Chapter 6
Vision Outcomes: Multimodal Transportation System Improvements

This chapter defines improvements to the transportation network - the integrated network of highways, streets, transit services, bicycle network, and pedestrian walkways - that provide connectivity, access, and mobility and sustain economic growth and support livable communities.

Multimodal Transportation System Improvements

General

The physical organization of the Neck area should be supported by a balanced, defined and well-organized framework of a multimodal transportation network that provides connectivity, access and mobility for rail, freight, and people of all ages and abilities. An integrated network of highways, streets, transit services and facilities, bicycle networks, and pedestrian walkways will support and sustain economic growth and livability throughout the community, and reduce negative impacts on health, energy, and neighborhood quality while reducing travel delay.

Transportation is ultimately about access. Where there is access, commerce and other activities can happen. On a larger scale, a multimodal transportation network is essential to the local and regional economy of the Neck area. The port facilities, interstate highways, and rail lines allow freight to be easily moved in and out of the region. The Amtrak station and Charleston International Airport connect passengers to cities and markets within the Southeastern United States and beyond. Together, those facilities in the Neck area support the regional and statewide economy with a multimodal transportation network facilitating movement of people and goods.

Multimodal transportation options work together to move people and goods.

On the smaller scale, multimodal transportation improves the economy, shapes development patterns, and influences quality of life and the natural environment. The integration of transportation and land use planning results in smarter, more organized growth that creates travel efficiency, comfort and convenience. Land use and transportation are symbiotic. Development density and location influence travel patterns, and in turn, the degree of access and mobility options provided by the transportation system can influence land use and development trends. Urban design can facilitate travel choices and alternatives to driving or someone having to rely on friends and family to drive them.

One of the goals of this Master Plan for the Neck area is to create walkable communities and activity centers that have quality design that affords safe and convenient access for all travel modes, mixed uses that encourage transit-oriented development, and investment in transportation projects, particularly in transit options and non-motorized transportation. This framework supports smart growth land use patterns so that residents and employees have the option of walking, bicycling, or taking transit for at least some of their daily activities.

Transit

Transit Markets and Technologies

The graphic below shows the transit markets that exist in the Neck area and the corresponding transit technologies best suited to cater to the different markets.

Neighborhood	Local	Neighborhood
• Standard Bus	• Enhanced Bus • Bus Rapid Transit (BTR) • Light Rail Transit (LRT)	• Express Bus • Commuter Rail

Beyond the type of market it can serve, a transit mode is defined by the type of right-of-way, type of service and system technology. Right-of-way can be broken down into three categories:

- Fully controlled or separated right-of-way;
- Longitudinally physically separated with at grade crossings; and
- In street interacting among mixed traffic.

Types of service are defined by the region served, stopping schedule, frequency of service, and time of operation. System technology refers to the mechanical features such as power source, vehicle type and method of travel. The method of travel is the difference between "non-fixed guideway" or "fixed guideway" systems, the most common being rubber tires on concrete/asphalt or steel wheels on rail.

The following pages describe the characteristics and attributes of the following transit modes:

- Express Bus;
- Bus Rapid Transit (BRT);
- Commuter Rail;

- Light Rail (LRT);
- Streetcar; and
- Heavy Rail.

Specific transit modes are most appropriate to serve specific markets. Some technologies are better suited for dense, urban environments; while others are designed to serve regional, commuter-based needs.

Among the spectrum of transit technologies currently available in North America, heavy rail transit and light rail transit afford the greatest operating speeds and capacity. However, as displayed in **Figure 6.1**, rail-based technologies typically have a significantly greater cost than other modes of transit such as bus rapid transit, express bus, and local bus.

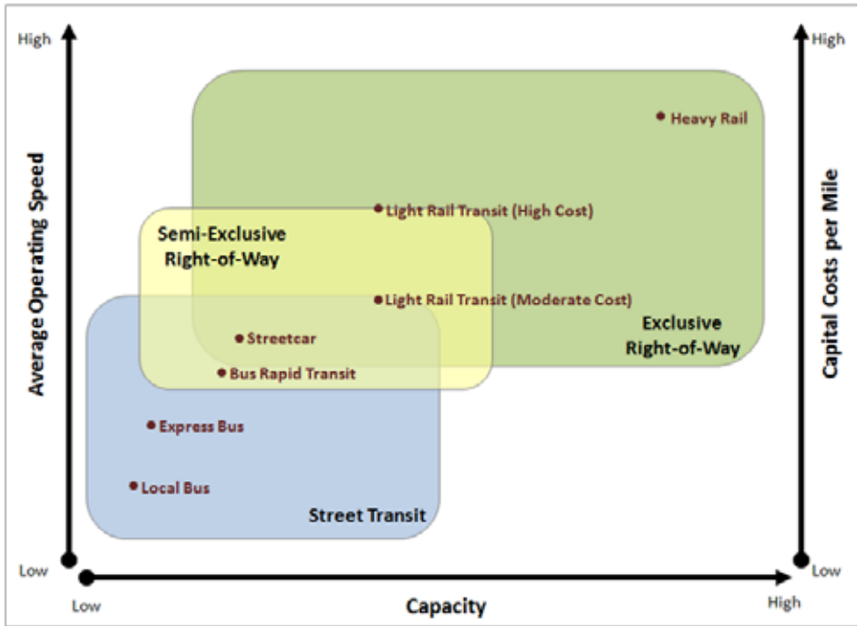


Figure 6.1 Rail Technologies

Express Bus

Express bus service utilizes diesel or hybrid buses to operate on existing roadways with mixed traffic, making limited stops along normal bus routes to accelerate service. Typical speeds range from 30 to 60 miles per hour.

Express bus

Express bus service typically does not use exclusive right-of-way. Numerous cities utilize Express Bus systems.

Bus Rapid Transit and Enhanced Bus

Bus Rapid Transit (BRT) utilizes diesel or hybrid buses to operate on dedicated right-of-ways, High Occupancy Vehicle (HOV) lanes or existing roadways. BRT systems are easily adaptable to community and corridor needs. This permanent, integrated system uses signal priority, queue jumpers, skip stop/express service and improved stations along corridors to make service efficient. Average travel speeds range from 10 to 30 miles per hour.

HOV lanes provide a faster moving transportation route for BRT systems.

HOV lanes are designated for vehicles with two or more passengers such as carpools and vanpools. Constructing a HOV lane rather than an exclusive bus-only lane provides added capacity for the general public that is willing to ride with two or more passengers. BRT systems can utilize the HOV lanes as well, and take advantage of a travel lane that is faster than a general purpose lane.

BRT systems provide urban and regional service. Stations are located between one-quarter and two miles apart. Service typically runs with a frequency of every three to 20 minutes (during peak periods).

Enhanced bus is a form of BRT with lower levels of infrastructure. Enhanced bus offers additional amenities and operational advances as compared to traditional local bus service, but does not operate in dedicated right-of-way like "true" BRT. Enhances bus services may feature upgraded stops and passenger amenities, stylized vehicles, unique branding, more frequent service, and other features that are not typically associated with local bus service.

