*City of Charleston*

DESIGN DIVISION

# REPORT 13

## BEE STREET BIKEWAY

DECEMBER 2023

# BEE STREET BIKEWAY

*December 2023*

## WELCOME

The Ashley River Crossing bicycle and pedestrian bridge represents a significant step forward for multimodalism in the Charleston region. Bee Street is the logical, peninsula-side, route to access the bridge. Improvements are needed on the corridor to support people of all abilities.


## CITY OF CHARLESTON

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## SPECIAL THANKS TO

*Charleston Moves*


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# EXECUTIVE SUMMARY

## Linking the Ashley River Crossing and the Charleston Peninsula

The Ashley River Crossing bike and pedestrian bridge will connect West Ashley to the peninsula, and completes a missing link in the East Coast Greenway route from Maine to Florida.

The project represents significant investment in bicycle infrastructure from local, state, and federal governments and from the private sector. The success of the Ashley River Crossing project is dependent on the ability to provide safe bike and pedestrian connections on both ends of the new bridge. On the peninsula side, the bridge will terminate at the intersection of Bee Street and Lockwood Drive, adding an influx of bicyclists and pedestrians to an area congested with vehicles. Accommodations must be made for these modes.

Bee Street is the logical connection point and access route to the bridge. Stretching from Lockwood Drive to Rutledge Avenue, Bee Street travels through the Medical District to the center of the peninsula. This study proposes Bee Street would be best served by a protected cycletrack that extends as far east as possible and gives recommendations for integrating a cycletrack, widened sidewalks, and canopy trees into the streetscape.

A protected cycletrack is among the most user-friendly forms of bicycle infrastructure as it provides a safe, dedicated, predictable, and condensed area for travel, separate from vehicles. A cycletrack supports a wide range of ability and confidence levels. Widened sidewalks and canopy trees facilitate a comfortable pedestrian experience.

Vehicle movement dominates the corridor today. As we move forward, we must consider an allocation of space that evenly supports all modes.


*Morgan Gundlach*
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# PROJECT OVERVIEW

**Bee Street will be a critical link for cyclists using the Ashley River Crossing**

This corridor is the logical route for pedestrians and cyclists to use; its centrally located, connects to other routes, and is easy to access from the bridge landing at Lockwood Drive.

## ASHLEY RIVER CROSSING

The concept of the Ashley River Crossing was first introduced by City of Charleston planners in 1976. Most recently, it was confirmed as a priority for investment in the People Pedal Plan and Plan West Ashley. After roughly 40 years of planning and financing efforts, last month City Council approved the contract, committing $13 million to the project. Design is expected to take one year with construction to follow.

The ARC's peninsula landing will be at the Bee Street/ Lockwood Drive intersection and will significantly increase the number of bicyclists and pedestrians in the area. Cyclists and pedestrians need a safe route to navigate the intersection and continue along Bee Street to reach calmer peninsula streets beyond.

Planned developments and the future Lowcountry Rapid Transit (LCRT) route need to be taken into account when considering future bike traffic and infrastructure on Bee Street.


# PHOTOS OF BEE STREET TODAY








**1.** Bee Street/Lockwood Drive Intersection (Facing west) **2.** Bee Street between VA Hospital and Bee Street Lofts (Facing east) **3.** Bee Street fronting VA Hospital (Facing west) **4.** Bee Street/Courtenay Drive Intersection (Facing east) **5.** Bee Street between Courtenay Drive and President Street (Facing west) **6.** Bee Street between Ashley Avenue and President Street (Facing west) **7.** Morris Street(Facing east)

# PROJECT OVERVIEW

## AREA 1

### ARC Landing

Bee Street and Lockwood Drive Intersection

## AREA 2

### Segment 1

Lockwood Drive to Courtenay Drive

### Segment 2

Courtenay Drive to President Street

### Segment 3

President Street to Rutledge Avenue

## AREA 3

### Bee-Mor-Rad Connector

Rutledge Avenue from Morris Street to Radcliffe Street


*Existing Bee Street*

NORTH

300 FEET

## Bikeway Recommendations

**1 ASHLEY RIVER BRIDGE OFF RAMP**

**22' wide (excluding slip lane)**

**Existing:** N/A

**Recommended:** Separated 12' cycle track using median land within ROW, south of current lanes

**2 BEE STREET** *AT BEE STREET LOFTS*

**32' wide**

**Existing:** N/A

**Recommended:** 10' cycle track with 2' buffer on adjacent property south of current ROW. Requires curb and utility relocation

**3 BEE STREET** *AT BRAVO STREET*

**40' wide**

**Existing:** N/A

**Recommended:** 10' cycle track with 2' buffer on adjacent property south of current ROW. Requires curb and utility relocation

