Transitway Corridor Feasibility Study

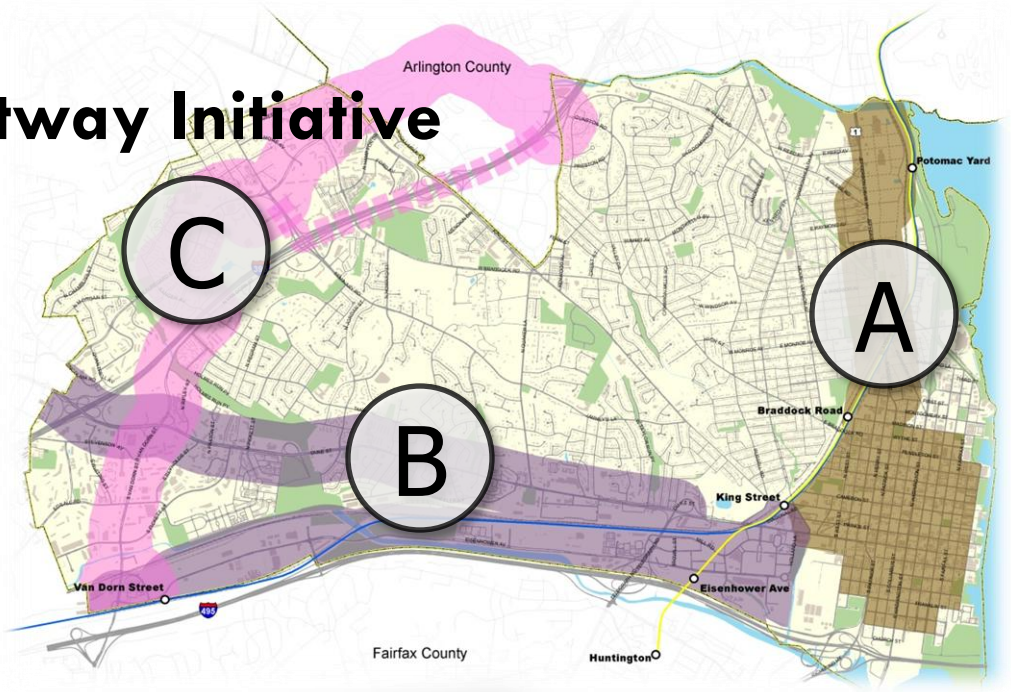
TPB Regional Bus Subcommittee
February 28, 2012 Meeting

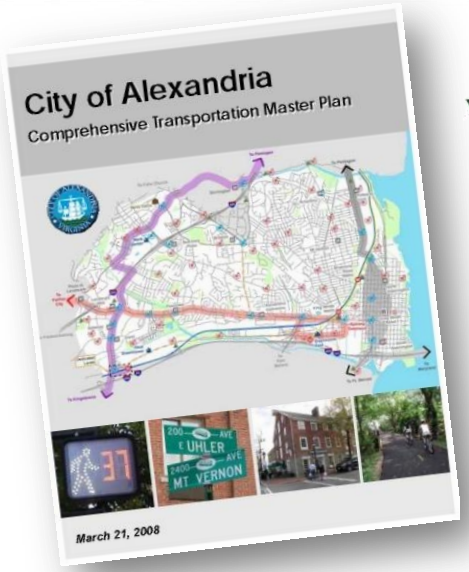
Alexandria Transitway Projects

Kimley-Horn and Associates, Inc.

City Transitway Initiative

- Corridors identified by Transportation Master Plan
  - Corridor A: North-South Corridor
  - Corridor B: Duke/Eisenhower
  - Corridor C: Beauregard/Van Dorn





TRANSITWAY CORRIDOR FEASIBILITY STUDY

Preparatory Work

- The City acquired a RSTP grant to determine the feasibility of high-capacity transitways in three corridors in the City.
- After issuing a RFP, the City contracted with the firm of Kimley-Horn to do this study.
- The City decided that due to the opening of BRAC-133 in the summer of 2011, and work on a small area plan for the Beauregard corridor, corridor C would be analyzed first, Corridor A next, and Corridor B last.
- The City decided that to make the recommendations truly the result of participation of all City stakeholder groups and the general public, a transit Corridors Working Group (CWG) was constituted.

High Capacity Transit Corridor Work Group

To provide citizen inputs to such issues as include **route alignments, cross-sections, methods of operation, types of vehicles** which should be used in these corridors at specific times, **land use considerations, ridership, and financial implications**.

- City Council – 2 representatives
- Planning Commission
- Transportation Commission
- Budget & Fiscal Affairs Advisory Committee
- Chamber of Commerce
- Federation of Civic Associations – 2 representatives
- Resident with Transit Planning Expertise

Public Meetings Related to the Transitway Feasibility Study

- After the CWG was set up, the City embarked on a series of meetings to identify the best alignment and transit mode both with the CWG and other meetings.
- All CWG meetings were open to the general public and their feedback was requested at each meeting.
- The City has employed this method of participation for all travel corridors which are being

Transit Corridor C

Corridor C Transitway Public Outreach History

Comprehensive Transportation Policy and Program (2002-2004)

Transportation Master Plan (2006-2008)

