

# TRANSITWAY CORRIDOR FEASIBILITY STUDY



High Capacity Transit Corridor Work Group  
February 16, 2012

Corridor B - Alternatives Evaluation Summary



T&ES

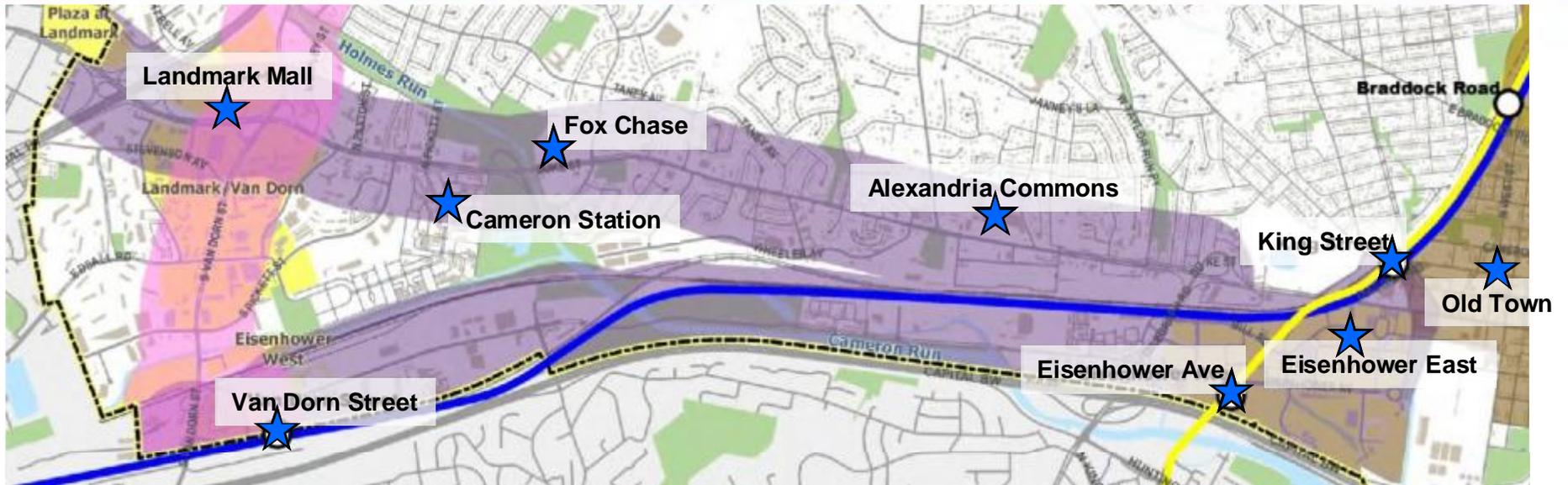


Kimley-Horn  
and Associates, Inc.

## *Meeting Agenda*

- Corridor B Discussion
  - Secondary Screening Summary
  - Alternatives Considered for Further Investigation of Impacts
  - Summary of Further Investigation of Impacts
- CWG & Public Comment
- Selection of Preferred Alternative
- Next Steps

# TRANSITWAY CORRIDOR FEASIBILITY STUDY



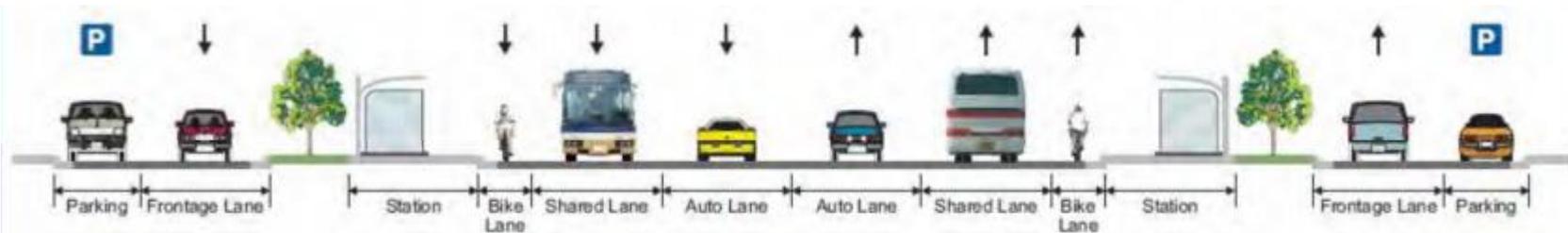
## *Corridor B: Duke/Eisenhower*



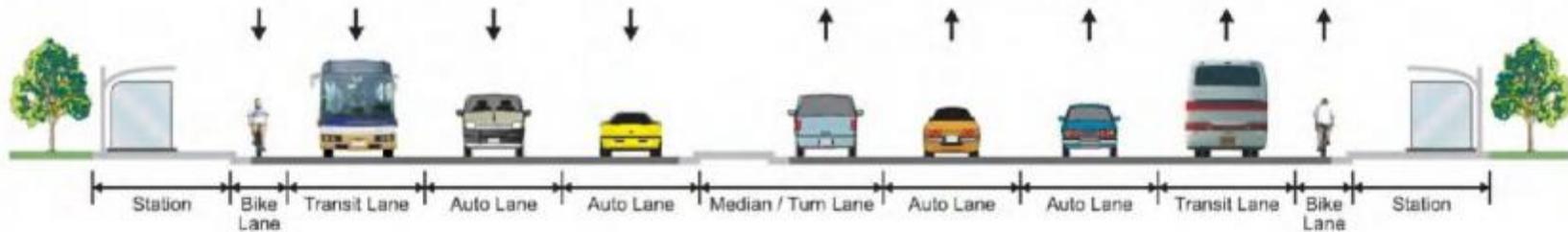
***SECONDARY SCREENING SUMMARY***

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 1 – Use Existing Lanes for Transit



Jordan Street to Wheeler Avenue

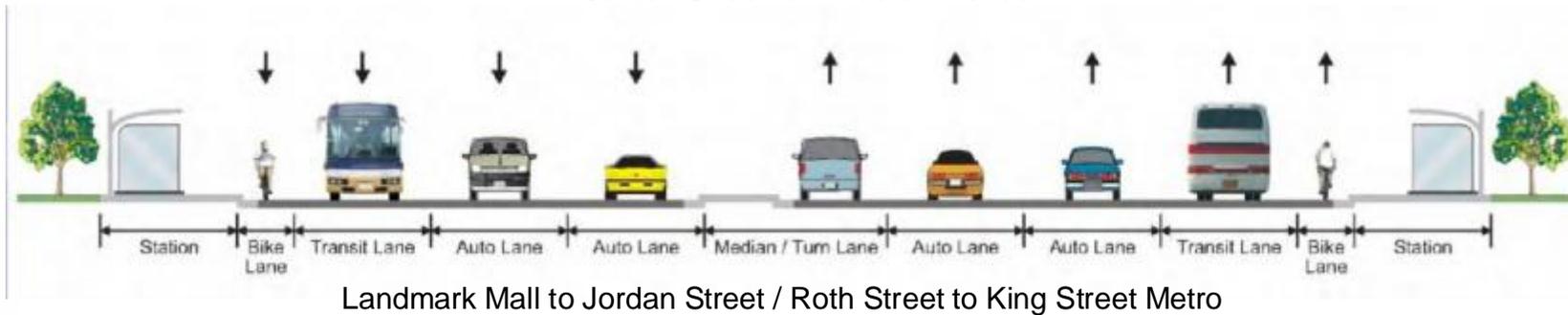
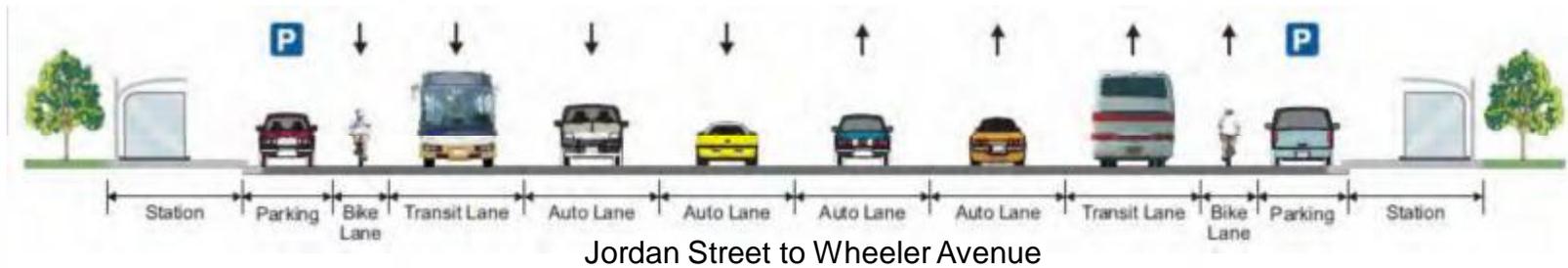


Landmark Mall to Jordan Street / Roth Street to King Street Metro

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>•Fewest negative impacts (including property)</li> <li>•Maintains service roads</li> <li>•Lowest capital cost</li> <li>•Easy to phase</li> </ul>	<ul style="list-style-type: none"> <li>•Worst transit operation due to shared lanes</li> <li>•Highest operating cost</li> <li>•Highest fleet cost</li> <li>•May be impacted by congestion on Duke Street</li> <li>•Longest transit travel time</li> <li>•Lowest ridership potential</li> </ul>

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

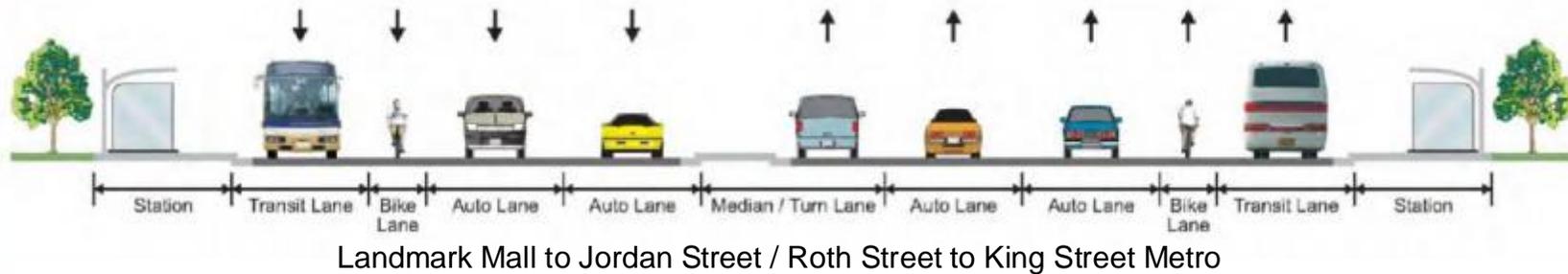
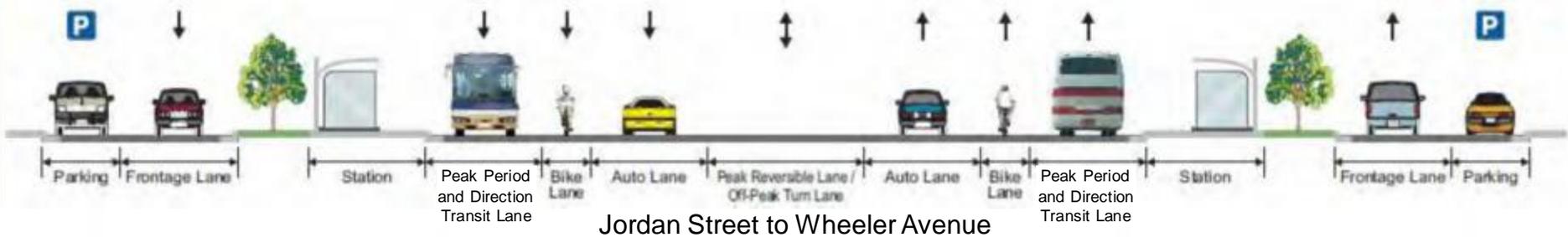
## Alternative 2 – Uses Service Road Right-of-Way



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>•Minimal impact to traffic flow</li> <li>•High-quality transit operation</li> <li>•Moderate capital, fleet, and operating cost</li> <li>•Some avoidance of congestion for transit</li> </ul>	<ul style="list-style-type: none"> <li>•Curvilinear alignment</li> <li>•On-street parking could disrupt transit operations</li> <li>•Impacts service roads and streetscape as a result</li> </ul>

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

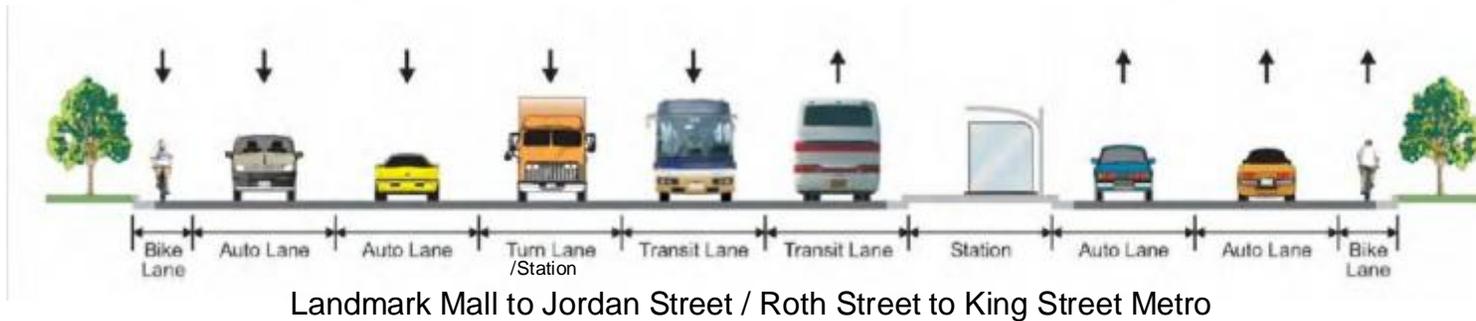
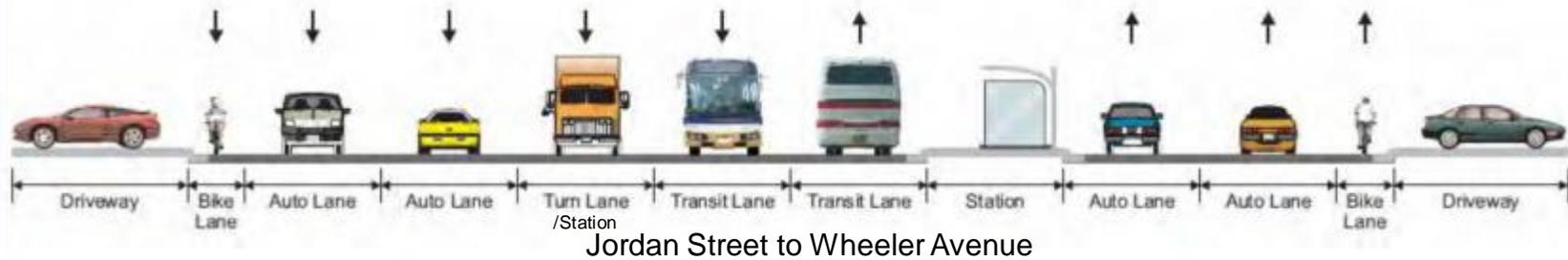
## Alternative 3 – Reversible Lane