**4 BEE STREET** *AT MUSC WELLNESS CENTER*

**50' wide**

**Existing:** N/A

**Recommended:** 10' cycle track with 2' buffer on adjacent property south of current

**5 BEE STREET** *EAST OF COURTENAY DRIVE*

**27' wide**

**Existing:** Sharrows

**Recommended:** 10' cycle track with 2' buffer using ROW north of current lanes. Requires curb and utility relocation

**6 BEE STREET** *EAST OF PRESIDENT STREET*

**27' wide**

**Existing:** Sharrows

**Recommended:** Sharrows

**7 RUTLEDGE AVENUE**

**32' wide**

**Existing:** N/A

**Recommended:** Bike lanes

**8 MORRIS STREET**

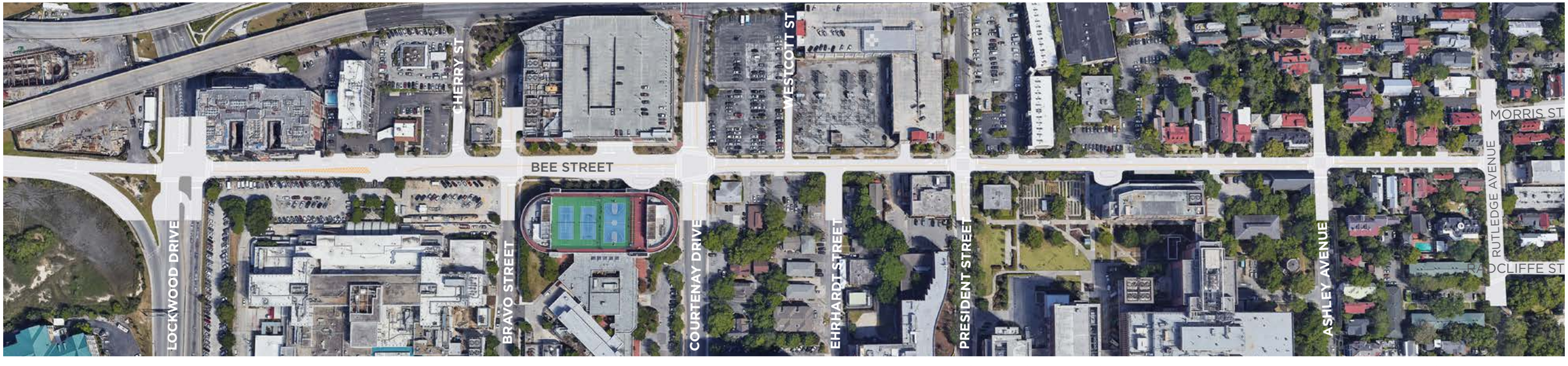
**26' wide**

**Existing:** N/A

**Recommended:** Contraflow bike lane

# BEE STREET OVERVIEW

## EXISTING BEE STREET




**Bee Street Average Annual Daily Traffic (Lockwood Drive to Westcott Street)**
2018: 9,800 | 2019: 8,800 | 2020: 8,700 *Source: BCDCOG*

## RECOMMENDED BEE STREET

# AREA 1 *EXISTING*

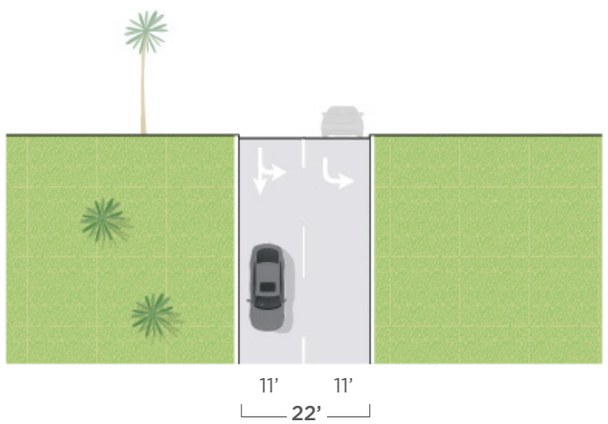
## Reconfigured to accommodate cyclists and pedestrians using the Ashley River Crossing

Add a bike/pedestrian crossing, cycletrack while maintaining current travel lanes on Bee Street


NORTH — 100 FEET

1. Slip lane off of Ashley River Bridge
2. Incomplete crosswalk
3. Excessively wide turn radius
4. No dedicated bike infrastructure
5. Multi-use path
6. Narrow sidewalk
7. Right on red permitted for inside lane
8. Unsignalized crosswalk

The Lockwood Drive slip lane encourages speeding and endangers pedestrians in the current crosswalk. Additionally, it already floods during king tides and storm events.

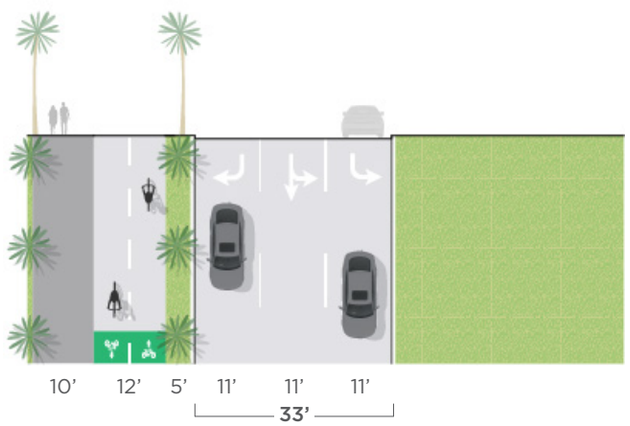





# *RECOMMENDED*

Adding a cycle track on Bee Street east of Lockwood Drive and maintaining current travel lanes will require using adjacent property south of current ROW. Curbs and utilities will need to be relocated.


CURRENT CURB LINE

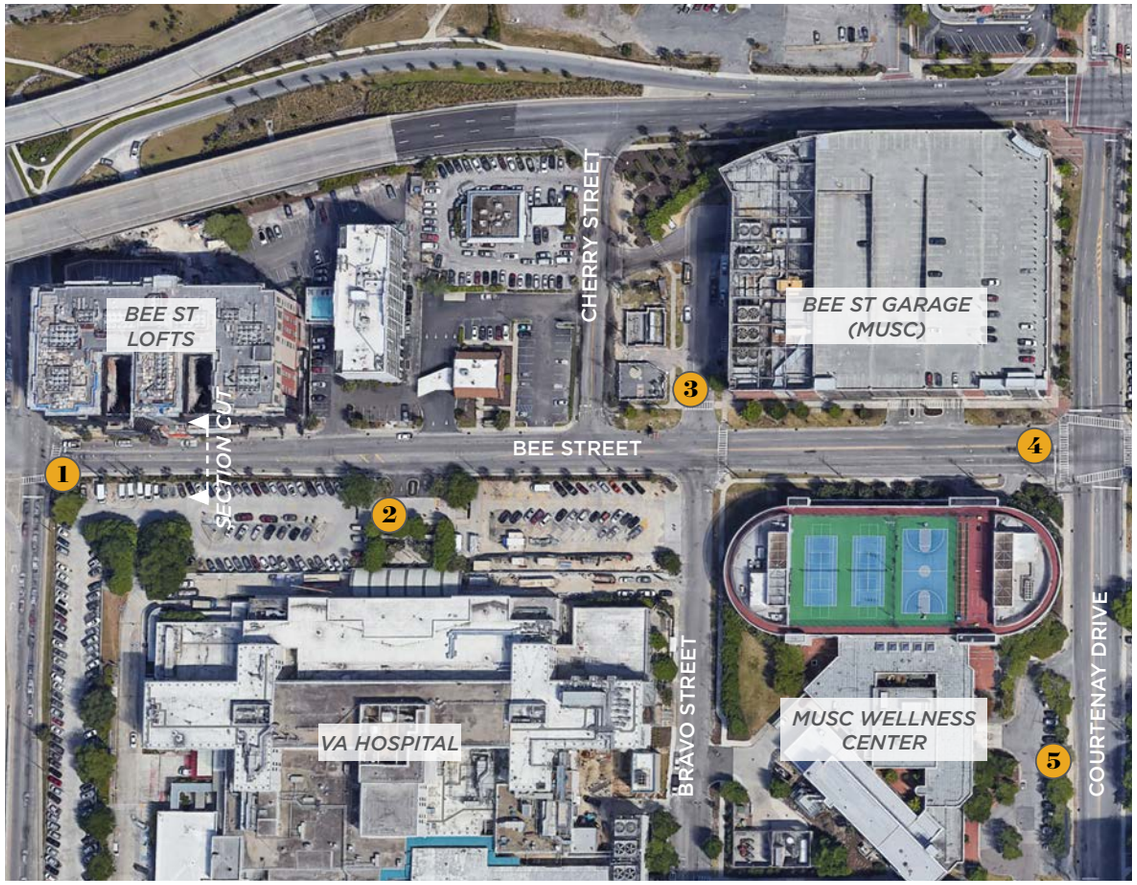



1. Remove slip lane and add a right turn lane at the intersection
2. Extend current median/greenspace, use new greenspace to mitigate tidal flooding
3. Widen Lockwood Drive sidewalk to 12’
4. Add crosswalk to complete intersection
5. Widen Bee Street to accommodate the cycletrack, width varies. Maintains current traffic capacity
6. Prohibit right turns on red to protect cyclists and pedestrians
7. Add pedestrian and bicycle signal phase to intersection timing
8. Add bicycle crossing