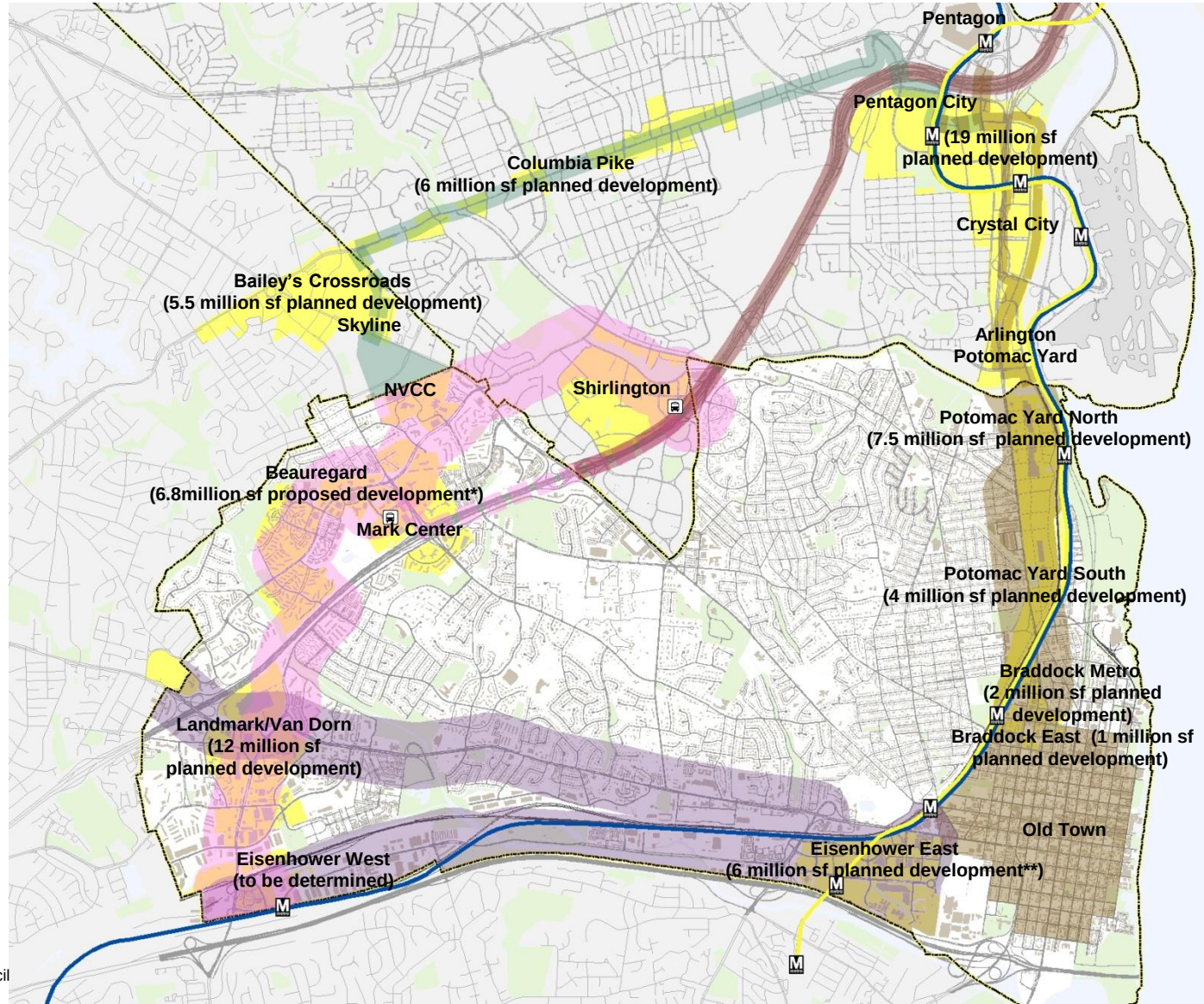
Ad Hoc Transportation Policy and Program Task Force Received over 100 oral & written comments on Transportation Plan	2 Community Meetings (2006-07) 2007 Citywide Transportation Forum City established Committee meetings
Alexandria Planning Commission	Public Hearing June 5, 2007 Public Hearing February 5, 2008
Alexandria City Council	Public Hearing April 12, 2008

Transitway Corridor Feasibility Study (2010 – Present)

High Capacity Transit Corridor Work Group	6 CWG Meetings
Planning Commission	2 public meetings
Transportation Commission	2 public meetings
Alexandria City Council	2 public meetings
Beauregard Corridor Stakeholder Group	7 public meetings
Beauregard Developer Team	7 public meetings

Land Use and Transportation Connectivity

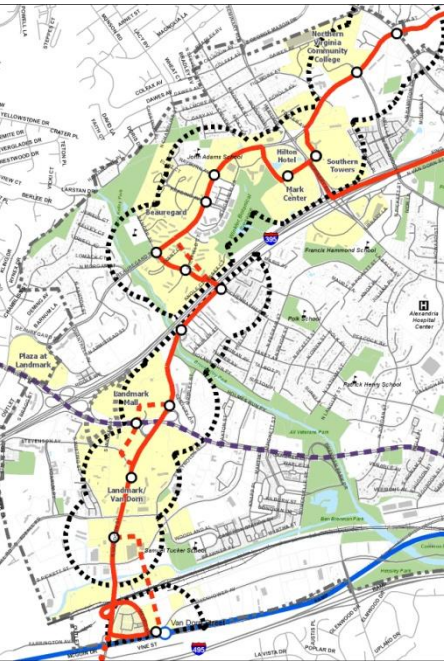
- Beauregard corridor plan
- Braddock Metro & Braddock East plans
- Columbia Pike Initiative
- Crystal City plan
- Eisenhower East plan
- Eisenhower West area development
- Landmark/Van Dorn corridor plan
- Mark Center plan
- Metrorail Blue & Yellow lines
- NVCC Community College master plan
- Old Town
- Pentagon
- Pentagon City development
- Potomac Yard plans (Arlington and Alexandria)
- Shirlington