	Advantages	Disadvantages
Reversible Lane	<ul style="list-style-type: none"> <li>•High-quality transit operation</li> <li>•Maintains most service roads</li> <li>•Moderate capital, operating, and fleet cost</li> <li>•Provides turn lanes at some new locations to help traffic flow</li> </ul>	<ul style="list-style-type: none"> <li>•Off-peak direction traffic impact OR off-peak direction transit impact</li> <li>•Property impacts</li> <li>•Requires overhead gantries to control reversible condition</li> <li>•May be confusing to drivers</li> </ul>
Reversible Lane Variation	<ul style="list-style-type: none"> <li>•Maintains most service roads</li> <li>•Less property impact than Alternative 3</li> <li>•Provides peak direction, peak period transit lane</li> <li>•Lower capital cost than Alternative 3</li> </ul>	<ul style="list-style-type: none"> <li>•No dedicated lanes off-peak time and direction</li> <li>•Property impacts</li> <li>•Requires overhead gantries to control reversible condition</li> <li>•Could be very confusing to drivers due to changing lane use condition</li> </ul>

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 4 – Median Running



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>•Best transit operation by eliminating conflicts with driveways and traffic</li> <li>•Lowest fleet and operating cost</li> <li>•Avoids impacts from traffic congestion</li> <li>•Highest ridership potential</li> </ul>	<ul style="list-style-type: none"> <li>•Largest property impact</li> <li>•Eliminates service roads and parking (in front of 28 homes)</li> <li>•Highest capital cost</li> <li>•Highest right-of-way cost and impacts</li> </ul>

***FURTHER INVESTIGATION OF  
ALTERNATIVES***

## *Alternatives to Consider for Further Investigation*

Alternative 1 –	Uses Existing Lanes for Transit
Alternative 2 –	Uses Service ROW
Alternative 3 –	Reversible Lane
<i>Alternative 3 – Variation</i>	<i>Reversible Lane Variation</i>
Alternative 4 –	Median Running

Alternative 1a – Without Duke Street Bike Lanes

Alternative 1b – With Duke Street Bike Lanes

Alternative 3a – Without Duke Street Bike Lanes

Alternative 3b – With Duke Street Bike Lanes



## *Existing Bicycle Facilities in the Corridor*



### Legend

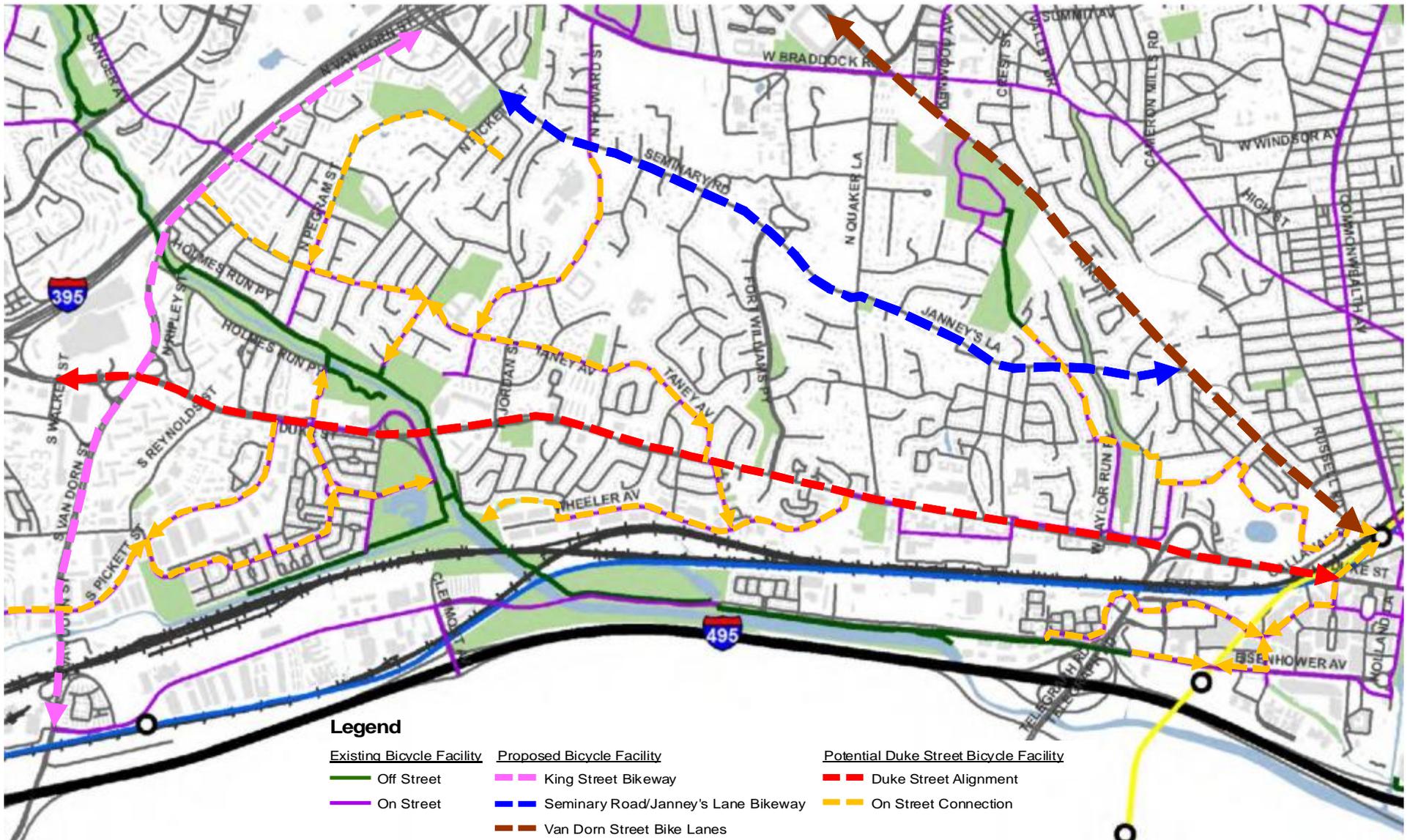
Bicycle Facility

— Off Street

— On Street

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

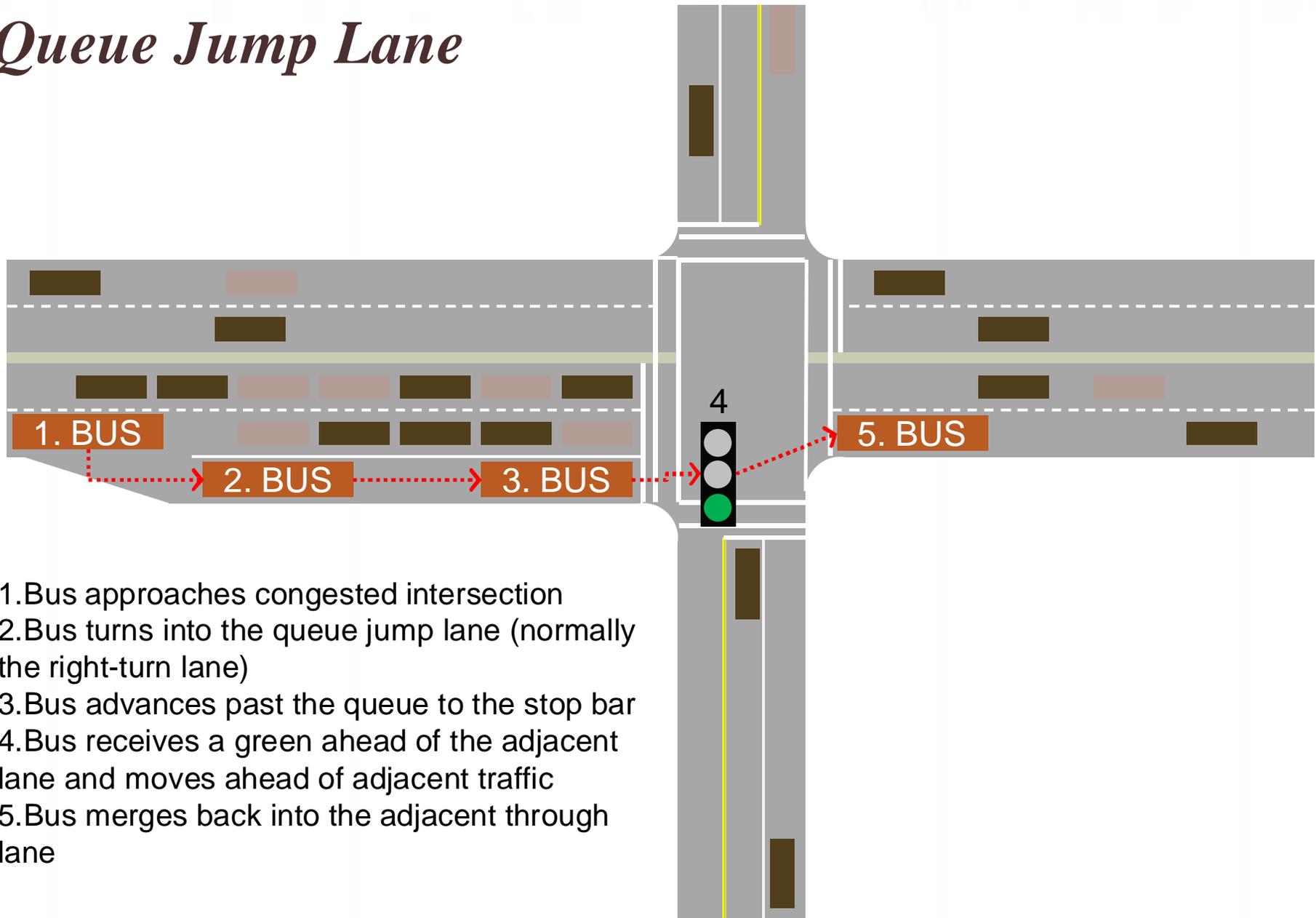
## Potential Bicycle Alternatives



## *Bicycle Facility Summary*

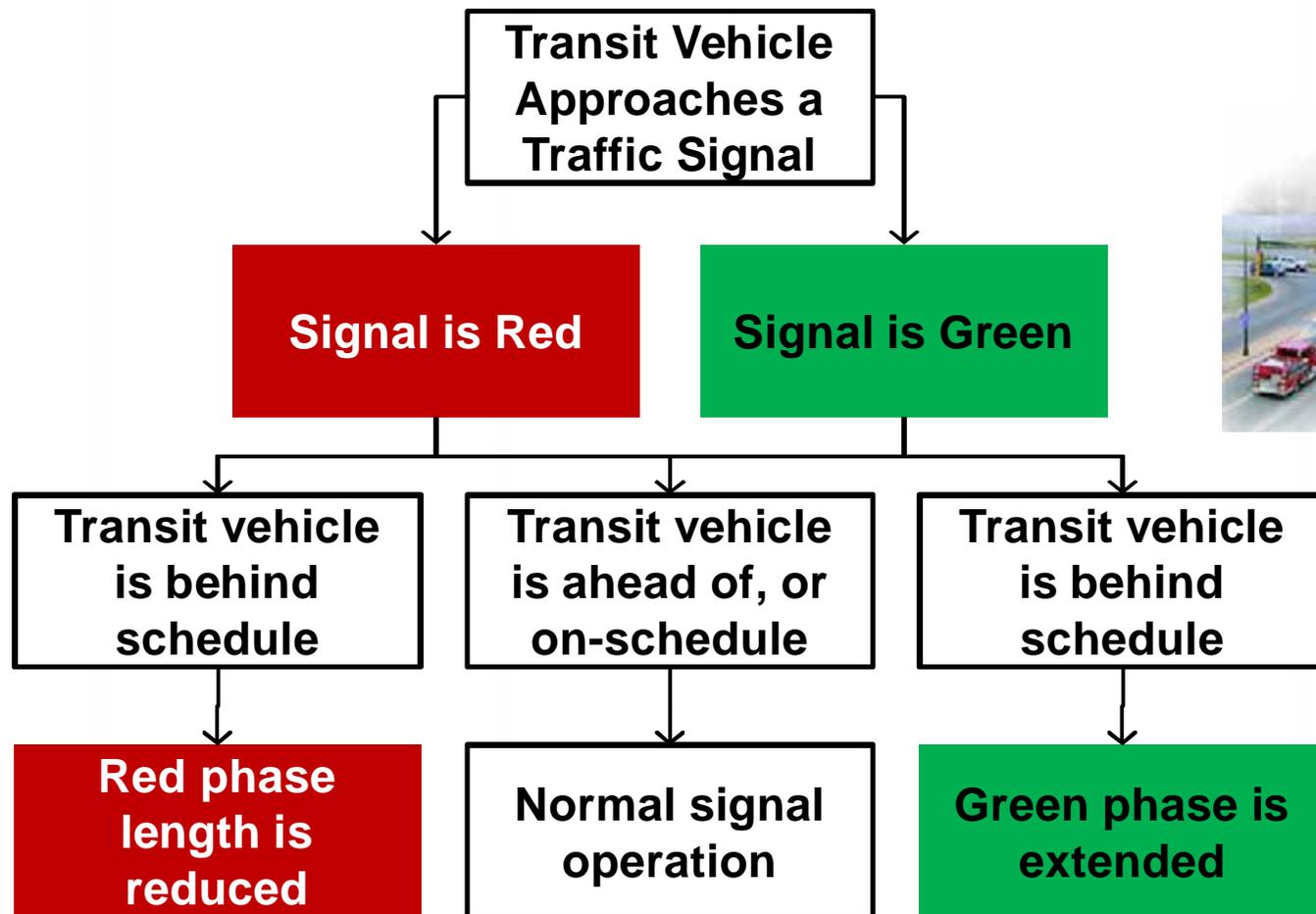
- Limited parallel street connectivity in close proximity to Duke Street
- Indirect connectivity parallel to Duke Street using Eisenhower Avenue, Taney Avenue, and Wheeler Avenue
- Measurable property impact as a result of construction of bike lanes along Duke Street (approximately one additional acre of right-of-way needed for bike lanes)
- Most direct bike connection would be along Duke Street

