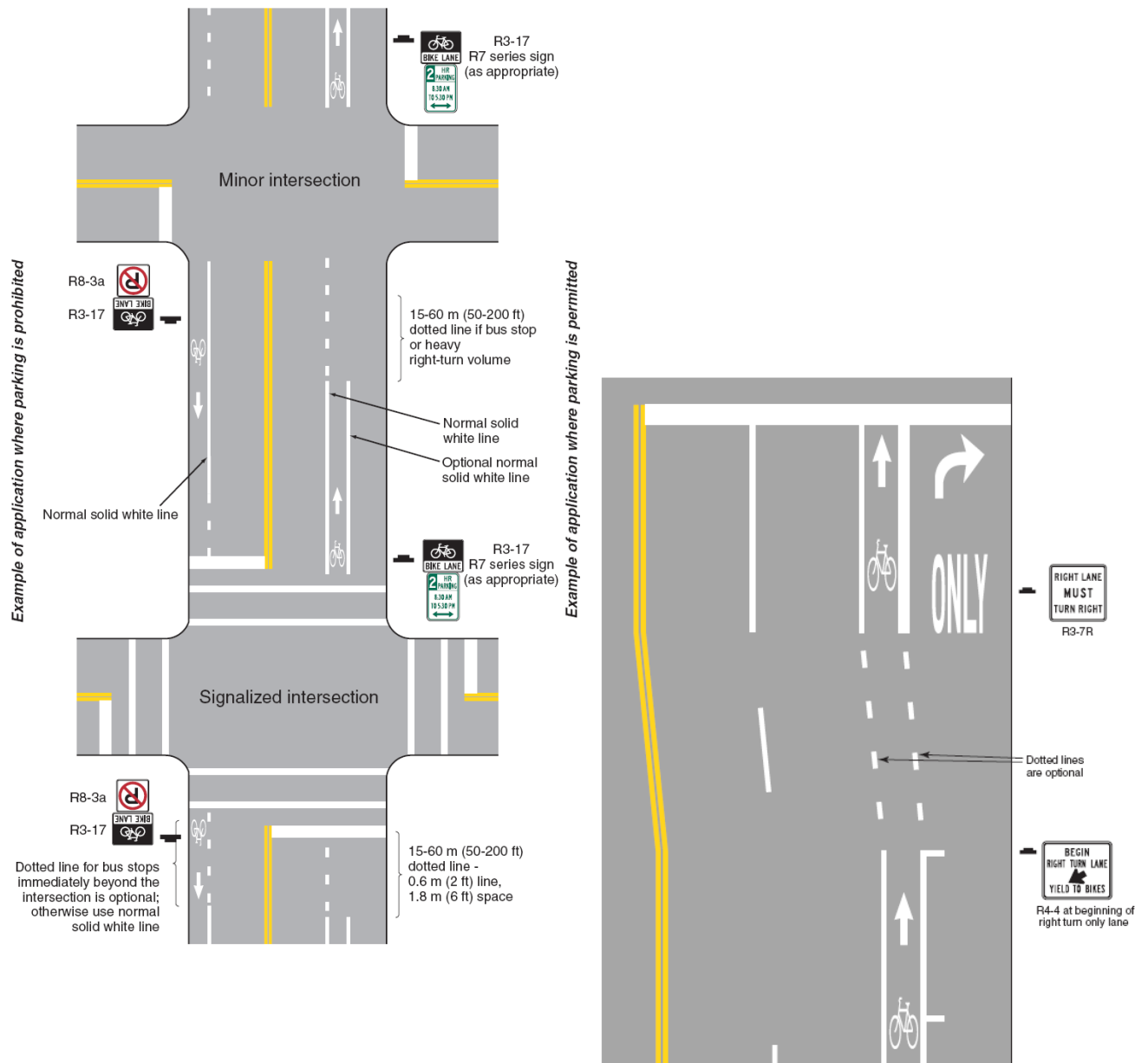


Figure 22:
Bicycle with
Rider Symbol

For additional information, see the MUTCD and the North Carolina Bicycle Facilities Planning Design Guidelines.

Figure 23: Examples of Pavement Markings for Bicycle Lanes on a Two-Way Street and Bicycle Lane Treatments at Parking Lanes into a Right Turn Only Lane



Source: Manual of Uniform Traffic Control Devices for Street and Highways, 2003 Edition

Bicycle Lane Signs

The use of the BIKE LANE sign (R3-17) to designate bicycle lanes is not required in Charlotte. Note that the next addition of the MUTCD (expected 2009) will state that the bicycle lane sign (R3-17) is optional to mark a bicycle lane. The use of this sign shall be limited to:

- locations with sight distance limitations
- locations where the bicycle lane is unexpected
- locations where motorists utilize the bicycle lane to drive and/or park
- locations where the bike lane unexpectedly ends



Figure 24: R3-17

The use of the bike lane sign should only be used in conjunction with marked bicycle lanes. The sign should be placed adjacent to a bicycle lane symbol pavement marking. For additional information, see the MUTCD.

Bike Lanes Next to Parking

The marking of bike lanes on closed section roadways with parallel parking should vary depending upon a number of factors including parking turnover, vehicular volumes, road width, lane width and pavement condition. In general, it is recommended that parking lanes be a minimum width of 8 feet adjacent to a 5 foot bicycle lane. A parking lane may be narrowed to 7 feet in constrained situations.

In locations where bike lanes are adjacent to on-street parking, consideration should be given to the possibility that bicyclists may crash into car doors that are suddenly swung open. This type of crash is typically more likely in locations with higher parking turnover, such as main streets, streets near restaurants, retail, etc. This is not typically a concern on residential streets. Bicyclists encountering an opened door must either stop short of the door, swerve into an adjacent travel lane or risk riding into the open door or being struck by the opening door. This act is commonly referred to as "dooring" by bicyclists. Bicyclists can be severely injured or even killed due to dooring events.



Figure 25: Door opened into bicycle lane

To mitigate or reduce the possibility of a dooring event a number of communities have experimented with various pavement markings, regulatory signs, and or warning signs to prevent dooring incidents. The following mitigation measures have been analyzed in locations with high parking turnover, and 7 or 8 foot parking lanes adjacent to bicycle lanes; or a history of dooring accidents or complaints of dooring "close calls." The use of these treatments may be considered on an experimental basis.

Dooring Warning Sign

This sign can be located adjacent to existing parking regulation signs to increase their visibility to motorists. It is intended as a warning sign to caution motorists to look before opening their door. This sign could be utilized at locations with bicycle lanes adjacent to narrower parking lanes or on roadways with narrow travel lanes where bicyclists ride close to parked vehicles. Variations of this sign are proposed or in use in Washington, D.C., Seattle, Washington, San Francisco, California, and New York. An example of a dooring warning sign is shown in Figure 26.

Modified Bicycle Lane Markings

Based upon a study performed in San Francisco, CA, marking the door zone with extension lines as shown in Figure 27 has been shown to encourage bicyclists to ride towards the left side of the bicycle lane outside of the door zone. Engineering judgment should be utilized to determine the frequency of placement of the door zone extension lines.

Consideration may also be given to utilizing a smaller bicycle lane symbol and arrow which would be placed on the extreme left side of bicycle lane to encourage bicyclists to ride on the left portion of the bicycle lane.



Figure 26: Dooring Warning Sign

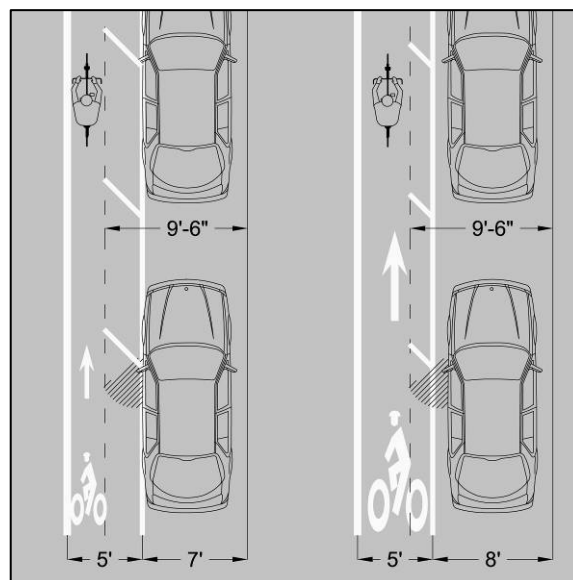


Figure 27: Dooring Warning Markings

Bicycle Lanes Adjacent to Angled Parking

Angled parking can be used to increase parking capacity and to reduce the width of travel lanes. Bicycle lanes may be considered adjacent to angled parking for locations with back-in (or reverse) angled parking. Bicycle lanes are generally not appropriate adjacent to front-in angled parking, unless sufficient space exists to enable vehicles to back out of the space without intruding on the bicycle lane.

When designing bike lanes adjacent to back-in angled parking, the parking stall markings shall be of sufficient size to fully store the typical design vehicle for the jurisdiction. A bike lane stripe shall be used to delineate the bike lane from the travel lane, but a second line shall not be used to separate the parking lane from the bike lane. It is preferable to use a 6 foot

bike lane (measured from the end of the parking stripes) to allow a vehicle to partially pull out of the travel lane before backing into the parking space, but the bicycle lane may be as narrow as four-feet.

There are numerous benefits to reverse angled parking. The benefits include:

- Improved sight distance between motorists and bicyclists compared to parallel parking or front-in angled parking
- No danger of “dooring” for bicyclists
- Allows for more parking spaces compared to parallel parking
- Allow easier loading/unloading of vehicles
- Direct pedestrians toward the curb



An example of reverse angled parking adjacent to a bicycle lane is shown to the right.

Example of back-in angled parking

In locations with front-in angled parking, sight distance between drivers and bicyclists is restricted. Therefore it is recommended that if a bicycle route passes through an area with front-in angled parking, that the parking be changed to back-in angled parking. If the parking can not be reversed, bicyclists should be directed to ride towards the center of the travel lane, away from the parked vehicles.

Shared Lane Markings

Shared lane markings are pavement markings placed along selected roads that alert automobile drivers to the presence of bicyclists and encourage bicyclists to ride outside of the “door zone” of parked cars. They reduce wrong-way bicycling and tend to increase the distance between bicyclists and passing cars. Shared lane markings are generally used where there is not enough space for bicycle lanes. They should not be used on roadways with a speed limit above 35 miles per hour.

Shared lane markings have the following benefits:

- Provide a visible cue to bicyclists and motorists that bicycles are expected and welcomed on the roadway
- Indicate the most appropriate location to ride on the roadway with respect to moving traffic and parked cars
- Can be used on roadways where there is not enough space for standard width bicycle lanes



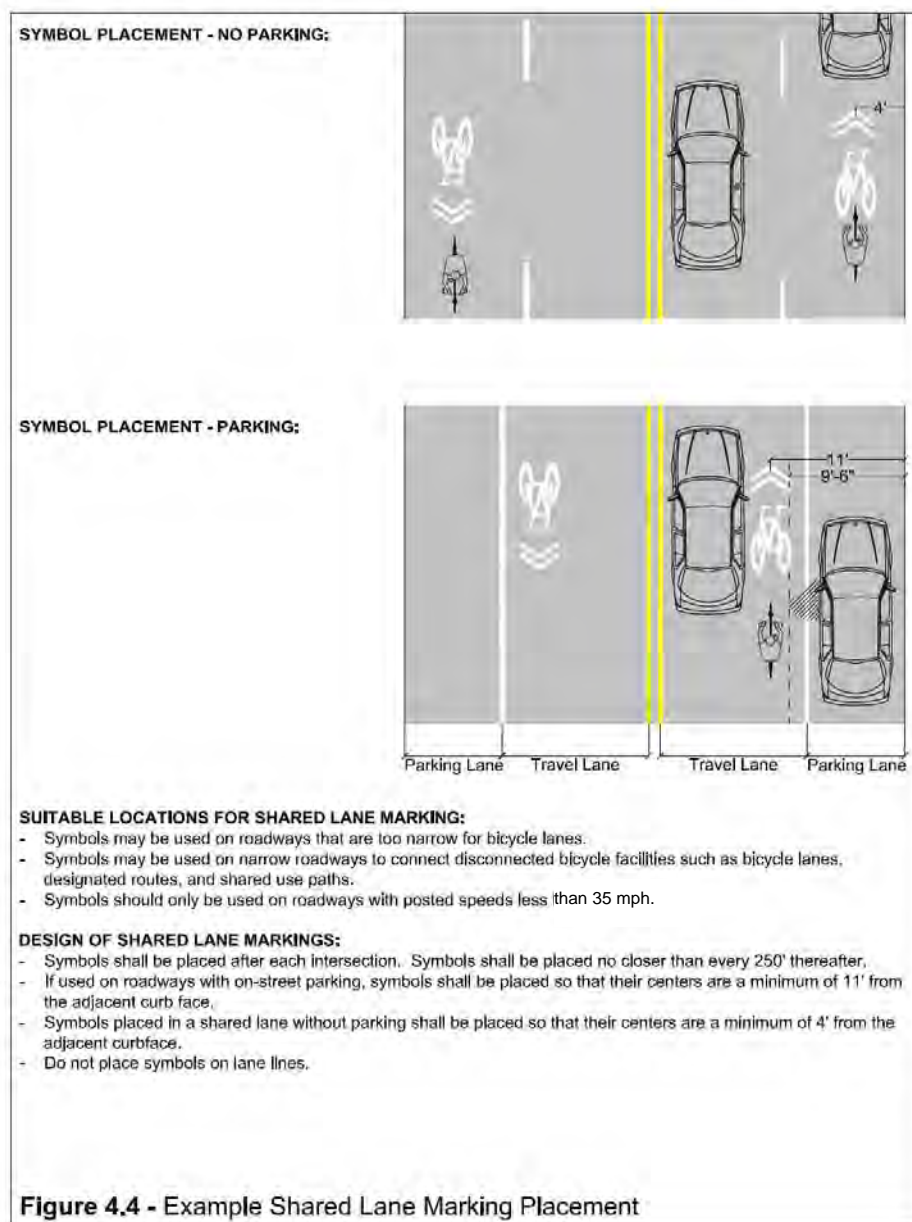
Shared Lane Markings

- Connect gaps between other bicycle facilities, such as a narrow section of roadway between road segments with bicycle lanes

The shared lane pavement marking should be placed:

- A minimum of 11 feet from the face of the curb when used adjacent to a parking lane;
- A minimum of 4 feet from the face of curb or roadway edge when not used adjacent to a parking lane; and
- Immediately following intersections and spaced at intervals up to 250-foot thereafter;
- The shared lane pavement marking shall not be placed in bicycle lanes.