Commuter Rail

Commuter rail systems are an electric or diesel propelled urban passenger train. Some trains can operate in "push-pull" mode allowing the train to be driven from either end. The trains operating in "push-pull" mode have a locomotive at one end of the train and a second control cab at the other end. A diesel multiple unit (DMU) is a train consisting of single or multiple carriages powered by one or more

Commuter rail provides a good transportation alternative to people with longer travel distances.

on-board diesel engines. Because DMUs have on-board engines, a separate locomotive is not necessary.

Riders of this service are characteristically workers who travel longer distances to their jobs. These trains are often more expensive and less frequent, and in most cities only operate during the peak periods. Average travel speeds range from 30 to 60 miles per hour.

Differing from light rail or bus rapid transit, commuter rail trains are larger and provide more seating and less standing room generally due to the longer commute time involved. Commuter rail services have the ability to coexist with freight rail providers because services are generally built on existing local standard gauge tracks; however, new dedicated tracks within the right-of-way are commonly constructed to prevent delays.

Commuter rail systems provide service between a city center and outer surrounding suburbs. Stations are generally located between two and five miles apart, with a route stretching between 10 and 125 miles. Trains typically following a schedule of operation with specific times rather than fixed intervals, and many operate only during peak hours.

Light Rail Transit

Light rail systems operate frequently and provide service to regional and urban areas.

Light rail transit (LRT) systems are powered by an overhead electric line and typically operate on a separated right-of-way. When necessary, light rail systems can operate in close proximity to mixed traffic, and alignments can exist within shared space within a city street or alongside a city street. Differing from heavy rail, light rail usually handles a smaller volume of riders and stops more frequently. Travel speeds are overall lower and range from 20 to 60 miles per hour.

Light rail systems provide service to regional and urban areas. Stations are generally spaced one mile apart and vary from sidewalk signs to platforms. Trains typically operate every 5 to 15 minutes (during peak periods).

Streetcar

Streetcars are electric-powered rail transit systems that run in city streets with mixed traffic and no grade separation. Differing from heavy rail and traditional light rail, streetcars handle smaller volumes of riders and stop more frequently. Travel speeds range from eight to 12 miles per hour.

Streetcars, also known as urban circulators, offer service to local areas.

Streetcars are often referred to as urban circulators and offer service to local areas. Stations are generally located one-quarter mile apart. Service typically runs every eight to 15 minutes (during peak periods).

Primary Corridors

Given the existing infrastructure in the Neck area, four corridors emerged as potential transit emphasis corridors:

- Spine Corridor: comprised of the land that surrounds the rail corridor, Rivers Avenue and Meeting Street that stretches north to Ashley Phosphate Road and beyond to Summerville;
- Dorchester Road Corridor: connects West Summerville to the heart of the Neck;
- I-26 Corridor: runs north-south connecting I-526 to the peninsula of Charleston; and
- Freight Rail Corridor: extends from Goose Creek to the peninsula of Charleston.

To serve the local and regional markets in these transit emphasis corridors, the following alternatives are recommended:

Enhanced Bus

- Provide enhanced bus service in the existing lanes on Rivers Avenue and Dorchester Road
- Increase frequency of service and improve amenities
- Construct a direct connection from Dorchester Road to the Intermodal Facility

Provide enhanced bus service on Rivers Ave. and Dorchester Rd.

Bus Rapid Transit

- Build upon strong ridership in Rivers Avenue Corridor
- Install dedicated guideway and operate bus rapid transit (BRT)

- Construct premium stations at catalyst sites
- Enable future conversion to light rail
- Operate with 10 minute frequency from 5:00 AM - 9:00 AM and from 3:00 PM - 9:30 PM
- Operate with 15 minute frequency from 9:00 AM - 3:00 PM

BRT systems should allow for future conversion to light rail systems.

LIGHT RAIL TRANSIT

- Install light rail in the dedicated guideway when the development intensifies at nodes along the corridor
- Operate with 10 minute frequency from 5:00AM - 9:00AM and from 3:00 PM - 9:30 PM
- Operate with 15 minute frequency from 9:00AM - 3:00 PM

Light rail systems should be developed when development intensifies.

EXPRESS BUS

- Provide express bus service in the existing lanes on I-26 and Dorchester Road
- Increase frequency of service and improve amenities
- Connect to the North Charleston Intermodal Facility

Express bus should be provided on I-26 and Dorchester Rd.

COMMUTER RAIL

- Construct commuter rail in freight rail corridor
- Offer peak period service to Summerville and/or Moncks Corner
- Operate from 5:00AM - 9:00AM & 3:00 PM - 8:30 PM with 30 minute frequency

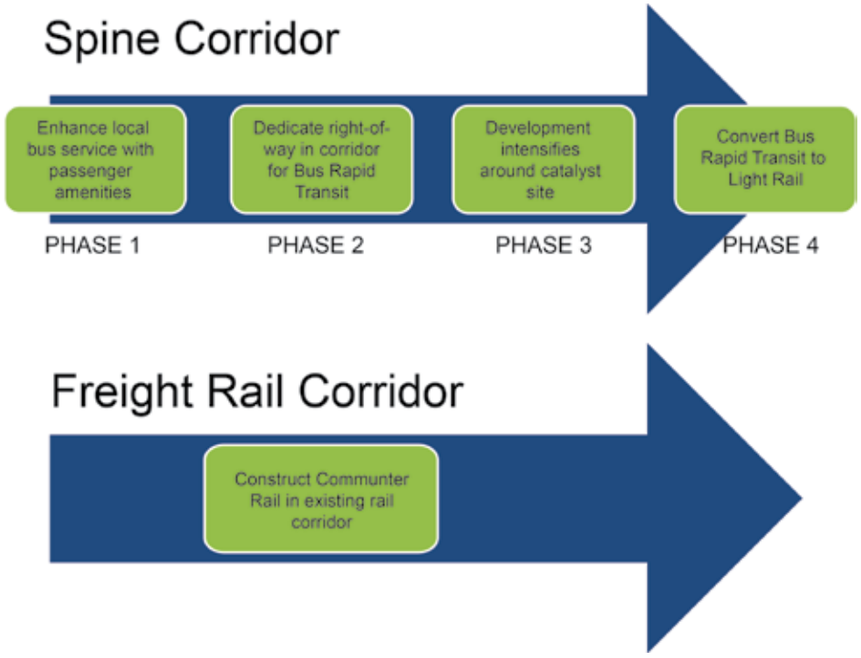
Operate commuter rail with regular frequency during peak times.