## *Queue Jump Lane*



1. Bus approaches congested intersection
2. Bus turns into the queue jump lane (normally the right-turn lane)
3. Bus advances past the queue to the stop bar
4. Bus receives a green ahead of the adjacent lane and moves ahead of adjacent traffic
5. Bus merges back into the adjacent through lane

## *Overview of Transit Signal Priority*

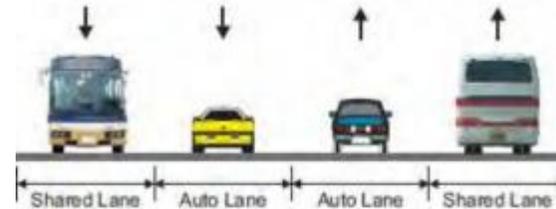




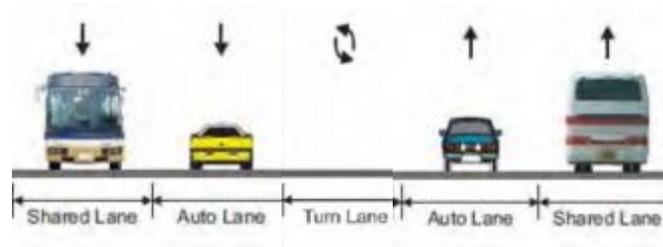
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Existing Conditions

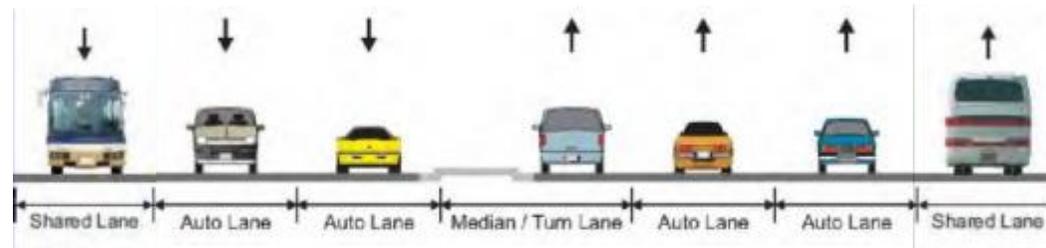
Jordan Street to Wheeler Avenue



Wheeler Avenue to Roth Street



Landmark Mall to Jordan Street & Roth Street to King Street Metro



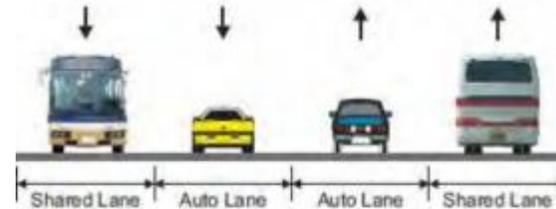
## Description

- 4.5 miles total: 4-lane segments [2 miles]; 6-lane segments [2.5 miles]
- DASH and WMATA bus service running along curb
- Right-of-way width varies greatly and is not centered around mainline
- Service roads between Jordan Street and Wheeler Avenue provide residential driveway access

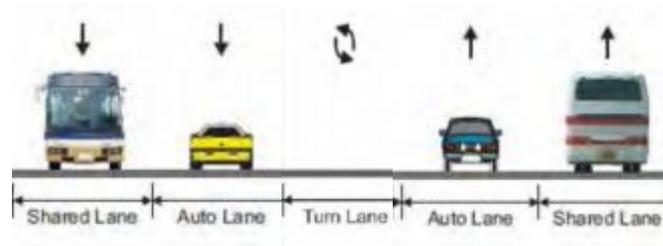
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 1

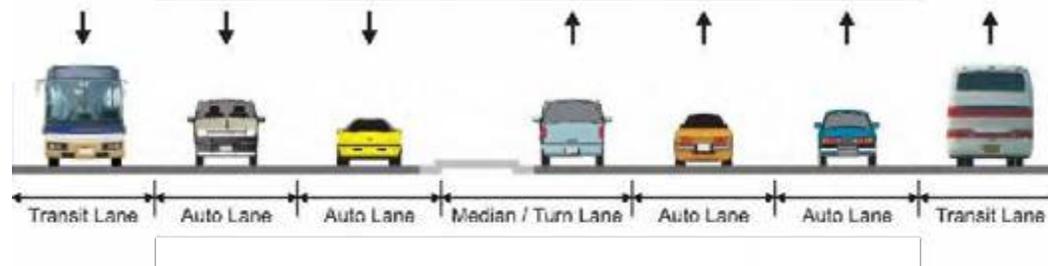
Gordon Street to Wheeler Avenue



Wheeler Avenue to Roth Street



Landmark Mall to Jordan Street &  
Roth Street to King Street Metro

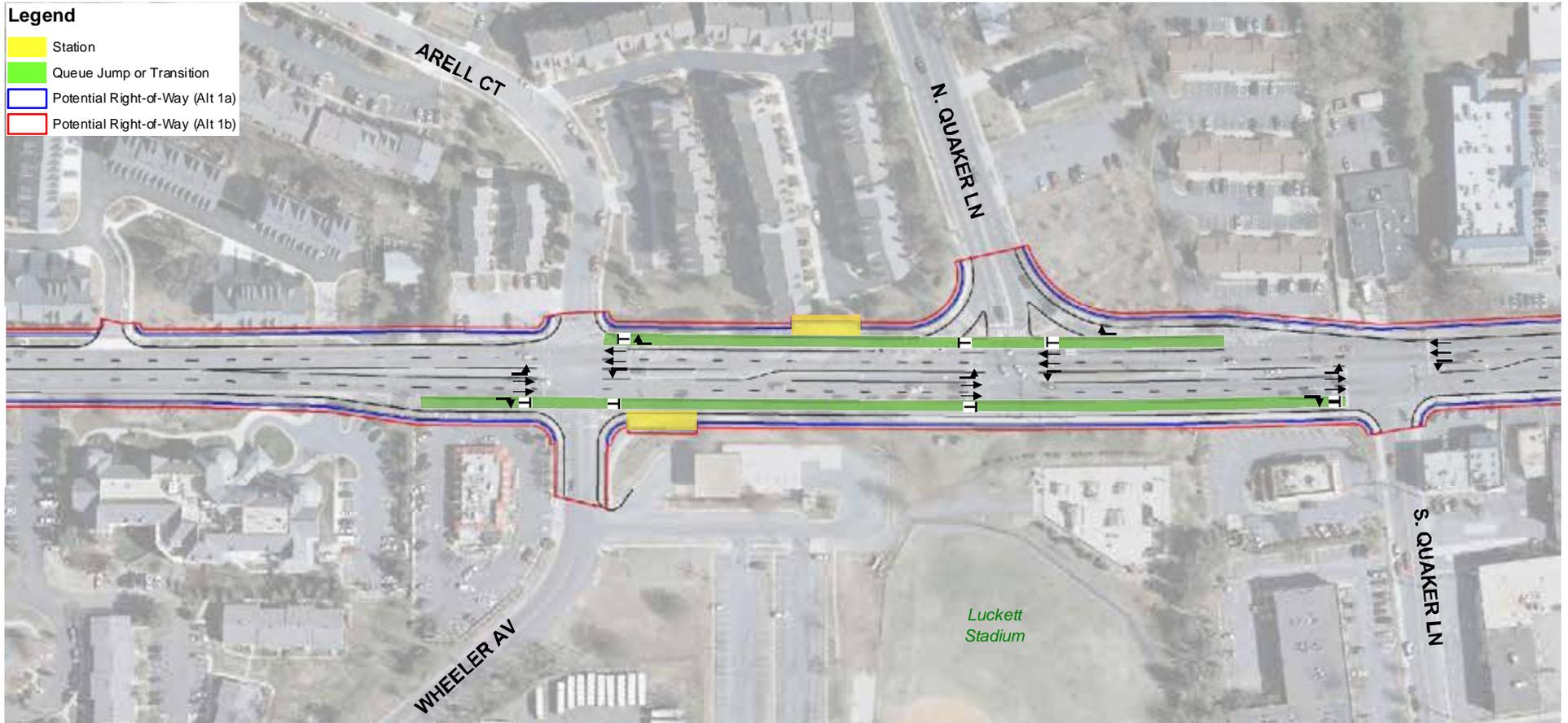


## Description

- Transit in mixed flow on 4-lane segments and in dedicated lanes on 6-lane segments
- Transitway uses queue jumps and pullout stations in some locations where there are not dedicated lanes
- Adds a WB lane between Jordan and Gordon, converting service road to one-way WB
- Adds a WB lane between Wheeler and S. Quaker
- Realigns EB on-ramp to Telegraph and access to adjacent property

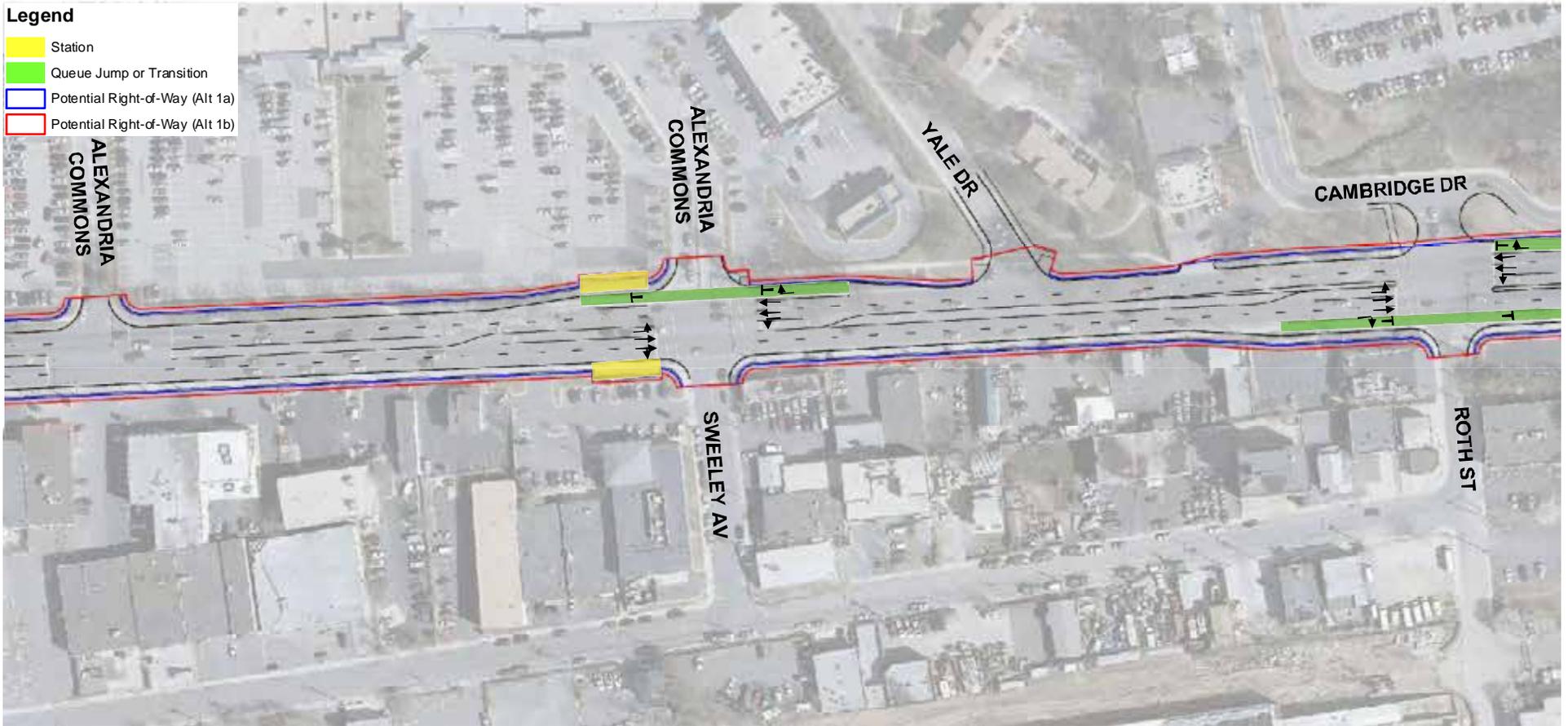
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 1 Concept in Plan View



