

*City of Charleston*

DESIGN DIVISION

# REPORT 07

PEOPLE PEDAL PLAN &  
URBAN BIKEWAY DESIGN TOOLKIT



DECEMBER 2017

# PEOPLE PEDAL PLAN

In order to alleviate traffic congestion, 12% of all trips downtown should be made by bicycle - a big change from our current “mode share” of only 2.5%. This is a fundamental goal of the People Pedal Plan, calling for a robust network of urban bikeways on the Charleston peninsula.

Design Division and Charleston Moves conducted a thorough evaluation of bicycle movement into, out of, and within downtown in 2015. A 1300- participant survey, physical evaluation of street and intersections, and a review of internationally-recognized best practices have led to the creation of a route map, set of strategies, and design standards based on local context.

Recommendations are based on low-cost solutions, which may involve road signage, paint and intersection timing. Ideally, utilities and curbs would not need to be relocated for this plan to work, and all proposed designs would maintain or improve the flow of automobile traffic.

**Unlike other bike plans, this document uses various online supportive and supplemental elements to guide its ongoing coordination, relevance and implementation. Please visit the project website for more data, tools, project details, and other current information: [www.designdivision.org/peoplepedal](http://www.designdivision.org/peoplepedal)**

## PART 1: PLAN

- 04**  
Problem Statement
- 06**  
Collision Data & Other Reasoning
- 08**  
Planning Process & Survey Results
- 10**  
Equity, Enforcement, Education
- 12**  
Urban Bikeway System Maps
- 16**  
Strategies for Implementation
- 28**  
Urban Bikeway Design Examples

## PART 2: TOOLKIT

- 32**  
Introduction
- 33**  
Charleston Standards
- 38**  
Essential Design Data
- 40**  
Decision-Making Tools



## KEY POINTS

**Here is what you need to know about this plan:**

1

### BETTER FOR TRAFFIC

This plan benefits motorists. Urban bikeways allow for better traffic flow because cyclists have a place to be and are given physical cues to ride more predictably. Also, when motorists choose to ride a bike, their car is not on the road.

2

### PAINT, NOT CURB WORK

This bike plan does not require the movement of curbs. Only roads wide enough to support a bike lane or lanes have been considered for the bike plan. With the exception of a few intersections that will need a new signal light and a study to re-time the lights to optimize them to bike usage, the only real cost of this bike plan is paint.

3

### UNLOCK THE GRID

More people will choose to ride a bicycle if comfortable facilities are provided. Many streets on the Charleston peninsula are already safe to ride, but these are isolated by a system of streets that are very unsafe. Providing this system of urban bikeways will “unlock” the currently-isolated grids of safe streets and form a complete, comfortable network.

4

### SCDOT & NACTO

The plan is based on demonstrated projects and standards in the real world. Standards are proposed for the unique Charleston context. Many of these will challenge the South Carolina Department of Transportation (SCDOT) outdated and poorly-performing standards for bicycle infrastructure. When in doubt, the North American City Transportation Officials (NACTO) Urban Bikeway Design Guide should be consulted.

5

### DESIGN FORMULA

Each element of the plan will have to be designed in detail on an individual basis. Suggestions in this plan may change accordingly. The Bikeway Design Toolkit offers a formula to test each roadway and provide ideal treatments according to speed and traffic volume.

6

### STARTING POINT

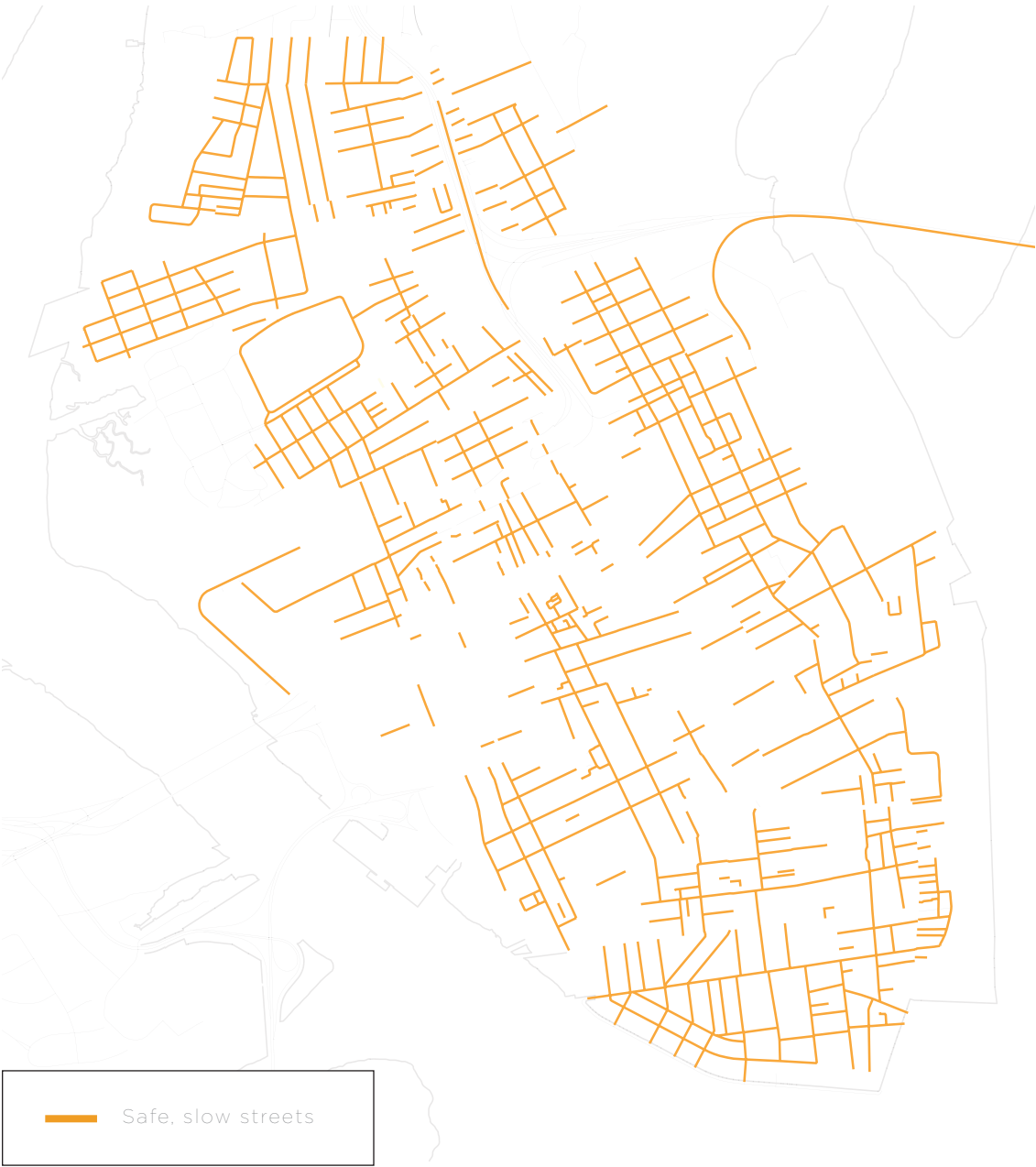
This is a bold vision for an urban bikeway system that begins on the peninsula. The plan is a booklet with a simple design approach, while a series of maps form a detailed diagram for further project coordination. Individual projects will be designed by the City and others to implement the plan.

# WHAT’S THE PROBLEM?

**Safe streets for cycling exist in downtown Charleston, but they don’t connect. Safe streets must be “unlocked,” that is connected to one another for a complete bicycling system.**

After surveying every street on the peninsula, City staff rated the streets for the overall safety and comfort level for cycling. The map below shows the streets that are easiest to cycle on.

The majority of streets in downtown Charleston are, in fact, safe for people on bicycles due to their slow vehicular speed and volume. However, as mapped below, the safe streets are fragmented by faster, more dangerous streets and intersections. This is the basic problem of bicycle movement: most streets are safe, but navigating across the city requires movement on or across faster, more dangerous streets.



## PART 1

### PEOPLE PEDAL PLAN

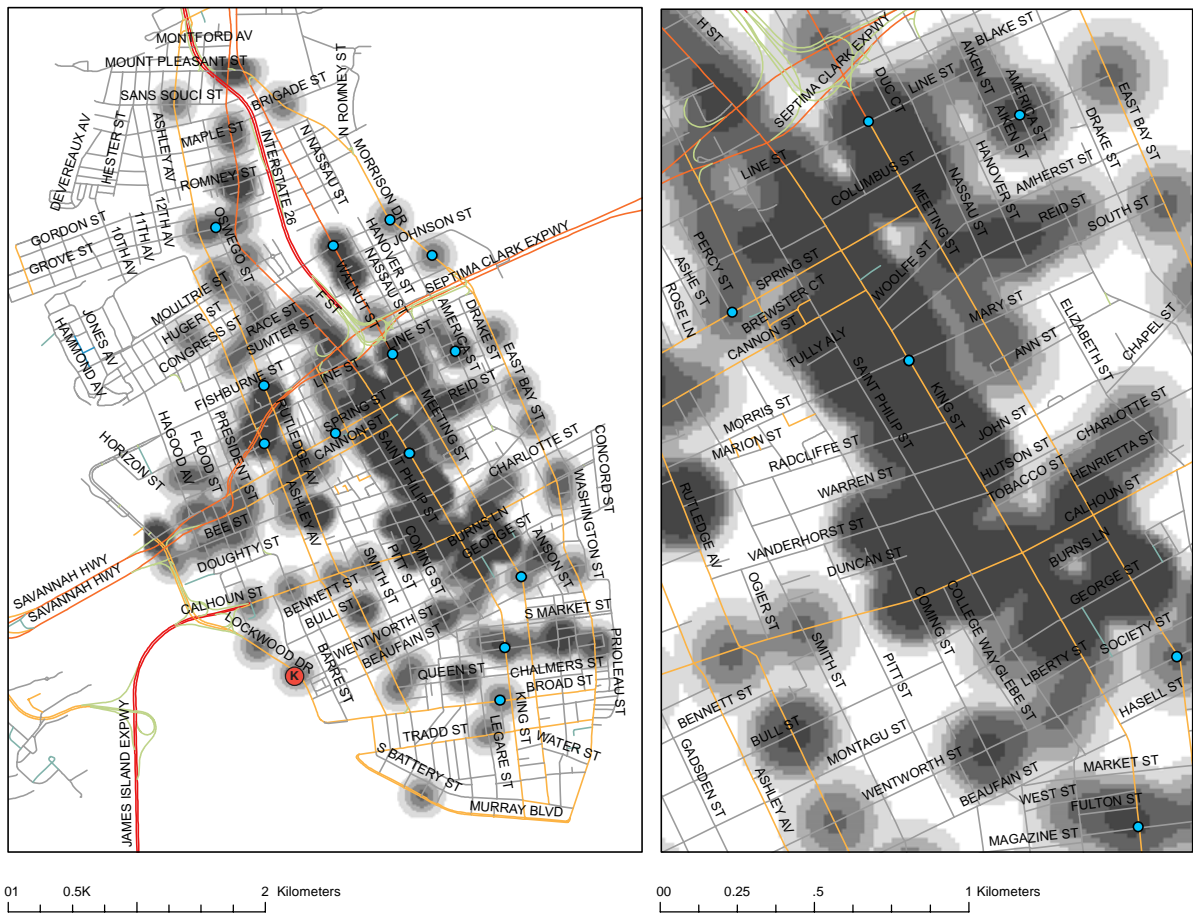
**This section is the core of the plan. It explains the current problem and provides analysis. The plan proposes a system of urban bikeways and includes a series of implementation strategies. Bikeway design examples are provided, which are but a small instance of the future design and coordination efforts needed to explore each bikeway segment and intersection.**



# A SURVEY OF COLLISIONS

## BICYCLE COLLISIONS IN DOWNTOWN CHARLESTON: 2009-2015

Compiled by the City of Charleston based on data from the South Carolina Department of Public Safety, the maps below display the type and concentration of automobile/bicycle collisions from 2009-2015. High concentrations are found wherever unsafe automobile routes correlate with the high presence of people on bikes. Locations especially affected include the King/St. Philip corridor, Calhoun Street, Ashley/Rutledge and Meeting Street. There is also a notable presence of recorded collisions surrounding the Crosstown, College of Charleston and MUSC campuses.