PHASED CORRIDOR DEVELOPMENT

As part of an integrated development effort, opportunities to shape transit will occur over time. Service should be implemented in phases based on the goals of the overall vision, when the intended market is there to serve and level of financial investment and resources that would be required to implement each option is available. **Figure 6.2** illustrates the final phase of the corridor development. Provisions and consideration should be given to the timing of fixed rail projects (as shown in **Figure 6.3**):

The investment of light rail in the Spine Corridor should be made after the BRT project demonstrates sustainable success. The BRT project would include a two-lane fixed guideway in median of Rivers Ave. between King Street and I-526, and in the abandoned railroad ROW in the Meeting/King corridor between the King Street overpass and downtown. Reserving the right-of-way necessary to construct a light rail will enable the future conversion from bus to light rail. Although a transit vision is part of this Neck Master Plan, the intent of the AA (Alternatives Analysis) that is being advanced by BCDCOG is to examine specific aspects of the transit corridor and consider these transit modes in greater detail.

In the Freight Rail Corridor, commuter rail will build on the success of the regional express route. When the express routes begin to recognize high ridership, the planning and design of a commuter rail system should commence.



The implementation phases are reasonable from the standpoint of addressing the stated transit needs to varying degrees; however, it is prudent to consider the costs associated with each option. The phases are comprised of transit services that

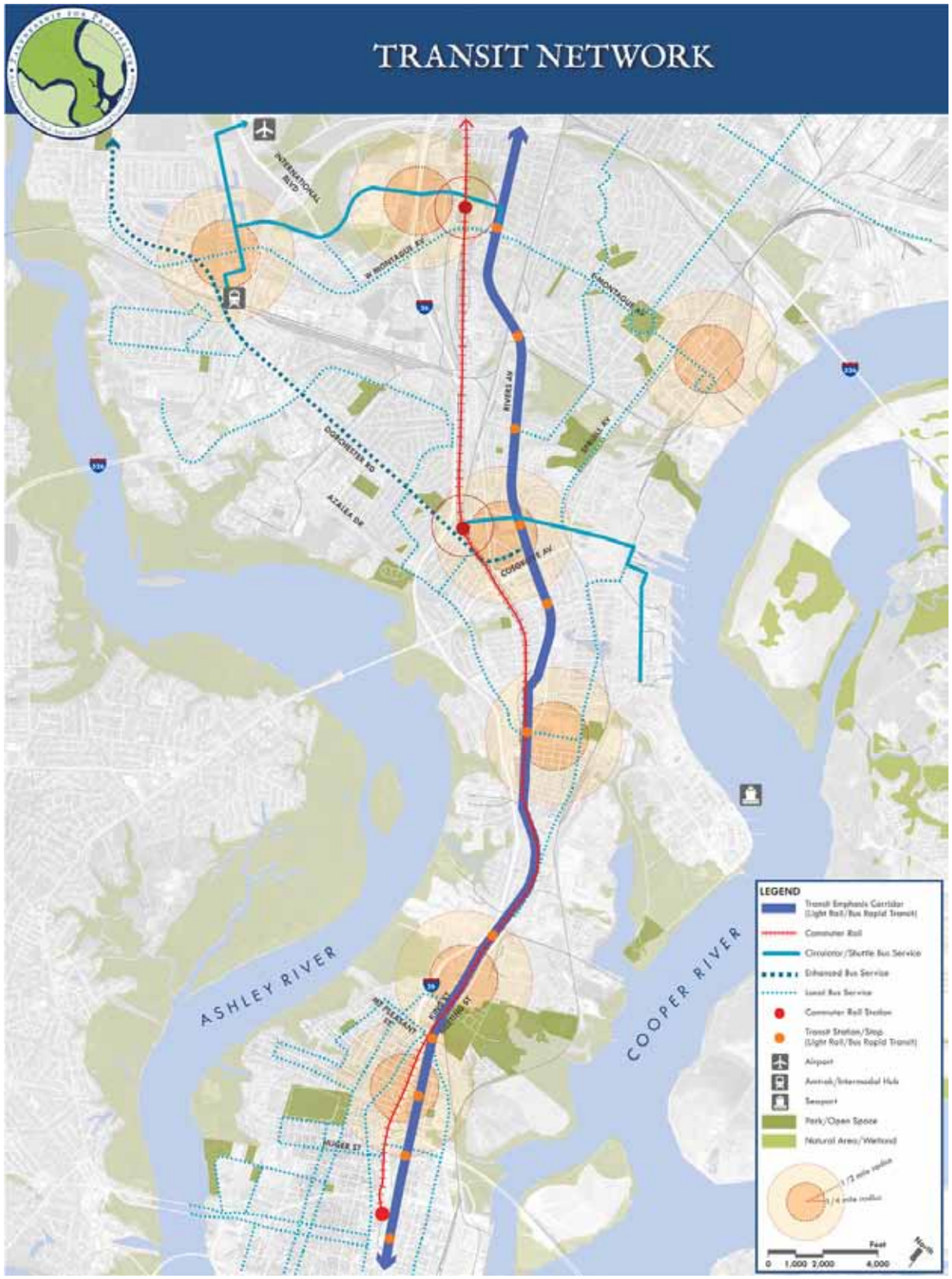


Figure 6.2 Planned Transit Network (See Appendix A pg. 214)

PHASE 1

Improve coverage and frequency of neighborhood service

PHASE 2

BRT through Spine Corridor

PHASE 3

Development at catalyst sites

PHASE 4

Replace BRT with light rail to serve new development

Figure 6.3 Phased Corridor Development

address regional, local and neighborhood transit needs. Services can be added as economic development occurs in the area and funds for new services become available. The service program is tentative and specific improvements should be based on experience gained as part of the implementation of preceding improvements.

Key Service Characteristics

Area-wide improvements to the existing fixed routes are recommended to serve the neighborhood market, but strategic investments made in these corridors and area wide will help to address regional and local transit needs. The specific services included in each corridor are based on the general strategies summarized in **Figure 6.4**.

Station Locations

The location of transit stations depends on surrounding land uses, as well as the physical capability of a site to accommodate a stopped transit vehicle. Transit stops are sited to maximize access to key activity centers within reasonable walking distance and are ideally placed in highly-visible locations with good pedestrian access. Stations should be integrated into the proposed catalyst areas in a cohesive manner. Transit infrastructure should be used as one tool to shape development efforts in the area by improving accessibility for people, while encouraging transit-oriented development patterns.

The existing SuperStop transfer facility has limited capacity at its current location. To accommodate improvements in standard bus service, the site could be expanded if it were to be moved north and incorporated into new development at the Shipwatch Square catalyst area.

Stations for the BRT/LRT proposed in the Spine Corridor are envisioned in the median along Rivers Avenue. Similar station amenities should be available at each stop.