Figure 28: Example Shared Lane Marking Placement



Source: Maryland SHA Bicycle and Pedestrian Design Guidelines

Climbing Lanes

Climbing lanes are a hybrid bicycle facility that includes a five-foot bicycle lane on one side of the roadway (typically in the uphill direction) and a shared lane marking on the other side of the roadway. This allows slower-moving, uphill bicyclists to have a designated bicycle lane space and allows motor vehicles to pass more easily. It also allows faster-moving, downhill bicyclists to have a shared-lane marking, which alerts motorists to expect faster-moving bicyclists in the travel lane, farther from parked cars. The bicycle lane and shared lane markings also indicate the proper direction for bicyclists to travel on either side of the street.



Climbing lanes include a five-foot bicycle lane on one side of the roadway and a shared lane marking on the other side of the roadway.

Road Diet

There are streets in Charlotte where space for bicycle lanes or other on-road bicycle facilities could be provided by removing existing travel lanes. This travel lane rechannelization, or road diet, often involves converting an existing four-lane roadway to a two-lane roadway with a center-turn lane. This allows bicycle facilities to be installed as well as raised median islands or a crossing island (similar to East Boulevard). This treatment reduces bicycle and pedestrian crossing distance and exposure to vehicular traffic, and has been shown to improve motor vehicle flow and reduce rear-end and left-turning crashes when used in appropriate locations.



Removing travel lanes may or may not require tradeoffs between travel modes within a roadway corridor. An engineering and policy analysis must be conducted to evaluate the impact of removing travel lanes on all modes.

This includes considering factors such as:

- Pedestrian crossing opportunities and safety
- Transit capacity and performance
- Bicycle network connectivity
- Peak-hour motor vehicle capacity
- Access to adjacent businesses
- Opportunity to reduce crashes of all types
- Opportunity to reduce vehicle travel



East Boulevard in Charlotte before and after a recently completed road diet.

speeds, thereby reducing injury severity to pedestrians and bicyclists involved in collisions

- Roadway substructure (if part of the roadway that was formerly a median or streetcar lane is reconfigured to carry heavy trucks, there may be additional maintenance costs)

Signed Bicycle Routes

A signed bicycle route may utilize a combination of facilities and roadway types (trails, shared roadways, bicycle lanes on arterials) to direct bicyclists. Typically a route is signed as a bicycle route if it has particular advantages for bicyclists such as:

- Enhanced arterial crossings (i.e. signal and/or refuge islands)
- Located on a lower vehicular speed route (i.e. traffic calmed street)
- Located on a roadway with low percentage of heavy vehicle traffic
- Located on a roadway with lower vehicular volumes
- Located on a roadway that provides enhanced bicycle facilities (i.e. bicycle lanes, wide outside lanes)
- Wayfinding to a cul-de-sac connection or trail connection

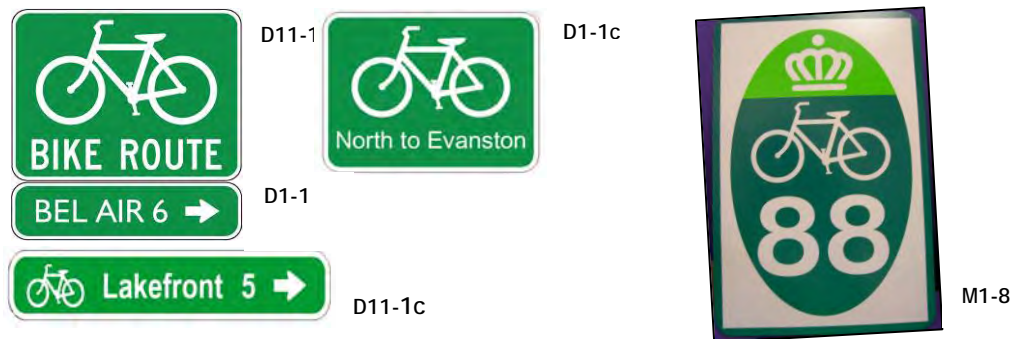


Figure 29: Examples of MUTCD signs for designating bicycle routes

SHARE THE ROAD Signs

SHARE THE ROAD warning signs can be used to alert motorists of the presence of bicyclists in locations where conflicts between motorists and bicyclists are frequent, and where there are no immediate opportunities to provide additional space for bicyclists.

The following are examples of where SHARE THE ROAD signs may be used:

- Where bicycling conditions are poor (i.e. locations with high volumes of traffic, operating speeds greater than 35 mph, no shoulder space, or poor pavement condition along roadway edge);
- Areas of roadway with poor sight distance;
- Transitions to shared travel lanes at the end of shoulders or bicycle lanes;
- Where an obstacle prevents bicyclists from continuing on an otherwise rideable shoulder



Share the road sign utilized on a multi-lane roadway with 11 and 12 foot travel lanes

The SHARE THE ROAD sign consists of the standard W11-1 bicycle warning sign with a SHARE THE ROAD (W16-1) plaque, per the MUTCD (see the picture on the previous page).

In general, SHARE THE ROAD signs should not be used in locations with good bicycling conditions, such as roadways with low traffic volumes or roads with wide paved shoulders or bicycle lanes. SHARE THE ROAD signs are not intended to designate bicycle routes. For additional information, see page 93 of the North Carolina Bicycle Facilities Planning and Design Guidelines.

Bicycle Detection and Signal Timing at Intersections

At signalized intersections where bicycle traffic exists or is anticipated (i.e. if it is designated in a local plan as an existing or proposed bicycle facility) consideration should be given to bicyclists in the timing of the traffic signal, and in the method of detecting the presence of bicyclists.

Loop detectors should be designed to respond to the presence of bicyclists. A number of bicycle sensitive loop detector configurations are available and should be provided at intersections that serve bicyclists (see ITE's *Manual of Traffic Detector Design* for more information). For traffic signals where bicyclists are having difficulty being detected, bicyclists should be directed to the spot of the loop where a bicyclist should stand in order to trip the signal by utilizing the pavement marking shown in Figure 30.

Visibility-limited signal faces should be positioned so that bicyclists can see the signal indication. If they cannot, then separate signal faces should be provided for bicyclists. The needs of bicyclists should also be considered during signal timing. The greatest risk to bicyclists traveling through intersections is during the clearance interval and during actuated phases during periods of low traffic flow. Signals should be designed to provide an adequate clearance interval for bicyclists who enter the intersection at the end of the green phase. The AASHTO Guide for the Development of Bicycle Facilities provides guidance on how to determine the clearance interval needed to accommodate bicyclists.

Signals should also be designed to provide a total crossing time long enough to accommodate bicyclists starting up on a new green phase. When an intersection approach receives a green signal, the bicyclist needs enough time to react, accelerate, and cross the intersection. The AASHTO Guide provides guidance on determining the amount of time needed for this movement. At intersections where the minor road requires detection for vehicles to activate the signal, it is especially important that provisions be made to allow bicyclists to activate the signal. The strength of the electromagnetic vehicle loops should be increased until it detects the wheel

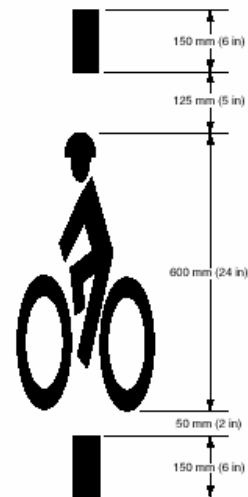


Figure 30: MUTCD Bicycle Loop Detector Marking Symbol



Example of bicyclist accessible pedestrian push button. This signal is located at a hawk signal installation.

of a bicycle or the video or microwave settings should be adjusted to trigger when a bicyclist is present.

A short term solution for intersections where it is not possible to retrofit the detection for bicyclists is to provide a pedestrian push-button along the side of the roadway to allow bicyclists to activate the signal.

The push button should be located close to the roadway edge to enable a bicyclist to activate it without dismounting from their bicycle or having to ride on the sidewalk (see the picture on the previous page).

Bicycles on Bridges

Bridges are a critical component of the transportation system in Charlotte. They traverse creeks, rivers, railroads, and limited access highways throughout the city. When bridges are not accessible for bicyclists or pedestrians, they are faced with a decision to travel through an uncomfortable situation or to seek an alternative route which can add miles to the journey. In most cases, the bicyclists or pedestrian will choose to cross the bridge rather than seek an alternate route. As it can be hard to predict the bicycling demand to cross over a bridge, it is recommended that all bridges (unless bicyclist and pedestrians are prohibited by law) provide accommodation for bicyclists.

Federal law, as established in the Transportation Equity Act for the 21st Century (TEA-21), makes the following statements with respect to bridges:

"In any case where a highway bridge deck is being replaced or rehabilitated with Federal financial participation, and bicyclists are permitted on facilities at or near each end of such bridge, and the safe accommodation of bicyclists can be provided at reasonable cost as part of such replacement or rehabilitation, then such bridge shall be so replaced or rehabilitated as to provide such safe accommodations." (23 U.S.C. Section 217)

The NC Bridge Policy has three relevant sections as listed below and can be found at <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/bpe2000.doc>. The Division of Bicycle and Pedestrian Transportation staff review all state bridge projects and make recommendations for wide shoulders, sidewalks and bicycle-safe railings according to potential usage by bicyclists (and pedestrians).

Bikeways

When a bikeway (i.e. shared use path, bicycle lane, wide outside lane) is required, the bridge shall be designed in accordance with AASHTO standard bicycle accommodations and North Carolina Bicycle Facilities Planning and Design Guidelines to give safe access to bicycles where feasible. A minimum handrail height of 54" is required where bicyclists will be riding next to the handrail.

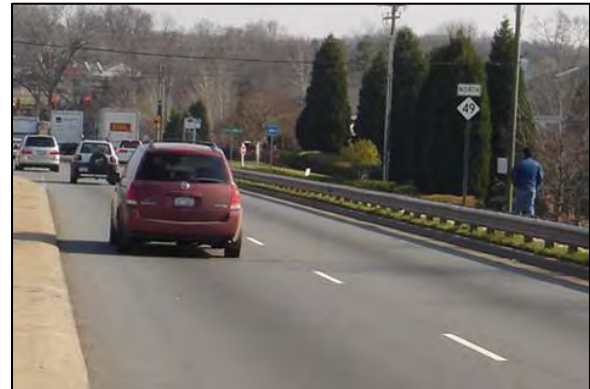
Bridges on Controlled Access Freeways

Bridge replacement projects on controlled access freeways where bicyclists are prohibited by law will generally *not* include facilities to accommodate bicyclists. In cases, however, where a bridge replacement project on a controlled access freeway impacts a non-controlled access roadway (i.e. a new overpass over an arterial roadway), the project should include the

necessary access for bicycles on the non-limited access roadway, including such elements as paved shoulders and bicycle crossing improvements to associated ramps and intersections.

Locations with Shared Use Pathways

For bridges that have an existing or proposed shared use path approaching one side, the bridge should be constructed with a shared use path on that side, separated from traffic by a concrete barrier. Use of the concrete barrier requires a crash cushion, or should otherwise be designed so that it does not pose a hazard to errant vehicles. Note that if a shared use path is only on one side of the bridge and does not continue on the roadway for any distance, this would encourage bicyclists to ride against traffic.



Tryon Street bridge crossing over I-485 provides a sidewalk only on one side of the road and no bicycle facilities

The pathway should be a minimum of 12' wide. The barrier between the pathway and the shoulder should be a uni-directional concrete barrier with a height of 42" from the surface of the pathway. The railing on the other side of the pathway is not required to be crashworthy. This railing should be constructed to a height of 54" from the surface of the pathway. It is important to also consider the shy distance that bicyclists utilize when bicycling along vertical objects. This distance is usually assumed to be 2 feet from the edge of a persons arm to the edge of the vertical object.

Rural Roads (Open Section)

The following guidelines apply to bridge replacement projects on rural roadways with open sections. On these bridges, 10' wide shoulders on both sides are desirable. Shoulder tapers should be considered along roadways without continuous paved shoulders to transition bicyclists onto the bridge shoulder. Roadway shoulder improvements associated with bridge replacement projects should include 4' wide (minimum) paved shoulders for bicycle use. Pedestrians who occasionally use rural bridges will share the shoulder space with bicycles - sidewalks generally are not required on rural bridges. However, on bridge replacement projects that are near points of community development such as schools, shopping centers, local businesses, tourism attractions, or other land uses that result in pedestrian concentrations along the highway, a curb and sidewalk cross section should be used in conjunction with 4' paved shoulders on each side of the road to accommodate bicyclists.