Regional development values approximate
*Value approximate based on current developer plans for Beauregard Area that have not been approved by City Council
**Value does not include Carlyle

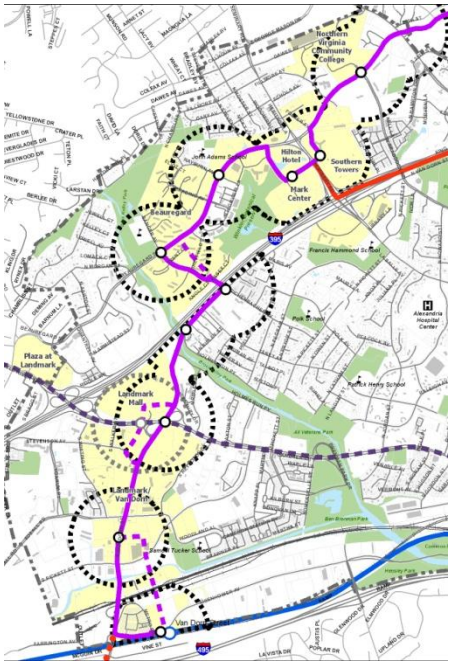
Preliminary Alternatives Selected for Further Evaluation

Alternative B



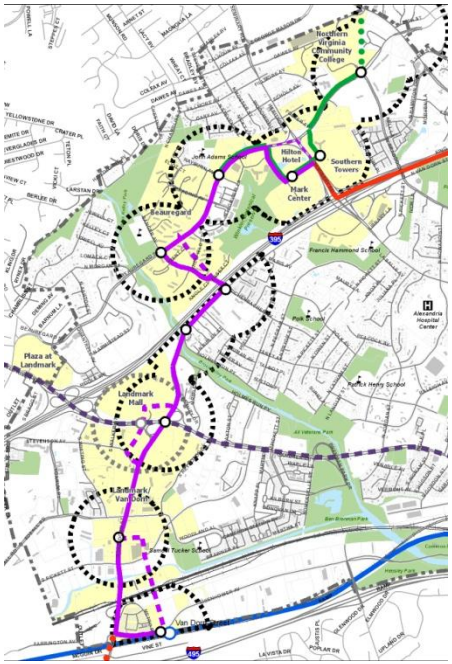
- Possible preliminary phase of any other alternative
- Baseline for evaluation

Alternative D



- Support from CWG
- BRT
- Shirlington connection
- Moderate capital cost

Alternative E



- Support from CWG
- BRT and streetcar
- Single seat ride between Columbia Pike and potential Beauregard Town Center
- Moderate-high capital cost

Alternative G

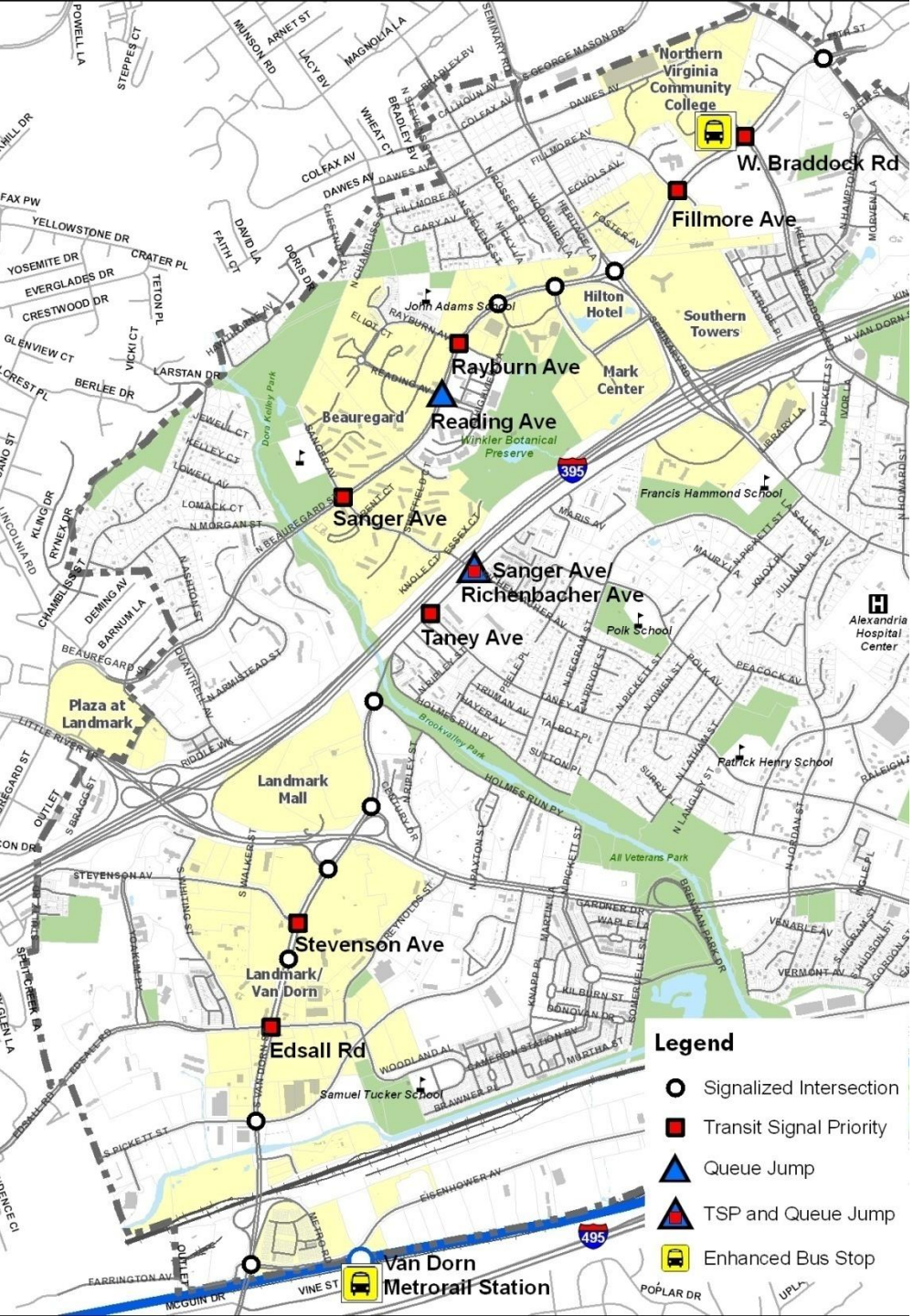
- Public support
- Streetcar option
- Compatibility with Columbia Pike
- High capital cost