# AREA 2- SEGMENT 1 *EXISTING*

## Highest demand for ROW space is between Lockwood Drive and Courtenay Avenue

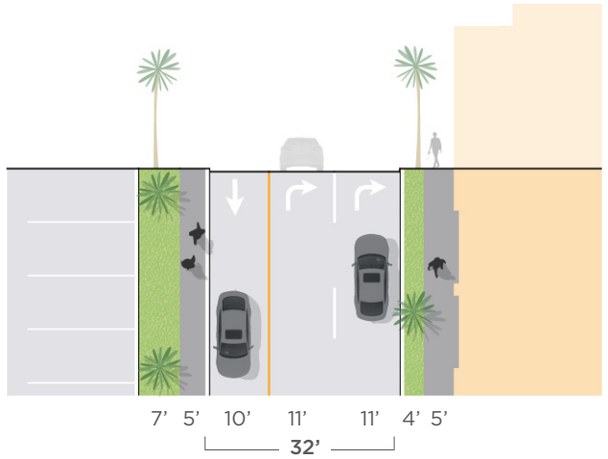
The current configuration gives priority to vehicles, with narrow sidewalks, and no bicycle infrastructure




NORTH

300 FEET

1. Two right turn lanes onto Lockwood Drive, one eastbound lane
2. VA hospital entrance
3. Future Hagood Avenue Extension
4. Widest ROW section; five vehicle lanes
5. Future Lowcountry Rapid Transit (LCRT) station area

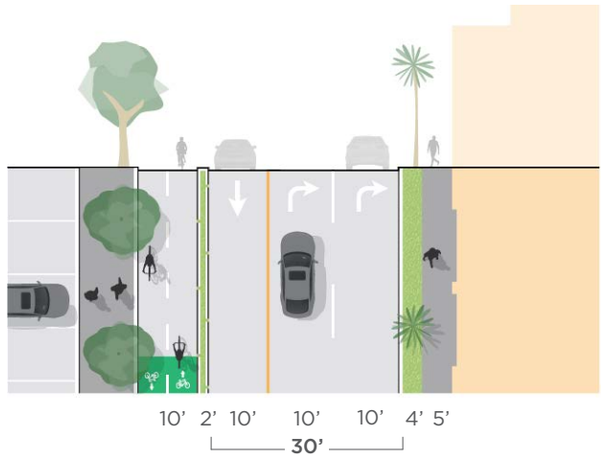



**Pinch point shown, Segment 1 widens to 50’*

# *RECOMMENDED*

Adding a cycle track and maintaining current travel lanes will require using adjacent property south of current ROW. Curbs and utilities will need to be relocated and one eastbound turn lane at Courtenay will be removed.


CURRENT CURB LINE




1. Keep all travel lanes between Lockwood and Bravo, move VA curbline to widen Bee St for 10’ cycle track with 2’ buffer
2. Reduce vehicle lane width to 10’ (current: 10’-11’)
3. Maintain left turn lane and add bike crossing at VA hospital entrance
4. Use current right turn lane on Bee at Courtenay for cycle track, consolidate eastbound vehicle traffic to two lanes
5. Move/straighten MUSC curbline at Bravo Street corner and remove remnant driveway at MUSC Wellness Center
6. Current CARTA stop
7. Relocate current VA CARTA stop here to encourage crosswalk crossings

# AREA 2- SEGMENT 1

*VA HOSPITAL*

## EXISTING


## RECOMMENDATIONS

1. Move VA curbline to widen Bee Street for cycletrack and maintain all current vehicle lanes
2. Maintain left turn lane and add bike crossing at VA Hospital entrance

## CYCLETRACK DESIGN

3. 2’ wide buffer with granite curbs
4. Gaps in buffer curbs to collect stormwater
5. Buffer planted with low-maintenance native species
6. Street trees provide shade to both sidewalk and cycletrack; absorb stormwater
7. Bi-directional bike traffic, 5’ wide lanes

## RECOMMENDED

## EXISTING


## RECOMMENDATIONS

1. Remove remnant driveway at MUSC Wellness Center

2. Use current right turn lane on Bee Street at Courtenay Drive for cycletrack; consolidate eastbound vehicle traffic to two lanes