BRT Station (Eugene, OR)

Light Rail Station (Phoenix, AZ)

Vehicle Technology	*Market*	*Description*
Spine Corridor		
Enhanced Bus	Local	Provide enhanced bus service on Rivers Ave. Include improved shelters, enhanced passenger information, unique branding, more frequent service.
Express Bus	Local	Construct two-lane fixed guideway in median of Rivers Ave. between King St. overpass and a point to the north of I-526 to be determined. Construct guideway to light rail standards to enable future conversion from bus to light rail.
Bus Rapid Transit	Local	Construct two-lane fixed guideway on abandoned railroad ROW in Meeting/King corridor between King St. overpass and downtown Charleston. Construct guideway to light rail standards to enable future conversion from bus to light rail. Portions of the corridor to be implemented with adjacent multi-use path.
Facility	Local	Replace SuperStop with expanded transfer facility to be incorporated into new development at McMillan catalyst site.
Light Rail Transit	Local	Convert existing fixed guideway on Rivers Ave. and in abandoned rail corridor from bus to light rail. Add necessary rail and systems infrastructure.
Dorchester Road Corridor		
Enhanced Bus	Local	Provide enhanced bus service on Dorchester Road from Rivers Ave. to North Charleston Intermodal Center. Include improved shelters, enhanced passenger information, unique branding, more frequent service.
Express Bus	Regional	Provide express bus service on Dorchester Road beyond the North Charleston Intermodal Center to the west side of Summerville.
Connection	Local / Regional	Construct street connection into Intermodal Center from Dorchester Road.
I-26 Corridor		
Enhanced Bus	Regional	Expand express bus service on I-26 using existing lanes (could use managed lanes in future if constructed).
Freight Rail Corridor		
Commuter Rail	Regional	Construct commuter rail service in existing freight rail corridors to Summerville and/or Moncks Corner.

Figure 6.4 Key Service Characteristics

Supporting Feeder Service

The fixed routes that operate in the Neck area will feed the neighborhood market into stations that will allow for easy connections to the other recommended transit improvements. Access to these local and regional services will provide more mobility choices for the residents of the Neck.

STANDARD BUS

- Improve existing CARTA service
- Offer greater coverage, higher frequencies and longer hours of operation

CARTA should expand service to include greater geographic coverage, higher frequencies, and longer hours of operation. To provide for wide access, stops are typically placed approximately every 800 feet, depending on surrounding land uses, transit demand, and other site-specific factors.

It is envisioned that passengers could use a transit mode that caters to the regional or local market to travel to a central location within the Neck area and then transfer to a standard bus route to get to their ultimate destination if necessary. Stops for feeder services should be located at the proposed stations for the express bus, BRT, LRT and commuter rail services. Consideration should be given to the frequency of service and how the future fixed route schedules could compliment the timing of the other transit modes.

Route	Route Name	Existing		Proposed	
		Hours of Operation	Frequency	Hours of Operation	Frequency
1	North Charleston Express	5:00AM - 9:00AM & 3:00PM - 8:30PM	30 minute	5:00AM - 9:00AM & 3:00PM - 8:30PM	30 minutes
-	Proposed Dorchester Road Express	-	-	5:00AM - 9:00AM & 3:00PM - 8:30PM	30 minutes
10	Rivers Avenue (with modifications)	6:00AM - 8:30PM	20 minute	6:00AM - 9:30PM	20 minutes
11	Dorchester/Airport	6:00AM - 9:00PM	60 minute	6:00AM - 9:30PM	30 minutes
12	Upper Dorchester	5:45AM - 9:34PM	45 minute	6:00AM - 9:30PM	30 minutes
13	Remount Rd.	6:30AM - 9:00PM	60 minute	6:00AM - 9:30PM	30 minutes
101	Spruill Ave.	7:00AM - 8:00PM	30 minute	6:00AM - 9:30PM	30 minutes
102	North Neck	6:30AM - 8:00PM	60 minute	6:00AM - 9:30PM	20 minutes
103	Leeds Ave.	7:00AM - 7:30PM	60 minute	6:00AM - 9:30PM	30 minutes
104	Montague Ave. (with modifications)	6:00AM - 8:00PM	60 minute	6:00AM - 9:30PM	30 minutes
-	Proposed Deviated Fixed Route at Mall Drive	-	-	6:00AM - 9:30PM	15 minutes
-	Proposed Deviated Fixed Route at Clemson	-	-	6:00AM - 9:30PM	15 minutes
CARTA is reviewing existing Peninsula Routes which may impact service in the Neck Area					

Figure 6.5 Recommended Modifications to Operations Plan

CHANGES TO EXISTING NETWORK

Figure 6.5 and following subsections present the recommended modifications to operations plan for the CARTA fixed routes, along with the other proposed express and deviated fixed-route services.

ROUTE 1 – NORTH CHARLESTON EXPRESS

- Connection from Downtown to North Charleston during commute hours
- Stops only Downtown and Super K Stop
- Service provided via I-26

Figure 6.6 depicts potential Route 1, the North Charleston Express.

Figure 6.6 Route 1 - North Charleston Express

DORCHESTER ROAD EXPRESS

- Connection from Downtown to Charleston International Airport
- Stops only Downtown and Western Summerville
- Service provided via Dorchester Road

Figure 6.7 depicts potential Route 2, the Dorchester Road Express.

Figure 6.7 Route 2 - Dorchester Road Express

Figure 6.8 Route 10 & 102 - Rivers Avenue

ROUTE 10 & 102 - RIVERS AVENUE

Modified Route 10:

- Provide service every 20 minutes
  - Connection from Super Stop to Super K Stop park-and-ride
  - Service provided via: Rivers Avenue

Route 102:

- Provide service every 20 minutes
- Connection from Downtown to Super K Stop park-and-ride
- Service provided via: Rivers/Cosgrove Avenue SuperStop, Chicora Cherokee Neighborhood, Union Heights Neighborhood, Rosemont Neighborhood, Meeting and Mary Visitors Center

Figure 6.8 depicts potential Route 10 and 102, the Rivers Avenue route.

ROUTE 11 DORCHESTER / AIRPORT

- Provide service every 30 minutes
- Connection to Downtown, Rivers / Cosgrove Avenue SuperStop, Tanger Outlets / Wal-mart, and Charleston International Airport
- Service provided via: Dorchester Road and Meeting Street

Figure 6.9 depicts potential Route 11, the Dorchester/Airport route.

Figure 6.9 Route 11 - Dorchester / Airport

ROUTE 12 UPPER DORCHESTER

- Local Connector
  - Provide service every 30 minutes
  - Connection to Rivers / Cosgrove Avenue SuperStop, Dorchester Road / Ashley Phosphate Blvd., and Super K Stop park-and-ride
  - Service provided via: Dorchester Road, Ashley Phosphate and Rivers Avenue

Figure 6.10 depicts potential Route12, the Upper Dorchester route.