Bridge Retrofit Projects

Bridges can be retrofitted to better accommodate bicyclists. There are a variety of ways of accomplishing this:

- 1) Reducing the width and/or number of travel lanes to create more space for bicycles. For example, a narrow sidewalk can be widened to provide for a more comfortable pedestrian environment, while maintaining adequate shoulder width for bicycling.
- 2) Adding a new bicycle structure to the existing bridge structure. In some cases, bridge footers may have been constructed in anticipation of a future roadway widening, or it may otherwise be possible to add an additional structure for bicyclists. Bridge retrofit solutions

require detailed structural analysis to determine if the bridge can accommodate the additional weight of new facilities without compromising its structural integrity. Note that adding a structure on only one side could potentially create safety concerns as bicyclists could end up on the road against (or facing) traffic.

Bridge policy in the North Carolina Roadway Design Manual

Additional sections of NCDOT's bridge policy, excerpted from the North Carolina Roadway Design Manual, are included below. The full document can be found on NCDOT's website at: <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/RDM2001/part1/chapter6/pt1ch6.pdf>.

Bridge Deck Railing

All bridge railings shall conform to current AASHTO criteria and shall have been successfully crash-tested in accordance with FHWA guidelines. Generally bridges with no sidewalks or no anticipated sidewalks should have a Jersey barrier rail. When a sidewalk or designated bikeway is justified, appropriate railings shall be used.

Off-Road Bicycle Facilities

Off-road bicycle facilities consist of greenways along creekbeds or independent alignments as well as shared use paths parallel to roadways (commonly called sidepaths). Short sections of shared use paths are utilized in Charlotte to provide connectivity to cul-de-sac neighborhoods and roadways that have been closed for traffic calming purposes.

The off-road bicycling facilities provided in Charlotte are a critical element of the bicycle network. They provide the connectivity missing between lower volume residential streets that make the signing of a bicycle route as an alternative to higher volume arterials possible. Additionally, many of the greenways that exist or are proposed provide direct connectivity to the on-road bicycle facility network that is not possible in many areas of Charlotte.



Example of a shared-use-path connection between neighborhood streets to improve bicyclist connectivity

The ability of the greenway network to supplement the on-road bicycle network will depend largely upon two factors:

- Constructing greenway facilities that connect to the on-road system on both ends
- Construction of safe arterial crossings where greenways intersect the roadway network

Greenway Facilities

Shared Use Paths

The designer should consult with the *Mecklenburg County Trail Design Standards*, the *AASHTO Guide for the Development of Bicycle Facilities* and the MUTCD for further information on greenway design elements, such as horizontal and vertical alignment, the proper design of pathway structures, intersection design and other pertinent topics.

Shared Use Paths Adjacent to Roadways

Shared Use Paths adjacent to roadways, also known as sidepaths or wide sidewalks, can provide a more comfortable place for novice bicyclists and other people who are not comfortable riding on the road with traffic. Shared use paths adjacent to roadways are most appropriate in corridors with few driveways and intersections. This is due to conflicts between turning motorists and bicyclists, in particular for bicyclists who are riding against traffic. This has been shown to be one of the most common causes of crashes for bicyclists. Figure 38 demonstrates such a conflict: the motorist in the driveway is looking to the left for breaks in traffic and does not see the bicyclist approaching from his right.

For the reasons described above, shared use paths adjacent to roadways need to be carefully designed if they are to function as bicycle facilities. They are most appropriate along roadways with few driveways or intersections and on-road bicycle facilities should also be provided (See the picture to the right). All intersections (including driveways) must be carefully designed to:

- reduce bicyclists exposure
- maximize sight distance for motor vehicles and bicyclists
- reduce crossing vehicle speeds
- provide adequate lighting

It is preferable for signalized intersections to provide protected sidepath crossing time.



Example of a sidepath conflict



Example of a sidepath built adjacent to a roadway striped with shoulders

Bicycle Amenities and Treatments

Bicycle Parking

High quality bicycle parking facilities are critical to encouraging people to choose to bicycle in Charlotte. Information on the design and placement of bicycle racks and bicycle lockers is included below.

Bicycle parking can be provided in the form of bike racks or bike lockers. Secure bicycle parking located close to building entrances and transit entry points can make bicycling more attractive. It also reduces the risk of bicycle damage or theft.

Bike rack design and site location are discussed in detail in the Bicycle Parking Guidelines, developed by the Association of Pedestrian and Bicycle Professionals (available on the resources page at <http://www.apbp.org>).

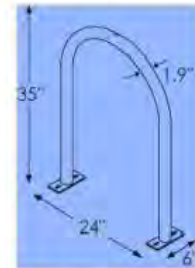


Example of bicycle lockers located in parking lot

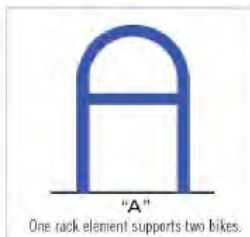
Bike lockers provide added protection from theft and weather. Bike parking is important at destinations such as town centers, historic sites, transit stations and park-and-ride lots. It is also important to provide bike parking near business entrances and at employment centers.

Figure 31: Examples of Bicycle Parking Designs (Preferred and Unacceptable)

Preferable Design



Dimensions vary by manufacturer and model.

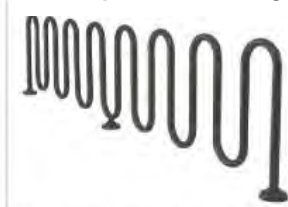


UNACCEPTABLE DESIGNS



This type of rack can bend the wheel.

Acceptable Design



This type of rack does not support the bicycle frame in at least 2 places.

RACK ELEMENTS

The preferred rack should:

- Support the bicycle frame in at least 2 places, allowing the frame and wheel to be locked using a U-lock or cable lock.
- Prevent the wheel of the bicycle from tipping over.
- Not damage the bicycle.
- Be durable and securely anchored.
- Allow front-in or back-in parking.

Railroad Crossings

Under certain circumstances, railroad tracks crossing the road can present a dangerous condition for bicyclists. At diagonal at-grade crossings, the gap next to the rail can trap the front wheel of a bicycle causing the bicyclist to crash. To prevent this from happening, the bicycle lane or shoulder should be designed to enable the bicyclist to approach the track at an angle closer to 90 degrees (but not less than 60 degrees) without having to swerve into motor vehicle travel lanes.

The width and the dimensions of the widened area discussed above will be dependent upon the skew of the railroad tracks relative to the bicyclist crossing point. It is important that the bicyclist is given sufficient space on the approach and the departure of the crossing to safely transition back to the travel way. An example of this widening treatment is shown in the picture to the right.



Skewed Railroad Crossing in Madison, Wisconsin - without a widening of the shoulder a bicyclist would be forced to swerve into the travel lane to avoid a crash.

In locations where a retrofit may not be feasible or where the retrofit may not occur for a period of time, the *Manual on Uniform Traffic Control Devices* (MUTCD) includes the W10-12 warning sign which should be used to warn bicyclists of skewed railroad crossings. See Figure 32 for an example of this sign. A filled or rubberized flangeway can also help to reduce, but not eliminate, the risk of a trapped wheel.



Figure 32: W10-12

Bicycle Safe Drainage Grates

Storm grates pose a hazard for bicyclists when the openings are parallel to the bicyclists' direction of travel. Bicycle tires can get caught between the bars of these grates, and cause bicyclists to crash. Unsafe drainage grates should be replaced with grates that are designed for bicycles as shown in Figures 33 and 35.

It is preferable to install the vane grate on roadways within the City of Charlotte as it provides excellent hydraulic efficiency (see Figure 34) and are safe for bicyclists to ride over. This grate was developed after NCDOT adopted their bicycle facility guidelines. The type "E", "F" and "G" grates shown in Figure 35 are not as hydraulically efficient as the vane grate. The type "F" and "G" grates can cause discomfort to cyclists because of the visual appearance of the openings. NCDOT has adopted the vane grate into their standard details-see detail 840.33.

The use of the vane grate is particularly important on roadways where there is no gutter present which increases the likelihood a bicyclist will ride over the grate. All grates where it can be expected that bicyclists may have to ride on should be specified with a no-slip finish if possible.

Additional information is available on the Division of Bicycle and Pedestrian Transportation's website at <http://www.ncdot.org/transit/bicycle>.

The preferred City of Charlotte bicycle friendly drainage vane grate design is shown in Figure 33.



Figure 33: Preferred City of Charlotte bicycle friendly vane grate design. Neenah Foundry Type "L" shown

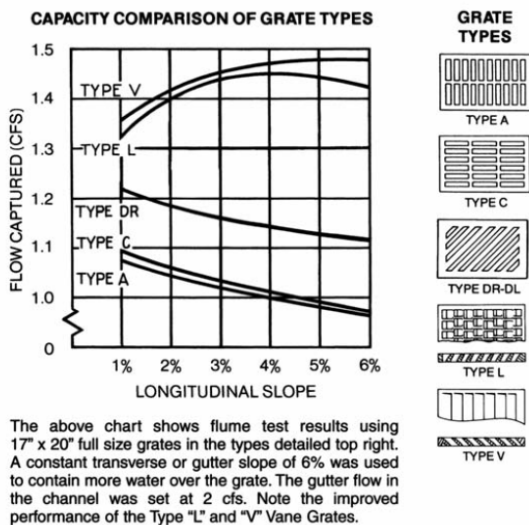
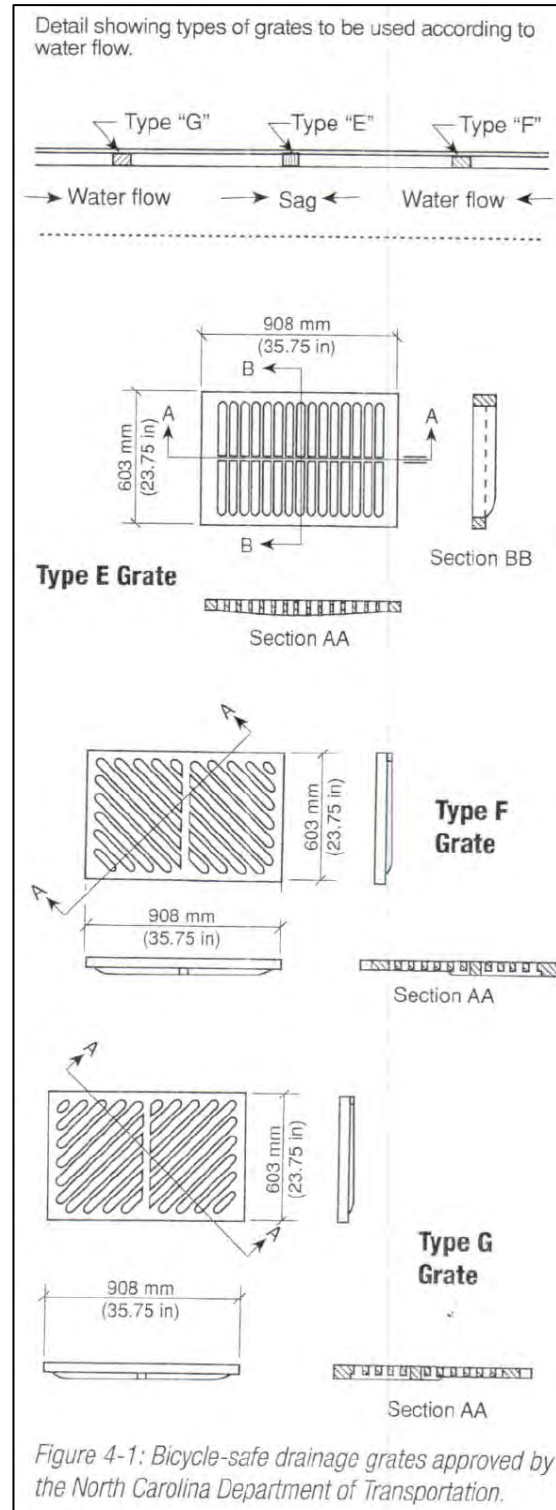


Figure 34: Comparison of hydraulic capacity (Neenah foundry chart)

Figure 35: Existing NCDOT bicycle friendly grates that are not preferred, but acceptable, for use on new installations in Charlotte.



Pedestrian Hybrid Signal (Hawk Signal)

The Pedestrian Hybrid Signal can be utilized to assist both pedestrians and bicyclists who need to cross high volume and/or high speed arterials at locations where it is not desirable to



Example of a hawk signal installation.

provide a fully signalized intersection. The major roadway is controlled by a traffic signal and the minor roadway is controlled by a stop sign with pedestrian and bicycle traffic signals (see the picture to the left). This signal discourages cut-through motor vehicle traffic while providing enhanced bicyclist and pedestrian crossing opportunities on multi-lane roadways that would otherwise be difficult to cross. The signal minimizes

vehicular delay to the main arterial by limiting stops to traffic only to those instances where a pedestrian or bicyclists activates the signal. This signal may be utilized on signed bicycle routes that require bicyclist to cross multi-lane arterials which are currently unsignalized.