### INJURY SEVERITY

**K** FATAL **●** INCAPACITATING

Data from police reports of traffic incidents by the South Carolina Department of Public Safety.

### CRASH CONCENTRATION

VERY LOW LOW MEDIUM HIGH VERY HIGH

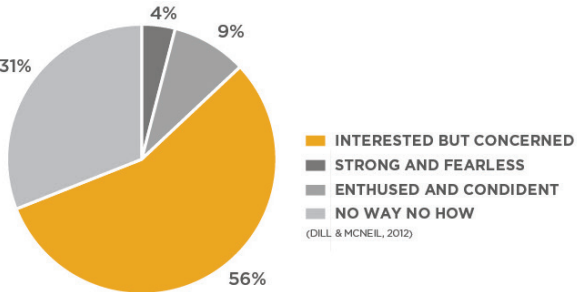
# ADDING TRANSPORTATION OPTIONS



## MAKING CYCLING SAFER

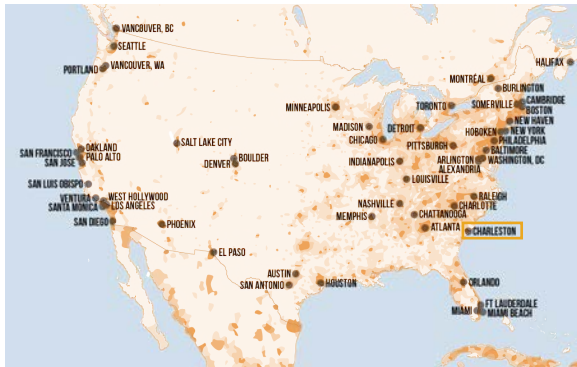
National surveys confirm that a majority of people would ride bicycles more often if roadways were safer. This study outlines steps to increase safety in downtown Charleston. It's like the old saying, "if you build it, they will come."

**As infrastructure is provided, some drivers will be willing to shift to cycling, helping to ease traffic congestion and reduce travel lanes often slowed by cyclists.**



## WORDS INTO ACTION

The City of Charleston adopted a complete streets resolution in 2008 geared toward creating a network of streets that allows all modes of transportation including bicycle, pedestrian and public transit and automobile. We became a NACTO member city in 2015. This past year, a regional bike and pedestrian plan was completed, called "Walk Bike BCD."



## BIKE SHARE SYSTEMS

The Charleston bike share system, HolySpokes!, launched in May 2017 with 250 bicycles and continues to add stop locations. These systems will result in more bicycles. In its first five months of operation, the system has logged over 30,000 miles ridden, a number which exceeds planners' expectations. Because of a partnership between the City and bikeshare operators, data generated by the bicycles will help in future route planning.





# PLANNING PROCESS

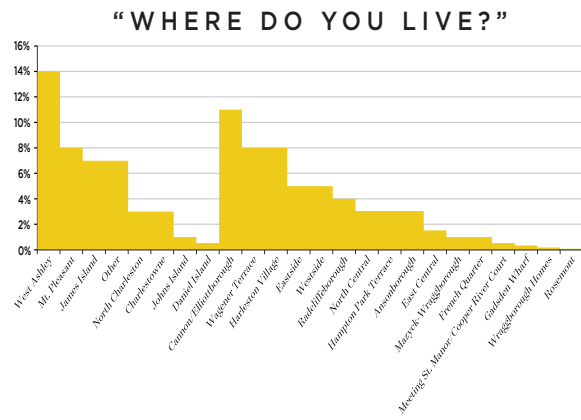
By understanding our research, it is concluded that a bike safe peninsula which is balanced with the needs of cars and pedestrian circulation, is most important to enhance the safety of downtown Charleston. First, every street and intersection should be made safer for pedestrians and cyclists alike. This is important because our surveys show that most every street is used on the peninsula by a bike. Second, key routes need infrastructure in order to be safe. And lastly, street behavior needs to be changed. All three of

these conclusions can be implemented by creating an education program to increase awareness among all modes of transport, and changing and creating new initiatives to build bike safe streets in conjunction with county and state.

**Our main goal: to create an interconnected set of safe routes for people on bikes without compromising car movement or relocating curbs or utilities.**

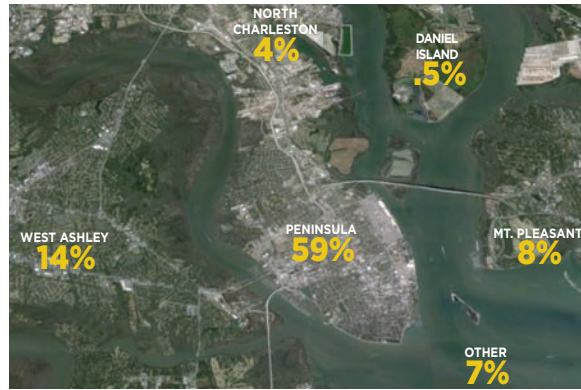
## STEP 1: USER SURVEYS

Using a comprehensive online survey, we determined the most-used routes by cyclists. Second, staff surveyed the safety of every street downtown by measuring their vehicular speed, volume, behavior and other factors, such as road surface and unpredictably. This established cyclists’ route preferences and each street’s relative safety.



## STEP 2: ROUTE ANALYSIS & PHASING ANALYSIS

By comparing preferred cycling routes with each street’s relative safety, we determined which streets and intersections needed intervention to improve safety. Following that, we analyzed each route’s ability to be implemented based on phasing criteria: likelihood of soonest resurfacing, usage by Holy Spokes bike share, and City maintenance.



## STEP 3: DESIGN PROPOSALS

Finally, each street that was recommended for analysis was then designed using methodology based upon the best practices and methods for urban areas. This prescribed a range of interventions, from calming, to bike lanes, to protected cycle tracks.

**Detailed route design and phasing will be accomplished over time.**



# SURVEY PROCESS AND FINDINGS

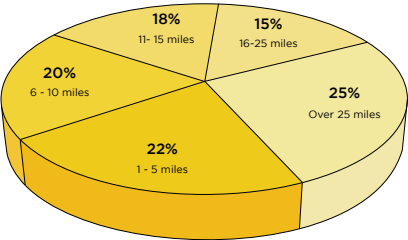
Before any planning, information was gathered from Charleston and its surrounding area’s residents. An online survey was created for bikers of all capacities to use. The survey was based upon methods used by Cambridge, Massachusetts, to gather data for a bike plan that was created and implemented in the city with great success.

Survey participants answered introductory questions and were then asked to draw their most used routes on a map of the Charleston region.



## HOW MANY MILES PER WEEK DO YOU RIDE?

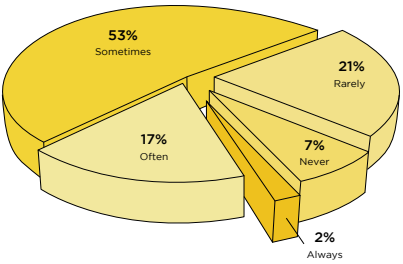
The survey was successful in gathering data from bicyclists of all riding habits. Whether an avid cyclist (over 25 miles per week) or casual bicyclist, people of all skill levels responded to the survey.



**This was the first comprehensive survey of cycling patterns in Charleston.**

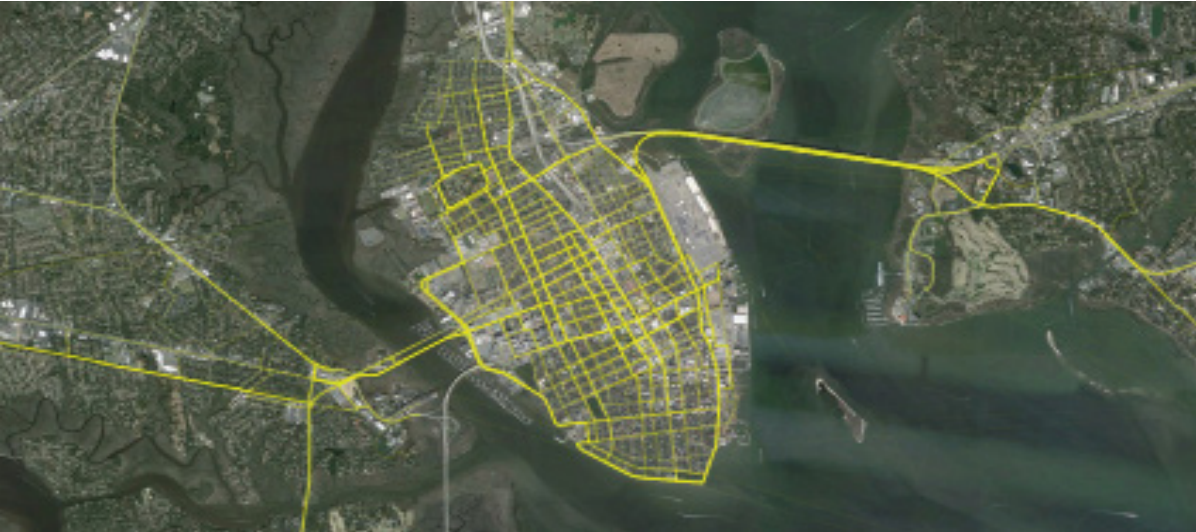
## DO YOU FEEL SAFE WHEN YOU RIDE?

Only 2 % of those surveyed always felt safe every time they ride in Charleston. As understanding of the bike culture in Charleston grew, it became apparent that many city streets present no danger to bike riders, but the need to cross or ride on a few key streets makes the whole biking experience feel less than safe.



## SURVEY FINDINGS

The follow routes are most used by cyclists: bridge connections, the peninsula’s perimeter, the north/south routes of King/St. Philip/Coming and Ashley/Rutledge, and the east/west routes of Huger, Bee, Calhoun and George. This survey forms the basis for design recommendations.



# BEYOND INFRASTRUCTURE: THE 3 E’S

Charleston has some learning to do. Observed driver and cyclist behavior is very poor. Cyclists often fail to behave in a manner that’s predictable and safe to motorists, which often makes them angry. Many cyclists ride on sidewalks and against the flow of traffic. Drivers speed, text, and harass cyclists. Many drivers believe cyclists belong on the sidewalk, but this is not correct. **Bicycles are vehicles that belong in the roadway; they do not belong on the sidewalk.\***

In order to have a safe and efficient urban bikeway system, efforts must be made to properly enforce traffic laws, educate the public on how to behave in the roadway, and ensure that such measures are conducted fairly among all people living in and visiting our city. Here are some important recommendations.