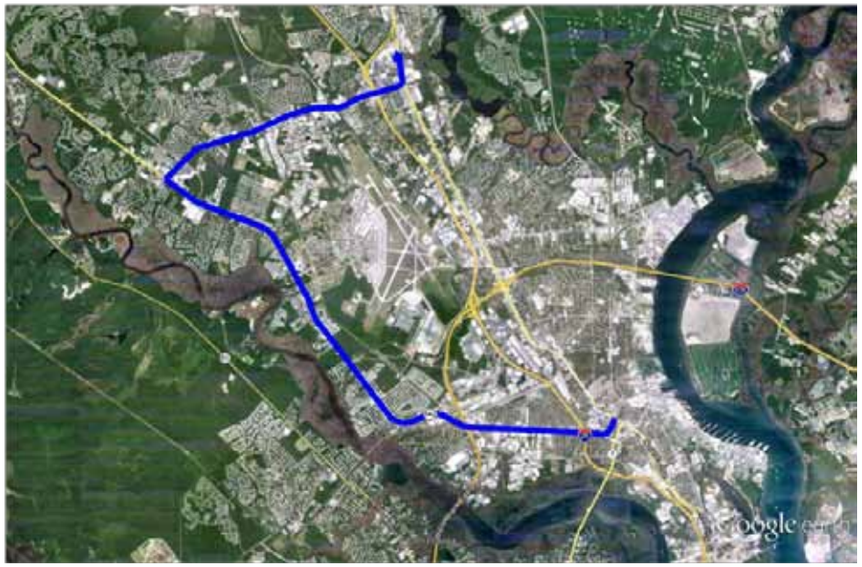


Figure 6.10 Route 12 - Upper Dorchester

ROUTE 13 REMOUNT ROAD

- Local Connector
  - Provide service every 30 minutes
  - Connection to Rivers / Cosgrove Avenue SuperStop, Remount Road and Yeamans Hall Road, and Port of Embarkation
  - Service provided via: Remount Road, Yeamans Hall Road, Rivers Avenue and Spruill Avenue

Figure 6.11 depicts potential Route 13, the Remount Road route.

Figure 6.11 Route 13 - Remount Road

ROUTE 101 SPRUILL AVENUE

- Discontinue Route 101
- This service area will be served by Route 109 and a future deviated fixed route circulator.

Figure 6.12 depicts potential Route 101, the Spruill Avenue route.

Figure 6.12 Route 101 - Spruill Avenue

ROUTE 103 LEEDS AVENUE

- Local Connector
  - Provide service every 30 minutes
  - Connection to Rivers/Cosgrove Avenue SuperStop, Lonnie Hamilton County Office Building, Cummins Plant

Figure 6.13 depicts potential Route 103, the Leeds Avenue route.

Figure 6.13 Route 103 - Leeds Avenue

ROUTE 104 MONTAGUE AVENUE

- Local Connector
  - Provide service every 30 minutes
  - Connection to North Charleston City Hall, Tanger Outlet / Wal-mart and community around Dorsey Avenue
  - Service provided via: Montague Avenue

Figure 6.14 depicts potential Route 104, the Montague Avenue route.

Figure 6.14 Route 104 - Montague Avenue

POTENTIAL MALL DRIVE DEVIATED FIXED ROUTE

- Deviated Fixed Route
  - Provide deviated service every 15 minutes
  - Connection to North Charleston City Hall, Tanger Outlet / Wal-mart, and Charleston International Airport
  - Service provided via: Mall Drive, new connection over I-26, and International Blvd.

Figure 6.15 depicts Potential Mall Drive Deviated Fixed Route.

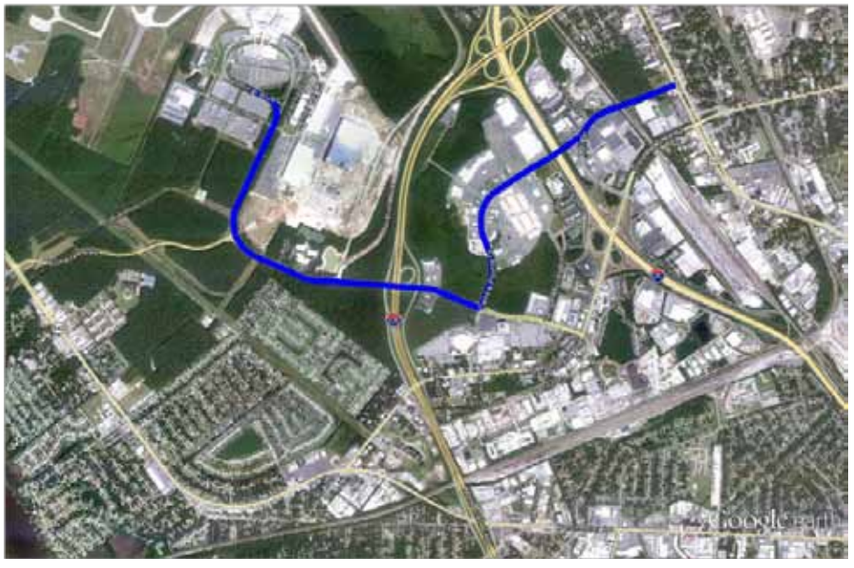


Figure 6.15 Potential Mall Drive Deviated Fixed Route

POTENTIAL CLEMSON DEVIATED FIXED ROUTE

- Deviated Fixed Route
  - Provide deviated service every 15 minutes
  - Connection to North Charleston City Hall, Tanger Outlet / Wal-mart, and Charleston International Airport
  - Service provided via: Mall Drive, new connection over I-26, and International Blvd.

Figure 6.16 depicts Potential Clemson Deviated Fixed Route.

Figure 6.16 Potential Clemson Deviated Fixed Route

BICYCLE AND PEDESTRIAN NETWORK

INTRODUCTION

Improving bicycle and pedestrian safety and accessibility is one of the critical elements of the Partnership for Prosperity Master Plan. As defined in previous chapters, the marginal environment for walking and bicycling throughout much of the Neck area represents a haphazard treatment of pedestrians and bicyclists and limits use of those active modes – as well as transit – for health, recreation and destination-oriented travel. As a complement to the development and revitalization of the mixed use catalyst areas and public transportation improvement strategy, the Master Plan defines a bicycle and pedestrian network (see **Figure 6.17**) that provides connectivity between residential areas and retail, civic or employment destinations, access to the water, parks and recreation amenities, and linkages to public transportation stations and corridors.

There are two central elements to the development of the Neck area bicycle and pedestrian plan:

1. Improve parallel street connectivity within the Neck Area

This plan looks at how to create opportunities for a redundant street network that can help organize the flow of trucks and auto traffic, protect neighborhoods from commercial vehicle noise and vibration impacts, and provide safe and convenient opportunities for pedestrians, bicyclists and transit users to reach their destinations. That is the essence of the development phasing plan for each catalyst area site. In some cases these connections and organization can help overcome barriers created by rail and highway facilities that separate people from their destinations. For instance, a new parallel street to Montague Avenue that links Mall Drive and North Charleston City Hall with Tanger Outlets and the Coliseum across I-26 is an example of that strategy. It should be designed to support the Gateway Entertainment District as a "Complete Street" that safely accommodates pedestrians, bicyclists, transit and autos. Similarly, enhancing north-south local street connectivity between Hobson Avenue, Noisette Boulevard and Virginia Avenue will help provide the network capacity to facilitate important changes along Spruill Avenue and Rivers Avenue to better accommodate travel alternatives.