This chapter provided information on bicycle facility and design solutions. The following chapter provides recommendations aimed at creating an interconnected network of bicycle facilities throughout Charlotte.

Chapter 8: Implementation and Funding

Building on the strength of its TAP, Urban Street Design Guidelines, Pedestrian and Bicycle Neighborhood Connectivity Study and other local plans, Charlotte is well-positioned to become a bicycle-friendly City by 2030. This chapter presents an implementation and funding strategy for realizing the vision of Charlotte as “the premier bicycling City in the United States,” as set forth by the Bicycle Master Plan Stakeholder Group.

Figure 36: Bicycle Plan Vision Statement

Overview

Implementing the recommendations in this Plan will begin to address the result of decades of transportation improvements that focused solely on the automobile and land use patterns that failed to accommodate bicyclists.

The TAP notes that “A key factor in whether Charlotte becomes a more bicycle-friendly city will be determined by the extent to which Charlotte’s growth strategy is successful and future growth develops in a more connected fashion than has occurred over the last 50 years.” The recommendations in this Plan support and reinforce the City’s efforts to develop in a more sustainable and connected manner.

“Charlotte is the premier bicycling city in the United States. Policies, programs and facilities promote safe recreational and commuter cycling for those of all skill levels.”

Bicycle Plan
Vision Statement

Charlotte is making important strides in incorporating bicycles into its day-to-day activities and will continue to do so. Charlotte will pursue a proactive, focused and ambitious strategy to improve bicycle conditions in the City, while also taking full advantage of opportunities presented by the many roads that will be widened and resurfaced over the years. Chapter 3 provides detailed recommendations on policies that will facilitate the implementation of the plan. The specific policy goals that provide the foundation for all bicycle planning efforts are listed below.

- Policy 1: Incorporate bicycle facilities in all transportation planning activities
- Policy 2: Seek all potential funding opportunities to implement the recommendations in the Bicycle Master Plan
- Policy 3: Include bicycle improvements in ongoing transit and greenway planning
- Policy 4: Design and build new and reconstructed roadways to be bicycle-friendly
- Policy 5: Implement bicycle improvements as a part of all resurfacing and maintenance activities
- Policy 6: Provide targeted and effective educational and awareness opportunities for bicyclists and motorists
- Policy 7: Continue to provide bicycle parking and other supporting facilities to encourage bicycling as a viable mode of transportation

Immediate Action Recommendations (0 to 2 years)

Several of the project and program recommendations should be implemented soon after this plan is adopted (within 2 years). These immediate action projects will improve bicycle conditions in specific areas, creating early successes for decision-makers to highlight. These immediate action projects will build momentum for the other recommendations in this Plan. Immediate action recommendations are listed below.

- Implement initial signed routes (See Figure 38)
- Update the City's existing bicycle educational and awareness video
- Actively pursue collaboration and partnerships with the new Safe Routes to School Program
- Pursue funding for on-road bicycle and greenway connection projects
- Implement initial set of shared lane markings, lane diets, road diets, proposed road widening and add striping recommendations (see Figure 39)

Near to Medium-Term Recommendations (To be completed by 2015)

In the near to medium-term the City should ensure that systems are in place to capitalize on potential opportunities to incorporate bicycle facilities in existing projects, while also pursuing a number of focused independent bicycle improvement projects. An important recommendation of this Plan is to enhance the collaboration and communication between bicycling planning and road resurfacing efforts, while at the same time revising policies and regulations to ensure the provision of high-quality bicycle facilities as part of all new development. Near-term bicycle facility projects include projects that are critical to connectivity. Many of these projects are in locations where adding bicycle lanes, climbing lanes, and shared lane markings to roadways is relatively straightforward. Near-term projects will also include some facilities that, while more challenging to implement, are critical to filling existing gaps.

Near-Term Bicycle Facility Recommendations

- *Provide initial set of signed bicycle routes throughout the City:* This Plan supports the recommendation in the TAP to create a signed route system that provides a connected network of bikeways. The Near to Medium-Term Bicycle Route Network identified in this Plan should serve as the framework for Charlotte's signed route system. This route provides a logical and efficient network of facilities throughout the City to encourage bicycling as a viable mode of transportation.

Connections between the Near to Medium-Term Network and specific signed routes and between specific destinations may need to be altered as a result of a more detailed study. In order for the signed route network to function well, signs should be destination-based, providing directional and wayfinding information. The signs should provide functional connections to link key destinations such as schools, greenways and shopping centers. The proposed initial segments in Charlotte's signed route system are listed below



Conceptual Signed Route Design

and are shown in Figure 38. These segments should be signed in the near to medium-term after a detailed design and engineering study of each route has been completed and, if necessary, intersection and spot improvements along the route have been completed. These initial segments should serve as the skeleton of the emerging signed route system. Additional signed segments should be added over time that connect to and branch off of the initial signed routes so that in the future Charlotte's signed route system connects the entire City. Signed routes that should be studied further include between Center City and Charlotte Douglas International Airport and between Center City and the US National Whitewater Center.

Initial signed routes

- The Carolina Place Mall to Arboretum Shopping Center
 - Center City to the University of North Carolina, Charlotte campus
 - McAlpine Creek Greenway to the University of North Carolina, Charlotte campus
 - Center City to the McAlpine Creek Greenway
 - Coulwood Creek Neighborhood to Mallard Creek Community Park
 - Paw Creek to Berryhill Park
- *Add bicycle facilities along with roads to be widened in the short-term:* The recently adopted Urban Street Design Guidelines will ensure that bicycle lanes are added to most roads that will be widened in the near-term. More than 50 miles of roads are planned to be widened by 2010 and many of these will include bike lanes. For this reason, these roads are included on the Near to Medium-Term Opportunities map. By 2020, an additional 112 miles of roads in the City are planned to be widened and by 2030 approximately 116 more will be added. This represents an important opportunity to provide bicycle facilities that will arise as a result of the road widening process in Charlotte.
 - *Implement the proposed action recommendations to create the Near to Medium-Term Bicycle Route Network by 2015:* The City should work proactively to implement the action recommendations on the Near to Medium-Term Opportunities map (shown as Figure 39). The City should begin by conducting pilot lane diet projects in Charlotte to elevate public awareness and analyze outcomes for both bicyclists and automobiles. City-maintained roads that may be good initial candidates for a lane diet include sections of Statesville Road and Matheson Road. State-maintained roads that may be good initial candidates for a lane diet include Sugar Creek Road, The Plaza and Monroe Road. Some roadways can accommodate new bicycle lane stripes, bicycle lane markings or shared lane markings without any other changes to the roadway. These projects are relatively low-cost opportunities that can demonstrate the City's commitment to implement the Bicycle Master Plan. The City should also undertake targeted road widening and sidepath construction projects in areas that are critical to connectivity.

Figure 38: Initial Signed Routes

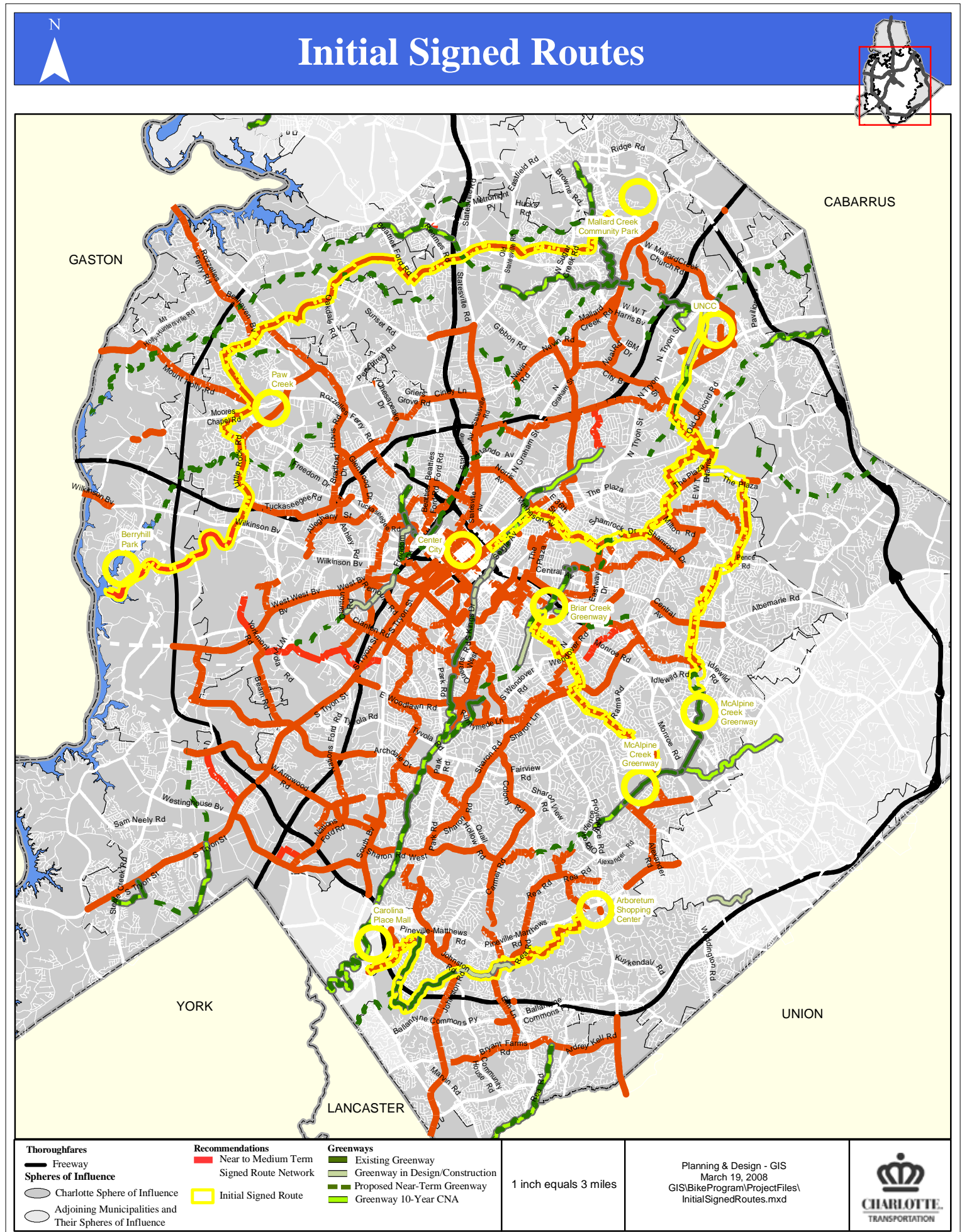
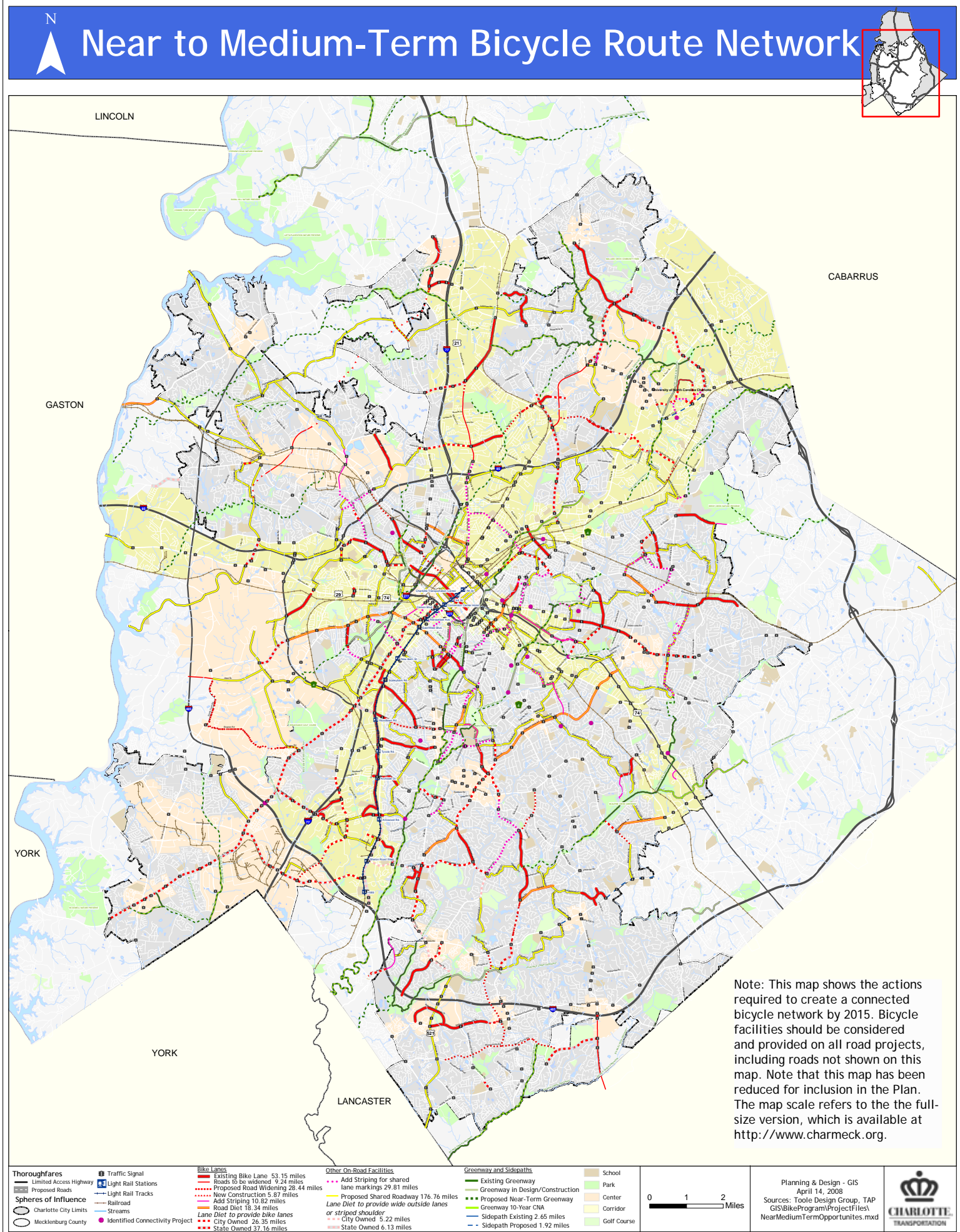
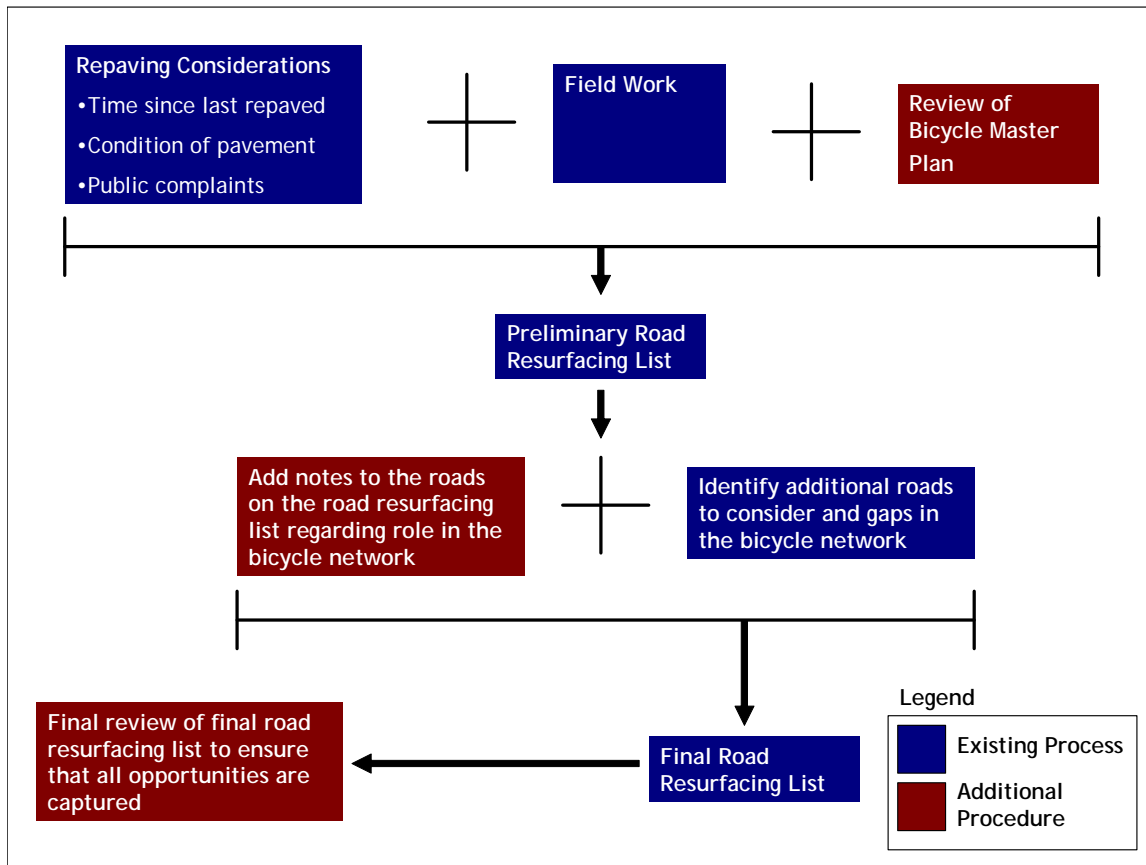


