

carta

Downtown Charleston Transit Study

Future BRT Running Ways

TEL A RIDE
DASH

EXPRESS ROUTES



ON-BOARD
BEACH REACH
FIXED ROUTES
PARK & RIDE

TEL A RIDE
DASH

About the Project



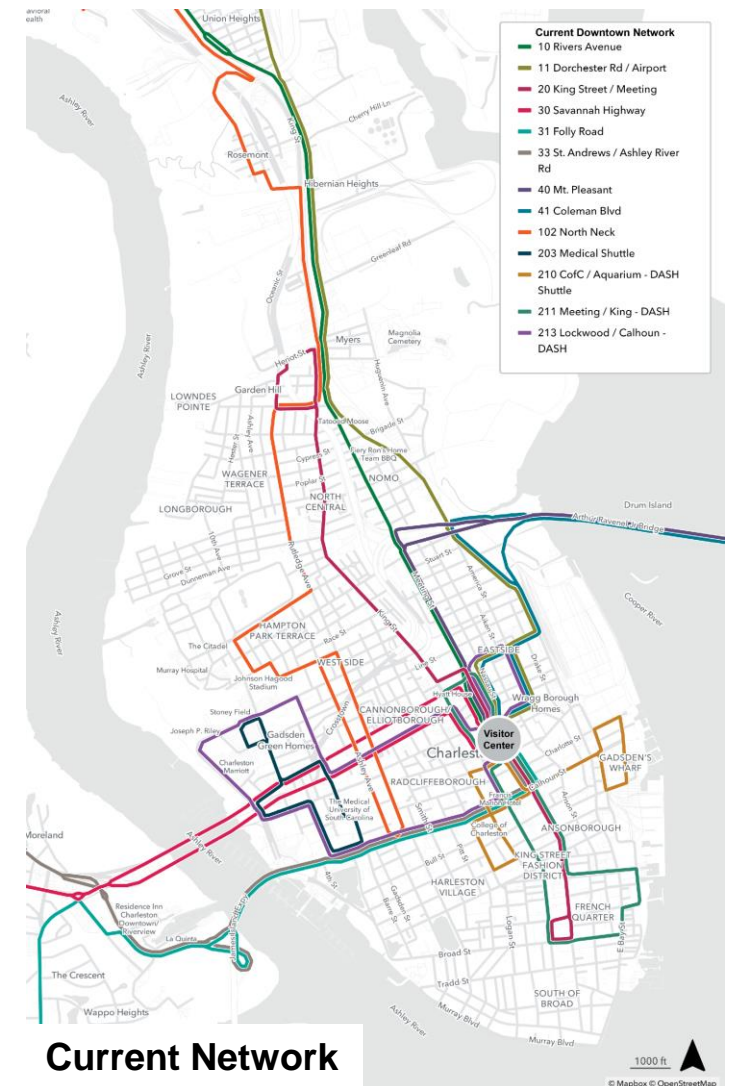
CARTA and BCDCOG are working on changes to local bus and DASH shuttle service on the Charleston Peninsula to:

1. Enhance service frequency, access reliability, and coverage;
2. Modernize transit infrastructure; and
3. Regain ridership post-pandemic and build new ridership.

This document contains draft concepts for future transit networks that were created based on current transit demand, planned developments on the Peninsula, ridership trends, on-time performance, fleet constraints, and community input to date. Additional considerations involved transit infrastructure on the Peninsula including:

- Planned Mt. Pleasant Street park-and-ride lot;
- Proposed Lowcountry Rapid Transit (LCRT) alignment and stations and corresponding infrastructure; and
- Access to existing and planned bicycle and pedestrian facilities.

The map to the right shows the Study Area and the existing downtown bus network. The Study Area includes the portion of the City of Charleston on the Peninsula, terminating at the northern city limits. Local routes and Downtown Area Shuttle (DASH) routes are shown on this map, but express routes are not. Express routes will be shown on a separate map within the document.



Future BRT Running Ways

Feasibility Review

BRT Running Ways Feasibility Overview



What's the backstory for this task?

Lowcountry Rapid Transit (LCRT) is being designed as a 21.3-mile modern bus rapid transit (BRT) project designed to operate mostly in dedicated lanes, from Ladson, serving North Charleston, and connecting to the WestEdge development in Downtown Charleston. The Regional Transit Framework Plan identified additional priorities for high-capacity transit routes sharing at least a portion of the LCRT alignment on the Peninsula.