Legend

- Rapid Bus
- Streetcar - Mixed Flow
- BRT (Bus Rapid Transit)
- Streetcar (dedicated lanes)
- Phased Route
- Optional Route or Columbia Pike Connection
- Transitway Station
- Quarter-mile station area

TRANSITWAY CORRIDOR FEASIBILITY STUDY

BASELINE ALTERNATIVE



TIGER Grant-Funded Van Dorn/Beauregard Transit Improvements Project

Transit Signal Priority Locations

1. Beauregard St at W. Braddock Rd
2. Beauregard St at Fillmore Ave
3. Beauregard St at Rayburn Ave
4. Beauregard St at Sanger Ave
5. S. Van Dorn St at Sanger Ave
6. S. Van Dorn St at Taney Ave
7. S. Van Dorn St at Stevenson Ave
8. S. Van Dorn St at Edsall Rd

Queue Jump Locations

1. Beauregard St at Reading Ave
2. N. Van Dorn St at Sanger Ave/ Richenbacher Ave

Enhanced Bus Stop Locations

1. Beauregard St at W. Braddock Rd
2. Van Dorn Metrorail station

Transit Signal Priority and Queue Jump Lanes

- Transit Signal Priority
  - If the signal is green, but about to turn red – adds few seconds of green time for approaching transit
  - If the signal is red – reduces the length of the red phase for approaching transit
- Queue Jump Lanes
  - Allow bus to bypass some traffic
  - Combination of signal phasing and a lane to improve transit performance

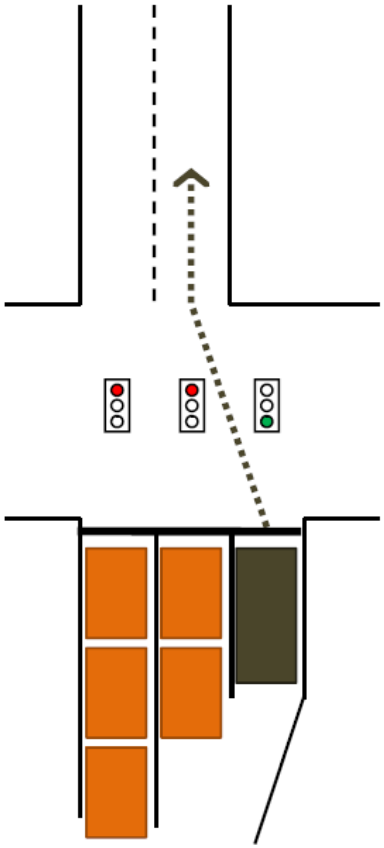


Illustration of queue jump through advance green for transit vehicle

Enhanced Bus Stops

- Provide transit information
- Safety of passengers

Secondary Evaluation Criteria – Effectiveness

Criteria Sub-Group	Evaluation Criteria	Measurement Method
Coverage	**Service to Population, Employment, and Other Destinations**	Tabulate population, employment, key destinations, and similar, served by option
	Transit Connectivity	Access to other transit services (existing and planned)
Operations	Running-way Configuration(s)	Quantify amount of runningway that is dedicated and amount that is mixed flow
	Corridor Length	Measured length of the corridor (mi or feet)
	Capacity	Potential corridor capacity (hourly) based on mode technology, headways, and other conditions
	Interoperability	Identification of whether the chosen runningway configuration and transit mode technology are compatible with regionally planned systems
	Avoidance of Congestion	Number and locations of LOS E/F intersections avoided
	Transit Travel Time	Transit travel time
	Intersection Priority	Percent of intersections where TSP is needed and can be implemented successfully - notation of where it cannot be implemented successfully
	Ridership	Forecast number of riders
Alignment	Geometrics	Geometric quality of alignment
	Runningway Status	Percent of corridor to be located on new or realigned roadway
Phasing	Phasing	Identification of ability to phase operations and implementation