## EQUITY

A critical part of the People Pedal Plan is a complete system; one that offers safe travel opportunities throughout the city. People who travel by bicycles come from all walks of life, and deserve the same courtesy and respect on the road as all other legal road vehicles.

- 1

**Enforce Laws in all Places**  
Work with local law enforcement to ensure efforts are being made to equitably educate and enforce according to geography.
- 2

**Target Education Efforts in Under Served Areas**  
Make special efforts to reach out and educate people in under served communities.
- 3

**Provide Infrastructure and Lights in Under served Areas**  
Infrastructure will be prioritized in under served areas. A program to provide lights and reflectors to cyclists in these areas should be created (and enhance any that currently exist).

## ENFORCEMENT

Law enforcement will be critical to enacting a behavioral change in bicyclists and motorists. Enforcement should be approached gently in the beginning with warning tickets and gradually transition to stricter policies.

- 1

**Create a Custom Warning Ticket Program**  
Everyone has a lot to learn. Issuing warning tickets is often a wake-up call to those breaking the law.
- 2

**Issue Citations**  
Bicycle and motorist laws should be enforced in a manner that corrects bad behavior (not punishes cyclists).
- 3

**Provide Additional Training for Law Enforcement Officers**  
Set up a mandatory training program for local law enforcement to ensure understanding, strategy, the importance of a safe bikeway system, and how new infrastructure should work.

## EDUCATION

Education will be the largest and most comprehensive approach of the three E’s. In many cases, bicyclists and motorists alike are limited in their skills and knowledge on how to use the existing road network safely.

- 1

**Rethink the “Ride Right” Program**  
The program is not reaching roadway users. The phrase “ride right” emphasis cyclists are the only problem and are in the way.
- 2



**Use Demonstration & Pilot Projects**  
Set up temporary and interim demonstrations of infrastructure improvements on the street so users can experience them firsthand.
- 3

**Partnerships and Marketing Campaign**  
The City’s Traffic & Transportation Department and the Planning Department will partner with advocates, businesses and institutions to launch a creative educational marketing campaign.

\* Cyclists are permitted on sidewalks when travel speeds are high or children are present.

# RULES OF THE ROAD

These basic ways of behaving while traveling will improve safety, comfort and traffic flow for all modes of transportation. Laws must be obeyed and enforced, but they must also be learned. An equitable education and enforcement campaign should begin with these simple ideas. Please refer to South Carolina Bicycle Laws- Article 27, Bicyclists and Users of play vehicles; Rights and Duties for complete section information.

MODE If you...	LAW Here’s what you MUST to do:	COURTESY Here’s what you SHOULD to do:
	<b>SLOW DOWN</b> Posted speed limits on the peninsula, especially in the historic district, are lower than you think.  <b>YIELD &amp; BACK OFF</b> <b>Section 56-5-3435</b> Bicycles do not belong on sidewalks; they belong on the street with you. You must maintain a safe operating distance.  <b>DON’T HONK OR YELL</b> <b>Section 56-5-3445</b> It is unlawful to harass, taunt, or maliciously throw an object at or in the direction of any person riding a bicycle.	<b>WAIT TO PASS</b> Why make an unsafe passing movement only to arrive at a traffic signal seconds later? This often complicates traffic flow.  <b>THIS IS DOWNTOWN</b> You need to understand that streets in a dense, historic urban environment will be full of people walking, cycling, and experiencing this place without cars.  <b>PARK WITH CAUTION</b> The “door zone” can be a dangerous area for cyclists riding next to parked cars. Use caution when opening doors and when entering/exiting street parking.
		<b>ACT LIKE A CAR</b> Your bicycle is a vehicle! You must stop at stop signs, wait for traffic lights to turn green and ride on the right side of the road in the direction of traffic.  <b>STAY OFF SIDEWALKS</b> <b>Section 56-5-3430</b> Don’t ride all over the place! Stay with traffic. Use hand signals to indicate your plan to turn. Drivers get angry when you act like you don’t care.  <b>USE LIGHTS</b> <b>Section 56-5-3470</b> At night, bicycles must be equipped with a lamp on the front which must emit a white light and a red reflector on back.
		<b>AVOID BUSY STREETS</b> Find a side street or designated bicycle rote to use instead, especially during rush hour.  <b>BE PREDICTABLE</b> Don’t ride all over the place! Stay with traffic. Use hand signals to indicate your plan to turn (state law 56-5-3480). Don’t make drivers angry.  <b>DON’T GET IN FRONT*</b> When approaching an intersection, consider waiting in the back of a group of stopped cars. They will go faster than you and will try to pass anyway.

\* Bike boxes allow cyclists to be seen at the intersection stop bar, but they are not always present.



# URBAN BIKEWAY SYSTEM

This plan proposes a complete system of urban bikeways for the Charleston peninsula. The map shows this network and its primary points of connection to surrounding parts of the city. It will be designed and implemented over time, segment by segment, intersection by intersection. This network is based on the survey data collected and the unique physical conditions on the ground. **These are general categories of improvement; each segment will be uniquely designed as needed.**



## TRAFFIC CALMING

Segments in the existing street network that need minor improvements to increase safety for non-motorized users. This may include: speed humps, curb extensions, diverters, and other tools to slow down traffic.



## SIGNAGE & SHARROWS

This involves the use of shared-lane arrow pavement markings and appropriate roadway signage. This indicates the presence of bicycle traffic to motorists and reminds them that bicycles are vehicles.



## GREENWAYS & SIDE PATHS

Shared-use pathways, or greenways, are at least 10 feet wide, off-street facilities that offer protected bicycle travel. These are often located on bridges and/or accompany linear parks.



## BIKE BOULEVARD

This goes beyond sharrows and signage to introduce advanced techniques that increase safety for all users on dense urban streets with heavy bicycle and pedestrian use. Creative treatments are strongly encouraged.



## BIKE LANE

Designated and delineated lanes in the travel way. These can be protected, contra-flow or placed on the left side. (At intersections, a bike box and skip lines though the intersection are often good ideas.)



## SEPARATED CYCLE TRACKS

This is a wide, often 2-way bike paths placed within urban streets. These are painted or more often protected from adjacent automobile traffic with a sufficient buffer (especially vertical).

**Note:** This is a living document.

The final design treatment of routes and intersections shown in this map are subject to change through the bikeway design process, especially as each one is run through the systems solution system (page 42).

# ROUTES BY TYPE



The Urban Bikeway System Map is available as a poster on the Design Division website: [www.designdivision.org/peoplepedalmap](http://www.designdivision.org/peoplepedalmap)



# URBAN BIKEWAY SYSTEM

Well-functioning and complete, multimodal intersections are critical elements of an urban transportation system, especially one with a complete network of urban bikeways. Many intersections on the peninsula include turn lanes and leave little space for other modes. Signal timing, crosswalks, curb extensions, and painted guidance are all essential considerations to keep traffic moving smoothly. **These are general categories of improvement; each intersection will be uniquely designed as needed.**



## SIMPLE CONNECTION

These intersections include crosswalks and pedestrian signals, but also accommodate and safely mix turning movements of bikes and cars.



## BIKE BOXES

A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.



## CYCLETRACK APPROACHES

Special treatment associated with the safe entry, exit, and mixing along two-way protected bikeways.



## BIKE CROSSING, GUIDANCE AND/OR MEDIAN REFUGES

Advanced intersection treatments may involve installing signals and phasing for cyclists and/or giving them a dedicated crosswalk at busy intersections. Additional bikeway markings approaching and through intersections may involve painted skip lines, continuation of sharrow through an intersection, or two-stage turn que boxes. Median refuge islands are protected spaces placed in the center of the street to facilitate bicycle and pedestrian crossings.



## OTHER SOLUTIONS

Other solutions for intersections may be applied as needed. For example, a traffic diverter along a bicycle boulevard can be used to give cyclists a comfortable route.

**Note:** Solutions may be mixed and are subject to change.

Intersections are very complex. Some of the proposed solutions will be modified and/or combined as needed to safely accommodate cyclists and pedestrians, being careful not to overly limit the level of service for automobiles.

# INTERSECTION TREATMENTS





# EXISTING & PLANNED BIKEWAYS

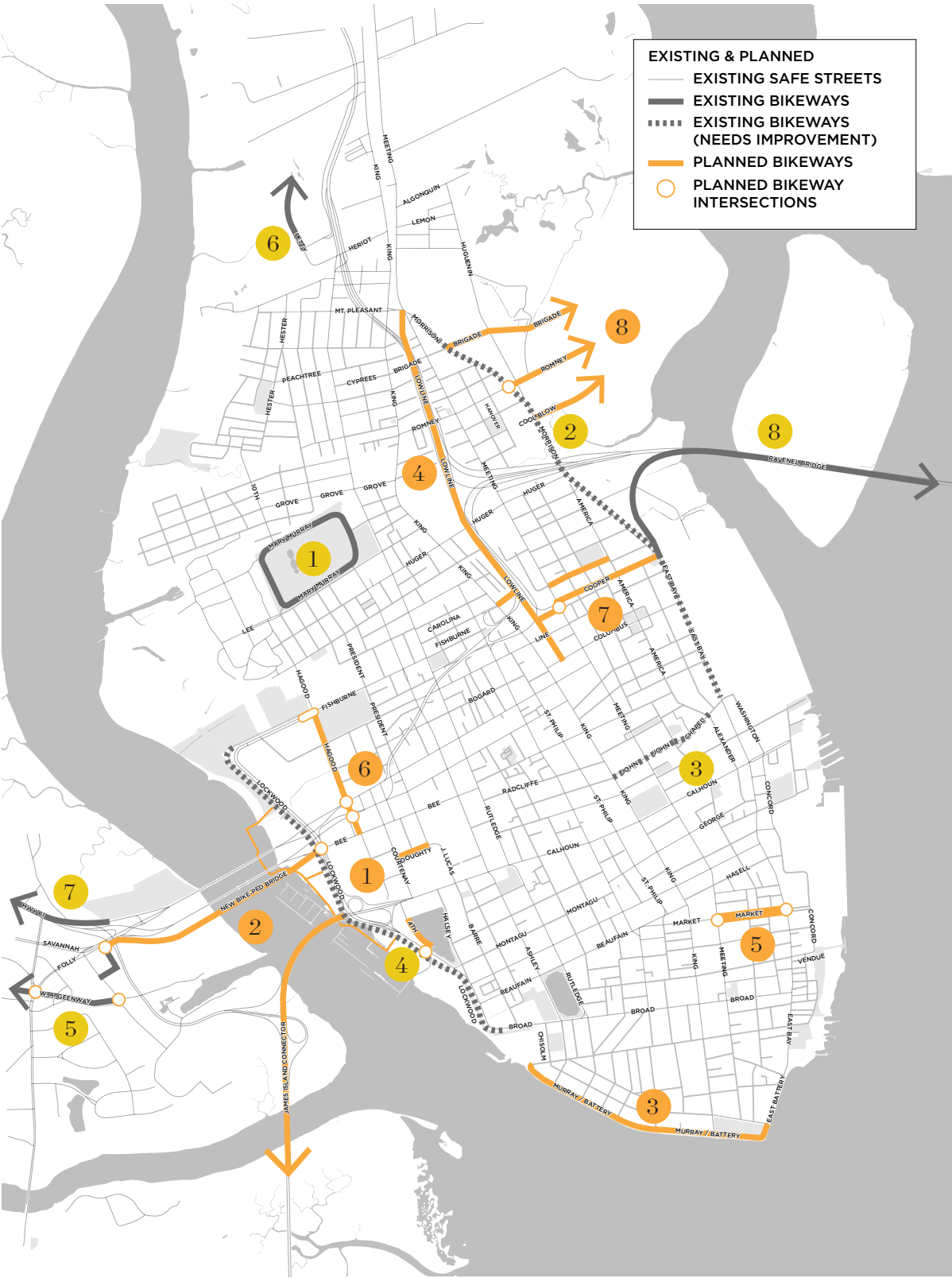
Phase I includes improvements that are already built, under construction, or in planning phases. This phase adds planned bikeway projects (or those projects where bicycle infrastructure is not the primary purpose, but would nevertheless provide a segment useful to the network).