## CYCLETRACK DESIGN

3. 2’ wide buffer with granite curbs

4. Gaps in buffer curbs for stormwater drainage

5. Buffer planted with low-maintenance native species

6. Street trees provide shade to both sidewalk and cycletrack; absorb stormwater

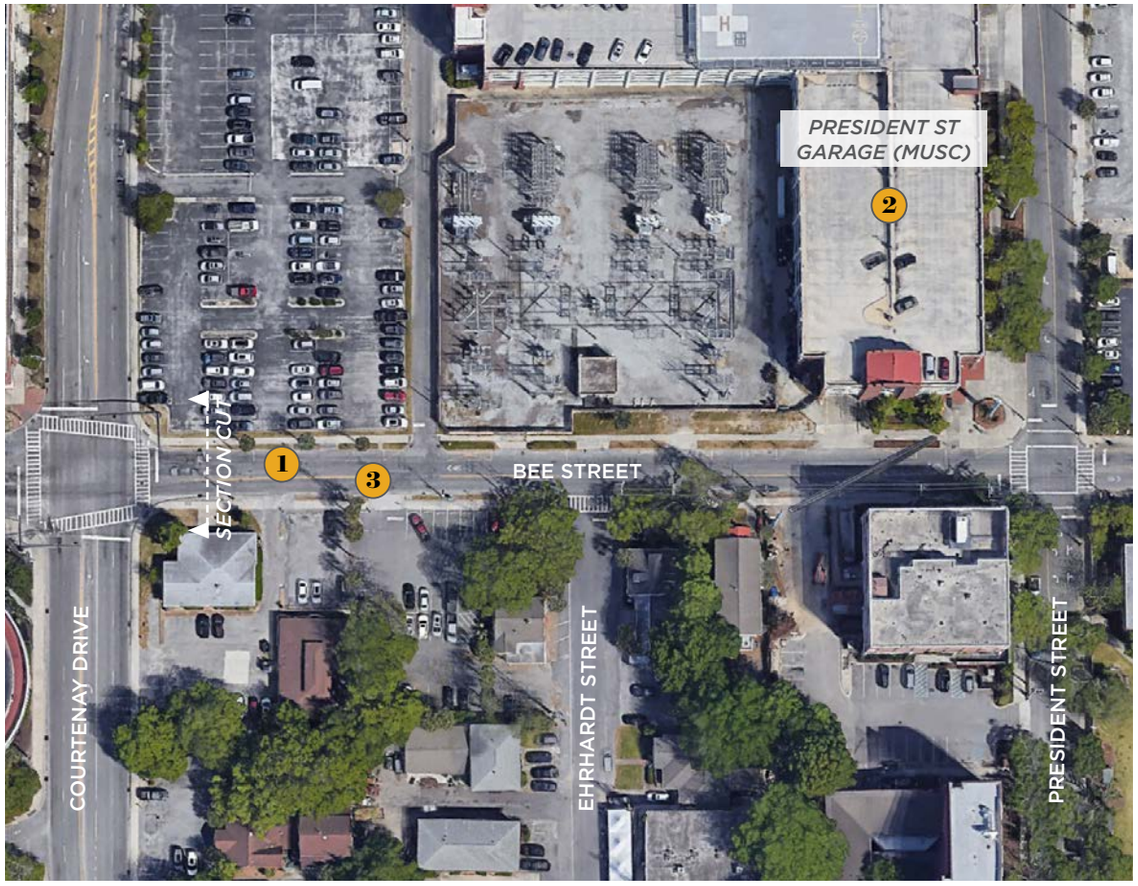
7. Bi-directional bike traffic, 5’ wide lanes

## RECOMMENDED

# AREA 2- SEGMENT 2 *EXISTING*

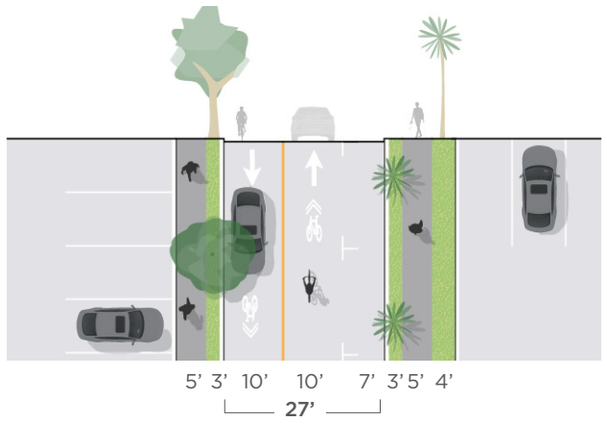
## Repurpose metered parking spaces and grass median

Maintain current travel lanes and convert metered parking into a 10' cycletrack with a 2' buffer.




NORTH — 200 FEET

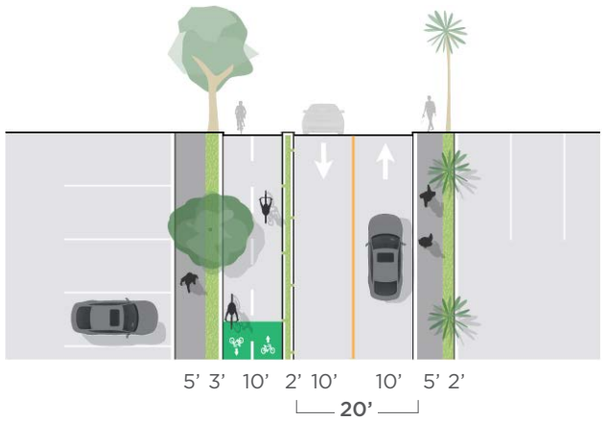
1. One westbound lane, one eastbound lane, one parking lane
2. Adjacent parking decks and surface lots in addition to metered parking
3. Sharrows begin; continue to Rutledge Avenue




# *RECOMMENDED*

Adding a cycletrack and maintaining current travel lanes will require removing eight metered parking spots and using adjacent ROW north of current lanes. Curbs and utilities will need to be relocated.


CURRENT CURB LINE




1. Move northern curbline to remove parking lane (8 metered parking spots) and part of adjacent grass median for 10' cycletrack with 2' buffer
2. Maintain 10' travel lanes
3. Provide driveway access across protected cycletrack
4. Transition to sharrows for all bike traffic at President Street

Extending the cycletrack past Courtenay Drive to President Street creates 500' of additional protected bike infrastructure, and allows cyclists to transition from cycletrack to sharrows at a smaller intersection

# AREA 2- SEGMENT 2

# *PRESIDENT STREET INTERSECTION*

## EXISTING


## RECOMMENDATIONS

1. Move northern curbline about 5’ to widen Bee Street for cycletrack
2. Transition to sharrows for all bike traffic at President Street

## CYCLETRACK DESIGN

3. 2’ wide buffer with granite curbs
4. Gaps in buffer curbs to collect stormwater
5. Buffer planted with low-maintenance native species
6. Street trees provide shade to both sidewalk and cycletrack; absorb stormwater
7. Bidirectional bike traffic, 5’ wide lanes

## RECOMMENDED

# AREA 2- SEGMENT 3

## EXISTING/RECOMMENDED

### The narrowest portion of Bee Street

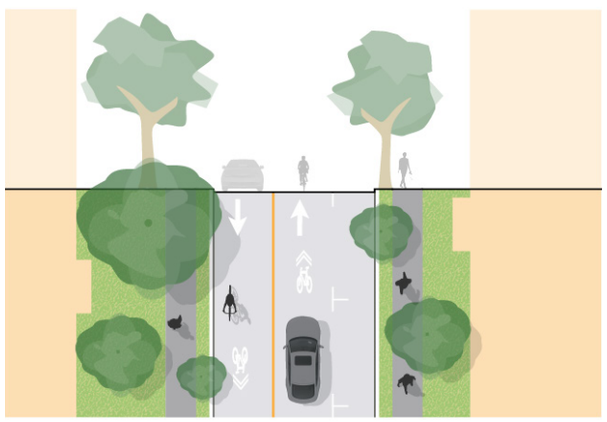
Maintain current sharrows placement, travel lane width, and street parking

Cyclists will transition from cycletrack to sharrows at the President Street intersection. Adding green paint to current sharrows adjacent to President Street will further ease this transition.