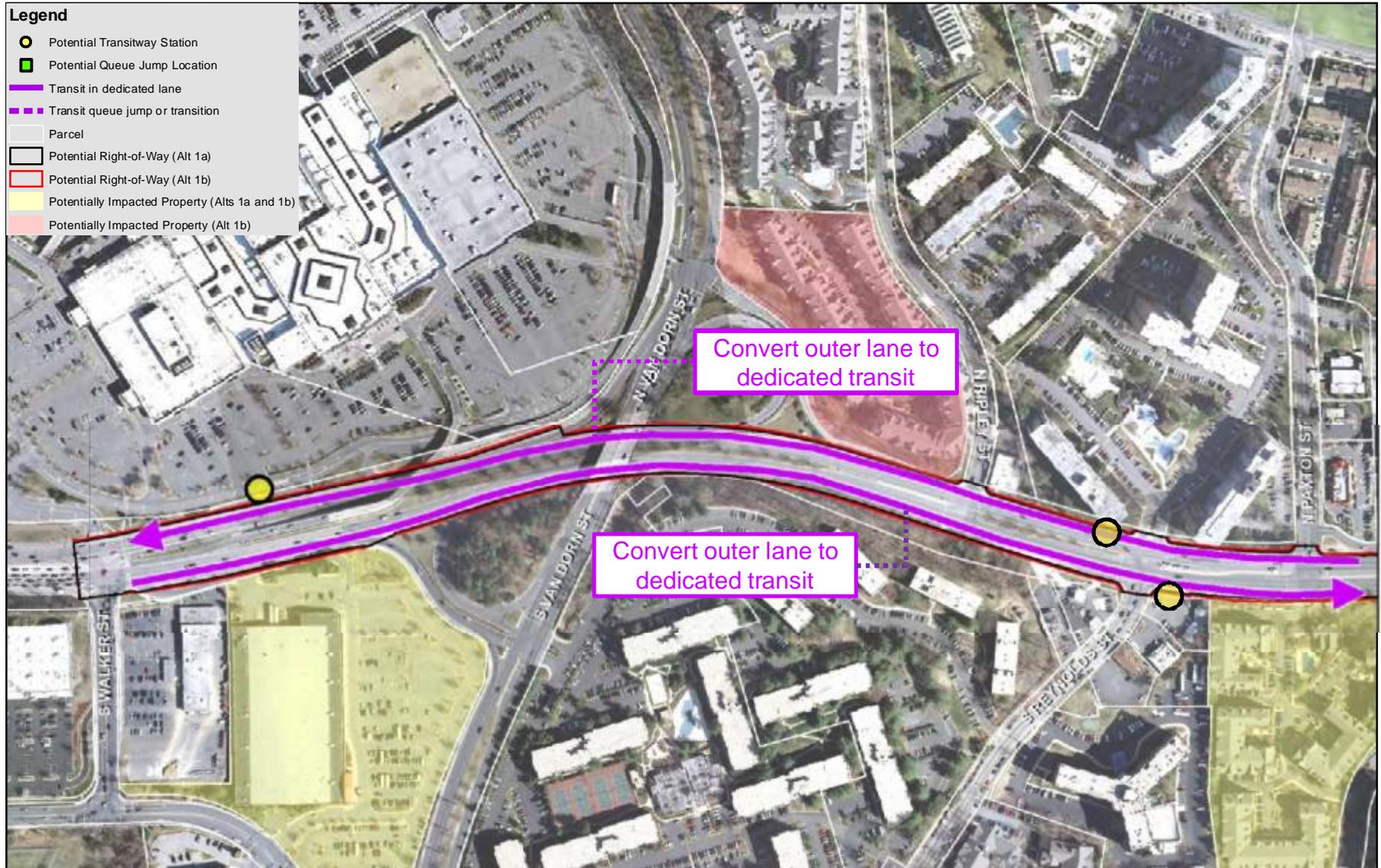
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## Alternative 1 Concept in Plan View



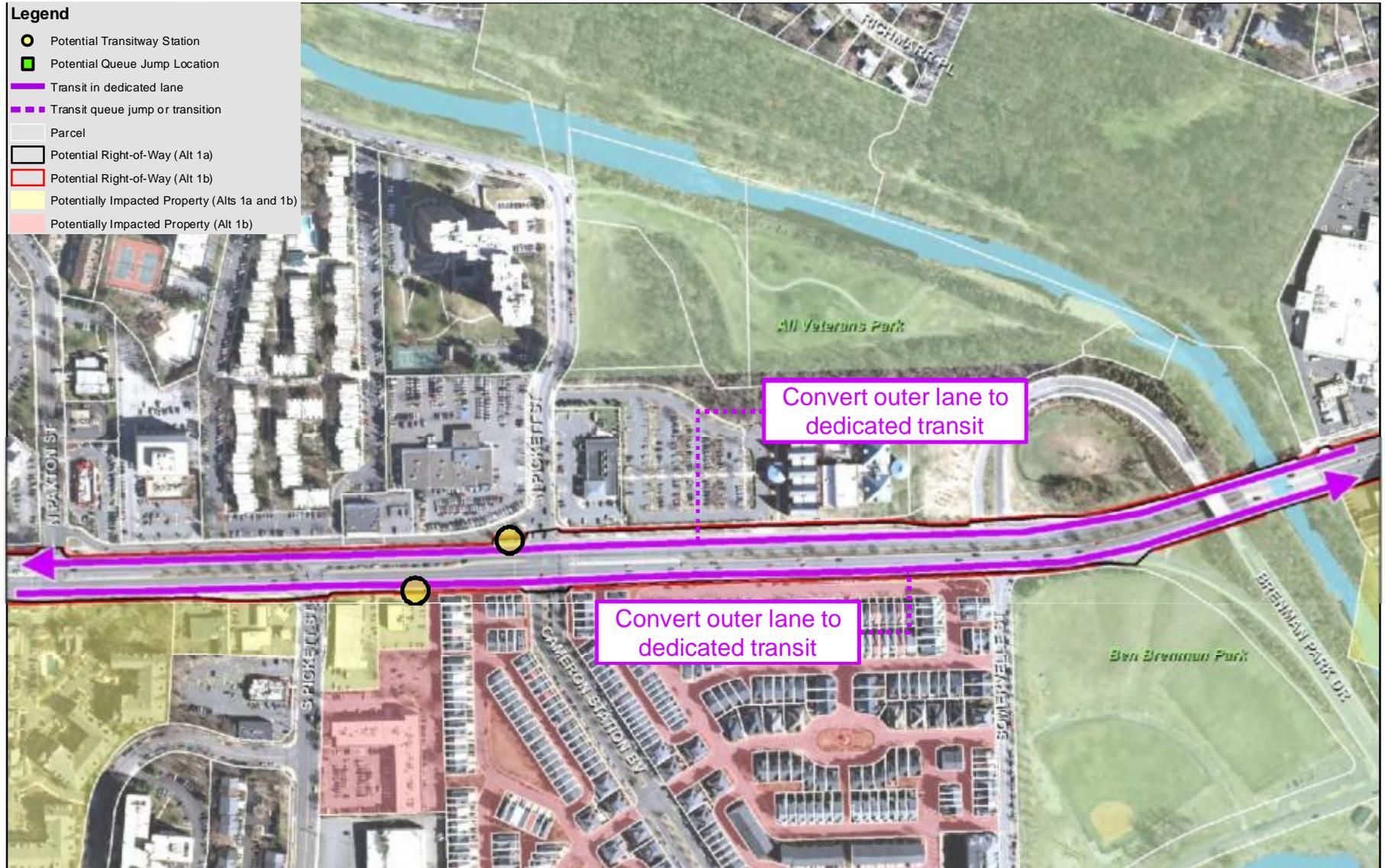
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 1 Concept - Potential Property Impacts



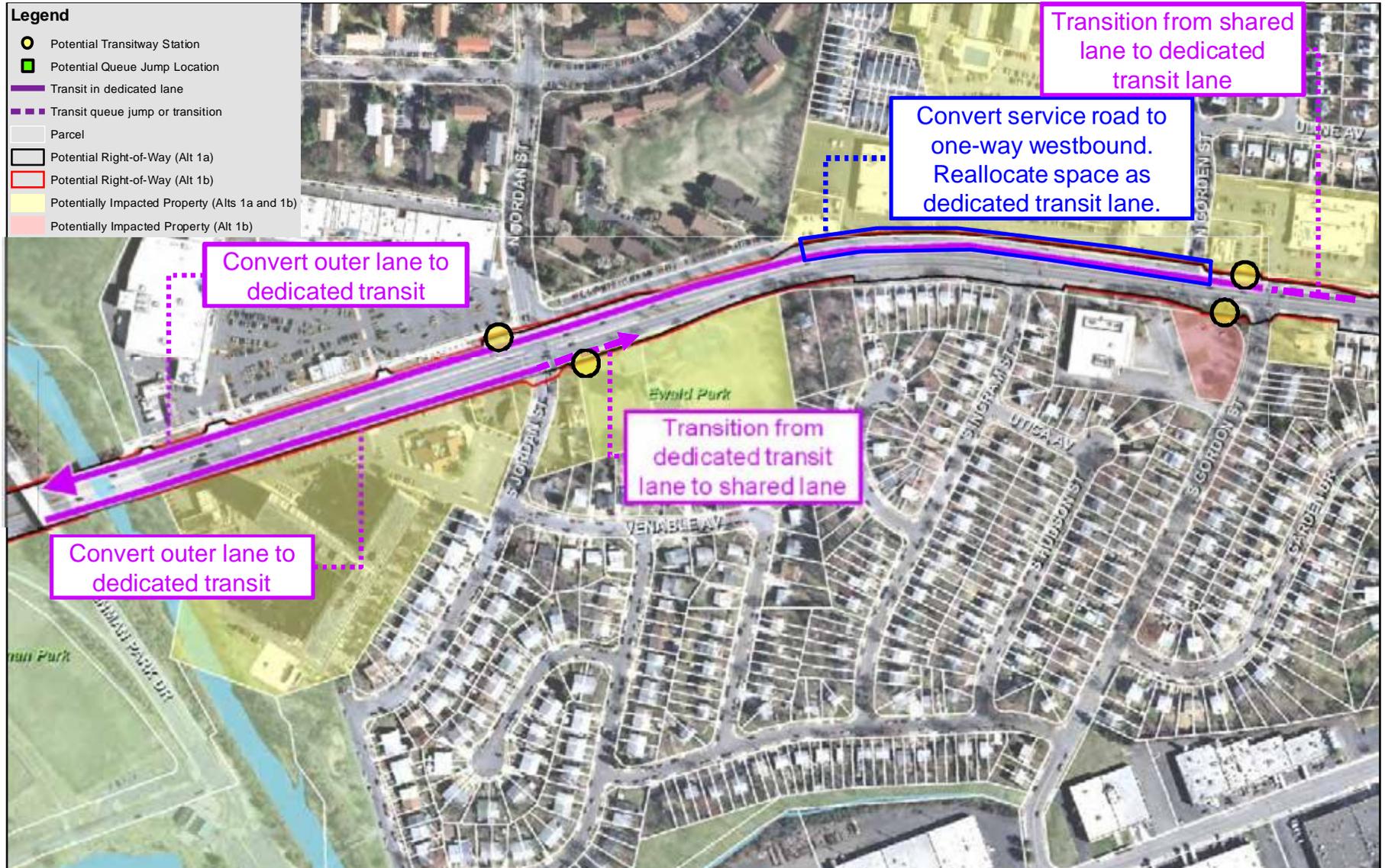
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## Alternative 1 Concept - Potential Property Impacts



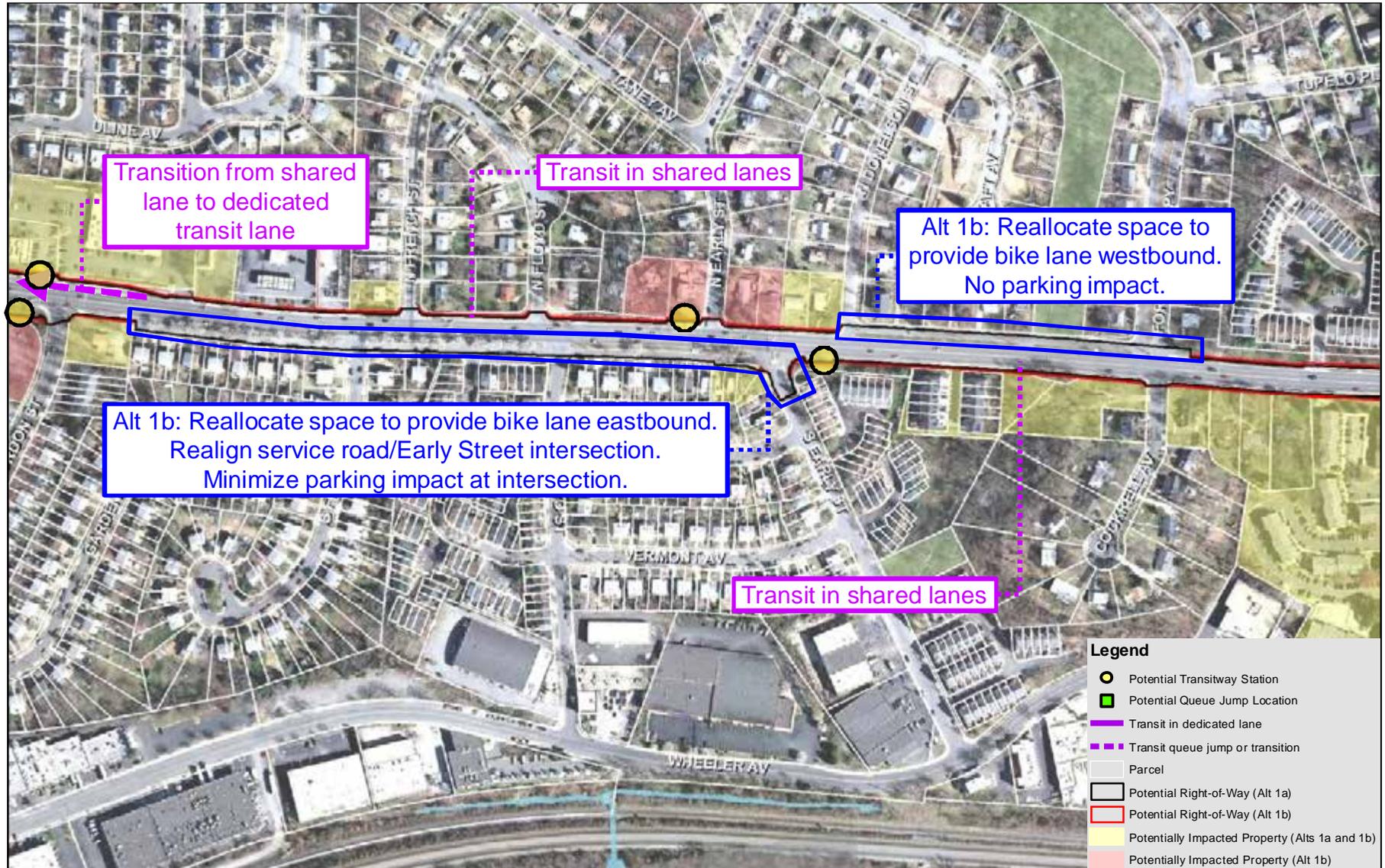
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## Alternative 1 Concept - Potential Property Impacts