On the Peninsula, the current proposal for LCRT running ways is side-running BRT in mixed traffic, with Transit Signal Priority (TSP) at all signalized intersections from the downtown terminus at the Hagood Ave./Line St. station to the Mt. Pleasant St. station. However, prior recommendations for this segment were a combination of curbside mixed-traffic and reversible peak hour lane configurations to provide BRT more advantages in travel time and reliability in the peak direction compared to local bus service, while also working within limited ROW.

Why are we doing this feasibility review now?

As part of the Downtown Charleston Transit Study, our desire is to take a fresh look at options for BRT running ways on the Peninsula that would deliver fast, reliable, high quality, safe, and cost-effective services. **Our purpose is to conduct a high-level feasibility review of BRT priority transit lane options to support future decision-making.**



LCRT Proposed Route and Stations

Prior Studies: The Need for Priority Transit Lanes

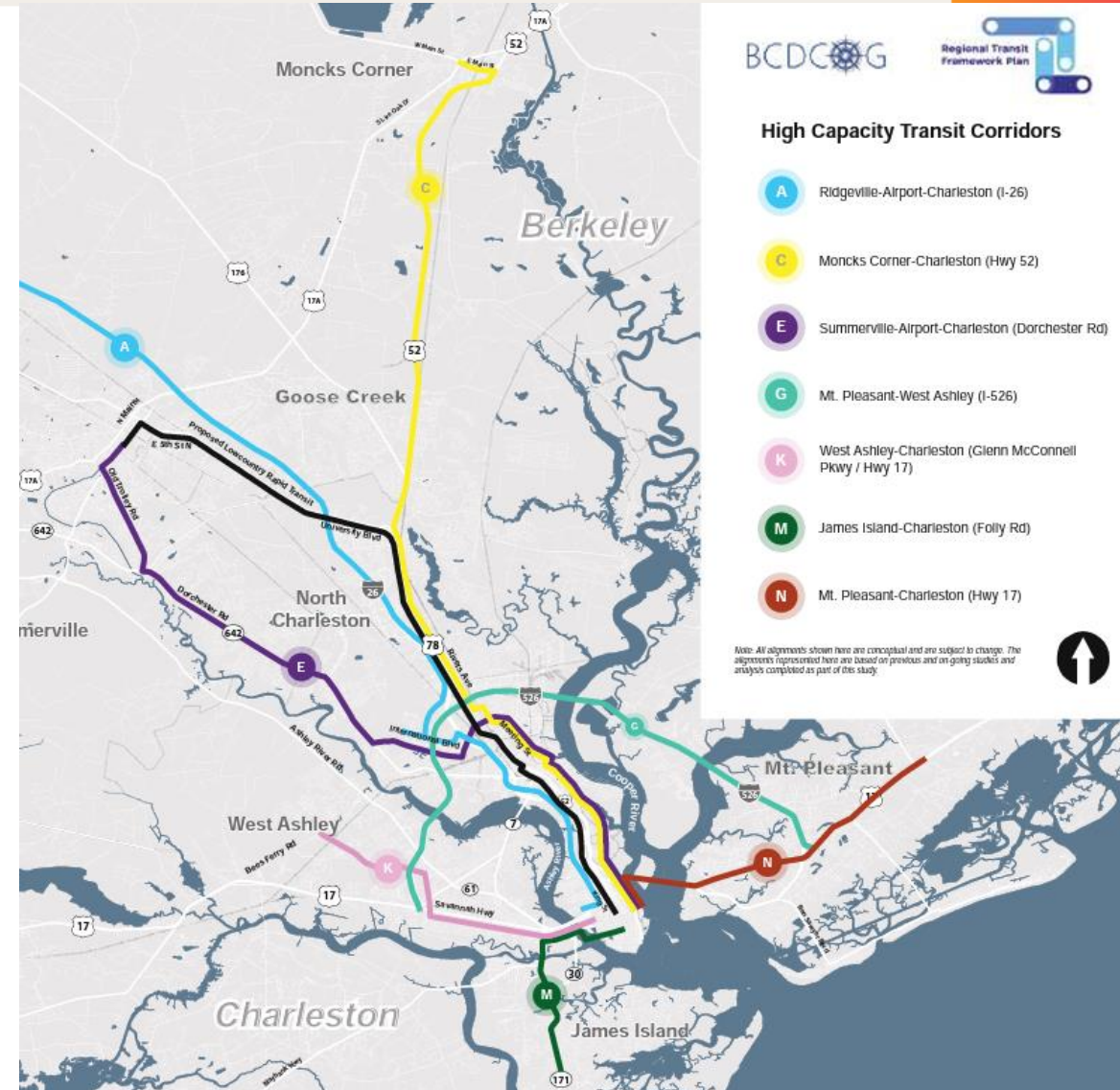


- In August 2020, the ***LCRT Alignment Refinement Technical Memo*** recommended elimination of the 'Lowline' option in the Peninsula area, setting up a full Meeting St. alignment south of Mt. Pleasant St.
- Proposed runningway characteristics were:
 - **Mt. Pleasant St.-Line:** Center running reversible lane
 - **Line-Calhoun:** Side running reversible peak hour Business Access & Transit (BAT) lane
 - **On Calhoun:** Side running peak reversible hour BAT lane
- Further LCRT design development culminating in approved Documented Categorical Exclusion (June 2021) resulted in changes to the type of transit lane south of the Mt. Pleasant St. station
 - Buses would operate in four lanes of **mixed-traffic** on current right-of-way south of Mt. Pleasant St. station to the southern terminus at Line St. / Hagood Ave. station
 - TSP to reduce delay and promote more reliable travel times at all signalized intersections
 - No reversible or BAT lanes

Prior Studies: The Need for Priority Transit Lanes