NORTH

100 FEET

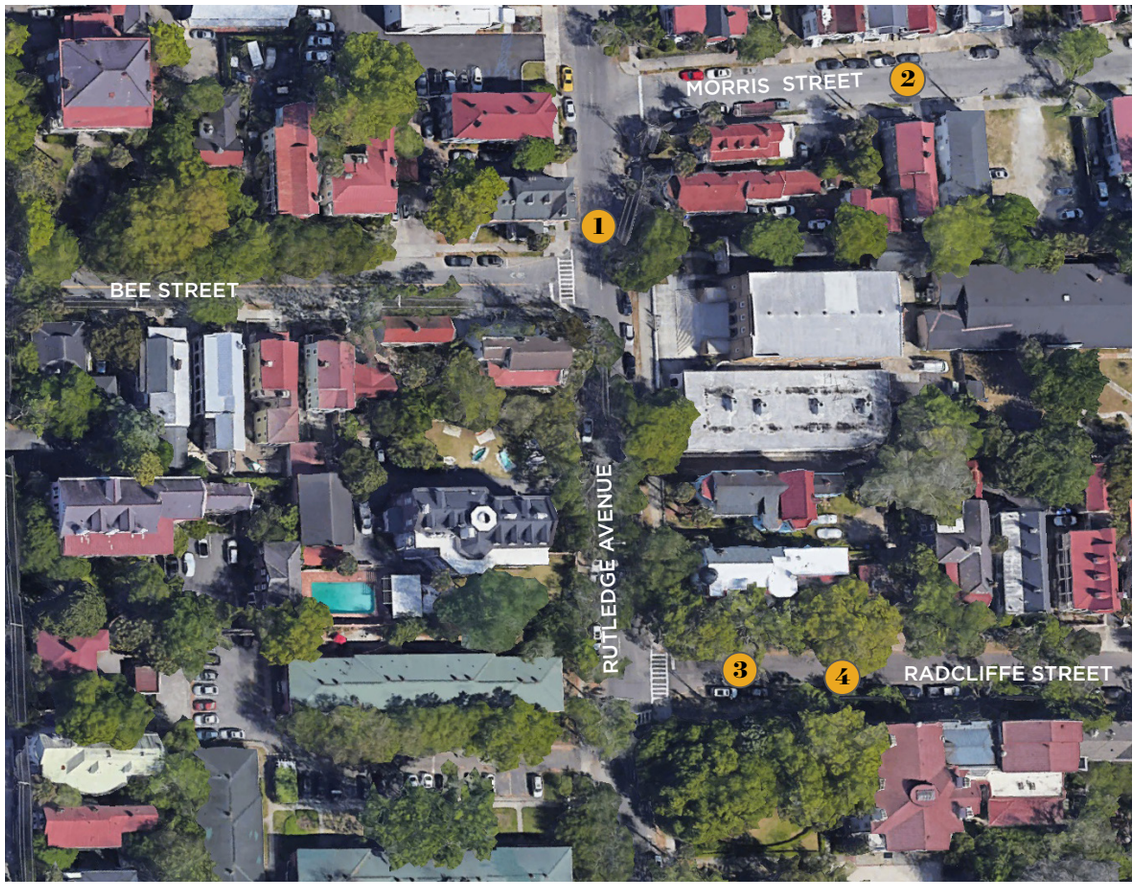
1. One westbound lane, one eastbound lane, one parking lane
2. Transition to residential neighborhood
3. Sharrows
4. Add green-backed sharrows to assist with cycletrack to sharrow transition
5. Metered parking to remain



# AREA 3 *EXISTING*

## Pair fast-moving vehicle traffic on Rutledge Avenue with protected bike lanes

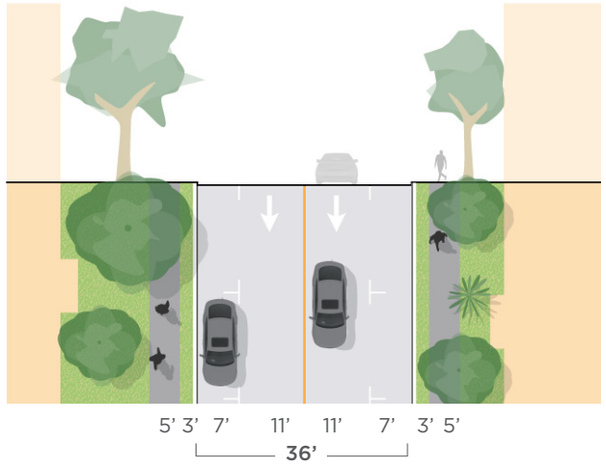
Our recommendation adds buffered bike lanes to Rutledge Avenue to help cyclists safely reach Morris Street and Radcliffe Street




1. Two southbound travel lanes and two parking lanes
2. One parking lane, one partial parking lane, one westbound lane
3. One westbound lane, one eastbound lane, one parking lane
4. Sharrows

NORTH

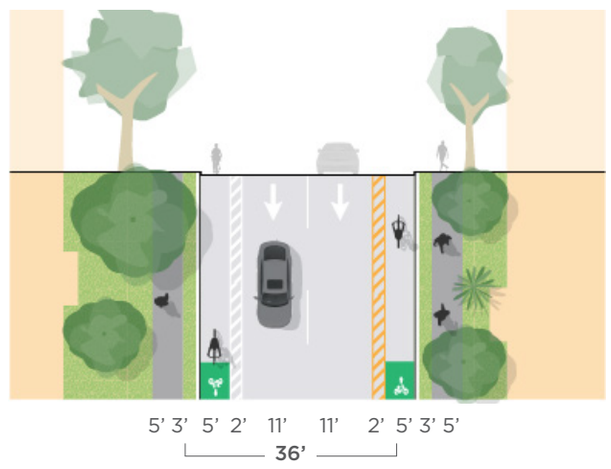
100 FEET






# *RECOMMENDED*

Over 1,000' of buffered bike lanes on Rutledge Avenue and Morris Street can be created by removing 22 parking spots (9 residential and 13 metered)