Secondary Evaluation Criteria - Impacts

Criteria Sub-Group	Evaluation Criteria	Measurement Method
Economic	**Development Incentive**	Perceived value of transit mode technologies with regard to development potential
Natural Environmental	Natural Environment	Summary of key environmental conditions affected (wetlands, floodplains, T&E, streams, and similar)
	Parks and Open Space	Summary of parks and/or open spaces affected
Neighborhood and Community	Property	Number, use type, and quantity of properties impacted with anticipated level of impact (ROW only, partial take, total take)
	Streetscapes	Impact to existing streetscapes
	Community Resources	Identify number and location of historical, cultural, community, archaeological resources affected
	Demographics	Identification of impacts to special populations
	Noise and Vibration	Summarize relative noise and vibration impacts of different mode types and corridor configurations
Transportation	**Traffic Flow Impact**	Effect of transit implementation on vehicular capacity of corridor
	Traffic Signals	Number of existing signalized intersections affected by transit, identification of need for new signal phases, and number/location of new traffic signals needed to accommodate transit
	Multimodal Accommodation	Impacts to, and ability to accommodate bicycles and pedestrians
	Parking	Impacts to parking

Planning-Level Ridership Forecasts for Corridor C

	Alternative			
	B *(baseline)*	**D**	**E**	**G**
Transit Mode:	Rapid Bus (mixed)	BRT (mixed & dedicated)	Streetcar (mixed) & BRT (mixed & dedicated)	Streetcar (dedicated)
Northern Connection:	Shirlington & Pentagon	Shirlington & Pentagon	Columbia Pike & Pentagon	Columbia Pike
Year 2035 Daily Weekday Ridership	-	12,500 to 17,500 riders/day	13,500 to 19,000 riders/day	15,000 to 20,000 riders/day

- Approximately 20% difference between lowest and highest daily ridership

Secondary Evaluation - Effectiveness

Evaluation Criteria			Alternative			
			B *(baseline)*	D	E	G
		Transit Mode:	Rapid Bus (mixed)	BRT (mixed & dedicated)	Streetcar (mixed) & BRT (mixed & dedicated)	Streetcar (dedicated)
		Northern Connection:	Shirlington & Pentagon	Shirlington & Pentagon	Columbia Pike & Pentagon	Columbia Pike
Coverage	Service to Regional Destinations		◧	◧	■	◧
	Service to Population, Employment, & Retail in the Corridor		■	◧	◧	◧
	Transit Connectivity		◧	◧	■	◧
Operations	Running-way Configuration(s)		□	■	■	■
	Corridor Length		◧	◧	■	■
	Capacity		◧	◧	◧	■
	Interoperability		◧	◧	■	■
	Avoidance of Congestion		◧	■	■	■
	Transit Travel Times	In Corridor	◧	■	■	■
		Between Termini	◧	■	■	□
	Ridership		□	◧	■	■
	Intersection Priority		◧	■	■	■
Align-ment	Alignment Quality		◧	◧	◧	◧
	Runningway Status		■	◧	◧	◧
Phasing			N/A	■	■	■

Rating:	■	Best	◧	Fair	□	Poor

Secondary Evaluation - Impacts

Evaluation Criteria		Alternative			
		B *(baseline)*	D	E	G
	Transit Mode:	Rapid Bus (mixed)	BRT (mixed & dedicated)	Streetcar (mixed) & BRT (mixed & dedicated)	Streetcar (dedicated)
	Northern Connection:	Shirlington & Pentagon	Shirlington & Pentagon	Columbia Pike & Pentagon	Columbia Pike
Economic	Development Incentive	○	◐	◐	●
Natural Environment	Natural Environment	●	◐	◐	◐
	Parks and Open Space	●	◐	◐	◐
Neighborhood and Community	Property	●	◐	◐	◐
	Streetscapes	●	◐	◐	◐
	Community Resources	●	●	●	●
	Demographics	●	◐	◐	◐
	Noise and Vibration	○	◐	◐	●
Transportation	Traffic Flow Impact	○	●	●	●
	Traffic Signals	◐	○	○	○
	Multimodal Accommodation	○	◐	◐	●
	Parking	●	◐	◐	◐

Rating:	●	Best	◐	Fair	○	Poor

Corridor C Transitway – Streetscape Impacts

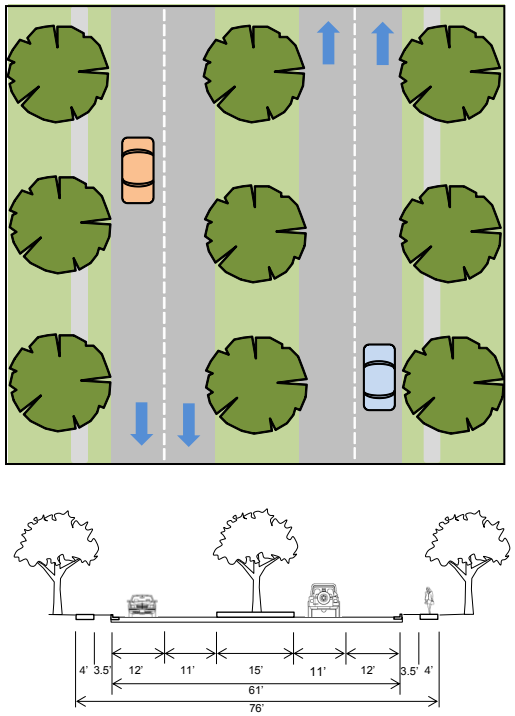
What are Complete Streets?