- The purpose of the **Regional Transit Framework Plan (RTFP)**, completed for BCDCOG in 2018, was to identify and prioritize a High Capacity Transit (HCT) network for the future of the Charleston Region.
 - Identified and evaluated 14 high-capacity transit corridors, which were screened down to 5 corridors recommended to advance for further detailed analysis.
 - Each of the 5 are assumed to share at least a portion of the LCRT alignment on the Peninsula.
 - As part of more recent planning efforts, the following BRT corridors from the RTFP have been identified as priorities:
 - **C: Moncks Corner-Charleston**
 - **E: Summerville-Airport-Charleston**
 - **N: Mt Pleasant-Charleston**





- **C: Moncks Corner-Charleston**

- 120 min one-way running time
- 10 min peak, 20 off-peak frequencies
- 6 buses/hr in peak

- **E: Summerville-Airport-Charleston**

- 60 min one-way running time
- 10 min peak, 20 off-peak frequencies
- 6 buses/hr in peak

- **N: Mt Pleasant-Charleston**

- 32 min one-way running time
- 10 min peak, 20 off-peak frequencies
- 6 buses/hr in peak

Assuming shared LCRT Alignment:

18 buses/hr combined RTFP routes
+ 6 buses/hr LCRT
24 buses/hr combined

Combined with LCRT, this system of high-capacity transit routes has the potential to result in a BRT bus using the alignment **as frequently as every two minutes!**

Comparison of BRT Running Way Options



- LCRT Refinement Tech Memo recommends reversible lane segments to provide transit time and reliability improvements compared to existing local bus service
- Documented Categorical Exclusion assumes mixed-traffic due to safety, visual, and cost concerns associated with reversible lanes
- Alternative proposed for review: Peak Hour BAT Lanes requiring less infrastructure investment

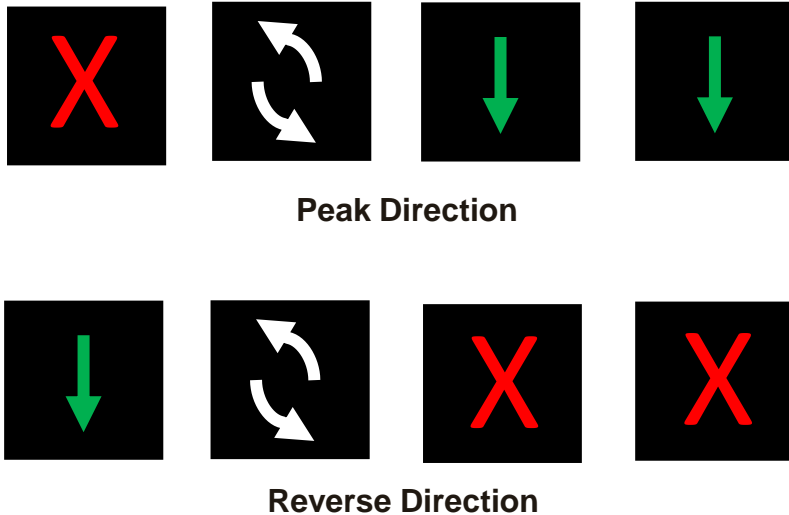
| Segment | LCRT Alignment Refinement Technical Memo | Documented Categorical Exclusion | <i>Alternative Running Ways (Review)</i> |
|--------------------------------|--|----------------------------------|--|
| Meeting St: Mt Pleasant – Line | Center Running Reversible | Mixed-Traffic Flow | <i>Peak Hour BAT Lanes</i> |
| Meeting St: Line – Calhoun | Side Running Reversible | | |
| Calhoun St | Peak Hour BAT Lane | | |