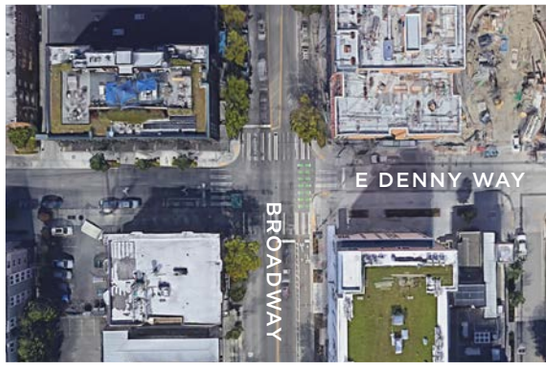

1. Remove 3 residential parking spots for 90' long 5' bike lane with 2' buffer
2. Add 80' long 5' contraflow bike lane with 2' buffer (no existing parking)
3. Remove 4 residential parking spots for 450' long 5' contraflow bike lane with 2' buffer (extended to Smith Street)
4. Remove 8 metered parking spots for 230' long 5' bike lane with 2' buffer
5. Remove 5 metered parking spots and 2 residential parking spots for 185' long 5' contraflow bike lane with 2' buffer
6. Add crosswalks with signs on Rutledge Ave
7. Add signs directing cyclists to cross at Radcliffe Street

# CYCLETRACK TRANSITION STRATEGIES

## COMMON CYCLE TRACK TRANSITION STRATEGIES


**Charlotte, NC (*2019*)**

Cycle track terminates at park, waterfront, or other edge




**Seattle, WA (*2013*)**

One lane of cycle traffic transitions to sharrows while another is encouraged to turn (or given no cue)

## BEST TRANSITION STRATEGIES FOR BEE STREET


**Atlanta, GA (*2016*)**

Using a bike crosswalk and additional paint to ease transition to sharrows


**Richmond, VA (*2018*)**

Merging cycle track and sharrow mid-block, maintaining a bike lane

## RELEVANT CYCLE TRACK/BUS LANE STRATEGIES


**Austin, TX**

Shared bus-bike lanes


**Chicago, IL *(2016)***

Weaving cycle track, bus rapid transit lanes, and turn lanes



# CYCLETRACK BUFFER EXAMPLES

## RAISED BUFFER (NO VEGETATION)

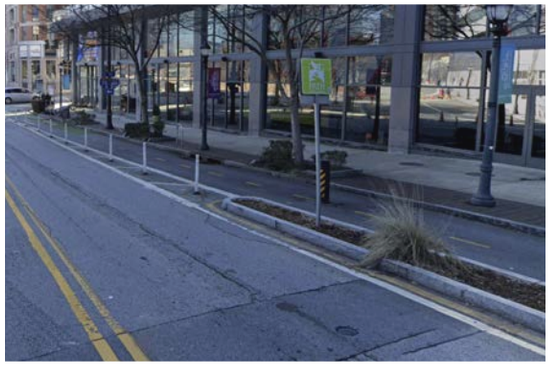
**Tampa, FL- Jackson St (*2018*)**

Brick median, metal delineators

**Washington D.C. (*2013*)**

Cement medians, bollards

## RAISED BUFFER WITH VEGETATION



**Atlanta, GA- Luckie St (*2017*)**

Plastic delineators, planted median

**Vancouver- Smithe St (*2021*)**

Cement median, planter boxes, metal delineators

## RAISED BUFFER WITH BIOSWALES


**Decatur, GA- McDonough St (*2017*)**

Bioswales, brick median, bollards


**Burbank, CA- Hollywood Way *(2016)***

Raised bike lane, bioswales

## RECOMMENDED

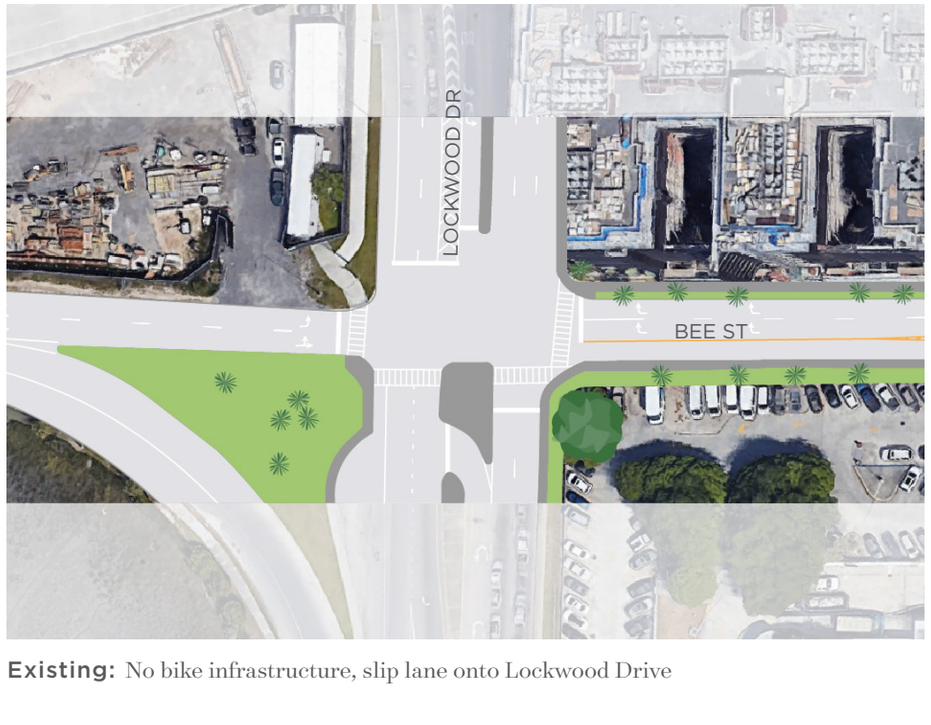

**Recommended Area 1:** Cycletrack crossing, add turn lane onto Lockwood Drive using current median land, widen Bee Street on VA property

Removing the current slip lane and replacing it with a dedicated right turn lane at the intersection is the first step in ensuring bike and pedestrian safety. Vehicle speeds, limited visibility for both vehicles and pedestrians, and regular flooding events are existing safety concerns that would become more dire with increased pedestrian and bicycle activity from the Ashley River Crossing.

A cycletrack and dedicated crosswalk consolidates bi-directional bike movement, creating a predictable pattern. Adding a fourth crosswalk provides more access and comfort for pedestrians. This crossing should be the shortest distance possible.

Widening Bee Street would create space for a cycletrack without removing a lane of vehicle travel, expand the sidewalk, reduce the lane shift for eastbound vehicles, and mitigate traffic impacts typically observed by lane reduction or bicycle traffic mixing with vehicle traffic.