- Complete Streets policies ensure that roadway projects will safely accommodate all users including pedestrians, bicyclists, transit-riders, persons with disabilities and motor vehicles.

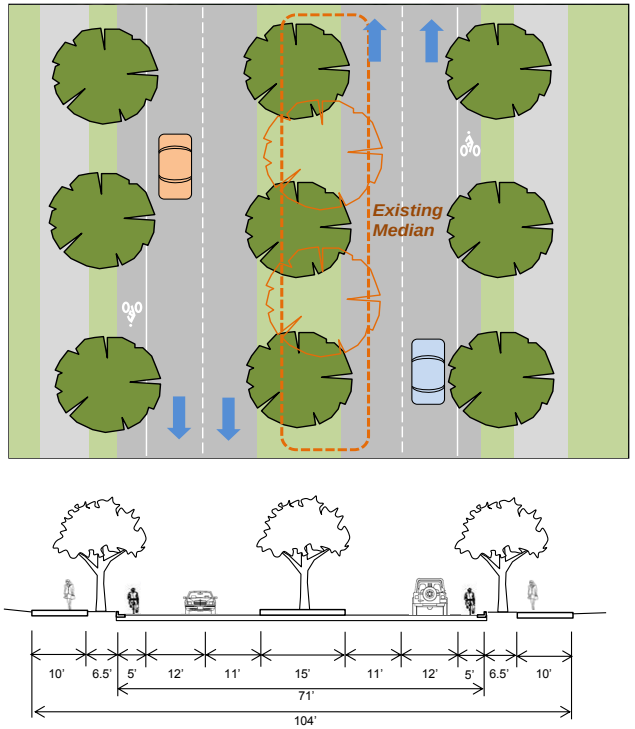
- Council adopted Complete Streets policy resolution in March 2011

Corridor C Transitway – Streetscape Impacts

Complete Streets



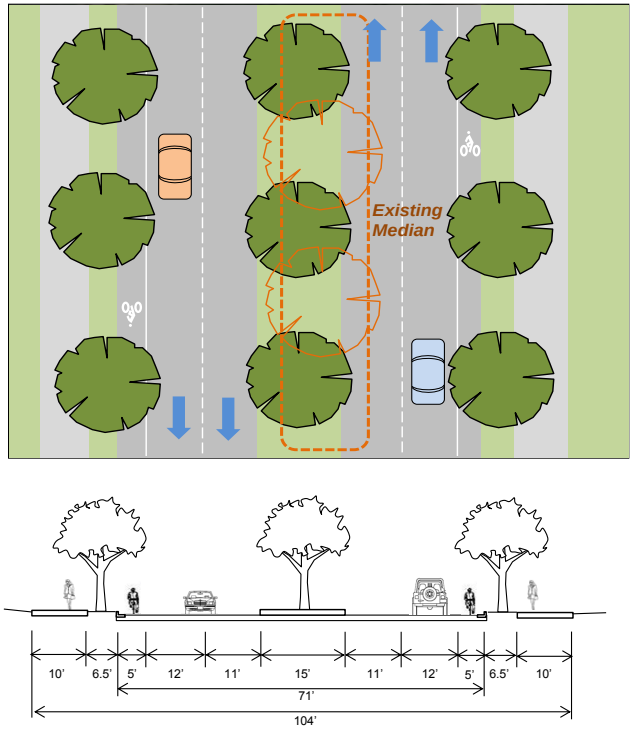
Existing (Suburban)