Alternatives to BRT Running Ways



LCRT Alignment Refinement Concept: Dynamic Reversible Lanes

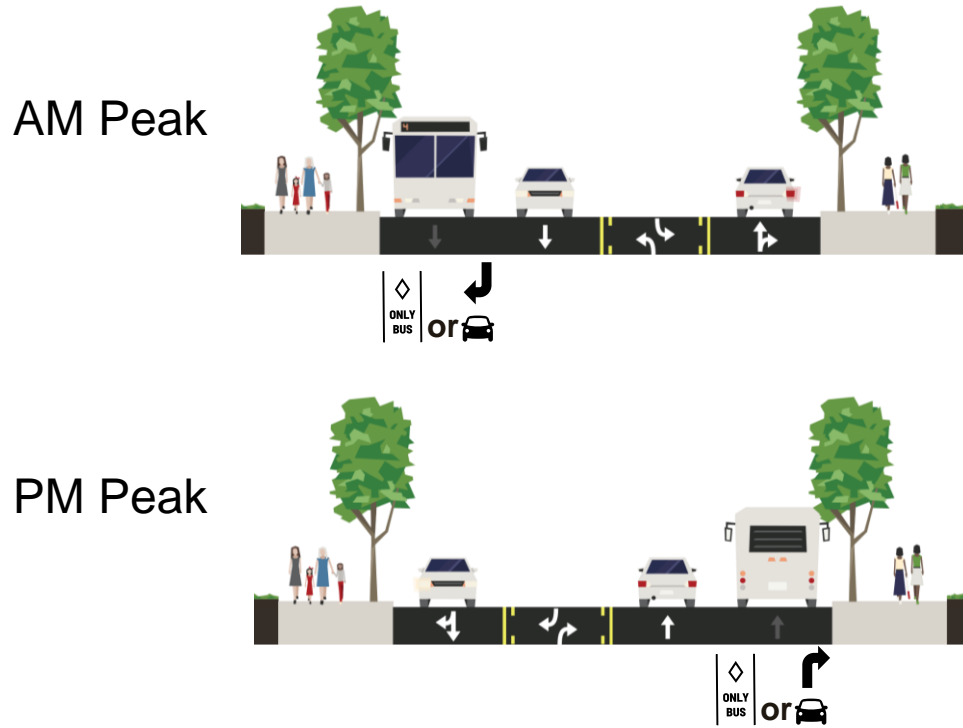
Alternative Concept: Signed Peak Hour Bus Lanes