## EXISTING



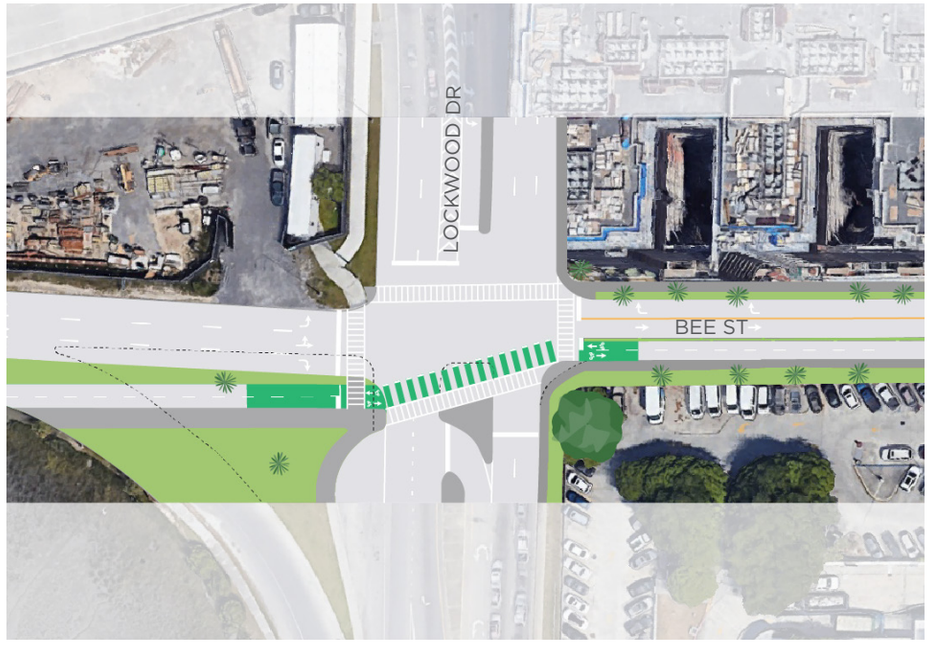

**Existing:** No bike infrastructure, slip lane onto Lockwood Drive

## STUDIED (UNDER CONSIDERATION)

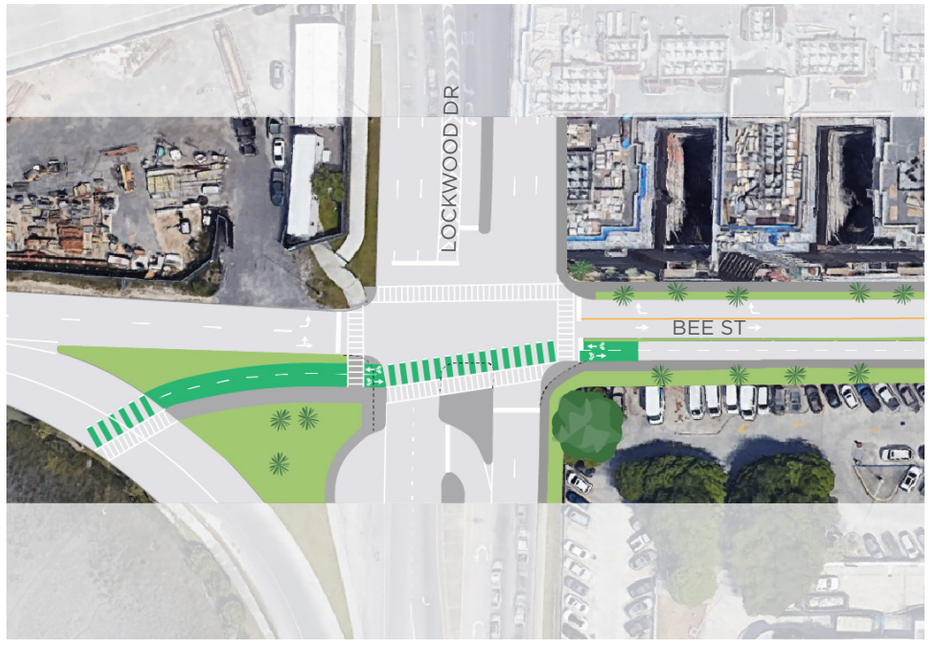

**Alternative 1:** Cycletrack crossing, add turn lane onto Lockwood Drive using pump station land, maintain Bee Street curblines

## STUDIED (NO LONGER UNDER CONSIDERATION)


**Alternative 2:** Angled cycletrack crossing, slip lane onto Lockwood Drive, straight pedestrian crosswalk




**Alternative 3:** Angled cycletrack crossing, right turn lane onto Lockwood Drive, angled pedestrian crosswalk




**Alternative 4:** Cycletrack crossing, maintain curblines, slip lane crossing

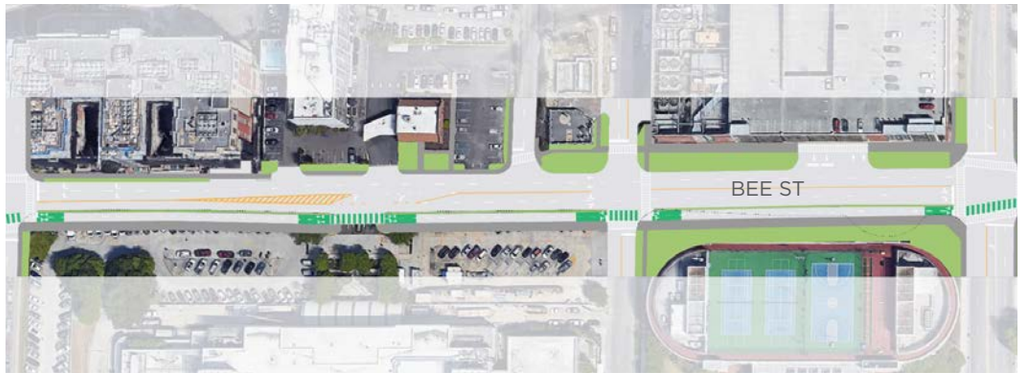
| | Cycletrack | Road Widening | Maintain Vehicle Lanes | Lane Shift | Slip Lane |
|---|---|---|---|---|---|
| Existing | | | ✓ | | ✓ |
| Proposed | ✓ | ✓ | ✓ | | |
| Alternative 1 | ✓ | | | | |
| Alternative 2 | ✓ | | | ✓ | |
| Alternative 3 | ✓ | | | ✓ | |
| Alternative 4 | ✓ | | | ✓ | ✓ |

**Lane Shift-** Alternatives 2, 3, and 4 would shift eastbound traffic crossing Lockwood Drive by about 7 feet, exceeding the recommended max lane shift of half a lane's width (5 feet) and endangering cyclists crossing Lockwood Drive.

**Road Widening-** Recommended widens Bee Street on VA Property. Alternative 1 widens bridge landing on current pump station land and Alternatives 2 and 3 widen bridge landing on current median.