2. Create a bicycle and pedestrian North-South Spine and a connected network

A well-marked, signed and highly visible corridor designed to improve bicycle and pedestrian connectivity between Charleston and North Charleston is a defining project for the Partnership for Prosperity Master Plan. It is actually a series of projects that, when developed through the cooperative planning of both cities, SCDOT and other entities will provide a signature facility promoting active recreation and non-motorized transportation throughout the study area. It can help redefine the perception and enhance the functionality of the Neck area for people of all ages and abilities. The North-South Spine would support bicyclists of varying skill levels and complete the network of sidewalks, on-road bikeways and shared-use paths to promote healthier neighborhoods and safer accessibility to commercial and employment destinations. As a complement to the North-South Spine network, the plan envisions a series of other connections into the Spine to better connect the entire study area. Both cities should work with SCDOT to advance "complete streets" principles for accommodating all modes of travel using feasible strategies within available rights-of-way.

Figure 6.18 presents the strategy for completing the North-South Spine network and developing a well-connected network for non-motorized transportation throughout the Neck study area. The map focuses on the Spruill Avenue corridor as a prime opportunity to transform this relatively lower speed and lower volume roadway into a well-defined street for all users. **Appendix D** includes a memo drafted for SCDOT's and the City of North Charleston's consideration to support an argument for restriping Spruill Avenue as a three-lane facility with buffered

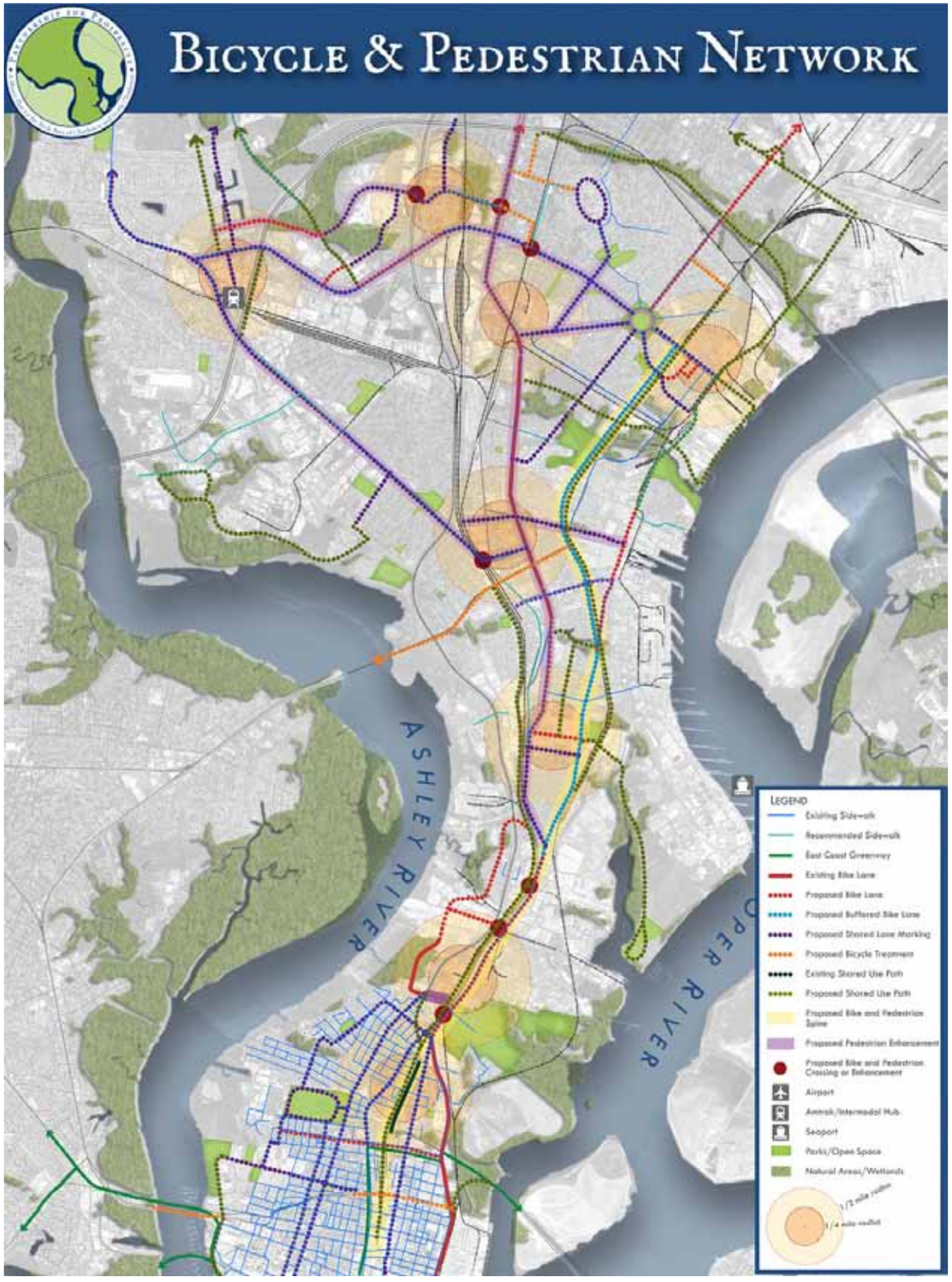


Figure 6.17 Bicycle & Pedestrian Network (See Appendix A pg. 217)

bicycle lanes and wider sidewalks. The memo makes the point that the characteristics of Spruill Avenue make it best suited to support destination-oriented multimodal travel between North Charleston and Charleston, and help create a safer roadway that provides access to many residential neighborhoods. *Note: Spruill Avenue was recently resurfaced and restriped with one lane going in each direction and bicycle lanes on both sides of the street.*

As indicated in the map, the North-South Spine route entails both on-road and off-road facility treatments. Spruill Avenue would provide much of the on-street portion of the Spine using either a standard bike lane as recently marked in North Charleston, or as indicated on the map, a buffered bike lane that further separates bicycles from moving traffic. The off-road portion of the network would consist of a conversion of the existing CSX rail line parallel to Spruill Avenue into a shared use path of at least 10' wide (14' is desirable). Where Spruill merges with King and Meeting Streets, the Spine network would become a combination of on-street bike lanes on Morison Drive and Meeting Street and off-road shared use path on King Street. Bicycle lanes on Rivers Avenue and Morrison Drive would feed into and support the Spine's connectivity to other parts of the Neck and peninsula. Shared lane markings on roads like Dorchester and Montague would maintain existing road capacity while providing support for those cyclists with the experience and comfort to ride with traffic.

Pedestrian access and safety is an equally important consideration. Most of the pedestrian-related strategies are defined in Chapter 5 as part of the discussion of phased development associated with each catalyst area. However, the map also indicates locations for new or enhanced pedestrian crossings to access the Spine network and overcome barriers between residential areas and non-residential destinations. The enhancements would generally consist of improved crosswalk markings and signals, wider sidewalks at intersections, and design strategies that help motorists see pedestrians more easily. Each specific modification will need to be determined on a case-by-case basis.