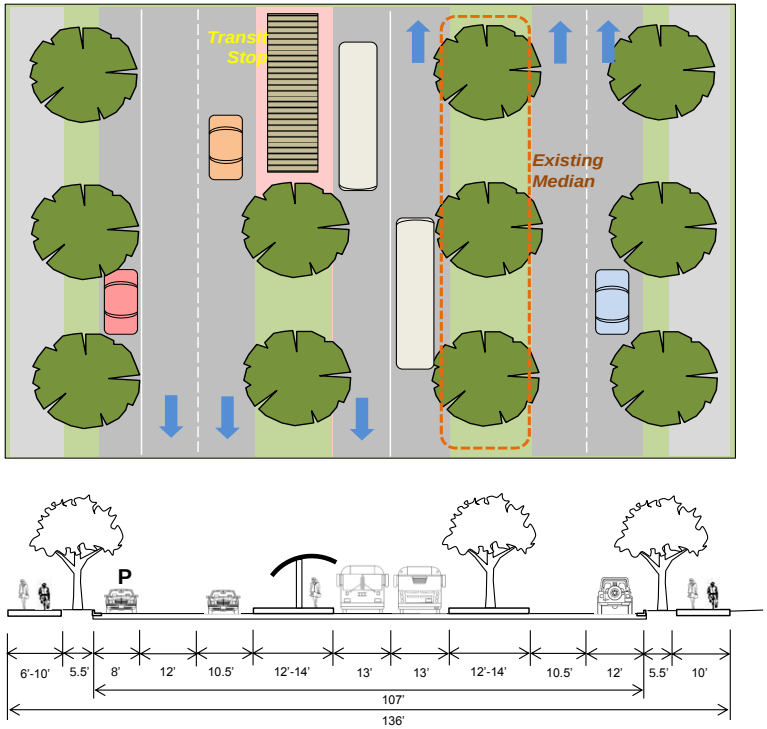
Complete Street

Corridor C Transitway – Streetscape Impacts

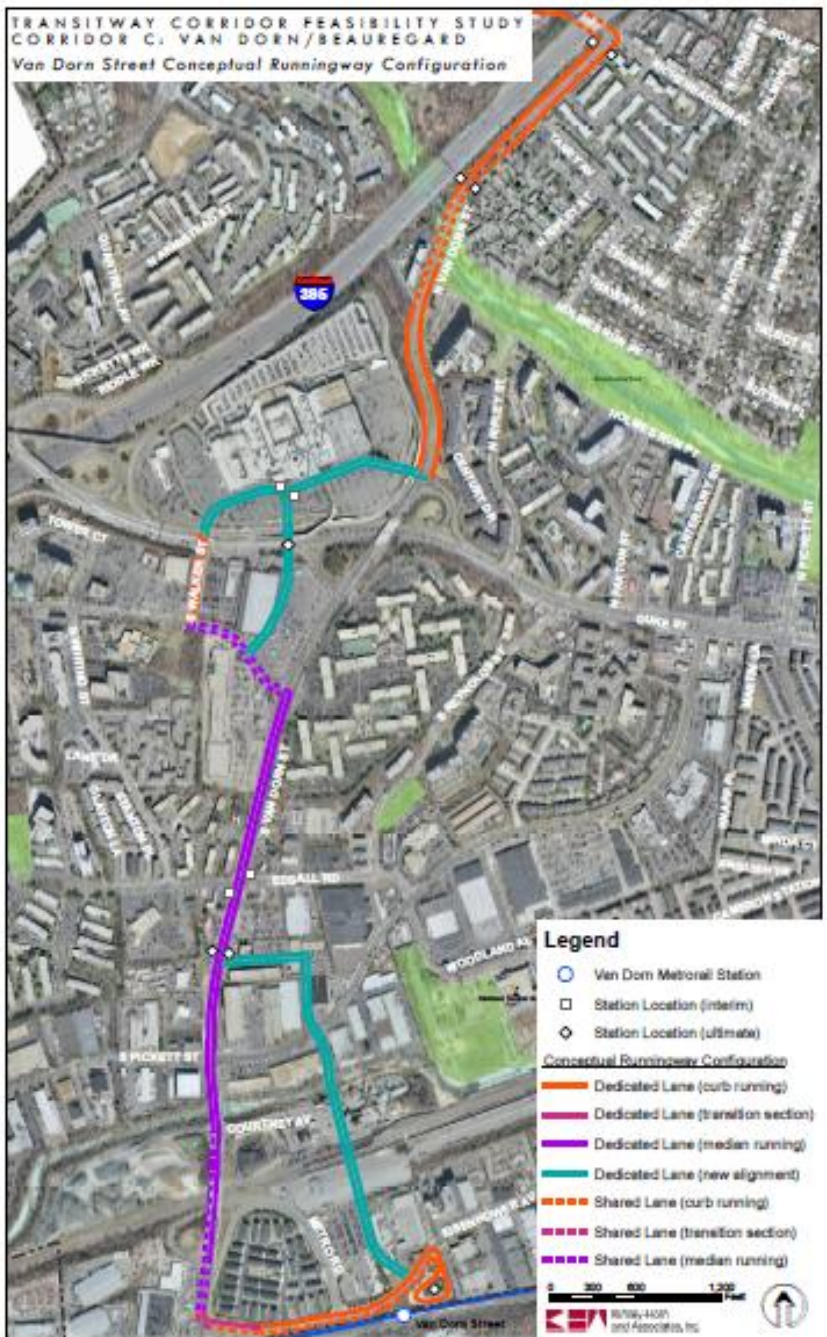
Transitway



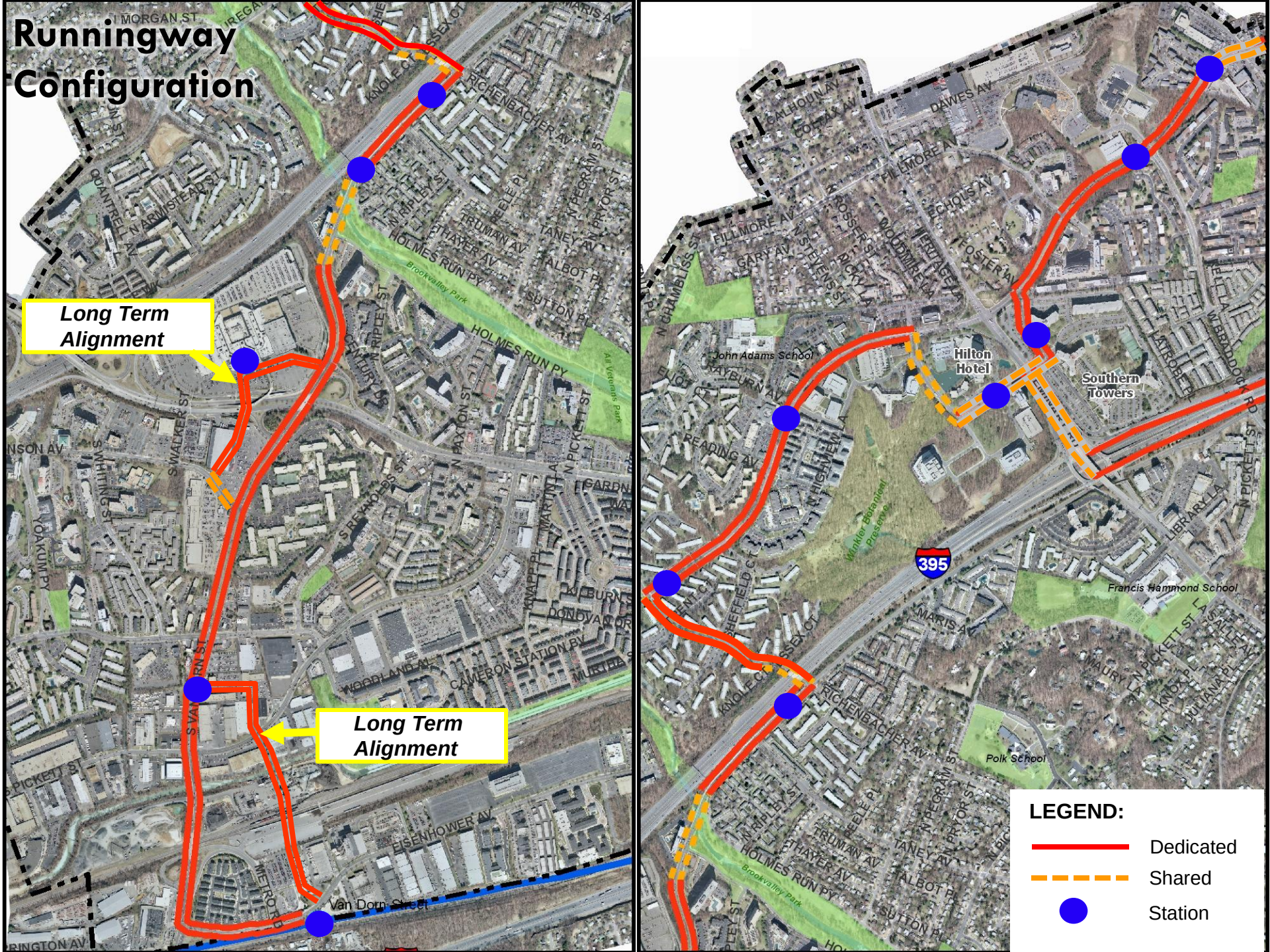
Complete Street



Transitway



Corridor C Transitway – Van Dorn Street


Runningway Configuration
Long Term Alignment
Long Term Alignment
Van Dorn Street
Hilton Hotel
Southern Towers
John Adams School
Francis Hammond School
Polk School
Winkler Botanical Preserve
Brookvalley Park
395
LEGEND:
Dedicated
Shared
Station

Planning-Level Cost Estimates

	Alternative			
	B *(baseline)*	**D**	**E**	**G**
Transit Mode:	Rapid Bus (mixed)	BRT (mixed & dedicated)	Streetcar (mixed) & BRT (mixed & dedicated)	Streetcar (dedicated)
Northern Connection:	Shirlington & Pentagon	Shirlington & Pentagon	Columbia Pike & Pentagon	Columbia Pike
Capital Cost Estimate[1] (exclusive of vehicles, based on modal cost per-mile within the City and maintenance facility cost estimation)	$15 M	$48 M	$67 M	$185 M
25-year Fleet Cost Estimate[2]	$24 M	$20 M	$34 M	$29 M
Right-of-Way Cost Estimate[1, 3]	$0 M	$33 M	$43 M	$50 M
25-year Operating Cost	$67 M	$60 M	$73 M	$59 M
Planning-Level Cost Estimate[4]	**$106 M**	**$161 M**	**$ 217 M**	**$323 M**

Notes

1. *Costs assume that Arlington's Columbia Pike streetcar terminates at NVCC at a maintenance facility. Costs for Alternatives E and G would be higher if the Columbia Pike maintenance facility is located in Long Bridge Park due to the location of the terminus of Columbia Pike.*
2. *Streetcar fleet costs are for the Alexandria portion of the streetcar only and are assumed to supplement Arlington's Columbia Pike fleet.*
3. *Right of way costs do not include property along Eisenhower Avenue, within Northern Virginia Community College, or in locations where development contribution is expected.*