## EXISTING ASSETS

#	SEGMENT NAME	DESCRIPTION
1	Hampton Park Circle	One lane of a two-lane road circumscribing a large park was re-striped as a bike lane and hatched area used for pedestrians. It is sometimes closed to automobiles.
2	Morrison Drive Bike Lane / East Bay Path	A bike lane exists on this street, but is intermittent and not protected from high speed traffic; the bike lane drops abruptly in difficult places and intersection design promotes poor mixing with automobiles.
3	John Street / Chapel Street	Bicycle signage and markings exist. Narrow lanes were placed along the car door zone, causing sharrows to be needed. They are not ideally placed.
4	Lockwood Drive Pathway	An existing multi-use path runs the length of Lockwood drive. Key enhancements to accommodate cyclists can increase safety.
5	West Ashley Greenway	Linear park runs east-west along Charleston's biggest suburb. This path is a major piece of infrastructure for business and residents in West Ashley.
6	Magnolia Bridge	Bicycle facilities exist on the access bridge to the future Magnolia Development.
7	Saint Andrews	Saint Andrews Highway has a bike lane similar to Morrison Drive (above).
8	Wonder's Way	12-foot wide bicycle-pedestrian path on the south side of the Arthur Ravenel, Jr. Bridge connecting Charleston to Mount Pleasant.

## PLANNED IMPROVEMENTS

1	Boardwalk & Fourth Street	A bikeable boardwalk will connect Brittlebank Park to the marinas and southern Lockwood Drive. Fourth Street will allow access to the Medical District.
2	Ashley River Crossing	The City of Charleston continues to explore feasible options for connecting West Ashley with Downtown and improving the relevant intersections.
3	Low Battery	Rename to Murray Boulevard. Safety enhancements should be made for cyclists and pedestrians.
4	Lowcountry Lowline	This linear park and transportation corridor will connect the Upper Peninsula.
5	Market Street	Bike lanes on both the North and South side. This is one of Charleston's most visited locations.
6	Hagood Drive	The connection of Hagood will provide safe movement across the Septima Clark Parkway.
7	Grace Bridge Area	As the neighborhoods are reconnected at this area, enhancements should be made for bicycle and pedestrian safety.
8	Laurel Island Connections	Laurel Island is ripe for large-scale redevelopment. Creating multimodal connections to the site is critical for the Upper Peninsula.



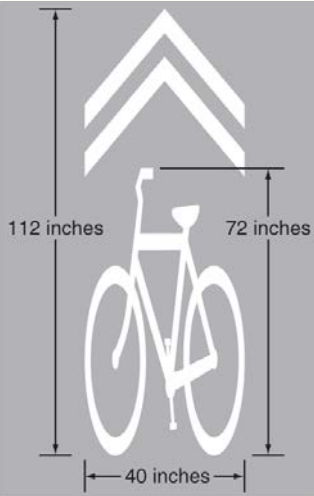
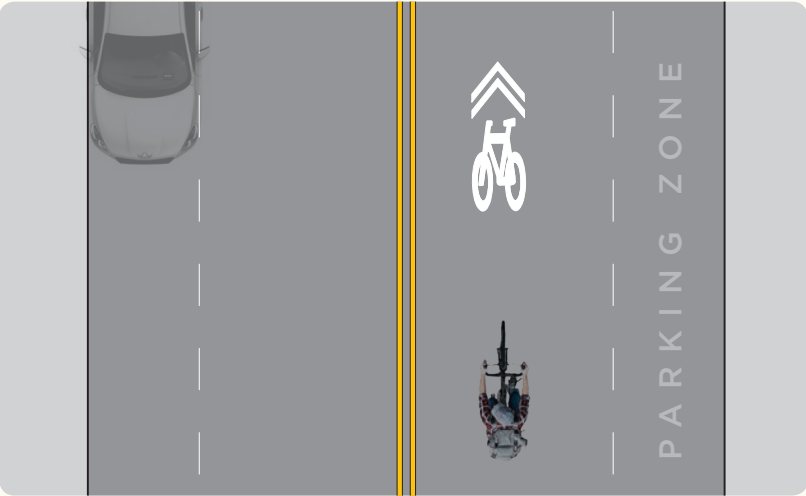
# STRATEGY 1 SHARROWS

A sharrow, also known as a Shared Lane Marking, is the bike-and-chevrons symbol illustrated in MUTCD figure 9C-9 (shown below). This marking is placed in a travel lane and indicates the preferred cycling location to cyclists and motorists. Sharrows will be placed in the center of the lane, include directional arrows where needed, and be accompanied by appropriate signage.

This phase takes advantage of two key opportunities: 1) the ability to more easily improve streets that are maintained by the City of Charleston (as opposed to the South Carolina Department of Transportation), and 2) the use of a sharrow marking to meet both interim and long term needs. The City will apply for an encroachment permit to allow sharrows on streets maintained by SCDOT.

## PLANNED IMPROVEMENT AREAS

1	Upper Peninsula	10th, Hester, and Grove Streets. These are mostly neighborhood-scale streets and could benefit greatly from sharrow placement.
2	Huger Street	An interim solution for Huger Street between Morrison Drive and Meeting Street will allow for safer east-west movement until future improvements.
3	Carolina / Fishbourne	These streets will become Bicycle Boulevards; a sharrow is simply a start to this. Fishbourne will use sharrows even as it becomes Lockwood Blvd.
4	Line Street & Cooper Street	A contraflow bike lane along the north edge of these two City-maintained streets. This would be coupled with sharrows in the remaining single, one-way travel lane.
5	Bee Street Corridor	Sharrows will connect the Medical Distirct to College of Charleston and key north-south bikeways until more advanced infrastructure can be added. Existing sharrows on John Street will be updated.
6	Interim North-South Bikeways	Sharrows will provide an interim solution for the following north-south routes: King Street, Saint Phillip Street and America Street.
7	Harleston Village Network	Cyclists should be given priority here. Several streets can be made safer by using sharrows and signage to complement recent traffic calming efforts.
8	Waterfront Loop	Sharrows are the preferred bicycle treatment for Low Battery. This will connect East Battery, East Bay, and Concord Street up towards the Aquarium.



Detailed sharrow placement guidance can be found on the Design Division website:

[www.designdivision.org/peoplepedal/](http://www.designdivision.org/peoplepedal/)





# STRATEGY 2 STREETS RESURFACING

A condition-based ranking system by Charleston County was used to identify streets in need of resurfacing. The ranking system uses an Overall Condition Index (OCI) to evaluate individual street segments between intersections. By identifying collections of segments that are likely to be resurfaced in the near term, or those having a low OCI score, the City and County will be able to work together to paint newly-resurfaced roadways to create designated urban bikeways.

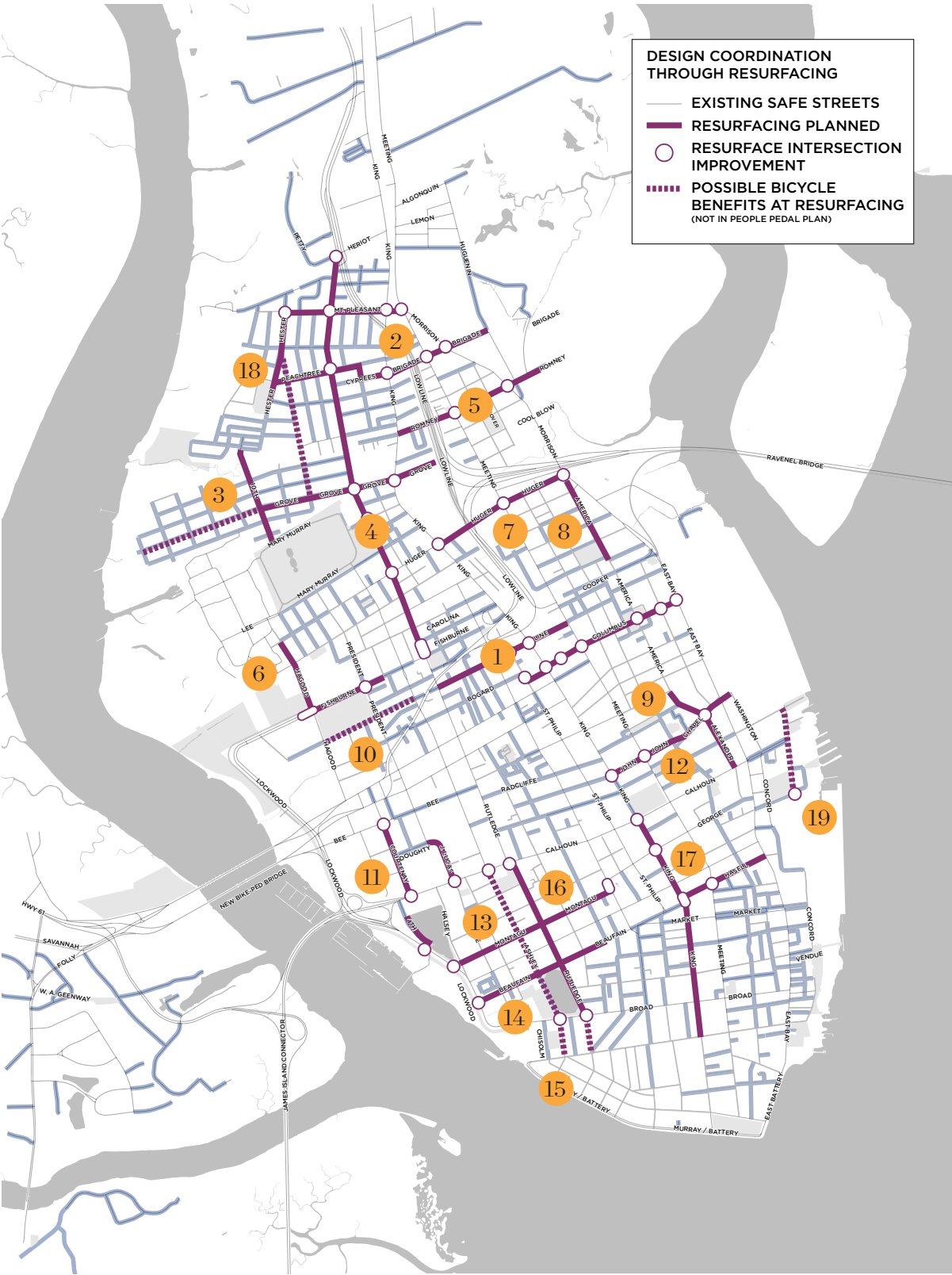
While this will save time and money in the implementation process, our more advanced urban bikeway concepts will have to be negotiated one-by-one with SCDOT design standards being challenged along the way. In other words, the painting plan associated with each street resurfacing must be developed in collaboration with Charleston County and the SCDOT.