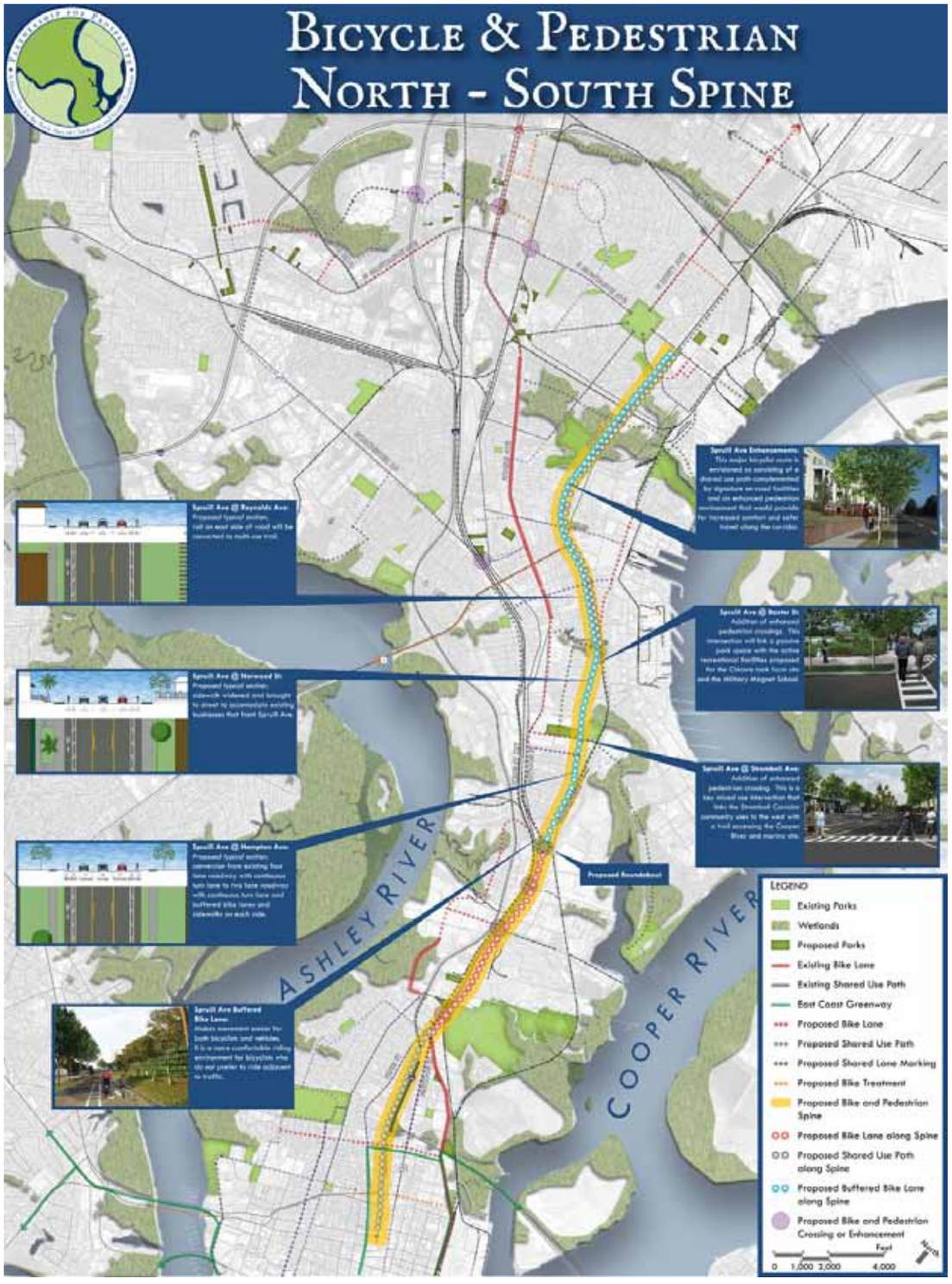


Figure 6.18 Bicycle & Pedestrian North-South Spine (See Appendix A pg. 218)

Developing the Network

The master plan for creating a bicycle network in the Neck are requires a balanced approach of both on-street and off-road riding that accommodates the needs and comfort levels of people of different ages and abilities, or level of experience. There are many different types of facility strategies and treatments that improve safety, convenience and comfort for bicycling. **Figures 6.19** and **6.20** illustrate using diagrams and pictures the different types of bicycling facility treatments that help promote a culture of bicycling. As indicated on the graphic, on-street treatments vary based on the posted speed of the roadway and its function.

When most people rely on bicycling for transportation (or consider it as an alternative to driving), they generally try to find routes where they can reach their destination most efficiently and comfortably. People living in the flat terrain of the greater Charleston area do not have to worry about avoiding hills; instead it is water bodies, the interstate and rail network, industrial lands and busy roadways with little accommodation for cyclists that deter convenient and accessible travel by bicycle. Bicyclists generally want a direct route that has minimal conflicts (with pedestrians, other bicyclists, glass and debris, etc.) and the ability to maintain a steady pace.

Off-road trails offer mobility, but they often lack access to destinations and feature hazards of their own, like dogs on long leashes or groups of slow-moving walkers. Not everyone is willing to take to the streets for bicycling, which are often busy with commuters, delivery trucks and distracted drivers, but they provide the most direct means of connecting neighborhoods, services and employment and the Master Plan has the objective of creating a stronger culture of bicycling in the Neck area. For that to happen it means developing an on-street network that is conducive for bicycling in addition to the shared use path network.

Creating a culture of on-street bicycle riding takes time and education, but perhaps its greatest value is that it does not have to take a lot of money. Well-designed bicycle networks provide economic value for the same reason highways and rail lines do - they improve access

Figure 6.19 Bicycle Facilities & Treatments

and mobility. When integrated into a comprehensive bicycle and pedestrian plan, the two elements of access and mobility have the greatest power of improving the culture of bicycling as transportation, and defining a positive brand identity for a region, community or neighborhood, generating economic returns in several ways. That is part of the strategy for the Neck area. By making the neighborhoods and streets more supportive of bicycling by providing both destinations and well-marked and designed facilities and treatments, the area will become more attractive and people who need transportation options will have them.

Different types of bicyclists clearly need different strategies to account for varying levels of experience and comfort. Destination-oriented cyclists benefit from a direct, well-defined routing plan that offers good flow and reduced conflicts. Most cities and urban areas like Charleston and North Charleston have the basics for such a network already in place using existing streets. Lower speed streets (collector roads and local streets, primarily, with posted speeds of 30 mph or lower) should function as shared streets that accommodate automobiles and bicycles within the travel lane.