Figure 39: Near to Medium-Term Bicycle Route Network



- *Add bicycle facilities as part of the road resurfacing process:* Ongoing transportation projects represent one of the most important opportunities for implementing the recommendations of this Plan. All roadway resurfacing, repaving and improvement projects should be evaluated to determine whether it is possible to provide the bicycle facility recommendations included in this Plan as part of a planned road project. Figure 40 below documents a strategy for improving coordination between local bicycle planning efforts and the local resurfacing process. To improve this process, the near to medium and long-term bicycle route maps in the Bicycle Master Plan should be reviewed prior to the creation of the annual road resurfacing list. Once the list has been created, notes should be added indicating the importance of certain road and potential opportunities to provide bicycle facilities. Once the final list is created, it should be compared to the near to medium-term and long-term maps in this Plan to ensure that all potential opportunities are captured.

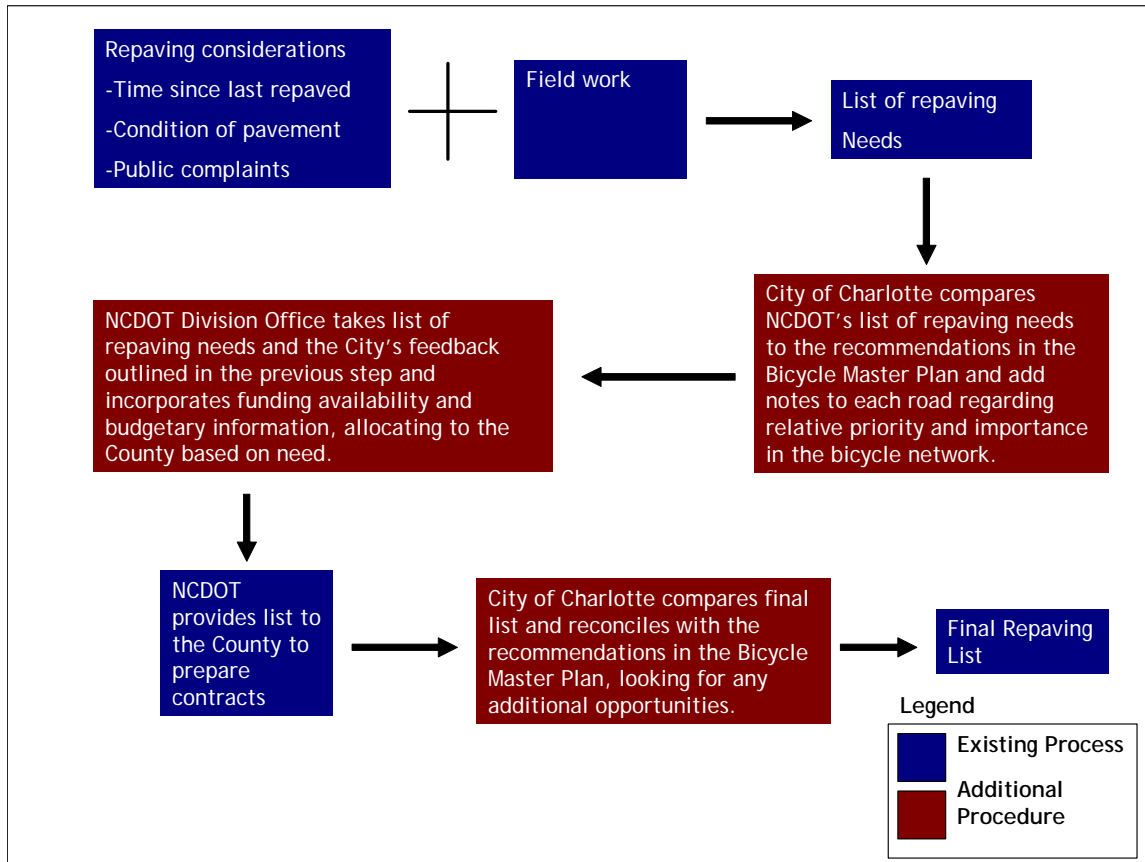
Figure 40: Recommended Additions to the Local Resurfacing Processes



- *Continue to build a collaborative relationship with NCDOT to ensure that State-maintained roads are bicycle friendly:* Ongoing coordination with NCDOT is an important challenge as the City seeks to improve bicycling conditions. Figure 9 in Chapter 4 shows State versus City-maintained roads in Charlotte. Many of these are interstate highways and/or limited access roads such as the Billy Graham Parkway. However, many also serve important roles in the bicycle network. For this reason, these roads are included on the Near to Medium-Term and Long-Term Bicycle Route

Network maps in this Plan. Ongoing discussion between the City and NCDOT will be required on a case by case basis as bicycle facilities are considered for specific roadways. The City and NCDOT should coordinate to ensure that bicycle accommodations are provided in all road improvement projects and that all opportunities to provide bicycle facilities, for example through the resurfacing process, are fully captured. Figure 41 below provides guidance on how to continue to improve coordination between the City of Charlotte and the NCDOT resurfacing process.

Figure 41: Recommended Additions to NCDOT's Resurfacing Processes



- *The City should consider moving up selected roads on the planned road improvement schedule because of their role in the bicycle network:* As noted, many roads in the City are planned to be widened in the future. As part of this, many of these roads will provide bicycle facilities. In some cases, the road to be widened fills an important gap in the bicycle network. In these cases, the City should consider completing the project sooner than is currently planned. It would accomplish this by moving it up in the list of projects identified in the TIP. A list of roads that the City should consider adjusting the timeframe forward is included below.

- *Sardis Road from Brackenbury Lane to the McAlpine Creek Greenway*
- *City Boulevard from West Sugar Creek to Neal Road*
- *City Boulevard from I-85 to North Tryon Street*

- *Pursue on-road bicycle and greenway connector projects as funding is made available:* The City should pursue projects that enhance connections between the on-road bicycle network and the greenway network. On-road bicycle facilities can fill gaps in the greenway network and connect different greenway segments. Greenways can provide alternate routes to difficult roads and provide a bicycling environment that is more comfortable for children and less experienced bicyclists. Providing seamless connections between on-road bicycle facilities and greenways also supports the goal of making bicycling throughout the City a more viable transportation choice.

This Plan fully supports on-road bicycle and greenway connections. Many of the policies presented in Chapter 3 of this Plan seek to enhance this relationship, for example by coordinating implementation of the Bicycle Master Plan and the Greenway Master Plan, seeking additional funding for planning, design and construction of bike/greenway connections and by encouraging 24-7 access to greenways that serve an important transportation purpose.

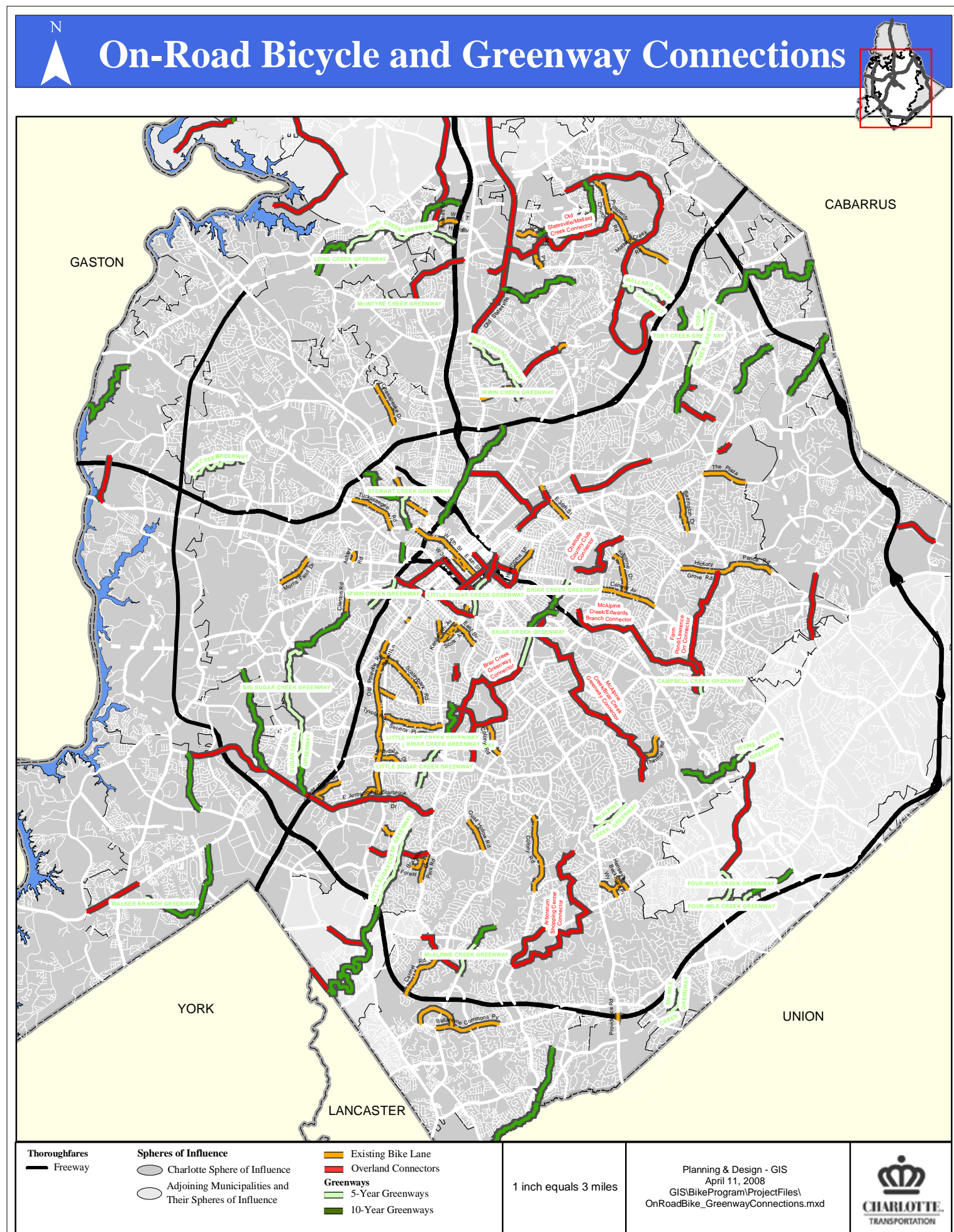
To further encourage the relationship between on-road bicycle facilities and greenways, this Plan highlights specific mutually beneficial segments of roads and greenways that should be prioritized in the coming years. A list of projects identified as part of the Bicycle Master Plan process as being especially important is included below and shown in Figure 42. In addition to connecting bicycle and greenway facilities, several of these segments represent important pieces of the Near to Medium-Term Bicycle Route Network and are also proposed as initial signed routes in this Plan. Implementing these projects would enable the City to accomplish numerous goals at the same time. Figure 42 also includes on-road bicycle facilities, or overland connectors, and priority greenway projects that were identified as part of the Greenway Master Plan process. The five and ten-year greenway projects shown in Figure 42 are especially important as they are going to be included in the Capital Investment Plan (CIP), indicating that they will be funded and implemented in the near-term.