## STREET RESURFACE COORDINATION OPPORTUNITIES

		CONTROL	DESIRED ROUTE TYPE	OCI
1	Line Street	City	Hybrid: Contraflow Bike Lane with Sharrow	50.02
2	Cypress / Brigade	Varies	Signage & Sharrows	24.84
3	10th & Grove	City	Signage & Sharrows; Traffic Calming	45.44
4	Upper Rutledge	State (Hwy)	Cycletrack	51.99
5	Romney Street	State	Cycletrack	22.20
6	Hagood North	State	Traffic Calming	58.71
7	Huger Street	Varies	Signage & Sharrows; Bike Lanes	70.16
8	America Street (A)	Varies	Greenway / Side Path; Bike Boulevard	56.63
9	America Street (B)	State	Bike Boulevard; Bike Lanes	57.73
10	Line Street Westside	City	TBD	32.76
11	Medical Dist. Segments	Varies	Various	54.82
12	John Street	City	Signage & Sharrows (Correction)	59.56
13	Montagu Street	State	Signage & Sharrows	70.68
14	Beaufain Street	State	Signage & Sharrows	51.27
15	Ashley Ave. South	Varies	Signage & Sharrows	52.62
16	Rutledge Ave. South	Varies	Signage & Sharrows	49.14
17	King Street South	State	Traffic Calming	56.15
18	Hasell Street	City	Signage & Sharrows	50.52
19	Concord North	State	Signage & Sharrows	55.17

**Note:** Some streets are designated for sharrows (previous page).

In many cases, streets ready for resurfacing are the same as those where sharrows are desired. The City and County will work together on initial placement or replacement of sharrows.



# STRATEGY 3 MISSING LINKS

This approach involves filling in the missing pieces to be sure that all initial individual projects begin to fit together as a unified bikeway system. These are sometimes small in size, but they can be critical pieces of the larger puzzle and without them the overall bikeway system could fail. These special links are not addressed by the sharrows strategy or the coordination with street resurfacing, therefore they merit their own map and discussion.

## PLANNED IMPROVEMENT AREAS

1	Upper Peninsula	Bike lanes along Romeny Street will connect with the Cool Blow Bridge, creating a safe and clear route for cyclists. Bike lanes will be added on King North.
2	Huger Street	West Huger Street traffic calming measures will complete this East-West route across the peninsula.
3	Hagood Avenue / President Street	Theses streets will incorporate traffic calming and president Street will operate as a bicycle boulevard in this area.
4	George Street	George Street is a highly biked street. A greenway through the College of Charleston Campus and intersection improvements will complete this East-West route.
5	Bee Street Corridor	Intersections along this corridor will be signalized. The removal of a few on street parking spaces will provide ample space for safe bike boxes and refuge areas when crossing busy streets.
6	St. Philip Street	This street will be a bicycle boulevard, and will provide cyclists a safe and direct route through the center of the peninsula.
7	Lockwood Drive / Broad Street	This link is key to completing the contiguous route between the Lockwood Drive path and Broad Street.
8	Concord Street	This planned extension of Concord Street will feature bike lanes and complete the connection to the Calhoun Street cycletrack.



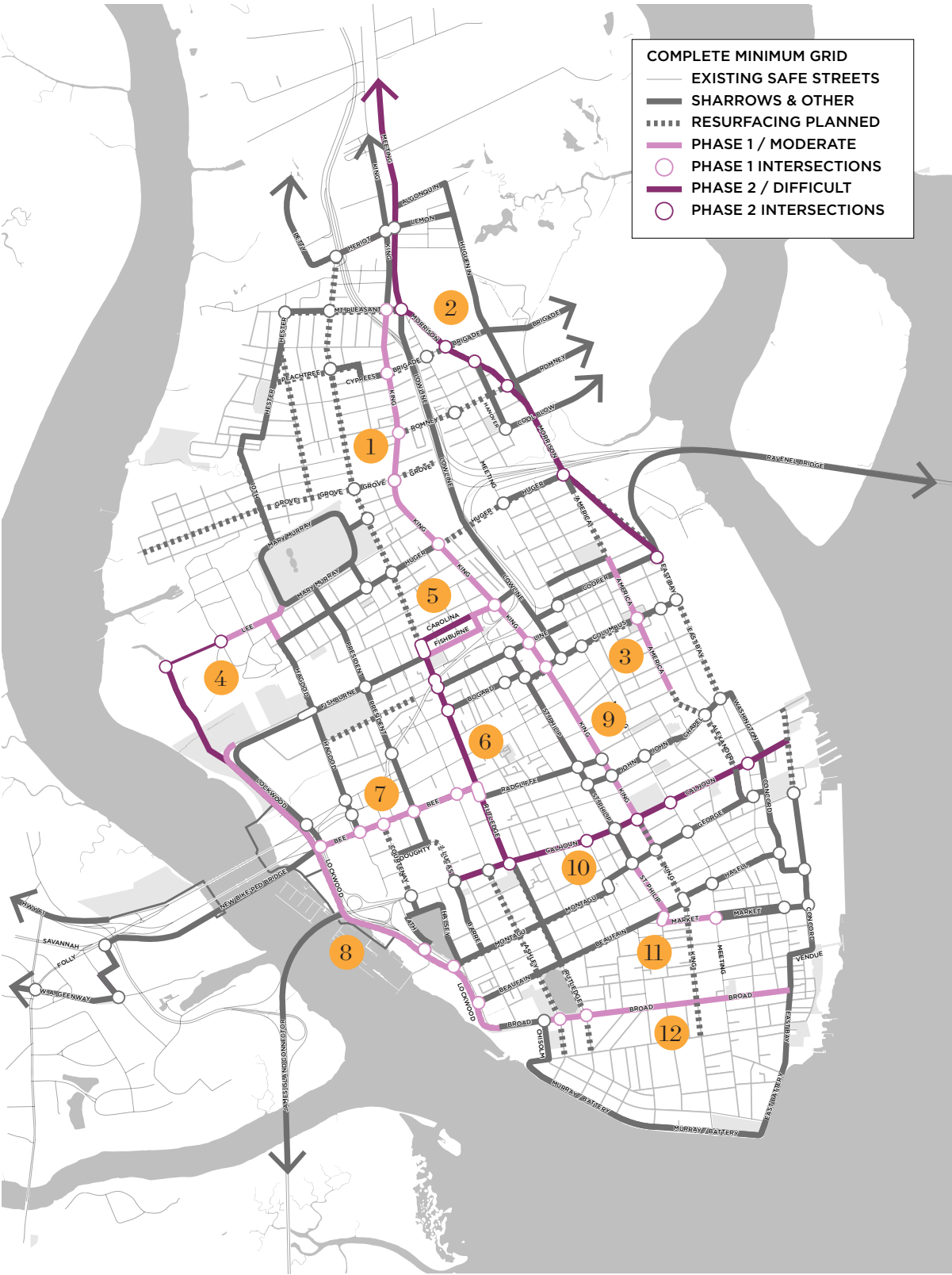


# STRATEGY 4 COMPLETE MINIMUM GRID

This group of projects might be considered the most conventional in terms of streetscape design and planning. These are relatively major investments that involve study of an entire urban corridor or small street grid. These projects are also the most effective, producing protected bikeways and other advanced facilities. Any one of these projects would have a significant impact on traffic safety.

## PLANNED IMPROVEMENTS

1	King Street North	King Street is heavily used by cyclists as the preferred north-south route, but along the emerging main street area, much of the travel lanes are outdated and bicycling conditions are in need of improvement.
2	Morrison Drive	Morrison Drive should be completed by removing the center turn lane and adding a cycle track protected by on street parking. This was shown in the Design Division's Report #1 on the Upper Peninsula.
3	America Street	A bike boulevard (sharrows, diverters, signage and other improvements) would connect the Eastside to Calhoun Street. The extra-wide road section along Alexander will be given more advanced bikeway markings.
4	Butterfly Walk & Bike Path	This extension of the multiuse path at Brittlebank Park is a carry over from the People to Parks and Walk-Bike BCD plans. This would connect West Edge and the Joe Riley Stadium to the Citadel and Hampton Park.
5	Carolina / Fishbourne	Sharrows will connect the Rutledge Avenue Cycle Track to King Street and the Lowline Greenway. Existing sharrows on will be updated.
6	Rutledge Avenue Cycletrack	An ambitious concept to replace on-street parking with a two-way protected cycle track from Heriot Street to Calhoun (connecting to another cycletrack). See page 18 for more information on this improvement. This could occur as two phases, the first being from Heriot Street to Fishbourne along with planned street resurfacing.
7	Bee Street at Medical District	This will be the missing link between West Ashley, the Ashley River Crossing and the heart of the peninsula. Half is City maintained with opportunities to remove on-street parking for bike lanes. The other half is highly constrained and maintained by SCDOT. (See illustration on page 28 and the cover of this document.)
8	Lockwood Blvd. Multiuse Pathway	The multiuse path along Lockwood from Brittlebank Park to Broad Street is insufficient for handling bicycle traffic. In the southern portion it simply needs to be widened, but in the central portion is must be overhauled.
9	Upper King Street	Minor changes to King Street would involve traffic calming, improving crosswalks, and adding curb extensions.
10	Calhoun Street Cycletrack	Calhoun Street could operate as a 2-lane roadway, especially if a turn lane were added to deal with left turns. This road diet and protected bikeway would connect College of Charleston to the Aquarium area. There could be two phases, the first being from Coming Street to East Bay Street.
11	St. Phillip to Market Connection	Connecting these streets will require a contraflow bike lane accompanied by sharrows.
12	Broad Street	Minor changes to Broad Street would involve traffic calming, perhaps improving crosswalks and adding curb extensions.



# STRATEGY 5 FUNDING BY PLACE

Incorporation into a long-range transportation plan affects how projects are funded by federal, state and county dollars. In addition to these conventional methods, various local mechanisms of funding can be used for urban bikeways based on the location of designated routes. This strategy combines routes located in the City's Tax Increment Financing (TIF) districts and those routes considered essential infrastructure for a large-scale development or institution. Partnerships offer unique opportunities for funding and service provision.