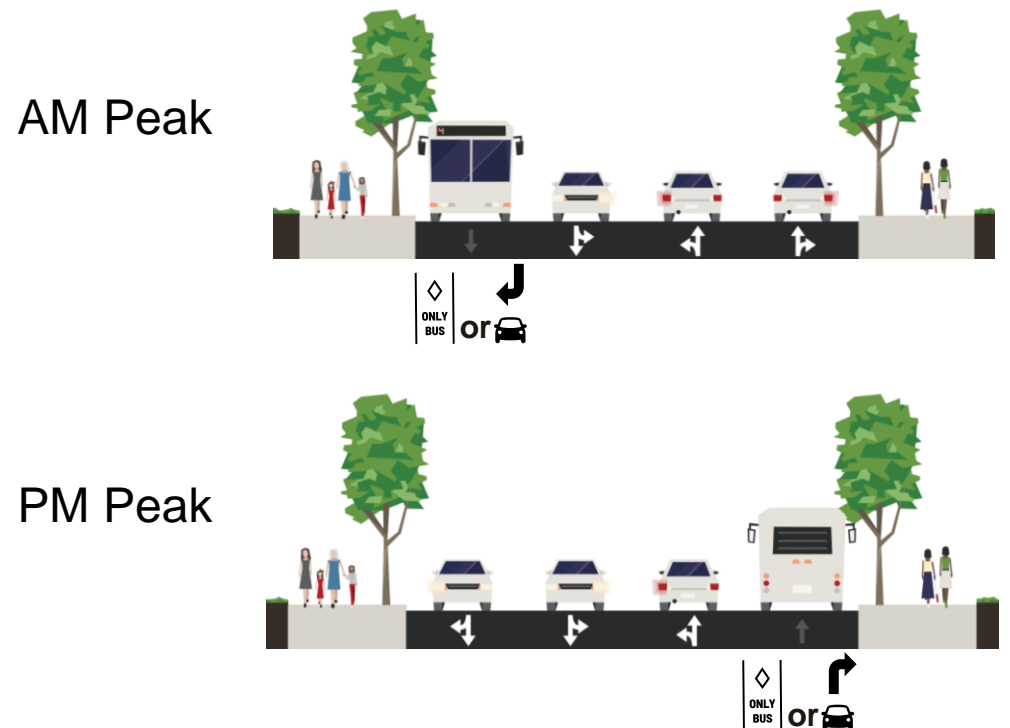
Alternatives to BRT Running Ways



LCRT Alignment Refinement Concept: Dynamic Reversible Lanes



Alternative Concept: Signed Peak Hour Bus Lanes



Alternative Concept: Operational Implications



| Direction | Peak Direction of Travel | | | Off-peak Direction of Travel | | |
|--|--|-----------|---|---|-----------|---|
| | Concept / Lane | Left Turn | Through | Right Turn | Left Turn | Through |
| Existing Conditions | Shared with through lane | | Shared with through lane | Shared with through lane | | Shared with through lane |
| LCRT Refinement Concept: Dynamic Reversible Lanes | Shared with off-peak direction | | Shared with peak direction | Shared with peak direction | | Shared with through lane (Matches existing) |
| Alternative Concept: Signed Peak Hour Bus Lanes | Shared with through lane (Unless restricted) | | Shared with through lane (Matches existing) | Shared with through lane (Matches existing) | | Shared with through lane (Matches existing) |

Comparing lane configurations, the key difference between the “dynamic reversible lanes” and “signed peak hour bus lanes” concepts is in the peak direction of travel, where the signed peak hour bus lane alternative does not have a dedicated left turn pocket. Left turners share a lane with through vehicles and matches the existing lane configuration, with the exception that there is only one through lane along the corridor.

In the off-peak direction, the signed peak hour bus lane configuration is the same as the existing lane configuration, with two through lanes, each being shared with left and right turners.

Alternative Concept: Operational Implications



| Other Implications | Dynamic Reversible Lanes | Peak Hour Bus Lanes |
|------------------------------|--|---|
| Costs | <ul style="list-style-type: none"> • High up front, unknown maintenance • Rollout must be done for larger segment | <ul style="list-style-type: none"> • Low, signage/stripping • Rollout in partial segments possible |
| Signage Required | <ul style="list-style-type: none"> • Interconnected overhead gantries (by block), plus potential signage | <ul style="list-style-type: none"> • Single sign on each block, plus optional pavement markings |
| Adaptability, Time of day | <ul style="list-style-type: none"> • High: Instantaneous | <ul style="list-style-type: none"> • Medium: Signage decals |
| Adaptability, Infrastructure | <ul style="list-style-type: none"> • Medium: Can change block-by-block but with increased complexity/safety risks • Bus lanes in future would require eliminating changeable lanes | <ul style="list-style-type: none"> • High: Can begin/end priority segments as needed, with signage • Could implement off-peak bus lanes in future |
| Safety Considerations | <ul style="list-style-type: none"> • Head on collisions: Driver and visitor familiarity with complex operations • Left turns in dedicated lanes | <ul style="list-style-type: none"> • Left turns in shared lane as existing |
| Sidewalk/Overhead Clutter | <ul style="list-style-type: none"> • High: gantries to be designed to wind load | <ul style="list-style-type: none"> • Medium: Additional signage |

Alternative Concept: Preliminary Traffic Evaluation



An existing conditions traffic model was reviewed to determine potential areas of concern with implementing the Alternative Concept. The Alternative Concept would reduce the number of through lanes in the peak direction and combine left and through movements into a single lane.

Left and through movements that met or exceeded the testing thresholds are noted on the model. Only the peak direction was reviewed on Meeting Street between Lee Street and John Street and on Calhoun Street between Courtenay Drive and St Philip Street.

Note that these thresholds should be considered only at a planning level, and that no detailed traffic analysis was conducted as part of this review.