- The Charlotte Country Club Connector provides a good north/south and east/west connection on the east side of Center City. It connects the greenway around the golf course and into the proposed on-road bike facilities on Tipperary Road, The Plaza and up to the northeast side of town. Connecting the Briar Creek and Back Creek Greenways, the route is in proximity to Merry Oaks Elementary School, Garinger High School and several parks and schools.
- When the Briar Creek Greenway is complete, it will provide bicyclists with an important alternate route to Wendover Road. The on-road bicycle facilities could fill a gap in the greenway network. It also represents a potential opportunity to address a project identified in the Connectivity Plan. The proposed connection would improve conditions for students at Myers Park High School, Selwyn Elementary School and Alexander Graham Middle School.
- The McAlpine Creek/Briar Creek Greenway Connector provides an important connection from the south side of town into the center of town. It includes a proposed signed route in the bike plan and connects the McAlpine Creek and Briar Creek Greenways. It represents an opportunity to contribute to the greenway plan's "25 in 5" goal with relatively minor on-road bicycle

improvements like signs, signals, intersection and spot improvements. It serves a large population, while providing an opportunity to address a project identified in the Connectivity Plan. It provides an alternate route to Monroe Road and Providence Road and there are many churches and schools in the vicinity

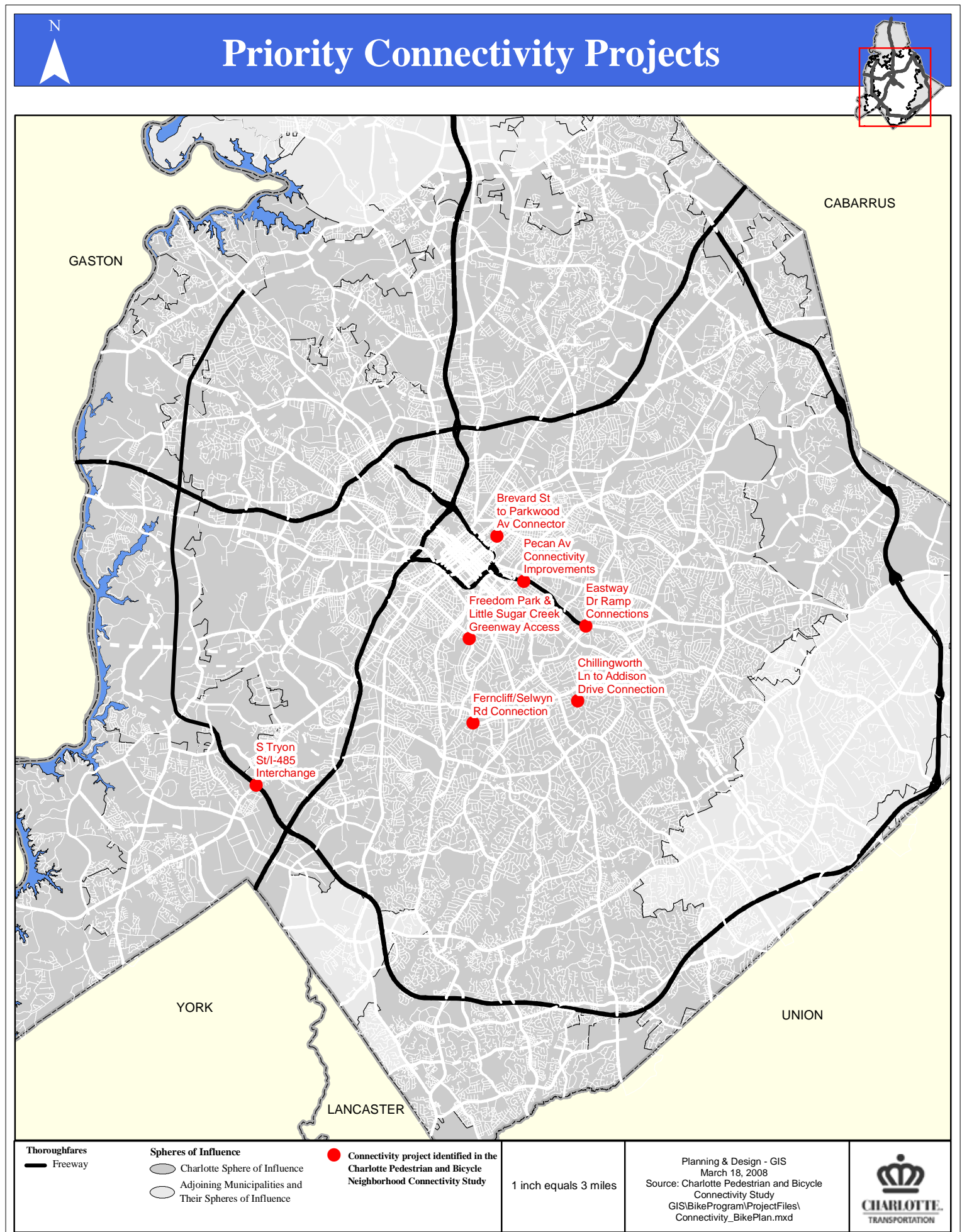
- The McAlpine Creek/Edwards Branch Connector provides an important bicycle connection between the southeast side of town and the center of town. It includes a proposed signed route in the bike plan and connects the McAlpine Creek and Edwards Branch Greenways. The route provides an alternate route to Independence Boulevard, a corridor identified in the TAP. It also represents an opportunity to contribute to the greenway plan's "25 in 5" goal with relatively minor on-road improvements like signs, signals and intersection and spot improvements.
- The Farm Pond Lane/Lawrence Orr Connector provides an alternate bicycle route to WT Harris Boulevard. It provides a good north/south route on the east side of town and a good opportunity to create bike lanes by lane dieting. It would continue the McAlpine Creek Greenway up to the northeast side of town. In doing so, it could help to connect McAlpine Creek Greenway, Reedy Creek Nature Preserve and Back Creek Greenway, while also connecting several business parks and shopping centers.
- The Arboretum Shopping Center Connector provides an alternate route to Providence Road and Pineville-Mathews Road. It connects the Four-Mile Creek and McAlpine Creek Greenways. It provides north/south and east/west connections on the south side of town and includes a proposed signed route in the bike plan. It represents an opportunity to contribute to the greenway plan's "25 in 5" goal with relatively minor on-road bicycle improvements like signs, signals, and intersection and spot improvements. It enhances access to an important shopping destination and there are parks and schools in the vicinity.
- The Old Statesville/Mallard Creek Connector connects three existing bike lanes. It provides alternate route to WT Harris Boulevard, while providing a good east/west route on the north side of town. It connects the Long Creek and Clark's Creek Greenways and could potentially fill gaps (at least in the short-term) in the proposed Carolina Thread Trail. It includes a proposed signed route in the bike plan and represents an opportunity to contribute to the greenway plan's "25 in 5" goal with relatively minor on-road bicycle improvements like signs, signals, and intersection and spot improvements. Residential development south of WT Harris Boulevard could potentially contribute to the connection and there are several schools, churches and business parks in the vicinity.

Figure 42: On-Road Bicycle and Greenway Connections



- *Implement projects throughout the City that eliminate barriers to bicycle access:* Projects identified in the City of Charlotte Pedestrian and Bicycle Connectivity Study present significant barriers in the bicycle network. A list of the projects that are identified in the Connectivity Study that are located within the near to medium-term bicycle route network is included below. These projects are shown as Figure 43 on the following page. All connectivity issues should be addressed to ensure that bicycling is a viable mode of transportation. However, the projects that fall within the Near to Medium-Term Bicycle Route Network should be considered a priority for improving bicycle transportation in Charlotte. If the City completed one of these projects per year, all would be addressed by 2015. The costs for undertaking these improvements have been added to the cost estimates included in Chapter 8 of this Plan.
 - *Pecan Avenue Connectivity Improvements:* This project is located approximately one mile east of uptown Charlotte on Pecan Avenue from East 9th Street to Central Avenue, and on Central Avenue from Pecan to Clement Avenue. The purpose of this project is to improve connectivity from the Elizabeth neighborhood to retail and public transportation destinations on Central Avenue via Pecan Avenue.
 - *Eastway Drive Ramp Connections:* This project is located at the intersection of Eastway Drive and Independence Boulevard, approximately one mile southeast of uptown Charlotte. The purpose of this case study is to improve connectivity between the neighborhood and destinations along Independence Boulevard and in the surrounding neighborhoods.
 - *Chillingworth Lane/Addison Drive Connection:* The project area is located over 4 miles from uptown Charlotte, east of Cotswold Mall, near Sharon Amity Road. The purpose of this case study is to improve pedestrian and bicycle access between Chillingworth Lane and Addison Drive.
 - *Ferncliff Road/Selwyn Avenue Connection:* The project area is located approximately 5 miles from uptown Charlotte in the neighborhoods of Sunnybrook and Barclay Downs, southwest of Selwyn Elementary School and Myers Park High School. The purpose of this case study is to provide an internal neighborhood connection between Ferncliff Road and Selwyn Avenue.
 - *Brevard Street to Parkwood Avenue Connector:* This project is located along Parkwood Avenue between Brevard Street and 16th Street, approximately one quarter mile northeast of uptown Charlotte. The purpose of the project is to improve the connection from Brevard Street and areas west to the residential areas southeast of Parkwood Avenue.
 - *Freedom Park and Little Sugar Creek (LSC) Greenway Access:* This project is located on East Boulevard where it meets the Little Sugar Creek Greenway and the entrance to Freedom Park near the Dilworth neighborhood. The purpose of this project is to improve access to Freedom Park and the Little Sugar Creek (LSC) Greenway at East Boulevard.
 - *South Tryon and I-485 Interchange:* This project is at the South Tryon Street and Interstate 485/Rusty Goode Jr. Freeway interchange. To provide access across this major interchange for pedestrians and bicyclists traveling between residential, office and retail areas and bus stops along South Tryon Street.

Figure 43: Priority Connectivity Projects



- *Pursue spot improvements in the Near to Medium-Term Network:* For the Near to Medium-Term Bicycle Route Network to function properly, specific intersections will have to be improved to provide enhanced bicycle access. Connectivity projects such as those highlighted in the Charlotte Pedestrian and Bicycle Neighborhood Connectivity Study will need to be addressed to eliminate barriers in the network. In addition, the City will need to identify, design and implement spot improvements such as adding bicycle detection at selected traffic lights and providing left-turn pockets for bicyclists, on an ongoing basis. In many cases, these improvements should be completed prior to or in tandem with signing a route. Figures 44 through 47 on the following pages highlight one example in each quadrant of the City of the types of design fixes that are needed to improve bicycle connectivity in the City.

Near-Term Educational and Awareness Initiatives

In addition to the current educational and awareness initiatives (described in Chapter 6), the City should undertake additional new programs in the near-term. Programs that should be added in the near-term to the City's ongoing efforts are listed below.

- Provide adult bicycle skills classes
- Provide new general information bicycle video for motorists and cyclists
- Pursue bicycle partnerships (Racks, Showers for Bike Commuters, incentives to bike to work)
- Provide "Basics of Bicycling" school curriculum at one pilot school
- Provide public service announcements
- Provide bicycle awareness in drivers' education and licensing (within scope of CDOT)
- Provide bicycle mapping resources such as the Charlotte Cycling Guide
- Conduct specific bicycle events in addition to BIKE Charlotte (Midnight Ride, Bike to the Park, Bike to the Movies, Ride Route 88, etc)
- Provide a bicycle tour of bicycle facilities (BAC member guided. Requires training of leaders)
- Train City staff on bicycle goals and Bicycle Master Plan
- Advertise new bicycle facilities
- Conduct annual bike counts
- Provide a pilot mini-grant project (Provide small mini-grants to outside groups for bicycle education/infrastructure projects)

Figure 44: Sample Spot Improvement, NW Quadrant



Figure 45: Sample Spot Improvement, SE Quadrant



Figure 46: Sample Spot Improvement, SW Quadrant



Figure 47: Sample Spot Improvement, NE Quadrant



Over time, the City should continue to implement all of the bicycle education and awareness programs and initiatives identified in the near-term recommendations section that have proven to be effective and successful. It should also add a new set of programs in the medium-term. It is assumed that the City will need to seek assistance or partnerships, as well as increase its budget for educational programs. For this reason, increased funding for expanded educational and awareness efforts is included within the cost estimates in this Plan (provided below). The programs that should be added in the medium-term are listed below.