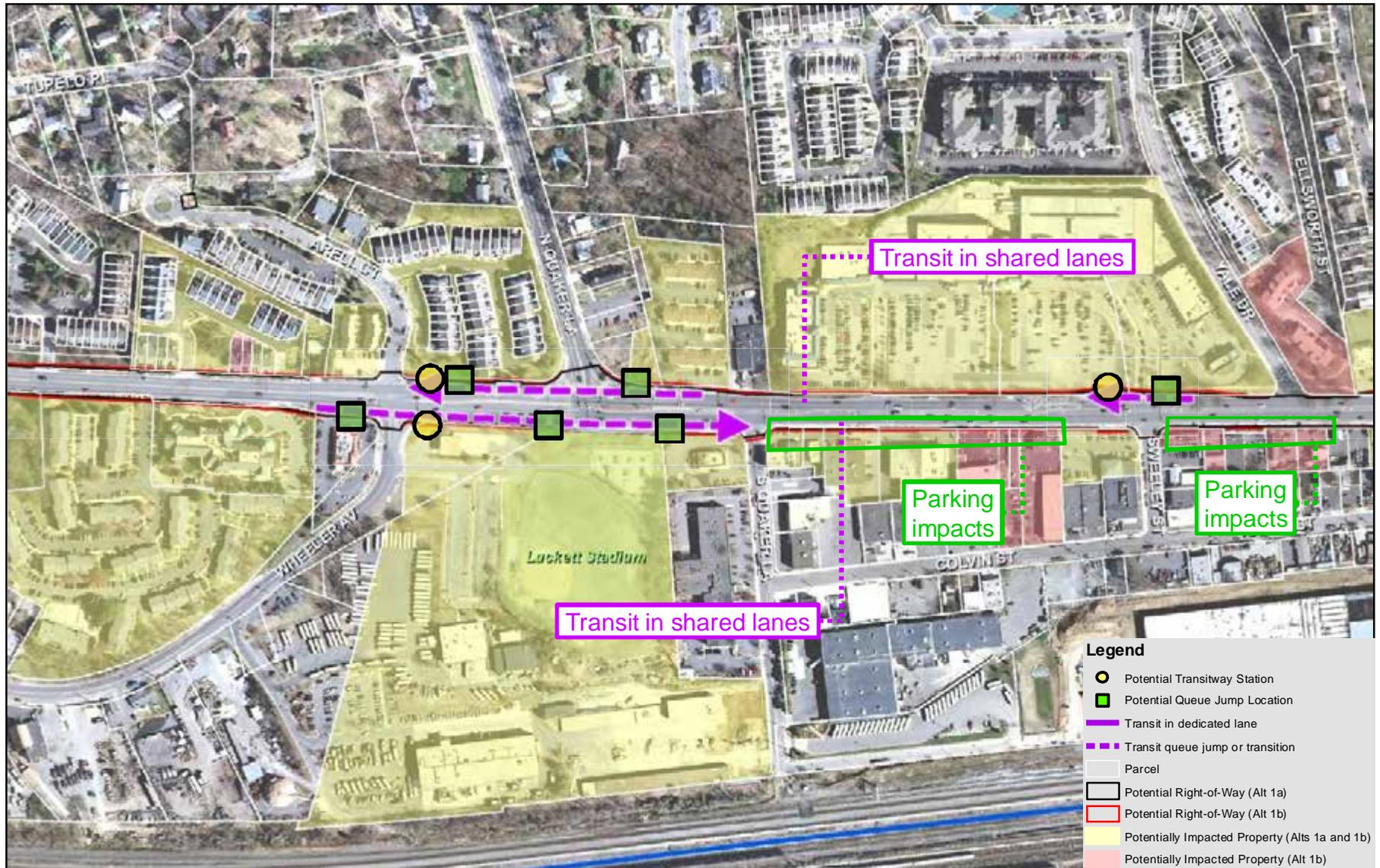
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## Alternative 1 Concept - Potential Property Impacts



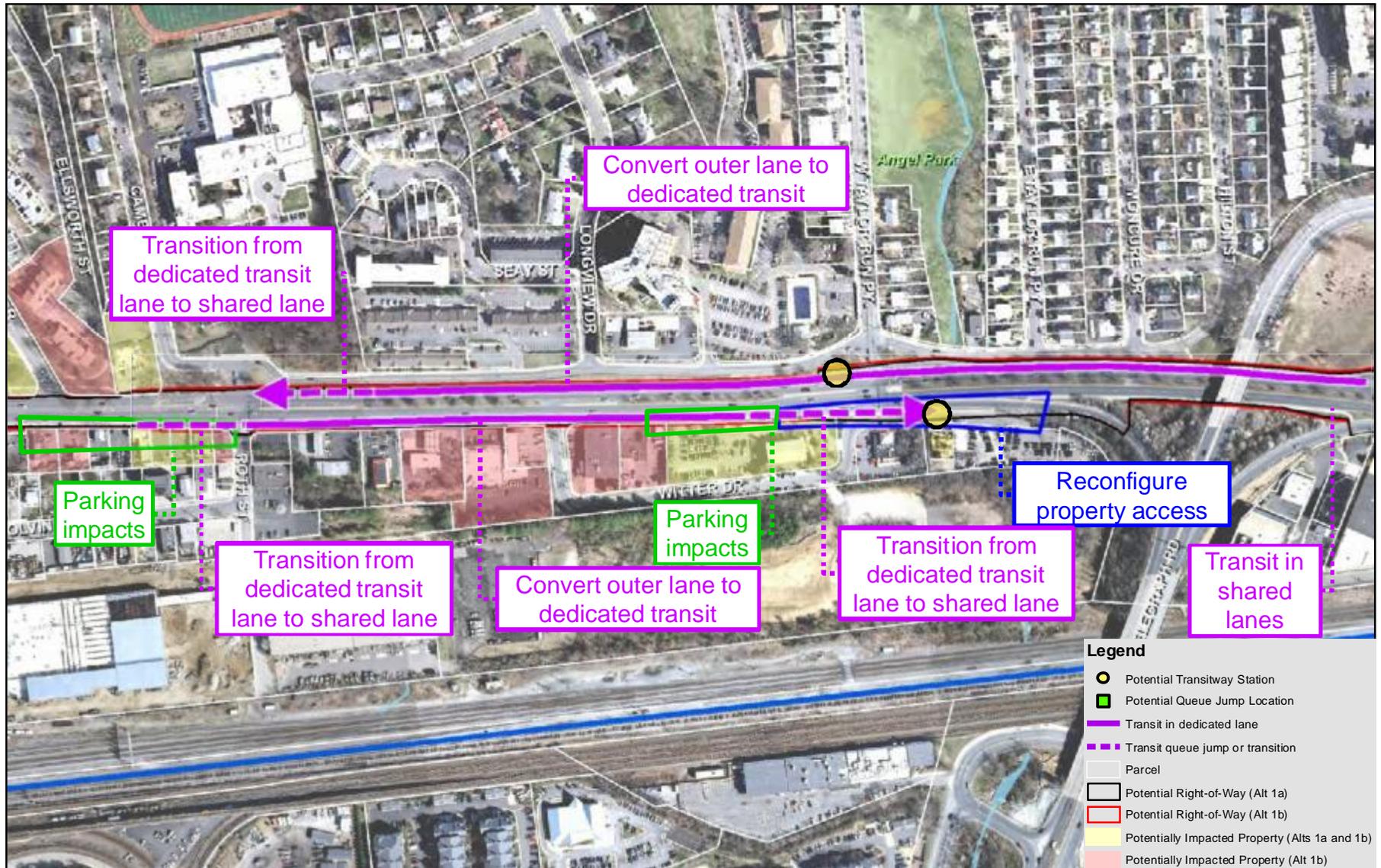
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## Alternative 1 Concept - Potential Property Impacts



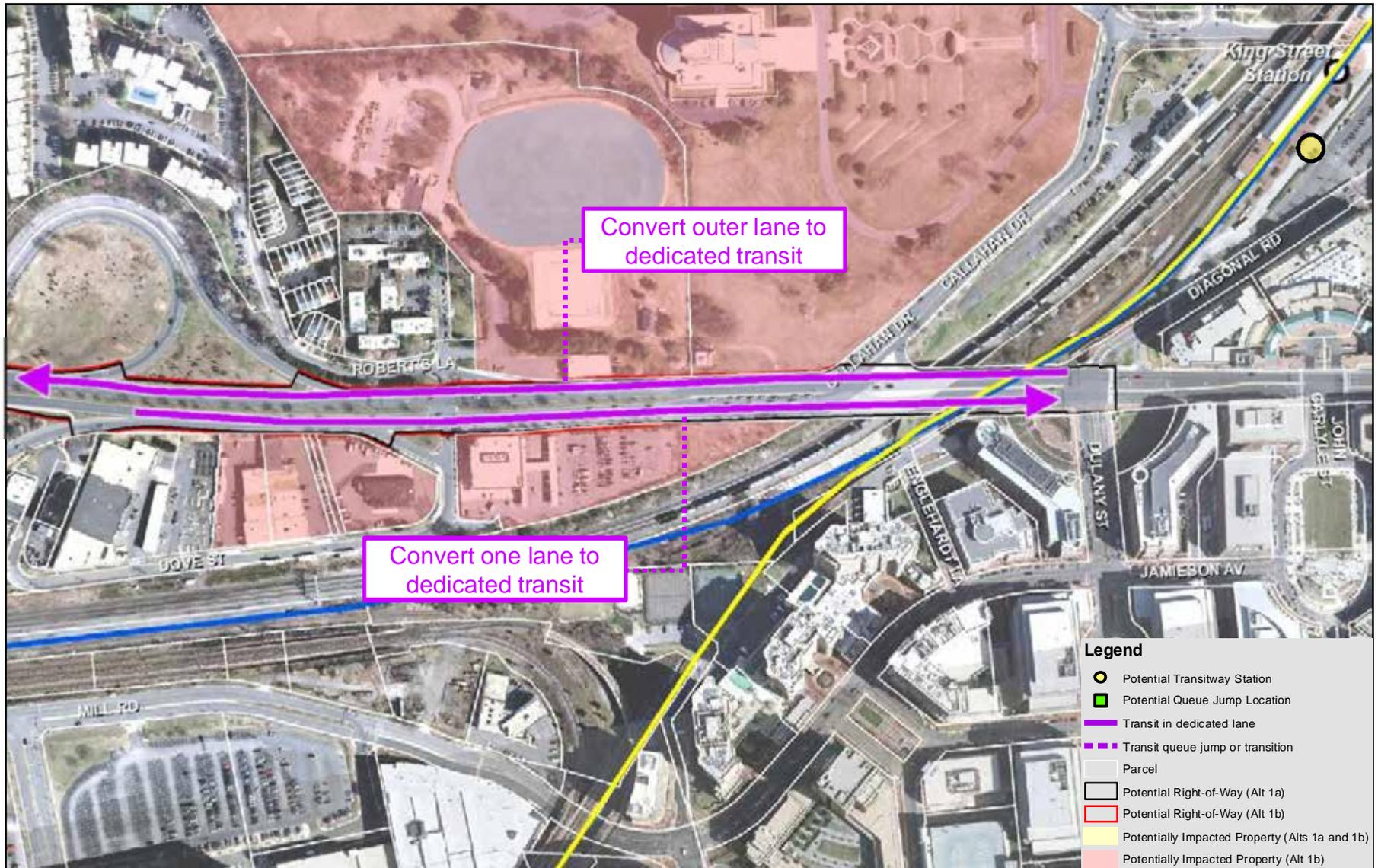
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## Alternative 1 Concept - Potential Property Impacts



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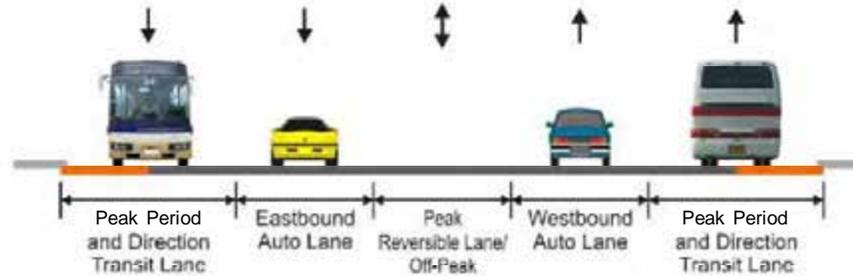
## Alternative 1 Concept - Potential Property Impacts