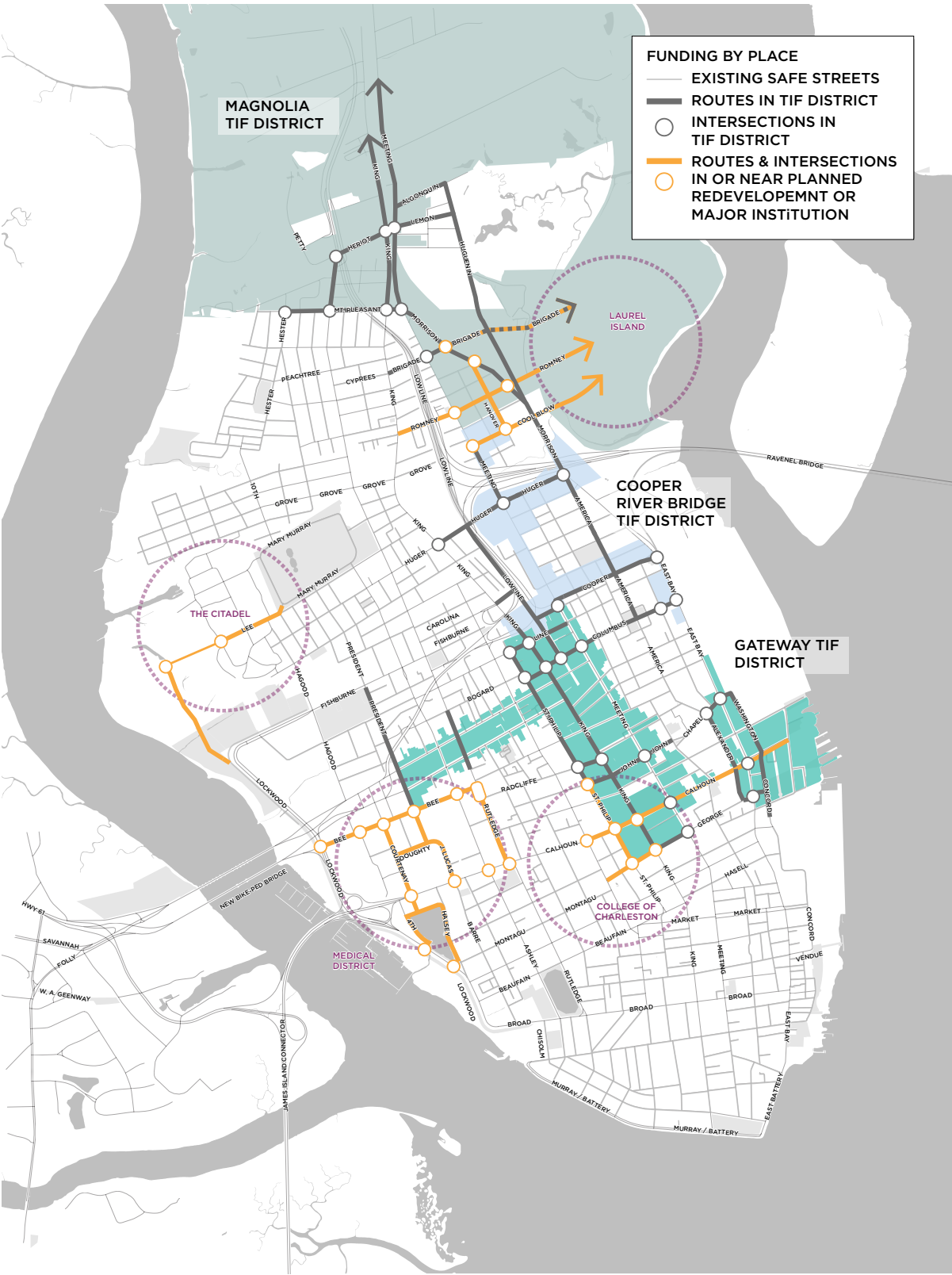
## PLANNED IMPROVEMENT AREAS

1	Magnolia TIF	Financing district in and north of the Upper Peninsula. This could help with connectivity issues in that area.
2	Cooper River Bridge TIF	Drawn along major corridors in the East Side and Upper Peninsula areas, this district could provide funds for several important projects, such as Huger Street, Cooper Street, and America Street.
3	Gateway TIF	Located in the heart of the peninsula, the district could help finance key improvements like King Street, Saint Phillip Street, Alexander Street, and others as shown on the map.
4	Laurel Island	This former landfill is a tremendous development opportunity. It uses three major roads for access, all of which should be advanced types of bikeway facilities to ensure safe, multimodal routes to and from the island.
5	The Citadel	This major institution should be engaged in planning and funding of the Butterfly Walk and its connection to Hampton Park.
6	Medical District	Plans are underway and a Bike Share system has been launched, but cycling infrastructure remains substandard. Major stakeholders in this area will be engaged to assist with the planning and development of urban bikeways that benefit students, patients, and employees.
7	College of Charleston	Bicycle ridership among College of Charleston students and staff is high. Urban bikeway needs in and around the campus are significant.

## LIGHTER, QUICKER, CHEAPER, SOONER: DEMONSTRATION PROJECTS & STRATEGIC ACTION



The use of short-term, temporary facilities with low-cost materials can be a great way to demonstrate the effects of a planned bikeway project. The demonstration project can last from a single day to several months. Mostly led by community groups and more recently sanctioned by local governments, many cities around the United States are engaging in this strategy, often calling it “tactical urbanism.” This can be a way to provide basic infrastructure and see how things work before making a permanent decision.





# BIKEWAY DESIGN EXAMPLES

## Bee Street at Lockwood Boulevard

This is the location at which the Ashley River Crossing would land, meeting the urban grid at the main gateway of the Medical District. The area handles a great deal of automobile traffic and is very dangerous for cyclists. Let's not build another "bridge to nowhere."



Improvements here involve a bike lane on each side of the street, including a bike lane painted through the intersection to connect with the Ashley River Crossing. Alternatives along this portion of Bee Street may also include a protected bikeway, cycletrack or multi-use pathway on under used frontages.



## Saint Philip Street at College of Charleston

This is one of College of Charleston's main streets; it is heavily traversed by students and other peninsula users on foot and by bicycle. Two-lanes may be needed for automobile travel, but such movement should be aggressively slowed to favor pedestrians and bicyclists.



This traffic calming method involves painted "half lanes" in the automobile travel area. The speed limit is reduced to 15 mile per hour, on par with bicycle speeds. This would require slow movement and caution on the part of the motorist, who may do well to simply choose a different route.





**Rutledge Avenue Cycletrack**

The cycletrack removes on-street parking along Rutledge Avenue to accommodate a 2-way protected bicycle facility. This would serve as the major north-south connector for safe and comfortable bicycle mobility serving the entire peninsula.



The cycletrack would be delineated with paint and other markings. Signage would instruct motorists on the desired and legal movements on driveways and cross streets. Such facilities often use on-street parking to buffer against traveling automobiles. The one-to-two-way conversion of Rutledge Avenue is also a key factor here.



**Calhoun Street Cycletrack**

The east-west corridor is ideal for a cycletrack, especially between Coming Street and East Bay Street. As shown by Holy Spokes bike share data, this area is heavily used by cyclists (likely College of Charleston students, workers and tourists). On-street parking, construction zones, and left turning movements already make this a two-lane street.



The illustration shows the bikeway being delineated by a painted stripe zone. Other solutions could be explored, like the use of on-street parking and other vertical protection and delineation devices. You can also see that a center turn lane would be needed to make this work better.







## PART 2

### URBAN BIKEWAY DESIGN TOOLKIT

**This section is the bikeway design toolkit for Charleston. It provides additional explanation of how the route map was developed. These details can seem very complex, but they are based in sound reasoning and best practices.**

- ADJUSTED FOR NARROW STREETS AND ONE-WAYS
- SENSITIVE TO HISTORIC CONTEXT
- LOW COST INTERVENTIONS

**Charleston’s rhythm and scale affiliates more with European cities than American cities of the same size. London, specifically, has a very similar density and scale to Charleston.**

London, a city where almost 20% of trips are made on bikes, has developed and is currently deploying a massive bike plan for their city. Many of the best traffic minds worked on creating the best possible solution for the city. The result was the London Cycling Design Standards, a report that holds the standards for how they identify, improve, and implement bike lanes across the city. By studying both the London Cycling Design Standards and the Urban Bikeway Design Guide, a guide produced by the National Association of City Transport Officials (NACTO), the Design Division learned the best practices in bikeway practices all over the world.

The Design Division, as part of the City of Charleston Department of Planning, Preservation, and Sustainability, understood very early in the design process that this project needs to be a series of very simple, very smart moves throughout the city that maintain harmony with other projects and future trends of this city. Each road selected in the bike plan was examined for safety, viability, and future use outlined by city transportation and development plans. Having a complete two phase plan gives the city a great advantage: it allows future projects to pull upon it for reference. If another project comes into disagreement with the plan in a way that cannot be resolved, the *Downtown Charleston Cycling Design Standards* can be used to create a new solution that dovetails into the plan as well as the route it has replaced.





SLOW STREETS



LANE ADJ. TO BARRIER



ONE-WAY PROTECTED TRACKS



COMBINED BIKE/TURN LANE



BIKE LANES



LEFT SIDE LANES



TWO-WAY TRACKS



INTERSECTION BIKE LANE



BIKE LANES W/ PARALLEL PARKING



CONTRA-FLOW LANES



BIKE BOXES



ADVISORY LANES



# CHARLESTON DESIGN STANDARDS

ALL STANDARDS SUBJECT TO ADJUSTMENT FOR INDIVIDUAL CONDITIONS

MINIMUM TRAVEL LANE 10’ FOR MAIN ROUTES. SECONDARY ROUTES HAVE NO MINIMUM

LANE TYPE	DIMENSIONS
STANDARD BIKE LANE	5’ 2’ BUFFER + 3’ LANE
MINIMUM BIKE LANE	3’ RIDABLE
MINIMUM with PARALLEL PARKING	12’ FROM CURB TO END OF BIKE LANE WITH 5’ LANE
MINIMUM ADJACENT to PHYSICAL BARRIER	5’
SHARED LANES	VARIES
LEFT-SIDE LANES	3’
CONTRA-FLOW LANE	SEE STANDARD & MINIMUM
ONE-WAY PROTECTED CYCLE TRACK	5’-8’ VOLUME DEPENDENT
TWO-WAY CYCLE TRACK	8’-13’ VOLUME DEPENDENT
BIKE BOXES	12’-24’ DEEP
COMBINED BIKE/TURN LANE	4’
INTERSECTION BIKE LANE CROSSING	4’
ADVISORY LANE	5’ MINIMUM

MARKINGS	PLACEMENT
2 SOLID LINES(HATCHING)	RIGHT SIDE, SAME DIRECTION
6”-8” WHITE LINE	RIGHT SIDE OF STREET ADJACENT TO TRAVEL LANES; SAME DIRECTION
6”-8” WHITE LINE	SEE CONVENTIONAL
6”-8” WHITE LINE	SEE CONVENTIONAL
SIGNAGE AND MARKING PER VEHICULAR SPEED & VOLUME	VARIES
6”-8” WHITE LINE	LEFT SIDE OF TRAVEL LANES
DOUBLE YELLOW LINES	ONE-WAY STREET
6” DASHED WHITE LINE 1’ DASHES - 6” GAPS	VARIES
DIRECTIONAL; WORD, SYMBOL, OR ARROW	NO PARKING 30’ FROM CROSSING
STOP LINE FOR VEHICLES, BIKE STENCIL, “NO RIGHT ON RED” SIGN	5’-6” FROM PEDESTRIAN CROSSING
BIKE STENCILS, DOTTED LINE	WITHIN COMBINED SPACE
2’X6” DASHED WHITE LINE WITH 2’-6’ SPACING ADJACENT TO TRAVEL LANE	SEE CONVENTIONAL
6”-8” DASHED WHITE LINE 13’ DASH - 6’-6” GAP	SEE CONVENTIONAL

DATA GATHERING

In order to better understand the roads in Charleston, Design Division employees visited each street in the city that was considered as part of the proposed bike plan to collect data. The colored column on the left gives the daily count of cars that travel on the road. After the count has been made, speed is measured using a radar gun. The speeds are averaged to find the *85th percentile speed*, the speed at or below which 85 percent of the cars travel. This is a practice used by many traffic engineering firms and Departments of Transportation in the United States.

You can see the 85th percentile speed in the right colored column. In both colored columns, the information is color coded from green to red, depending on safety. By using both sets of information we were able to determine the safety of the road.

Both sets of data are very important for determining the road safety. A road may only have a 15 mph 85 percentile speed, but if it has 10,000 cars on it per day, the road becomes hazardous to a cyclist.