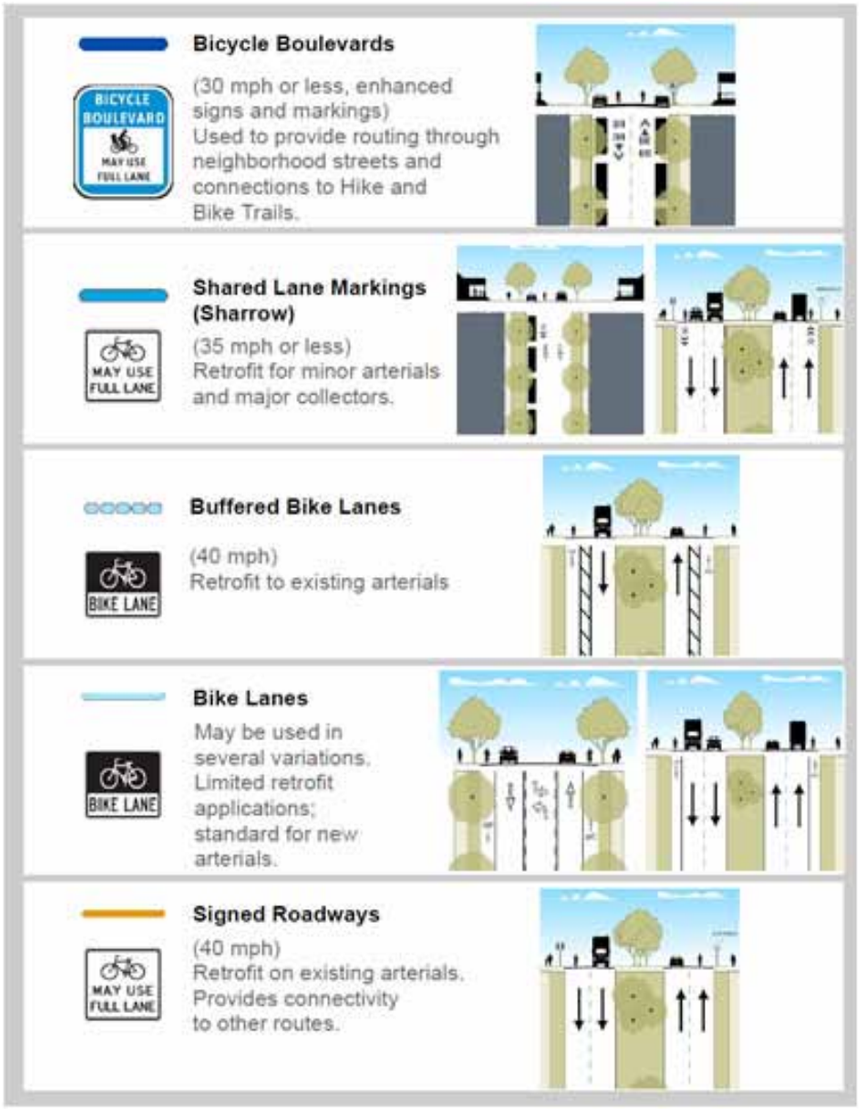


Figure 6.20 Bicycle Facilities by Roadway Speed

Shared Street Facilities

The most common approach of many agencies is to add bike lanes or other expensive retrofits for separated on-street facilities. Unfortunately, they are often poorly designed to reduce costs. Furthermore, narrowing roads to add bike lanes within the right-of-way can run afoul of official design standards and pose problems for commercial vehicles and even some motorists accustomed to traveling faster. Even when properly designed, that approach results in a patchwork of roads with bike lanes, such as the relatively short stretch of Rivers Avenue, and no real continuity of network. That puts cyclists in a quandary when the designated bike lane ends, forcing them to switch from bike lane to sidewalk or merge into the traffic lane, which can present safety problems.

Sharrows show cyclists where to ride and alert motorists of bicycle presence.

What is needed for the Neck area is a coordinated strategy creating a lower cost shared network to make cycling more accepted and inviting. By using streets that best exhibit a few key traits, a plan for shared streets serves motorists and bicyclists equitably, offering both mobility and accessibility. Using shared lane pavement markings ("sharrows") and clear signage does not require right-of-way, offering a more cost-effective and publicly-accepted way of building a network providing mobility and accessibility, generating greater demand. It can have the added benefit of slowing down motorized traffic in appropriate locations, such as through or adjacent to neighborhoods, and there is evidence that bicyclists spend more money shopping when averaged over the course of a month or year than auto drivers.

Six Key Considerations

Selecting the right streets to place bicycling on a more equitable level as cars can have profound effects on personal mobility and economic development. There are six considerations to creating a preferential on-road network offering shared space for bicycle- and car-drivers:

1. **Continuous Traffic Flow.** A network of well-spaced collector or minor arterial streets with few stop signs or signals that traverse the Neck area is good for motorists as well as bicyclists. It serves as the backbone of a good bicycling community. A smooth asphalt, non-brick, surface is important. Too many stops at signs or signals disrupts the flow and introduces safety issues for cyclists. These are the bikeways or bike boulevards that link different parts of a community together east to west, north to south.

2. **A Connected Network.** Cyclists don't mind riding ½ mile or so out of direction to traverse a network of streets offering good flow and fewer conflicts. Stitching this network of different types of streets with distinctive signage, pavement markings, banners and clear maps further reinforces the emphasis on primary routes where cyclists are invited and should be expected.

3. **Capacity Availability.** Very experienced cyclists will ride in heavy traffic, but it is intimidating for others. The Neck area has many 2- and 4-lane roads operating well below capacity much of the day, making it easy for motorists to safely pass cyclists controlling the lane.

4. **Acceptable Speed Differential.** As traffic speeds rise, the need for designated bike lanes or paths increases. Roads with operating speeds of 20 to 35 mph create a more comfortable environment for bicyclists averaging between 10-20 miles per hour without the need for physical separation. Shared lane markings and the presence of bicyclists using the full lane can help keep traffic at the desired target speed.

5. **Education.** Many motorists do not understand that sharing the road means one at a time, not riding side-by-side. Lane widths on most streets are too narrow for safe side-by-side sharing. Similarly, many cyclists do not follow the laws of the road. Using properly designed sharrows and adding signage helps to reinforce the message that bicyclists belong. Sharrows can also indicate where bicyclists should ride in the lane, which is particularly important so that bicyclists ride out of the "door zone" when there is on-street parking. This must be augmented by educational messages explaining the purpose of shared lane signage and markings, which may be unfamiliar to many motorists, and specific training for law enforcement, cyclists and motorists. BCDCOG and both cities should support efforts by non-profits, cycling clubs and other organizations to provide training for bicyclists and motorists.

The Neck area should take advantage of the available capacity for cyclists.

6. **Enforcement.** Laws vary state to state, but roads with travel lanes less than 14' wide are not suitable for side-by-side sharing. Police play an important role in educational and enforcement efforts so that both car drivers and bicycle drivers operate safely and with respect for each other. It is critical to get city and county law enforcement on board for an on-street cycling strategy in the Neck area and throughout the BCDCOG region.

Taking those steps to build an area-wide network one street at a time will prove effective at both attracting riders and creating economic vitality for a more mobile and accessible Neck area community.