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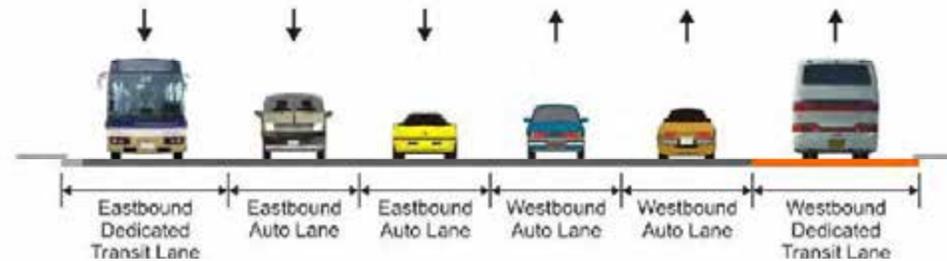
## Alternative 3

Jordan Street to Wheeler Avenue

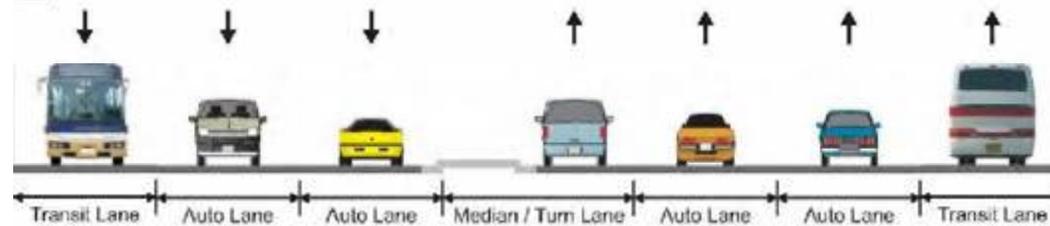


Note: See next slide for time-of-day lane operations

Wheeler Avenue to Roth Street



Landmark Mall to Jordan Street & Roth Street to King Street Metro



### Description

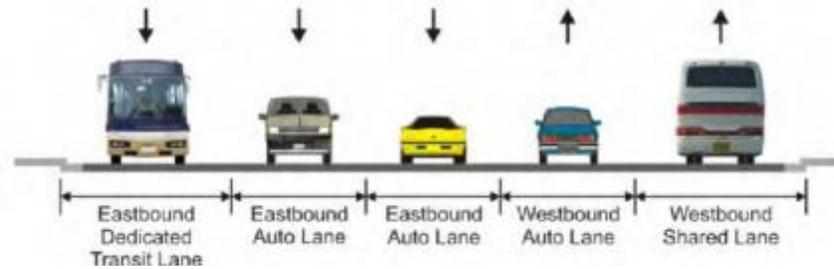
#### Legend

Additional Pavement

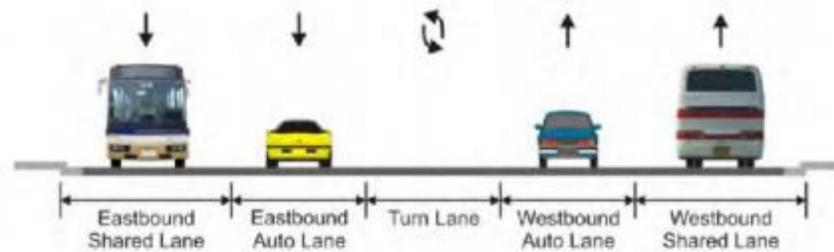
- Identical to Alternative 1 from Landmark Mall to Gordon and from Roth to Metro
- Travelway widened to 61 feet from Gordon to Wheeler (same width as section between Wheeler and Roth today)
- Travelway widened to 72 feet from Wheeler to Roth – adds auto lane to accommodate heavy traffic from Quaker to Telegraph
- No left-turn lane during peak periods from Jordan to Roth

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

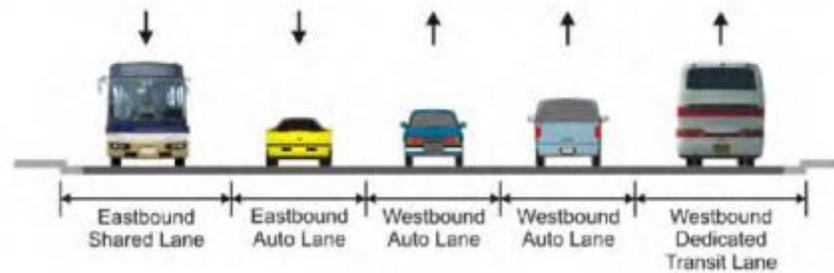
## Alternative 3 – Jordan to Wheeler Lane Operations