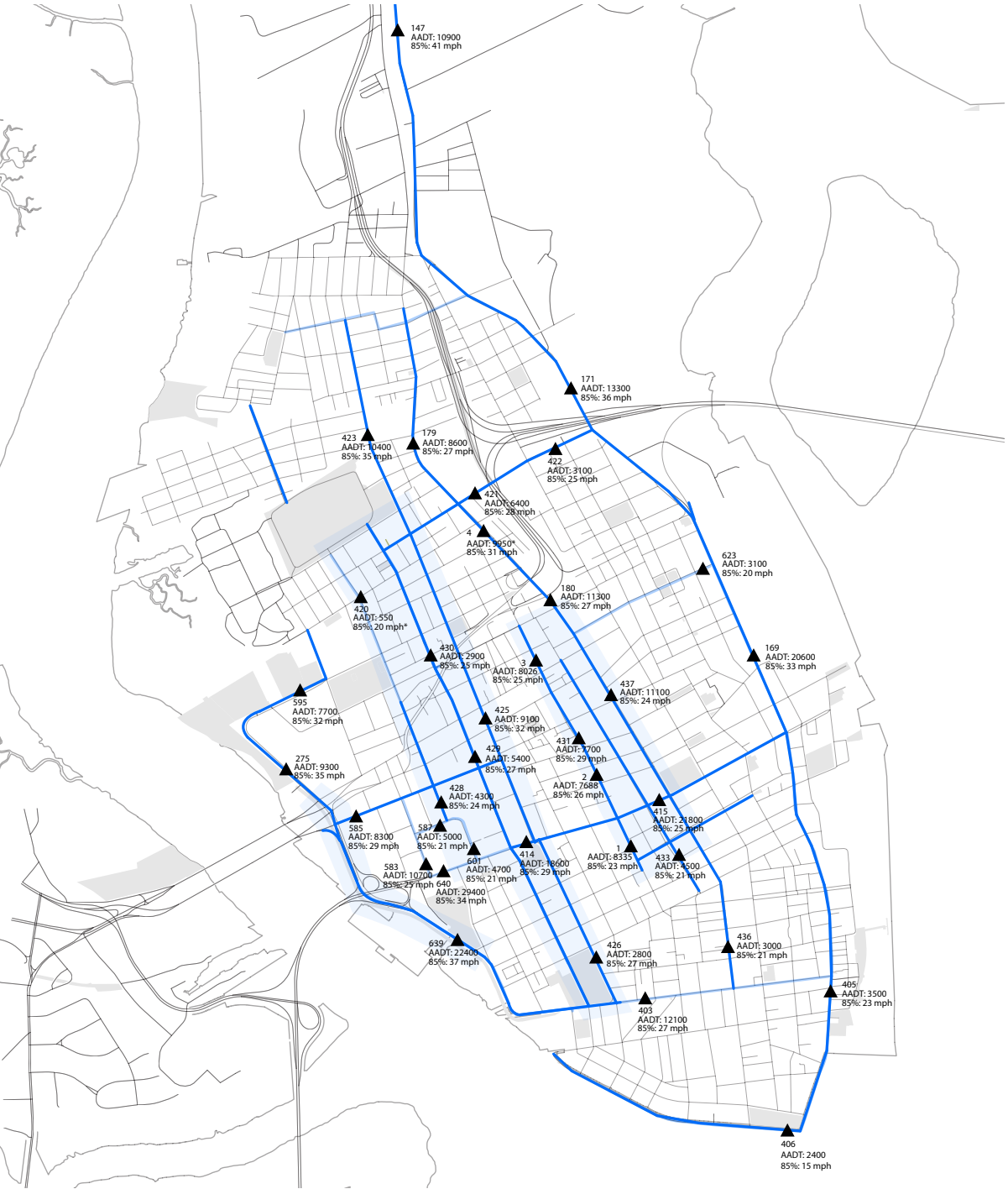
STATION	AADT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	85%	Location
420	550	1	19	18																		12.67	President @ Congress
406	2400	15	11	12	14	17	15	17	9	9	9	9	9	11	9	12	14	13	15	9	26	15.3	Murray Blvd
623	3100	18	21	19	17	17	20	13	20	25	15	19	20	17	15	17	18	18	17	17	11	20	Columbus b/t Drake & E Bay
436	3500	16	16	14	11	16	17	23	15	17	13	19	21	13	15	18	22	21	18	14	21	21	King b/t Queen & Clifford
587	5000	20	21	17	17	20	21	19	24	20	14	15	12	20	13	12	17	15	16	22	17	21	Doughty b/t Courtenay & President
601	4700	21	18	22	17	19	13	19	23	18	23	14	12	13	11	16	12	10	10	11	11	21.15	Jonathan Lucas b/t Doughty & Calhoun
433	4500	14	19	17	17	23	15	17	21	18	24	15	27	19	19	19	19	20	17	21	16	21.3	St. Philip @ Liberty
1	8335	23																				23	Coming N of George
405	3500	26	24	22	19	17	19	15	15	16	16	15	22	22	23	19	18	15	19	13	24	23.15	E Bay @ Elliot
428	4300	22	19	21	23	14	19	17	14	24	17	12	19	18	23	26	27	21	14	21	29	24.3	President b/t Bee & Doughty
437	11100	22	19	17	22	21	27	27	21	21	18	23	22	24	27	22	20	20	22	22	19	24.45	King b/t Reid & Mary
415	21800	16	15	19	18	19	14	14	21	17	17	26	24	25	20	22	23	25	21	22	26	25	Calhoun b/t St. Philip & King
3	8026	25																				25	Coming N of Spring
422	3100	22	21	19	25	22	24	23	23	21	30	25	21	25	25	23	24	23	26	21	29	25.15	Huger b/t Meeting & Hanover
430	2900	19	17	19	25	28	18	19	21	26	26	24	22	25	20	17	16	14	25	23	25	25.15	Ashley @ Sumter
583	10700	19	15	23	17	19	13	24	22	20	21	18	22	28	28	17	22	29	21	19	25	25.45	Courtenay b/t Doughty & Calhoun
2	7688	26																				26	Coming N of Vanderhorst
179	8600	26	23	25	24	23	24	22	27	24	24	26	24	28	25	27	27	23	21	25	24	27	King b/t Grove & Francis
180	11300	18	23	21	27	26	23	31	21	29	27	22	23	25	25	17	21	22	18	20	22	27	King N of Line
403	12100	32	27	28	26	19	23	22	22	27	23	21	23	22	25	26	23	23	24	24	22	27	Broad b/t Trapman & Franklin
426	2800	18	27	19	28	23	25	25	20	24	17	28	23	27	26	18	25	19	29	21	22	27.15	Rutledge b/t Queen & Beaufain
429	5400	22	25	21	20	36	23	27	25	18	33	23	23	23	21	26	25	17	29	21	23	27.3	Ashley b/t Cannon & Bee
421	6400	20	30	25	17	28	22	19	23	27	19	29	33	18	19	24	20	28	23	27	18	28.15	Huger b/t King & 26
414	18600	19	23	29	30	28	29	28	21	20	24	20	18	25	29	19	23	19	27	28	28	29	Calhoun b/t Ashley & Rutledge
431	7700	29	25	25	26	25	26	29	29	28	16	23	23	27	28	30	31	24	19	25	23	29	Coming b/t Radcliffe & Morris
585	8300	21	27	30	23	24	30	24	21	24	22	24	23	23	24	19	26	29	29	28	21	29	Bee b/t Lockwood & Cherry
4	9950	27	26	21	25	31	28	28	35	29	28	28	30	30	29	36	30	29	21	35	23	31.6	King b/t Huger & Congress
425	9100	32	33	30	28	29	24	17	24	27	26	24	20	22	34	31	32	27	24	21	21	32	Rutledge b/t Spring & Cannon
595	7700	34	31	29	32	30	29	34	29	32	31	16	19	21	28	28	25	25	23	28	21	32	Fishburne b/t Lockwood & Hagood
169	20600	24	27	33	28	32	28	30	32	30	29	23	28	30	26	34	28	35	29	33	27	33	East Bay N of Chapel
640	29400	38	28	21	27	32	20	31	34	29	28	19	25	31	29	37	37	34	21	26	33	34.45	Calhoun b/t Courenay & Jonathan Lucas
275	9300	31	32	32	35	27	22	22	28	28	26	28	31	30	32	38	35	24	30	35	34	35	Lockwood N of 17
423	10400	35	34	37	31	30	30	29	32	31	28	33	24	32	31	36	26	32	35	31	34	35	Rutledge b/t Grove & St. Margaret
171	13300	30	24	26	38	35	29	33	27	30	43	29	36	34	22	45	31	32	36	31	25	36.3	Morrison N of 17
639	22400	27	24	30	30	31	36	36	30	29	39	25	37	41	28	36	29	38	35	37	35	37.15	Lockwood b/t Calhoun & Montagu
147	10900	38	24	36	38	43	37	41	43	41	41	36	40	39	32	34	41	36	38	35	34	41	Morrison N of Mt. Pleasant



# DATA GATHERING

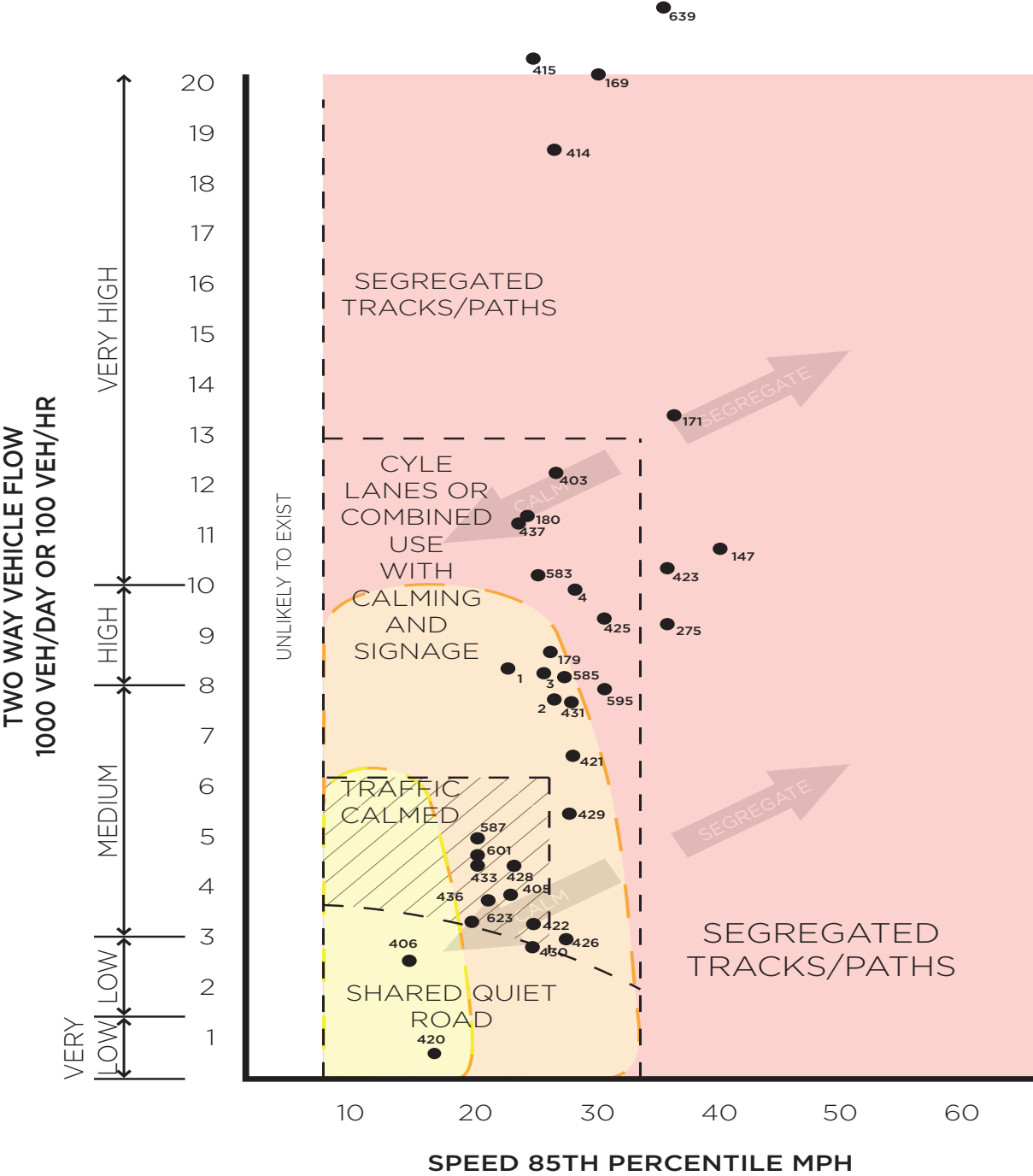
Creating a replicable approach to the design of the bicycling infrastructure on each road is paramount to the success of the bike plan.