New programs to add in the near to medium-term

- Public relations campaign that focuses on bicycle awareness and education (Increase visibility of bicycle transportation, safety practices, etc.)
- Regular production of videos for distribution to bike shops, bike clubs, government channel broadcast and website viewing
- Increase frequency of adult bicycle skills class
- Expand Basics of Bicycling school curriculum beyond pilot project to additional schools
- Outreach to non-English speaking populations
- Safe Routes to School contributions (through city or school SRTS program)
- Expanded bicycle events (tours, fairs, etc.)
- Host bicycle summit meeting or conference (local, state, APBP, etc)
- Partner in commuting program to assist commuters in choosing bike routes
- Seek assistance or partnerships with focus on education and awareness initiatives

Cost Estimates for the Near to Medium-Term Bicycle Network

General construction cost estimates for implementing the bicycle network depicted in the Near to Medium-Term Opportunities map were developed. The estimated cost to implement the near to medium-term recommendations by 2015 is approximately \$2.2 million per year (based on 2008 dollars). The level of investment that may be required to implement this Plan is relatively modest in comparison to other transportation facilities and is consistent with the TAP. The TAP states that to meet the City's goals for bicycle travel, the Bicycle Program will require a funding level of \$47.5 million over a 25-year planning period. This amounts to \$1.9 million per year, well within the range of the estimates included in this Plan.

The construction cost estimates for the near to medium-term bicycle network were developed by calculating estimates of quantities and applying unit costs. Costs were then translated into per mile or per facility costs, and assume a "worse-case" scenario that each project is a stand alone project. Significant cost savings can be achieved by combining many of these projects with other Capital Improvement Program projects, such as road resurfacing, road widening and farm-to-market road improvements.

The construction cost estimates for stand alone bicycle projects are based on 2008 dollars and were assigned based on historical cost data. The costs shown reflect only construction of the particular bicycle facility indicated, and do not reflect other costs that may be associated with a larger project. The costs are intended to be general and used for long-range planning purposes. Because each project is unique, a 25% contingency factor has been applied to the cost of construction depicted in Table 4 to help account for costs associated with planning, surveying, engineering design, right-of-way acquisition, mobilization, maintenance of traffic during construction, landscaping/aesthetics, utility adjustments, lighting, drainage,

Table 4: Near to Medium Term Bicycle Action Costs

Near to Medium-Term Bicycle Facility Costs

Proposed Action	Cost Per Linear Mile	Linear Miles in the Near to Medium-Term Network	Total Cost
Add Striping to Provide Shared Lane Marking	\$10,560	29.81	\$314,794
Add Striping to Provide Bike Lane	\$50,160	10.82	\$542,731
Lane Diet to Provide Bike Lane on a City-Maintained Road	\$118,800	26.35	\$3,130,380
Road Diet to Provide Bike Lane	\$118,800	18.34	\$2,178,792
Construct a Side Path	\$199,530	1.92	\$383,098
Proposed Road Widening to Provide Bike Lanes	\$188,240	28.44	\$5,353,546
Lane Diet to Provide Wide Outside Lanes or Striped Shoulders on a City-Maintained Road	\$118,800		\$0
Add Signs	\$2,750	25	\$68,750
Total Near to Medium-Term Bicycle Facility Costs (City)			\$11,972,090
City Cost Per Year (2008-2015)			\$1,710,299
Estimated cost per year to accomplish the educational and awareness initiatives outlined in Chapter 6 of the Bicycle Master Plan (City)			\$240,000
Total cost to address the projects identified in the Charlotte Bicycle and Pedestrian Connectivity Study that fall within the Near to Medium-Term Bicycle Route Network (City)	Connectivity Projects: Pecan Avenue, Eastway Drive Ramp, Chillingworth Lane/Addison Drive, Ferncliff Road/Selwyn Avenue, Brevard Street to Parkwood Avenue,	Freedom Park and Little Sugar Creek Greenway Access, and South Tryon and I-485 interchange	\$1,620,000
City Cost Per Year (2008-2015)			\$231,429
Total City costs per year to accomplish facility and program goals by 2015 (as outlined in the TAP)			\$2,181,727
Note: Project costs are expected to be reduced by combining bicycle projects with other CIP projects			

stormwater management, erosion and sediment control, significant grading, bridges, retaining walls, significant changes in vehicular traffic patterns, or future maintenance. Since most of the bicycle capital projects will likely be combined with road resurfacing and road widening projects, it is anticipated that the project design elements listed above will not be applicable to many bicycle facility implementation projects.

Funding

Implementation of this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations. CDOT should lead this effort. All CDOT staff should be aware of the recommendations in this Plan and should seek to implement them as a part of their regular work. The Bike Program should continue to provide technical expertise on issues related to bicycling and ensure that implementation of the Plan moves forward.

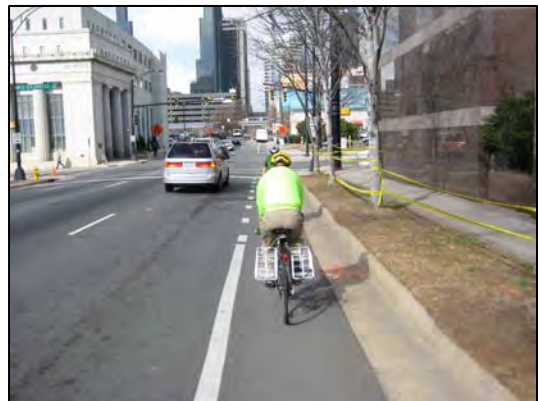
Existing and Funded Programs to Implement the Recommendations in this Plan

The City should take advantage of existing funding provided through the municipal bond that supports the Bicycle Program. It should seek to increase the amount of funding provided in the next bond to support the implementation of the recommendations included within the near to medium-term cost estimates. It should also pursue other public and private sources, and dedicate portions of this funding to critical bicycle projects.

Many of the most important projects in the near and long-term bicycle network will not be implemented through routine roadway repaving and reconstruction projects and will instead require an independently-funded capital improvement. In addition, there are a number of street retrofit projects that are important bicycle routes but hard to fund from traditional sources and need a separate, dedicated funding source. The City may be able to obtain funds for these projects by pursuing federal and state grants, seeking special appropriations or including them in future levy and bond initiatives.

Key programs for planning and implementing the bicycle recommendations in this Plan are included below.

- Bridge Program
- Farm to Market Road Improvement Program
- Intersection Capacity and Multimodal Enhancement Program
- Minor Roadway Improvement Program
- Specific Thoroughfare and Street Projects
- Street Connectivity Program
- Street Resurfacing Program
- Traffic Control Devices Upgrade Program
- Bicycle Program
- Area Plan Capital Project Program
- Center City Implementation Program
- Streetscape/Pedscape Program



Implementation of this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations.

- Traffic Calming Program

Implementation of the recommendations in this Plan will also require that adequate funding is provided to additional TAP-adopted programs. These programs are listed below.

- Public-Private Participation Program
- Pedestrian/Bicycle Connectivity Program
- Safe Routes to School Program
- Air Quality and Congestion Mitigation Program
- Centers and Corridors Implementation: Corridors
- Centers and Corridors Implementation: Centers

Conclusion

This chapter presented an implementation and funding strategy for realizing the Stakeholder Group's vision of Charlotte as "the premier bicycling City in the United States." It presents a near-term strategy that focuses on ensuring that systems and processes are in place to capitalize on all potential opportunities, while undertaking bicycle facility projects that are relatively simple and inexpensive and that will help create early successes. Wherever practical, bicycle route signs should be posted during this time period. Near-term projects will also include several bicycle facilities that are more challenging to implement in places where critical gaps exist.

Medium-term recommendations focus on providing the most important routes and connections to ensure that bicyclists have access to and between the corridors and centers identified in the TAP. The medium-term network relies heavily on the emerging greenway network, as well as ongoing road widening, road resurfacing and private-sector development. Long-term recommendations are focused on the goal of creating a connected, accessible and convenient network of bicycle facilities throughout Charlotte. Implementation of the near, medium and long-term recommendations in this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations. Table 5 on the following page outlines critical partnerships that will be necessary in the implementation of the recommendations in this Plan.



Long-term recommendations are focused on the goal of creating a connected, accessible and convenient network of bicycle facilities throughout Charlotte.

Table 5: Implementation Schedule

Immediate Action Recommendations (2008-2010)	CDOT Partners
Implement initial signed routes	CDOT, EN
Update the City's existing bicycle educational and awareness video	CDOT, BAC, BA, GC
Actively pursue collaboration and partnerships with the new Safe Routes to School Program	CDOT, SRTS
Pursue funding for on-road bicycle and greenway connection projects	CDOT, PR
Implement initial set of shared lane markings, lane diets, road diets, proposed road widening and add striping recommendations	CDOT, RM, EN, NCDOT
Near to Medium-Term Recommendations (To be completed by 2015)	CDOT Partners
Provide initial set of signed routes throughout the City	CDOT, EN
Add bicycle facilities along with roads to be widened in the short-term	CDOT, NCDOT, RM, EN
Implement the proposed action recommendations to create the Near to Medium-Term Bicycle Route Network by 2015	CDOT, RM, EN, NCDOT
Add bicycle facilities as part of the road resurfacing process	CDOT, RM, NCDOT
Continue to build a collaborative relationship with NCDOT to ensure that State-maintained roads are bicycle friendly	CDOT, NCDOT
The City should consider moving up selected roads on the planned road improvement schedule because of their role in the bicycle network	CDOT, MUMPO, PD
Pursue the bicycle/greenway network connector projects as funding is made available	CDOT, PR
Implement projects throughout the City that eliminate barriers to bicycle access	CDOT, EN, PD, NCDOT
Pursue spot improvements in the Near to Medium-Term Network	CDOT, RM, EN, NCDOT
Pursue near-term educational and awareness Initiatives	CDOT, BAC, BA
Key	
(CDOT) Charlotte Department of Transportation (RM) Road Maintenance Division (EN) Engineering Department (PR) Mecklenburg County Park and Recreation Department (BAC) Bicycle Advisory Committee (BA) Bicycle Advocacy Organizations (NCDOT) NCDOT Division Office (PD) Planning Department (ZD) Zoning Department (SRTS) Safe Routes to School (MUMPO) Mecklenburg Union Metropolitan Planning Organization (GC) Government Channel - Cable 16	

Chapter 9: Conclusion

The Bicycle Master Plan presents a near-term strategy that focuses on ensuring that systems and processes are in place to capitalize on all potential opportunities, while undertaking bicycle facility projects that are inexpensive and that will help create early successes. Medium-term recommendations focus on providing the most important routes and connections to ensure that bicyclists have access to and between the corridors and centers identified in Charlotte's TAP. The medium-term network relies heavily on the emerging greenway network, as well as ongoing road widening, road resurfacing and private-sector development.

Long-term recommendations are focused on the goal of creating a connected, accessible and convenient network of bicycle facilities throughout Charlotte. Implementation of the near, medium and long-term recommendations in this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations.



By building on previous and ongoing planning efforts, this Plan seeks to make the most of the exciting opportunities that the City has at this critical point in time.

By presenting a long-term vision, implementation strategy and timeline for a connected bicycle network and highlighting education programs and policy revisions to supplement this network, this Plan presents a clear vision for a bicycle-friendly Charlotte. By building on previous and ongoing planning efforts, this Plan seeks to make the most of the exciting opportunities that the City has at this critical point in time. In doing so, this Plan's vision of Charlotte as the premier bicycling city in the United States is fully consistent with the goals of the TAP.

Appendix A: Status of Policies in Chapter 3

Recommendation Number	Policy	Retained From Previous Plan	Carried Forward with Substantive Revisions	New Recommendation
1.1	The City and NCDOT will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative routes will be identified.			
1.2	The City of Charlotte prefers bicycle lanes over wide outside lanes on both City and State-maintained roads.			
1.3	The City will strive to complete the near to medium-term bicycle route network by 2015.			
1.4	The City should install a signed bicycle route system that links major destinations in Charlotte.			
1.5	The City will seek to implement the recommendations included in the Near to Mid-Term Opportunities map and the long-term Bicycle Route Network map.			
1.6	The City will strive to continue to fund the full-time Bicycle Program Manager position to spearhead the City's bicycle planning efforts.			
1.7	The City should consider a variety of methods to expand and implement the recommendations in this Plan.			
1.8	Continue to appoint the Bicycle Program Manager to the MPO Technical Coordinating Committee.			
1.9	Continue to support the Bicycle Advisory Committee's role in improving bicycling in Charlotte.			
1.10	The City will require that bicycle issues be considered in all plan reviews and that the Bicycle Program Manager has a voice in all roadway construction review processes.			
1.11	The Bicycle Program Manager and/or the BAC should provide an annual briefing to the City Council regarding priority projects, ongoing concerns, etc.			
1.12	The City will explore ways that the Urban Street Design Guidelines and key code changes can provide for bicycle connections between residential developments and activity centers and between new roads and the existing road network.			
1.13	The City will consider amending the subdivision and zoning ordinances to incorporate provisions for on-road bicycle facilities and other bicycle-friendly amenities.			
1.14	The City will continue to incorporate prioritized bicycle improvements into the annual Transportation Improvement Program (TIP).			
1.15	The City should update the Bicycle Master Plan every five years in conjunction with TAP updates.			
1.16	Consider lowering the speed limit on streets that provide important bicycle connections.			
1.17	The City should continue to incorporate bicycle planning activities into its day-to-day activities.			
2.1	The City will strive to provide an annual allotment for bicycle improvements in the City budget to implement bicycle projects called for in this Plan and to leverage other funds.			
2.2	The City will implement bikeway improvements as part of all new roadway projects.			
2.3	The City will seek State and Federal funds for bicycle projects.			