**AM Peak Period**



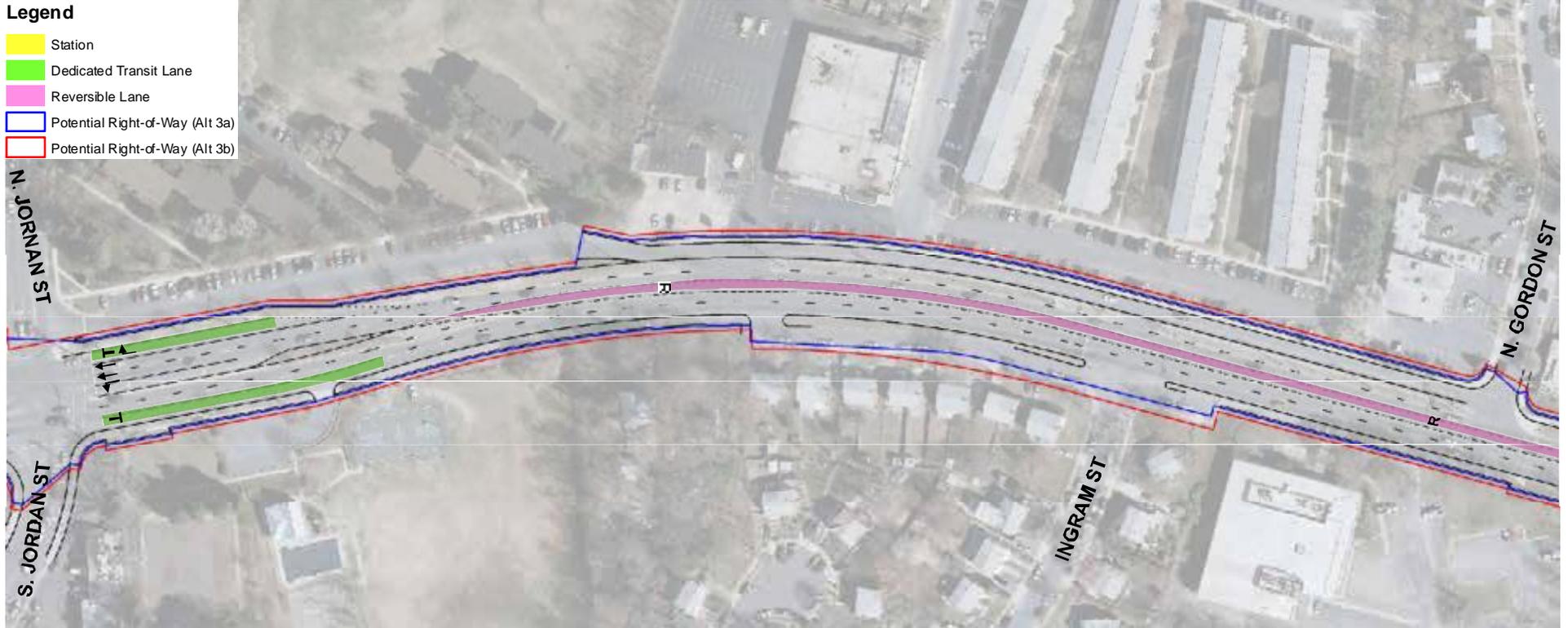
**Off-Peak**



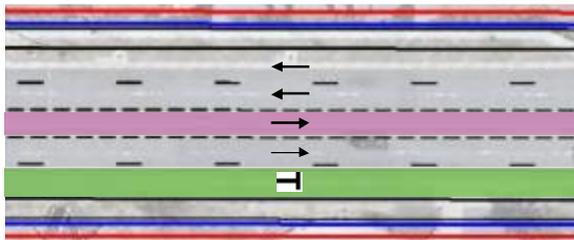
**PM Peak Period**

# TRANSITWAY CORRIDOR FEASIBILITY STUDY

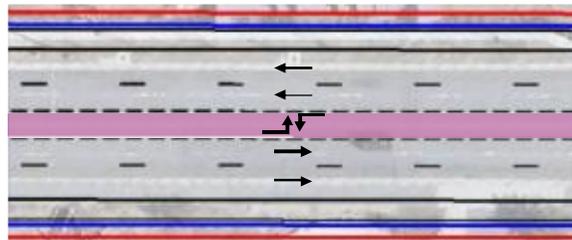
## Alternative 3 Concept in Plan View



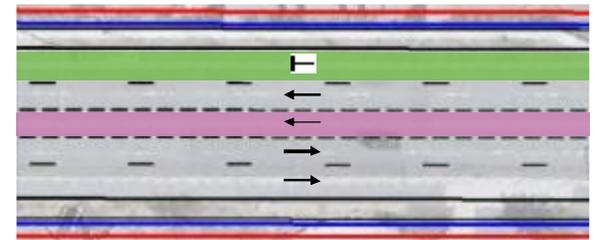
AM Peak Period



Off-Peak Period

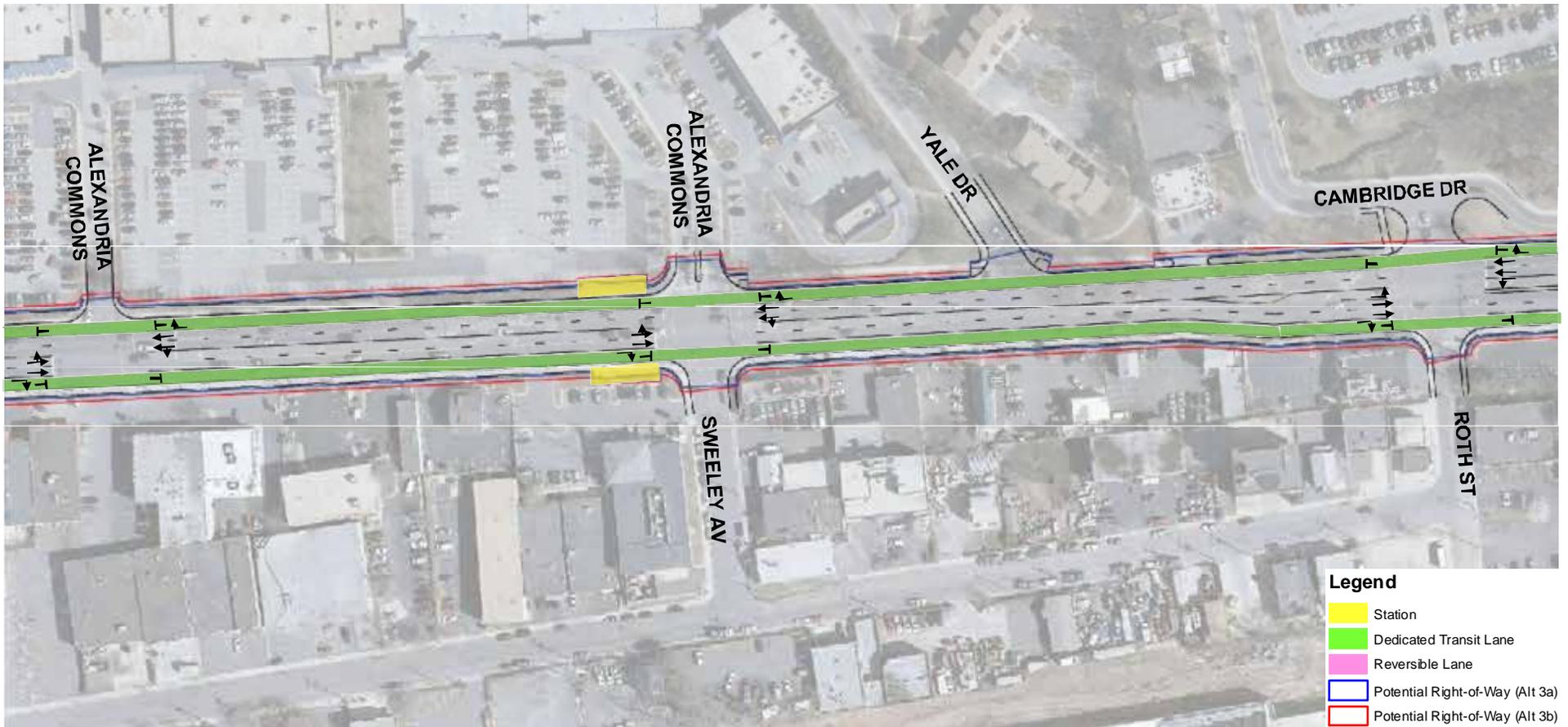


PM Peak Period



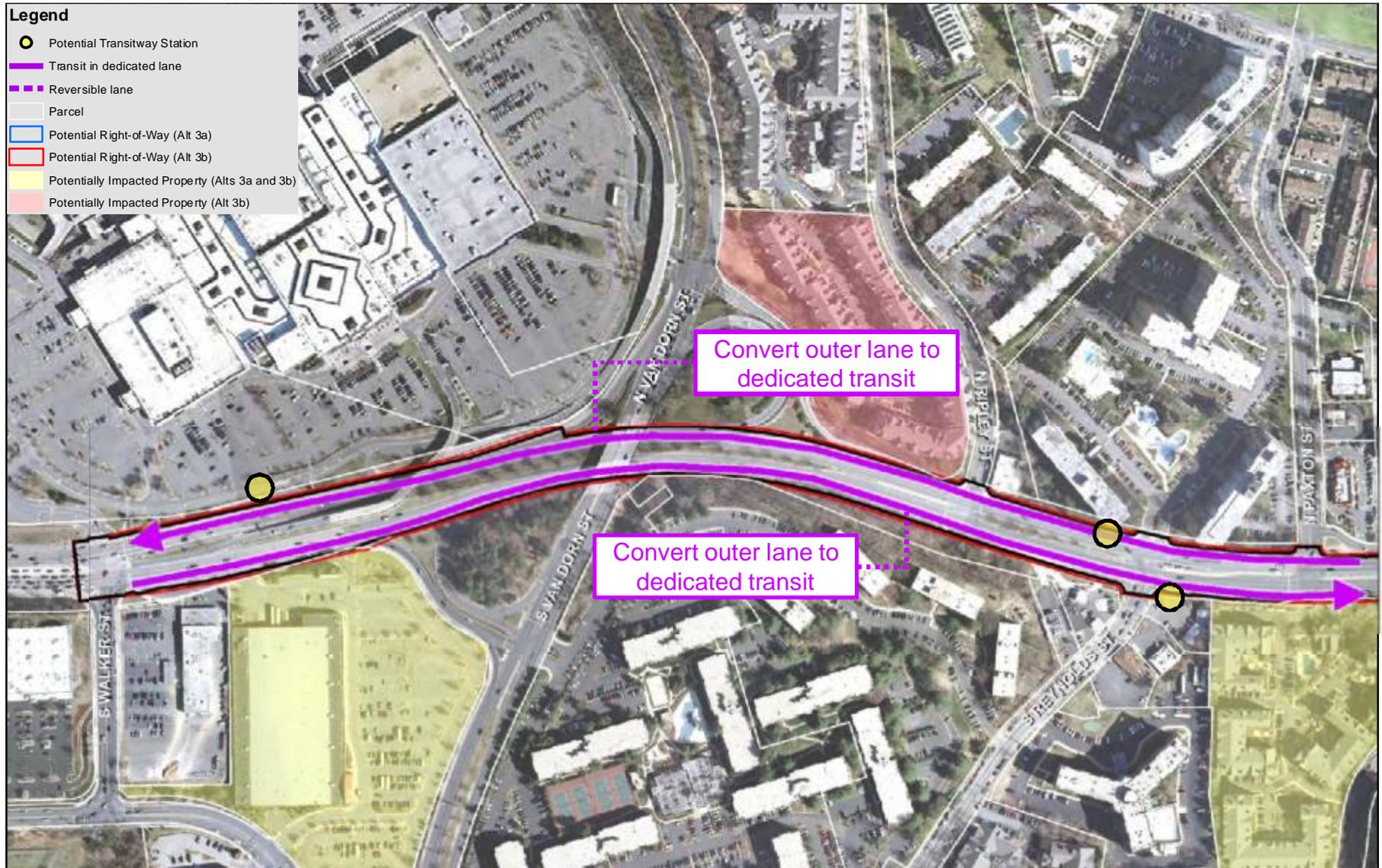
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## Alternative 3 Concept in Plan View



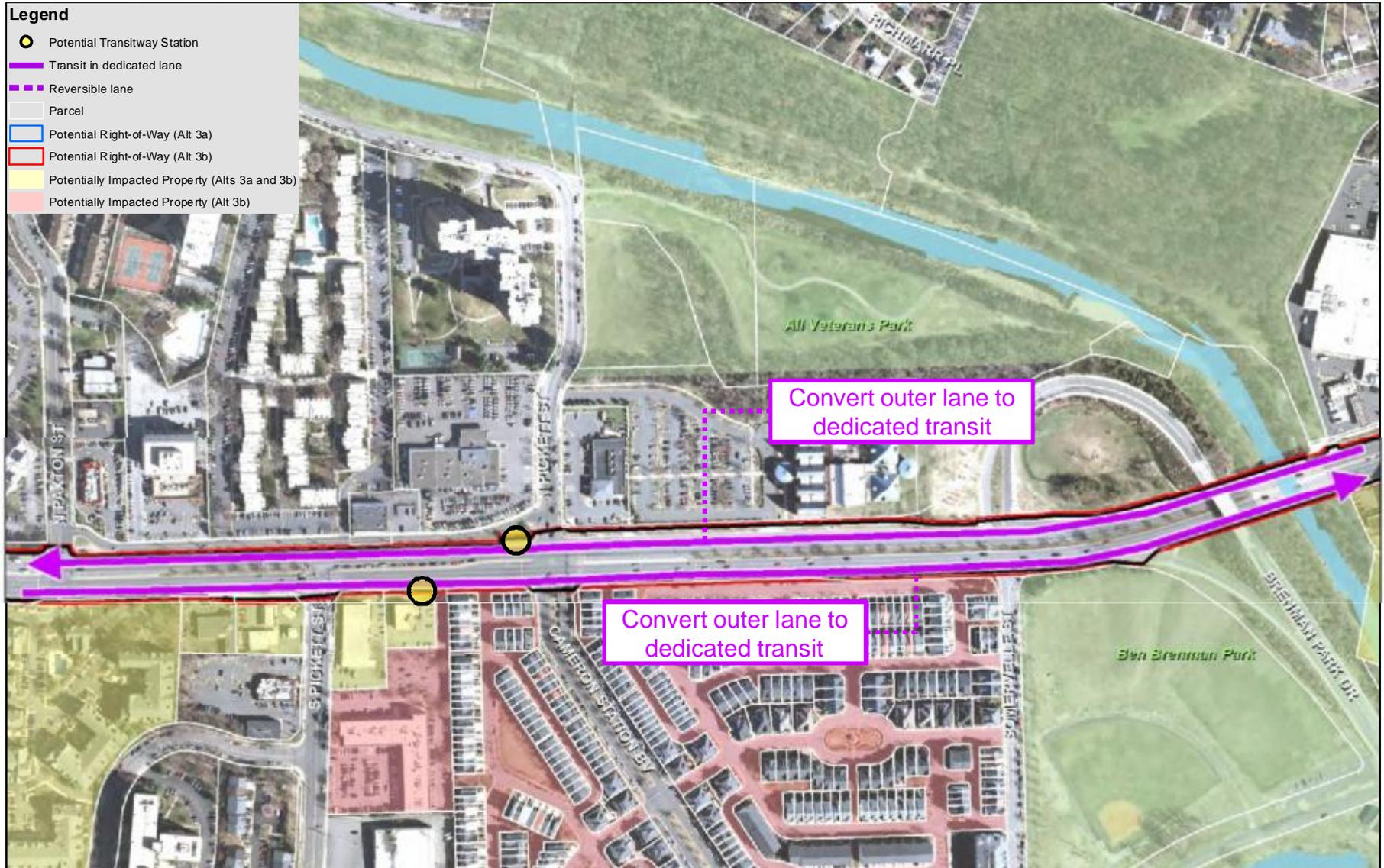
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 3 Concept - Potential Property Impacts



# TRANSITWAY CORRIDOR FEASIBILITY STUDY

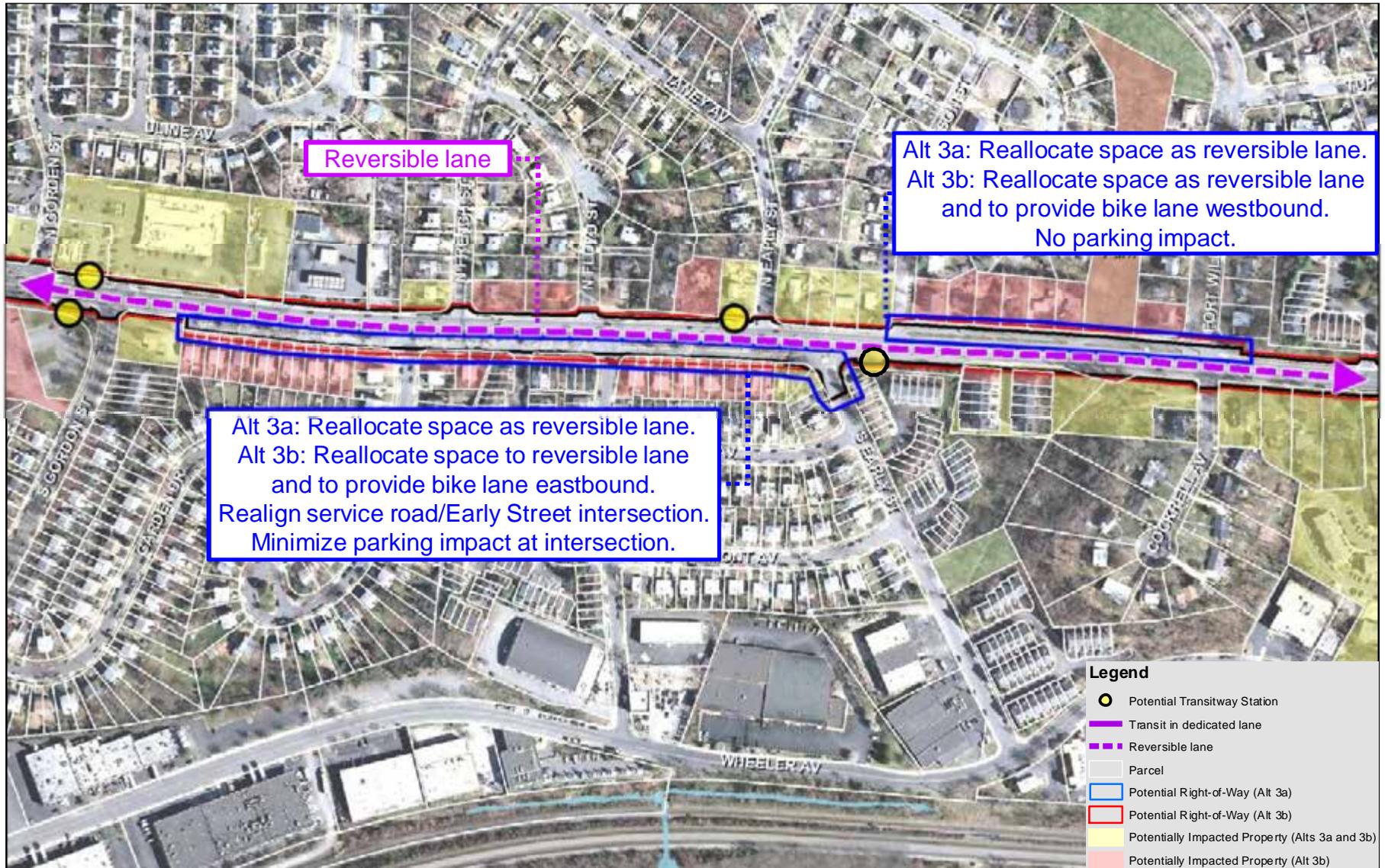
## Alternative 3 Concept - Potential Property Impacts (Continued)





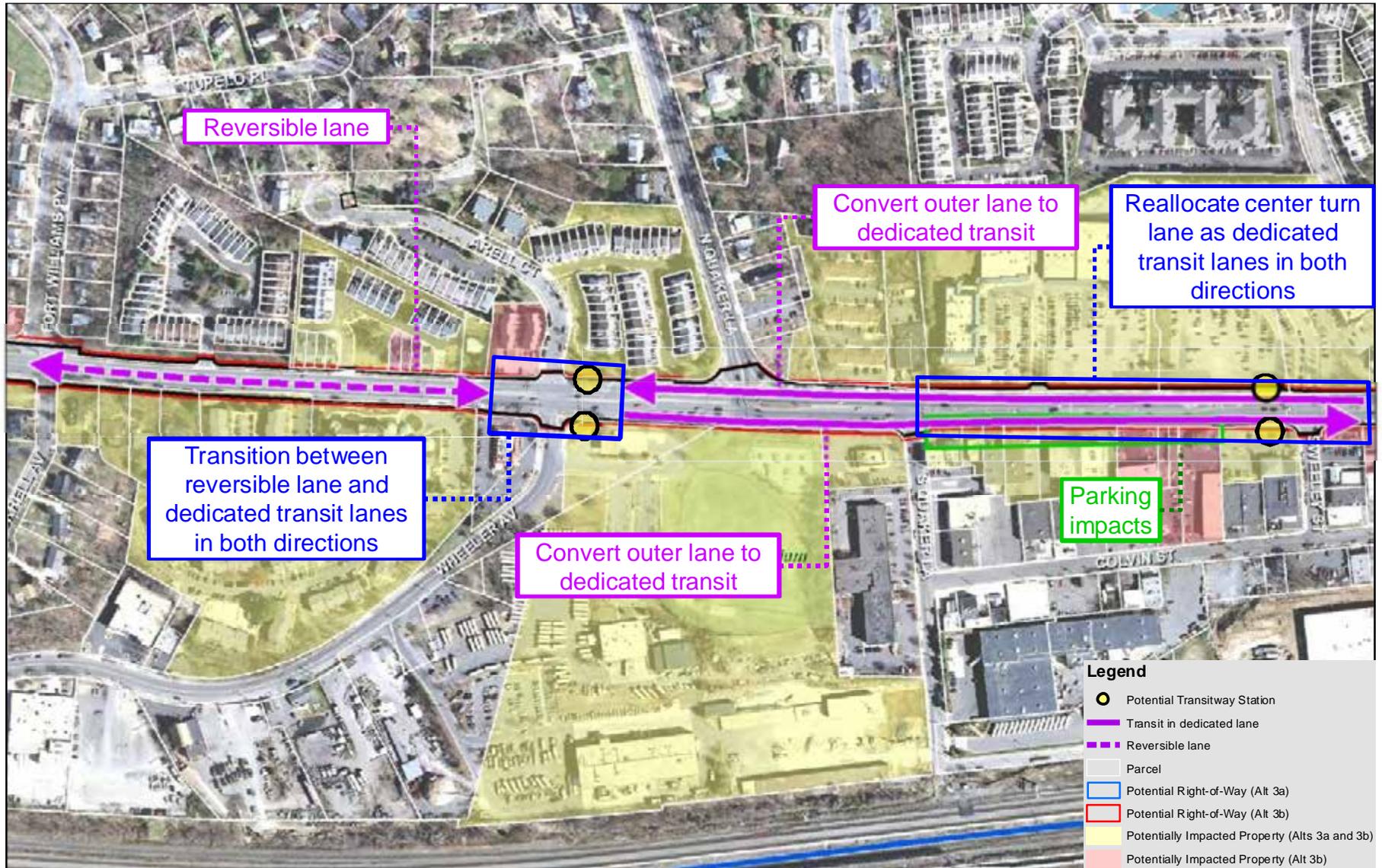
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 3 Concept - Potential Property Impacts (Continued)