Every road within the city tested a little bit differently in the traffic and speed counts. We needed a way to take the information we had collected and produce designs from it that gave us the safest and most viable solution for each road. The graph to the left was created based on London’s bike infrastructure. All data points were placed on a scatter plot and another graphic was overlaid onto the graph to help surmise the general design approach to each road. The end result is a tool that gives a great starting point to the area.

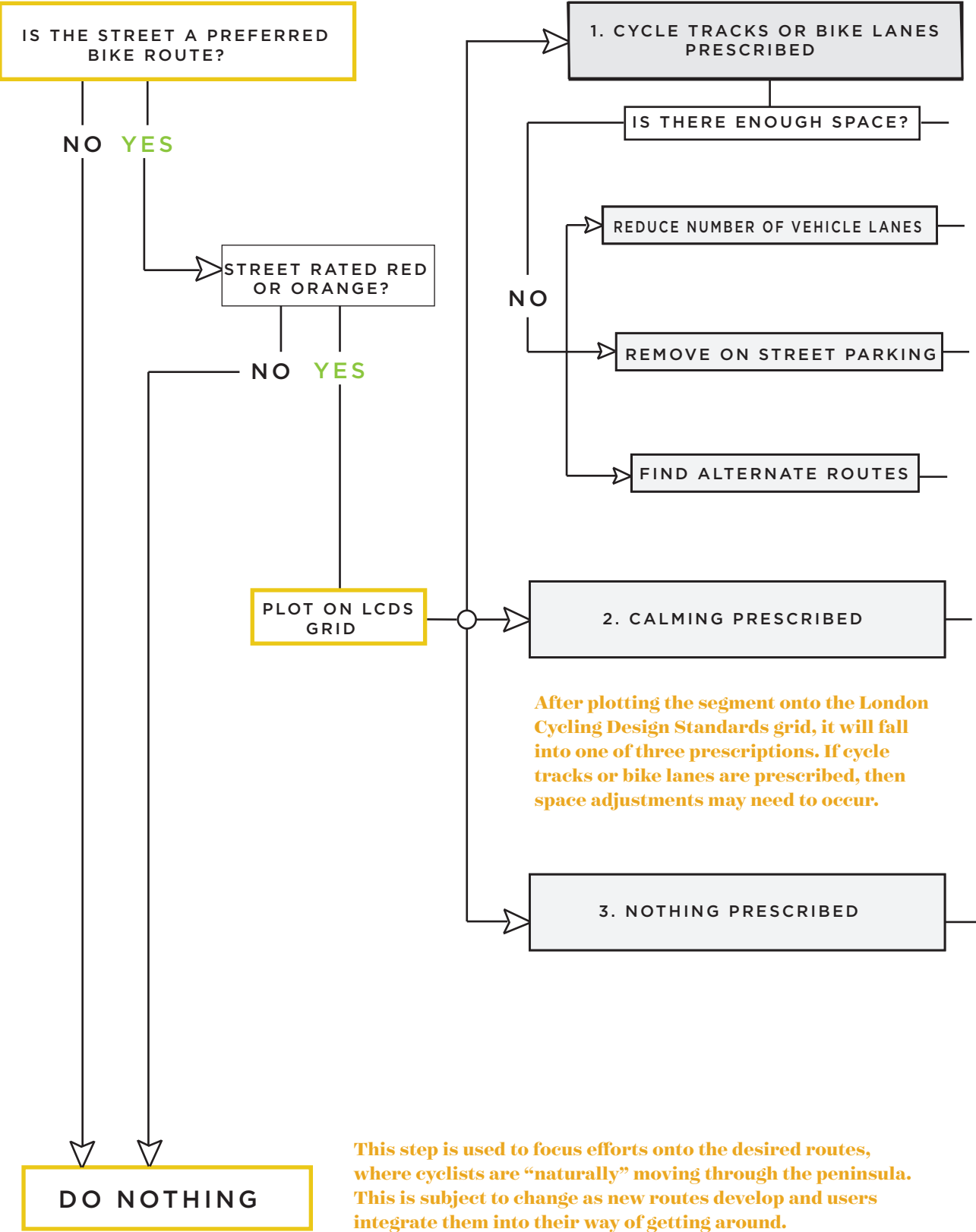


# SEGMENT DESIGN SOLUTIONS

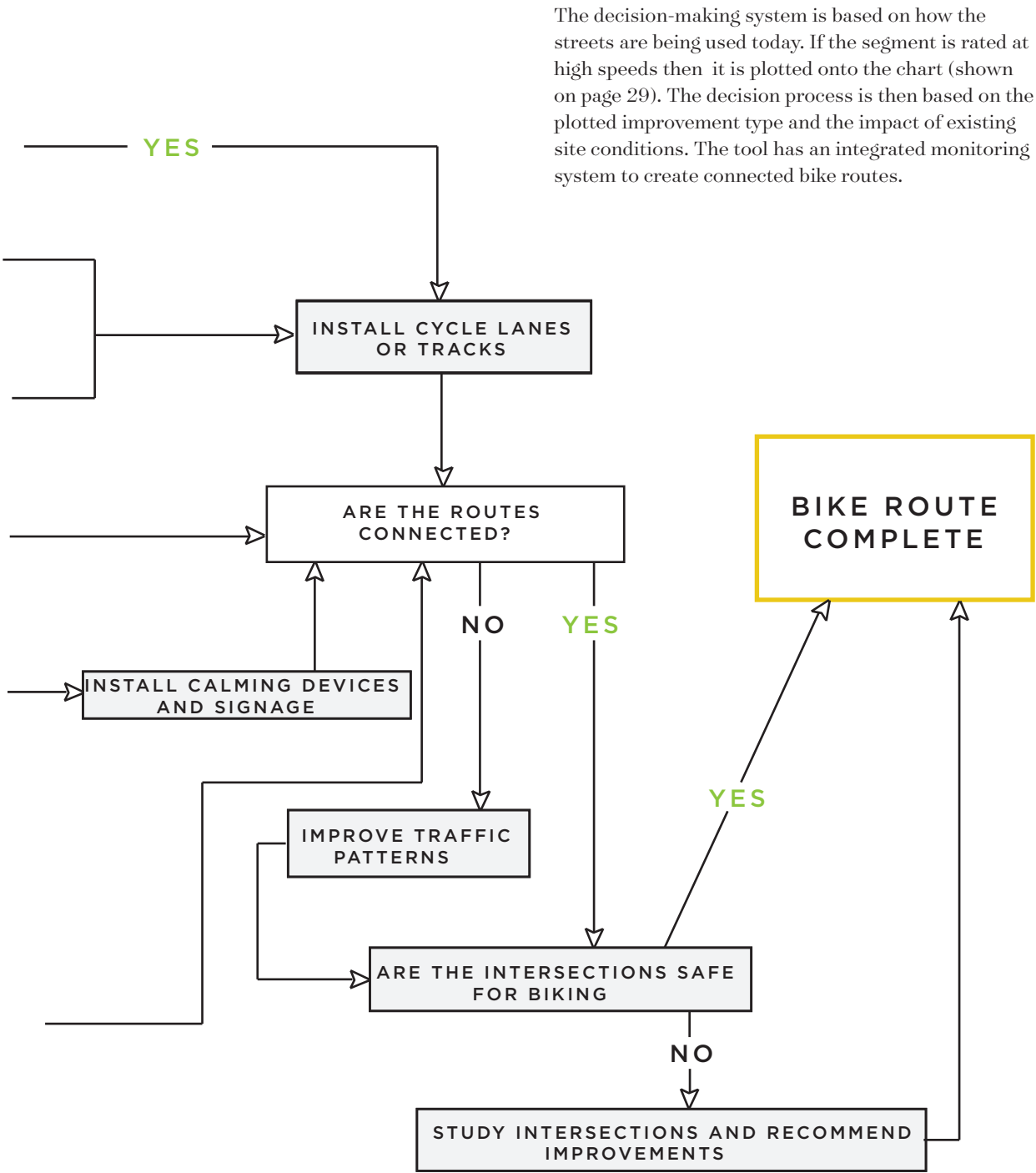
This chart plots the measured 85th percentile speeds with general volumes of vehicular flow on the indicated roadway segment. This data distribution shows which type of improvement is most applicable based on these metrics, as shown by the shaded areas. This is one of the main tools used to create design recommendations for the urban bikeway system map.



# SEGMENT SOLUTION SYSTEM



This step is used to focus efforts onto the desired routes, where cyclists are “naturally” moving through the peninsula. This is subject to change as new routes develop and users integrate them into their way of getting around.



The decision-making system is based on how the streets are being used today. If the segment is rated at high speeds then it is plotted onto the chart (shown on page 29). The decision process is then based on the plotted improvement type and the impact of existing site conditions. The tool has an integrated monitoring system to create connected bike routes.

Once the solution is allocated, the key question becomes on of connectivity to other routes. Traffic patterns may need to be improved and/or intersections reconfigured to achieve connections.



# CITY OF CHARLESTON

*Mayor John Tecklenburg*

## DESIGN DIVISION

*Allen Davis, Director*

*Morgan Gundlach, Urban Designer*

*David Herrero, Urban Designer*

*Vivian Gao, Urban Designer*

*Nicole Bronola, Apprentice*

*Laney Tuten, Apprentice*

*Chris Melton, Apprentice*

*Paul Mosher, Apprentice*

*Claire Warshauer, Intern*

## PLANNING DEPARTMENT

*Jacob Lindsey, Director*

*Aaron Holly, Planner*

*Philip Overcash, Planner*

## TRAFFIC & TRANSPORTATION DEPARTMENT

*Keith Benjamin, Director*

*Michael Mathis, Transportation Project Manager*

## CHARLESTON MOVES

*Katie Zimmerman, Executive Director*

*Kurt Cavanaugh, Executive Director (Former)*

*Savannah Brennan, Membership and Outreach Coordinator*

*Conner Lock, Graphic Design*



DESIGNDIVISION.ORG