Recommendation Number	Policy	Retained from previous Plan	Carried forward with substantive revisions	New recommendation
2.4	The City will seek additional funding and partnerships for planning, design and construction of critical greenway and bike connection projects.			
2.5	The City will seek public and private partnerships to implement bicycle improvements.			
3.1	The City will consider bicycle accommodations in the planning, design and development of all rapid transit corridors, station areas and transit hubs.			
3.2	The City will coordinate with the Mecklenburg County Parks and Recreation Department to provide connections between on-street bikeways and greenway trails.			
3.3	The City will coordinate the implementation of the Greenway Master Plan and the Bicycle Master Plan.			
3.4	CDOT and Mecklenburg County Parks and Recreation Department should continue to meet regularly to provide progress updates for each individual network, capital planning projects and overland bike to greenway connectors and should consider developing a yearly summit to address departmental concerns and progress regarding non-motorized connectivity.			
3.5	The City will work with the County to provide 24-hour a day, seven day a week access to greenways that are used for transportation purposes in the bicycle route network.			
3.6	The City will develop design standards and guidelines for intersection and greenway/bike crossings.			
4.1	The City will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city, where feasible. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative bike routes will be identified.			
4.2	The City will seek to implement a minimum 5-foot bicycle lane on all new or reconstructed bridges and overpasses depending on posted speeds and on-street parking.			
4.3	The City will conduct field tests of various emerging design treatments to improve bicycling conditions in the City.			
4.4	The City will further study how to retrofit drainage grates in a way that would accommodate paving over the gutter pan.			
4.5	The City will consider eliminating or reducing the gutter pan to 12-inches on roadways with constrained right-of-way.			
4.6	The City will seek to use the curb reconstruction procedure detailed in Figure 3 below as its method for determining how curb lines will be required as part of proposed new development.			
4.7	The City and NCDOT should continue to work in close partnership on the appropriate design of bicycle facilities with the assumption that bike lanes or other facilities identified in this Plan will always be provided on new and reconstructed roads.			
5.1	The City will seek to provide the bicycle facilities identified in this Plan as part of the road resurfacing process.			
5.2	The City will seek to improve coordination between resurfacing and bicycle planning efforts.			
5.3	The City should publicize the "Dial 311" system as an effective means for addressing bicycle-specific spot improvement needs.			

Recommendation Number	Policy	Retained from previous Plan	Carried forward with substantive revisions	New recommendation
5.4	The City will seek to reduce the minimum vertical separation tolerance requirement to decrease the acceptable vertical distance between the gutter and the road surface.			
6.1	The City will initiate and hold annual bike events to provide education opportunities and raise awareness of bicycling.			
6.2	The City will educate bicyclists on the use of bike racks on buses to promote safe usage.			
6.3	The City will work with government agencies as well as private employers to provide incentives for biking to work.			
6.4	The City will encourage Mecklenburg County Schools to implement a bicycle education curriculum in local school.			
6.5	Encourage law enforcement agencies and community organizations to improve bicycle safety through increased bicycle helmet usage.			
6.6	The City will consider supporting the inclusion of bicycle safety information in the State of North Carolina's Department of Motor Vehicles (DMV) procedures as part of the City's annual legislative request and lobbying efforts.			
6.7	The City will support and encourage programs that promote motorist awareness of bicycle rights.			
6.8	The City will support and encourage programs that educate bicyclists of responsibilities and safe riding habits.			
6.9	The City will consider supporting the addition of bicycle safety information in the local Safety and Health Council of North Carolina driver safety courses.			
6.10	The City will conduct regular before and after bicycle counts and studies to evaluate the impact of the emerging bicycle network.			
6.11	The City will continue to conduct annual accident analyses to determine local accident characteristics.			
7.1	The City should continue to provide bicycle racks at major destinations and provide bicycle racks and lockers at major transit connections.			
7.2	The City will seek to improve enforcement of the bicycle parking ordinance to ensure that parking is located close to building entrances.			
7.3	The City will provide bicycle parking in all City garages and encourage bicycle parking in private garages.			

Appendix B: Bicycle Plan Policies – Coordination and Support of TAP

Recommendation Number	Bicycle Plan Policy	Which TAP Objective/Policy does the Bicycle Plan Policy Support?
1.1	The City and NCDOT will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative routes will be identified.	Policy 2.6.1
1.2	The City of Charlotte prefers bicycle lanes over wide outside lanes on both City and State-maintained roads.	Policy 2.6.1
1.3	The City will strive to complete the near to medium-term bicycle route network by 2015.	Objective 2.6
1.4	The City should install a signed bicycle route system that links major destinations in Charlotte.	Policy 2.6.2 and Policy 2.6.4
1.5	The City will seek to implement the recommendations included in the Near to Mid-Term Opportunities map and the long-term Bicycle Route Network map.	Objective 2.6
1.6	The City will strive to continue to fund the full-time Bicycle Program Manager position to spearhead the City's bicycle planning efforts.	Objective 2.2 and Objective 2.6
1.7	The City should consider a variety of methods to expand and implement the recommendations in this Plan.	Objective 2.1 and accompanying policies Objective 2.6 and accompanying policies
1.8	Continue to appoint the Bicycle Program Manager to the MPO Technical Coordinating Committee.	Objective 2.1, Objective 2.2, and Objective 2.6
1.9	Continue to support the Bicycle Advisory Committee's role in improving bicycling in Charlotte.	Objective 2.1, Objective 2.2 and Objective 2.6
1.10	The City will require that bicycle issues be considered in all plan reviews and that the Bicycle Program Manager has a voice in all roadway construction review processes.	Policy 2.1.2, Policy 2.1.3, Policy 2.1.4, Policy 2.1.5, Objective 2.2 and Policy 2.2.7
1.11	The Bicycle Program Manager and/or the BAC should provide an annual briefing to the City Council regarding priority projects, ongoing concerns, etc.	Policy 2.1.3, Objective 2.2, Policy 2.2.1, Policy 2.2.5 and Policy 2.2.6 and Objective 5.1
1.12	The City will explore ways that the Urban Street Design Guidelines and key code changes can provide for bicycle connections between residential developments and activity centers and between new roads and the existing road network.	Policy 2.1.1, Policy 2.1.3, Policy 2.1.4, Policy 2.6.1 and Policy 2.6.3
1.13	The City will consider amending the subdivision and zoning ordinances to incorporate provisions for on-road bicycle facilities and other bicycle-friendly amenities.	Policy 2.1.4, Policy 2.6.6, Policy 2.6.7
1.14	The City will continue to incorporate prioritized bicycle improvements into the annual Transportation Improvement Program (TIP).	Policy 2.1.3 and Policy 2.2.7
1.15	The City should update the Bicycle Master Plan every five years in conjunction with TAP updates.	Policy 2.6.8
1.16	Consider lowering the speed limit on streets that provide important bicycle connections.	Policy 2.1.1 and Policy 2.1.2
1.17	The City should continue to incorporate bicycle planning activities into its day-to-day activities.	Objective 2.1, Policy 2.1.2, Policy 2.1.4, Policy 2.1.5, Policies 2.6.1 - 2.6.7
2.1	The City will strive to provide an annual allotment for bicycle improvements in the City budget to implement bicycle projects called for in this Plan and to leverage other funds.	Policy 2.2.7 and Objective 2.6
2.2	The City will implement bikeway improvements as part of all new roadway projects.	Policy 2.6.3, Policy 2.6.4 and Policy 2.6.7
2.3	The City will seek State and Federal funds for bicycle projects.	Policy 2.1.5

Recommendation Number	Policy	Retained from previous Plan
2.4	The City will seek additional funding and partnerships for planning, design and construction of critical greenway and bike connection projects.	Policy 2.6.4
2.5	The City will seek public and private partnerships to implement bicycle improvements.	Policy 2.6.7
3.1	The City will consider bicycle accommodations in the planning, design and development of all rapid transit corridors, station areas and transit hubs.	Policy 2.1.2
3.2	The City will coordinate with the Mecklenburg County Parks and Recreation Department to provide connections between on-street bikeways and greenway trails.	Policy 2.6.4, Policy 2.6.5, and Policy 2.6.6
3.3	The City will coordinate the implementation of the Greenway Master Plan and the Bicycle Master Plan.	Objective 2.6 and Policy 2.6.4
3.4	CDOT and Mecklenburg County Parks and Recreation Department should continue to meet regularly to provide progress updates for each individual network, capital planning projects and overland bike to greenway connectors and should consider developing a yearly summit to address departmental concerns and progress regarding non-motorized connectivity.	Objective 2.1
3.5	The City will work with the County to provide 24-hour a day, seven day a week access to greenways that are used for transportation purposes in the bicycle route network.	Objective 2.1, Policy 2.6.4
3.6	The City will develop design standards and guidelines for intersection and greenway/bike crossings.	Policy 2.6.4
4.1	The City will require bicycle lanes designed consistent with the Urban Street Design Guidelines, on all new or reconstructed roadways within the city, where feasible. Where bicycle lanes are not feasible, justifications will be included as part of the road preliminary design process and alternative bike routes will be identified.	Policy 2.6.1
4.2	The City will seek to implement a minimum 5-foot bicycle lane on all new or reconstructed bridges and overpasses depending on posted speeds and on-street parking.	Objective 2.6
4.3	The City will conduct field tests of various emerging design treatments to improve bicycling conditions in the City.	Policy 2.1.3 and Policy 2.2.1
4.4	The City will further study how to retrofit drainage grates in a way that would accommodate paving over the gutter pan.	Policy 2.4.4
4.5	The City will consider eliminating or reducing the gutter pan to 12-inches on roadways with constrained right-of-way.	Policy 2.4.4
4.6	The City will seek to use the curb reconstruction procedure detailed in Figure 3 below as its method for determining how curb lines will be required as part of proposed new development.	Policy 2.6.3
4.7	The City and NCDOT should continue to work in close partnership on the appropriate design of bicycle facilities with the assumption that bike lanes or other facilities identified in this Plan will always be provided on new and reconstructed roads.	Policy 2.1.5
5.1	The City will seek to provide the bicycle facilities identified in this Plan as part of the road resurfacing process.	Policy 2.6.3
5.2	The City will seek to improve coordination between resurfacing and bicycle planning efforts.	Policy 2.6.3
5.3	The City should publicize the "Dial 311" system as an effective means for addressing bicycle-specific spot improvement needs.	Policy 2.1.2, Policy 2.2.6 and Policy 2.4.1

Recommendation Number	Policy	Retained from previous Plan
5.4	The City will seek to reduce the minimum vertical separation tolerance requirement to decrease the acceptable vertical distance between the gutter and the road surface.	Policy 2.6.1
6.1	The City will initiate and hold annual bike events to provide education opportunities and raise awareness of bicycling.	Policy 2.2.6
6.2	The City will educate bicyclists on the use of bike racks on buses to promote safe usage.	Policy 2.2.6 and Policy 2.3.3
6.3	The City will work with government agencies as well as private employers to provide incentives for biking to work.	Policy 2.2.6
6.4	The City will encourage Mecklenburg County Schools to implement a bicycle education curriculum in local school.	Policy 2.2.6
6.5	Encourage law enforcement agencies and community organizations to improve bicycle safety through increased bicycle helmet usage.	Policy 2.2.6
6.6	The City will consider supporting the inclusion of bicycle safety information in the State of North Carolina's Department of Motor Vehicles (DMV) procedures as part of the City's annual legislative request and lobbying efforts.	Policy 2.2.6
6.7	The City will support and encourage programs that promote motorist awareness of bicycle rights.	Policy 2.2.6
6.8	The City will support and encourage programs that educate bicyclists of responsibilities and safe riding habits.	Policy 2.2.6
6.9	The City will consider supporting the addition of bicycle safety information in the local Safety and Health Council of North Carolina driver safety courses.	Policy 2.2.6
6.10	The City will conduct regular before and after bicycle counts and studies to evaluate the impact of the emerging bicycle network.	Policy 2.2.1 and Policy 2.6.5
6.11	The City will continue to conduct annual accident analyses to determine local accident characteristics.	Policy 2.2.5 and Policy 2.5.2
7.1	The City should continue to provide bicycle racks at major destinations and provide bicycle racks and lockers at major transit connections.	Objective 2.1 and Policy 2.1.2
7.2	The City will seek to improve enforcement of the bicycle parking ordinance to ensure that parking is located close to building entrances.	Policy 2.6.7
7.3	The City will provide bicycle parking in all City garages and encourage bicycle parking in private garages.	Objective 2.1, Policy 2.1.2, and Policy 2.6.8