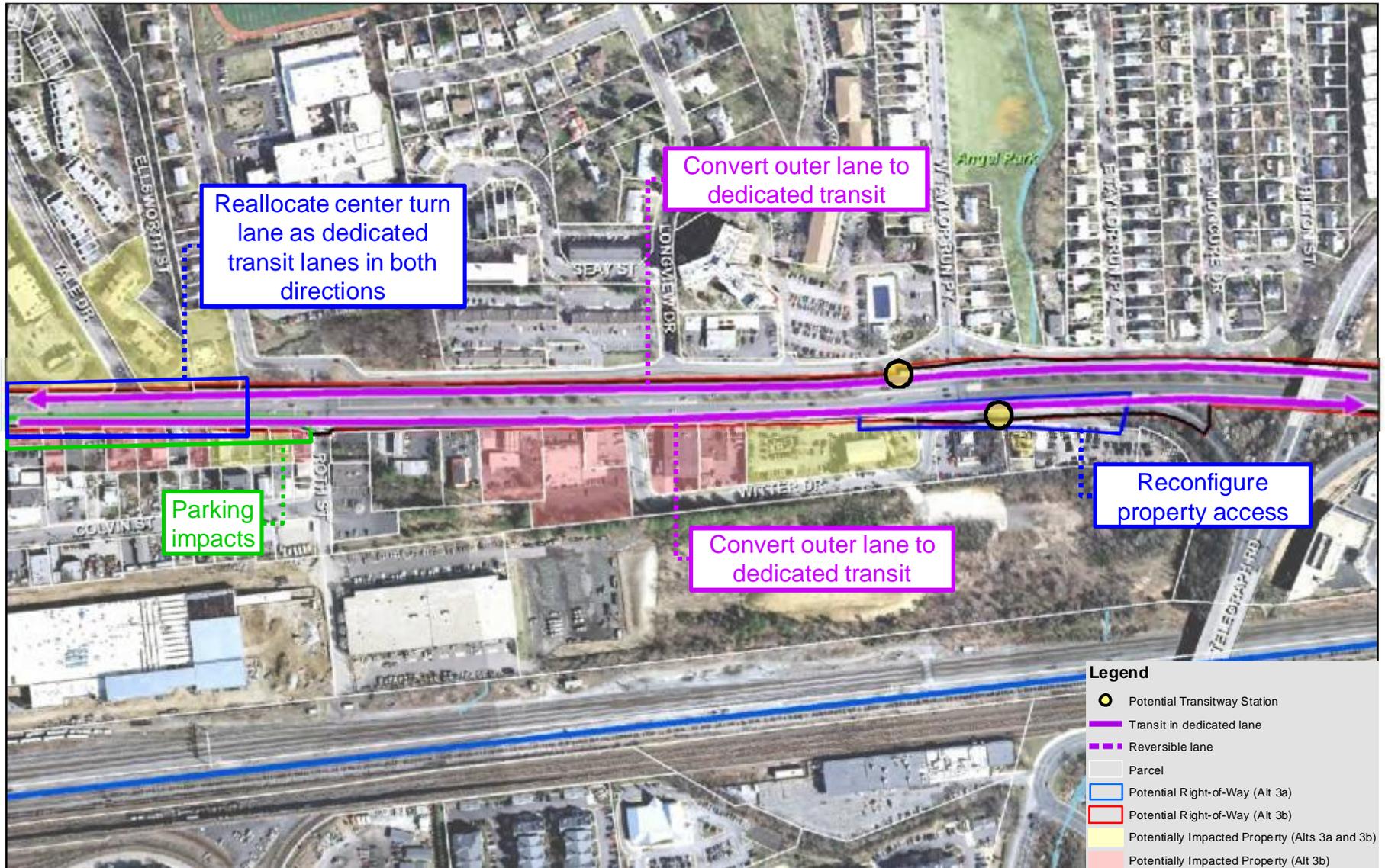
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## Alternative 3 Concept - Potential Property Impacts (Continued)



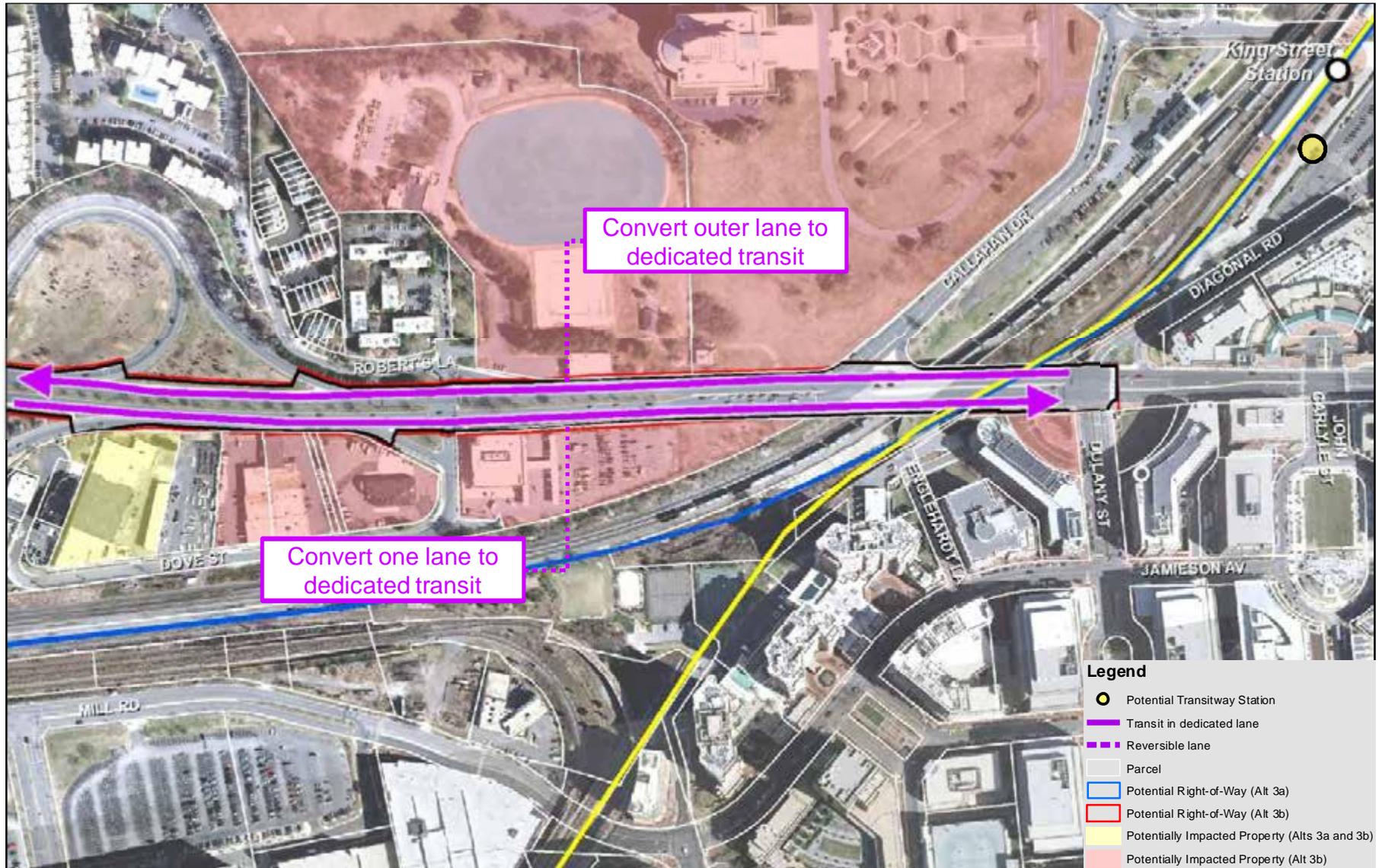
# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 3 Concept - Potential Property Impacts (Continued)



# TRANSITWAY CORRIDOR FEASIBILITY STUDY

## Alternative 3 Concept - Potential Property Impacts (Continued)



## *Potential Impacts*

	Alternative			
	1a	1b	3a	3b
Description:	Use Existing Lanes for Transit	Use Existing Lanes for Transit with Bike Lanes	Reversible Lane	Reversible Lane with Bike Lanes
Park Impact	< 0.15 acres	0.20 acres	< 0.15 acres	0.25 acres
Property Impact	1.0 acres 65 parcels	2.5 acres 100 parcels	1.5 acres 75 parcels	3.5 acres 160 parcels
Commercial Parking Impact	53 spaces	121 spaces	66 spaces	159 spaces
Residential Parking Impact	2 spaces	12 spaces	4 spaces	13 spaces

## *Potential Right-of-Way Costs*

	Alternative			
	1a	1b	3a	3b
Description:	Use Existing Lanes for Transit	Use Existing Lanes for Transit with Bike Lanes	Reversible Lane	Reversible Lane with Bike Lanes
Right-of-Way Cost Estimate	\$3.5 M	\$8 M	\$4 M	\$12 M

## Planning-Level Cost Estimates

	Alternative			
	1a	1b	3a	3b
<b>Assumed Transit Mode:</b>	BRT	BRT	BRT	BRT
<b>Description:</b>	Use Existing Lanes for Transit	Use Existing Lanes for Transit with Bike Lanes	Reversible Lane	Reversible Lane with Bike Lanes
<b>Capital Cost Estimate<sup>1</sup></b> (exclusive of vehicles, based on cost per-mile within the City)	\$20 M	\$40 M	\$28 M	\$53 M
<b>25-year Fleet Cost Estimate<sup>2</sup></b>	\$20 M	\$20 M	\$16 M	\$16 M
<b>Right-of-Way Cost Estimate</b>	\$3.5 M	\$8 M	\$4 M	\$12 M
<b>25-year Operating Cost</b>	\$67 M	\$67 M	\$60 M	\$60 M
<b>Planning-Level Cost Estimate<sup>1</sup></b>	<b>\$111 M</b>	<b>\$135 M</b>	<b>\$108 M</b>	<b>\$141 M</b>

Notes  
 1. Planning level cost estimates are shown in year 2012 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for major utility relocations/new service, or the capital costs for roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project.

## *New Starts/Small Starts Summary*

- Small Starts
  - Typical Range of FTA funding participation (based on 2012 awards by FTA)
    - 35% to 80% federal funding
    - Maximum participation (Small Starts, 80% or \$75 million, whichever is less)
  
- Rail Transit Projects (generally FTA New Starts)
  - Range of project capital costs: \$200 million to more than a billion dollars
  - Range of FTA funding participation
    - 40% to 60% federal funding
    - Maximum participation – varies, generally in 50% to 60% range

## *Corridor B - Conceptual Project Funding Scenario*

Project	Assumed Transit Mode	Total Capital Cost (millions)	Federal Share (millions)	Local Share (millions)	Federal Percent	Section 5309 Project Type
Alternative 1a Use Existing Lanes for Transit	BRT	\$32 M	\$26 M	\$6 M	80%	Small Starts
Alternative 1b Use Existing Lanes for Transit with Bike Lanes	BRT	\$57 M	\$46 M	\$11 M	80%	Small Starts
Alternative 3a Reversible Lane	BRT	\$39 M	\$31 M	\$8 M	80%	Small Starts
Alternative 4 Reversible Lane with Bike Lanes	BRT	\$72 M	\$58 M	\$14 M	80%	Small Starts

## *Planning Level Transit Travel Times*

	Alternative			
	1a	1b	3a	3b
Description:	Use Existing Lanes for Transit	Use Existing Lanes for Transit with Bike Lanes	Reversible Lane	Reversible Lane with Bike Lanes
One-way Peak Period Travel Time Estimate (between Landmark Mall and King Street Metrorail Station)	22 minutes	22 minutes	19 minutes	19 minutes

Note: Transit travel times were estimated using the methodology from Transit Cooperative Research Program Report 100: Transit Capacity and Quality of Service Manual, Second Edition

- Reversible lane saves at least 3 minutes (17% of the travel time) for a one-way trip between Landmark Mall and the King Street Metrorail station

## *Advantages and Disadvantages - Summary*

Alternative	Advantages	Disadvantages
Alternative 1a – Use Existing Lanes for Transit	<ul style="list-style-type: none"> <li>•Fewest property impacts</li> <li>•Maintains service roads</li> </ul>	<ul style="list-style-type: none"> <li>•Worst transit operation due to shared lanes</li> <li>•No Duke Street bicycle facility</li> </ul>
Alternative 1b – Use Existing Lanes for Transit with Bike Lanes	<ul style="list-style-type: none"> <li>•Maintains service roads</li> <li>•Provides bike lanes</li> </ul>	<ul style="list-style-type: none"> <li>•Worst transit operation due to shared lanes</li> <li>•Large property impacts due to bike lanes and streetscape enhancements</li> </ul>
Alternative 3a – Reversible Lane	<ul style="list-style-type: none"> <li>•Quality transit operation</li> <li>•Maintains service roads</li> </ul>	<ul style="list-style-type: none"> <li>•Off-peak auto impact from Gordon to Wheeler</li> <li>•No Duke Street bicycle facility</li> <li>•Lane control gantries</li> <li>•Potentially confusing to drivers</li> </ul>
Alternative 3b – Reversible Lane with Bike Lanes	<ul style="list-style-type: none"> <li>•Quality transit operation</li> <li>•Maintains service roads</li> <li>•Provides bike lanes</li> </ul>	<ul style="list-style-type: none"> <li>•Off-peak auto impact from Gordon to Wheeler</li> <li>•Large property impacts due to bike lanes and streetscape enhancements</li> <li>•Lane control gantries</li> <li>•Potentially confusing to drivers</li> </ul>

# ***DISCUSSION & COMMENTS***

## *Thank you for your attention!*

For access to the information that was presented tonight, as well as other study information, please visit the project website at:

- <http://alexandriava.gov/HighCapacityTransit>

Once there, follow the link for the “[High Capacity Transit Corridor Work Group](#)”