Alternative Concept: Preliminary Traffic Evaluation



AM Peak Direction Volumes (SB Meeting, WB Calhoun)

High-level thresholds to consider (veh/hr)

Left Turns >40



Left Turns >100



Throughs >800



Throughs >1000



Alternative Concept: Preliminary Traffic Evaluation

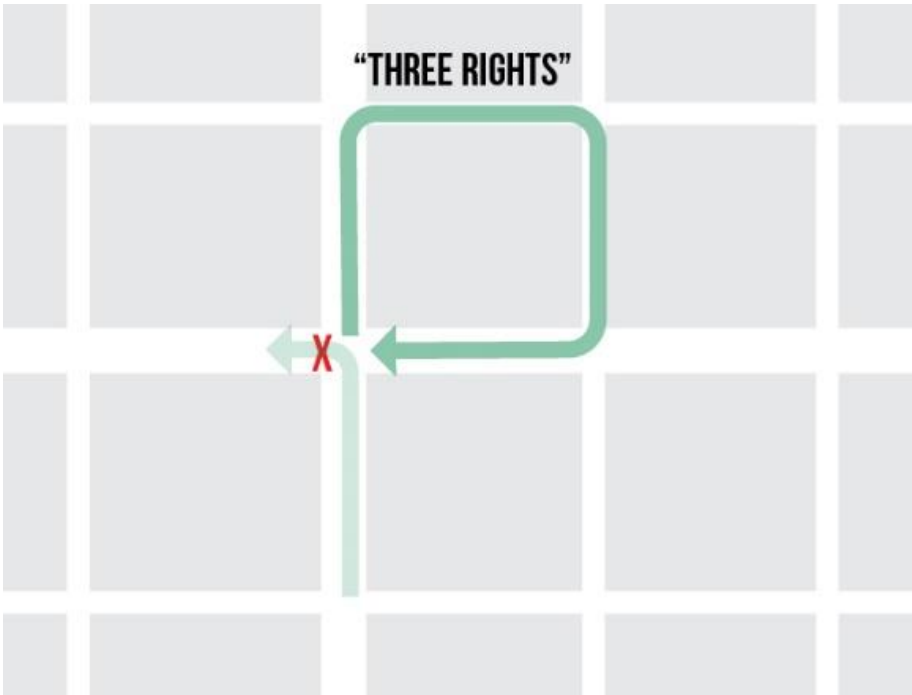


PM Peak Direction Volumes (NB Meeting, EB Calhoun)

High-level thresholds to consider (veh/hr)

| | |
|-----------------|--|
| Left Turns >40 | |
| Left Turns >100 | |
| Throughs >800 | |
| Throughs >1000 | |

Alternative Concept: Left Turn Restrictions



Source: NACTO

Restricting left turns is a potential measure to alleviate left turning vehicles blocking a single through lane while the signal is green

- 40 vehicle/hour turning is 1 vehicle/cycle with a 90 second cycle length
- Potentially implement after evaluation
- Consider alternative routes or lack thereof
- Consider impacts to right turns, bus operations, and side streets

Alternative Concept: Potential Implementation Areas



A pilot implementation of the **Signed Peak Hour Bus Lanes** alternative concept could be implemented where traffic volumes are lower.

AM Peak

- **Westbound Calhoun St between King St and Courtenay Dr**
- **Southbound Meeting St between Woolfe St and John St**

PM Peak

- **Eastbound Calhoun St between Rutledge Ave and King St**
- **Northbound Meeting St between John St and Line St**

Monitor and consider left turn restrictions if needed where through or left turn volumes are higher.

Pilot studies should be accompanied with before/after evaluations of bus travel time/reliability and the effect on vehicle delay through quantifiable travel time runs over a predetermined length of the corridor.

Note: No bus lane infrastructure is proposed on the blocks adjacent to Marion Square

Alternative Concept: Conclusion



The fatal flaw analysis conducted indicates that **signed peak hour bus lanes on the Peninsula along certain segments may be feasible to increase bus speed and reliability**. A successful pilot demonstration could be completed using a minimal amount of roadway signage and striping, and curbside station infrastructure could continue to be used.

The following supplemental operational analyses could be conducted to better understand the effects of signed peak hour bus lanes on the peak hour vehicular traffic network:

1. Reopen basic traffic analysis conducted during LCRT concept development
 - Revisit LCRT Traffic Reports and explore potential recalibration of assumptions
2. Bus Operations Analysis
 - Vissim* to evaluate complex operations and optimize person-throughput
 - More detailed evaluation of center-running reversible configuration
 - Buses/hour threshold to require dedicated bus lanes south of Line St

**Vissim is a multi-modal traffic flow micro-simulation software*