# AREA 2- SEGMENT 1

## RECOMMENDED




**Recommended Area 2- Segment 1:** Cycle track with buffer on current VA property, move curbline, maintain all vehicle lanes

A buffered cycletrack along the southern edge of Bee Street will provide the safest route for cyclists through the busiest and most spatially constrained part of the Bee Street corridor. Widening Bee Street will allow for the inclusion of the needed cycletrack without removing any vehicle travel lanes.

The cycletrack would be at grade, the same as the vehicle travel lanes. While elevating the cycletrack to the sidewalk level would further separate the modes, keeping the cycletrack at street level promotes and supports bikes and cars coexisting in the roadway.

All options show eastbound right turn lane and shared left/ through lane (rather than left turn lane and shared right/ through lane) to prevent 10' lane shift crossing Courtenay Drive



# *ALTERNATIVES COMPARISON*

## EXISTING


**Existing:** No bike infrastructure, widens from 32' to 50'

## STUDIED (UNDER CONSIDERATION)


**Alternative 1:** Elevated cycletrack on current VA property, maintain curbline, maintain all vehicle lanes


**Alternative 2:** Cycle track with buffer in current ROW, maintain curbline, remove westbound right turn lane

# AREA 2- SEGMENT 2



## RECOMMENDED


**Recommended Area 2: Segment 2** Cycle track with buffer using current parking lane and some median land, move curbline

Recommended was selected to maximize the length of the Bee St cycle track and maximize cyclist safety. By removing 8 (already under-utilized) on-street metered parking spots and about 5' of the existing grass median on the north side of Bee St, 725' of additional protected cycle track can be added.

As an additional safety bonus, the proposed plan allows cyclists to transition from cycle track to sharrows at the President St intersection instead of the significantly wider and busier Courtenay Drive intersection (Alternative 1).

## EXISTING


**Existing:** Sharrows, two travel lanes, and an underutilized parking lane

## STUDIED (UNDER CONSIDERATION)


**Alternative 1:** Transition to one westbound bike lane and eastbound sharrows at Courtenay, lose parking lane but maintain curbline

## RECOMMENDED


**Recommended Area 3:** Remove 22 parking spots to add bike lanes to Rutledge Avenue from Radcliffe Street to Morris Street and a contraflow lane on Morris Street from Rutledge Avenue to Smith Street.

This alternative maximizes the Bee Street-Downtown connection with buffered bike lanes on Rutledge Avenue from Morris Street to Radcliffe Street. Protected infrastructure helps cyclists safely navigate Rutledge Avenue, a corridor that has typically only been utilized by confident cyclists. This unlocks the central peninsula and the Medical District for bike commuters, recreational users, and families.

Protected infrastructure on Rutledge Avenue provides an option for more users of varying skill and confidence levels to access the Bee Street Bikeway and the Ashley River Crossing.

Including a contraflow bike lane on Morris Street provides better access and more options to cyclists. Four residential parking spaces would be replaced with bike infrastructure to Smith Street, a calm two-way street.

## EXISTING


**Existing:** No bike infrastructure on Rutledge Avenue or Morris Street, sharrows on Radcliffe Street

## STUDIED (UNDER CONSIDERATION)


**Alternative 1:** Remove parking lane on Rutledge Ave to add a contraflow bike lane and southbound sharrows

## AREA 1

### ARC Landing

Bee Street and Lockwood Drive Intersection

**Recommended:***

Separated cycletrack, road widening using median land within ROW, south of current lanes

**Alternative 1:**

Separated cycletrack, bridge landing widening using pump station land within ROW, north of current lanes

**Recommended Area 1 is not compatible with Area 2- Segment 1 Alternative 2*

## AREA 2

### Segment 1

Lockwood Drive to Courtenay Drive

**Recommended:**

Cycletrack on adjacent property south of current ROW. Requires curb and utility relocation

**Alternative 1:**

Elevated cycletrack on adjacent property south of current ROW (maintain curbline)

**Alternative 2:**

Cycletrack within existing ROW (maintain curbline)

### Segment 2

Courtenay Drive to President Street

**Recommended:**

Cycletrack using adjacent ROW north of current lanes. Requires curb and utility relocation

**Alternative 1:**

Westbound bike lane within existing ROW (maintain curbline)

### Segment 3

President Street to Rutledge Avenue

**Existing/Recommended:**

Sharrows

## AREA 3

### Bee-Mor-Rad Connector

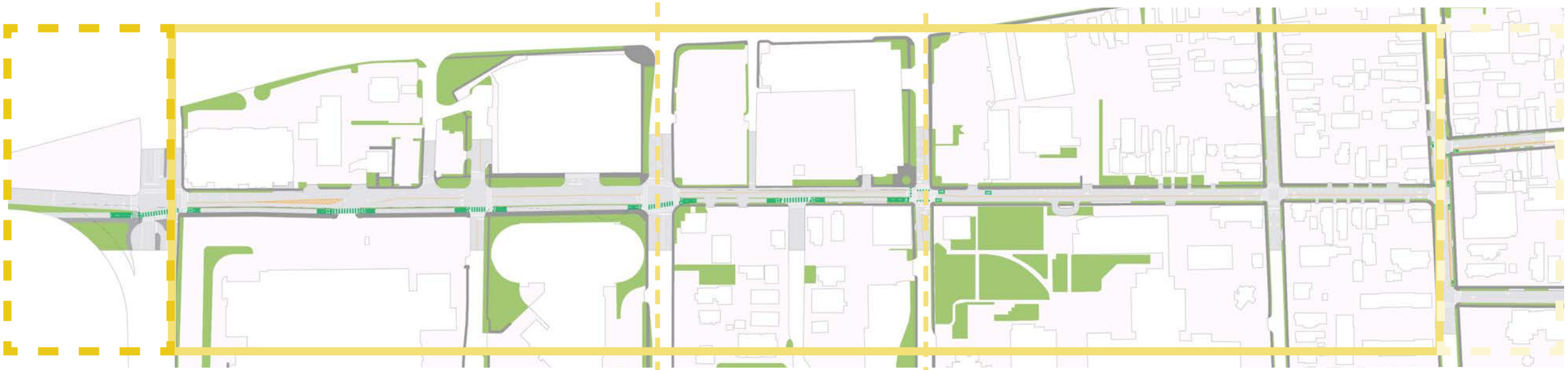
Rutledge Ave from Morris Street to Radcliffe Street

**Recommended:**

Bike lanes on Rutledge Avenue between Morris Street and Radcliffe Street

**Alternative 1:**

Northbound bike lane between Radcliffe Street and Bee Street



*Proposed Bee Street*

NORTH

300 FEET


DESIGNDIVISION.ORG

*Charleston, South Carolina*

*2023*