4. *Planning level cost estimates are shown in year 2010 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. Alignments designated as "optional" or "phased" are not included in the cost.*

Summary of Public Comments

Phasing

- Need for a multi-phased approach to implementing the transitway
- Start out with something smaller, not high capacity transit
- Need to understand where people are and where they need to go

Connectivity

- Provide connectivity to local activity centers in Alexandria, Arlington, and Fairfax
- Serve local residents first, then regional connections
- Important to provide pedestrian and bicycle connectivity

Mode and Operation

- Need something that is permanent, like streetcars, that will attract visitors and development
- Need dedicated lanes for system effectiveness
- Use existing travel lanes to accommodate transit
- Make sure there is a seamless connection between corridors and other transit
- Needs to be a high quality operation
- Must operate at high frequencies throughout the day

Summary of Public Comments

Impacts

- Don't reduce or impact current local transit services after high capacity transit is implemented
- Need to understand the impacts of the BRAC facility, especially to the roadway system.
- Do not worsen the traffic impacts
- Sanger Avenue cannot handle a transitway – it's already constrained
- There are potential environmental impacts to Holmes Run
- Concerned about the impacts at Sanger and Van Dorn intersection – it's already congested
- Minimize the impacts to the West End – it's already being impacted by BRAC
- A streetcar system is too expensive to
- BCSG – Provide adequate facilities for emergency response and traffic operations

Corridor C Transitway – Recommended Operation

Alternative D

Bus Rapid Transit in Dedicated Lanes from Van Dorn Metro to Pentagon

Planning-Level Cost Estimate

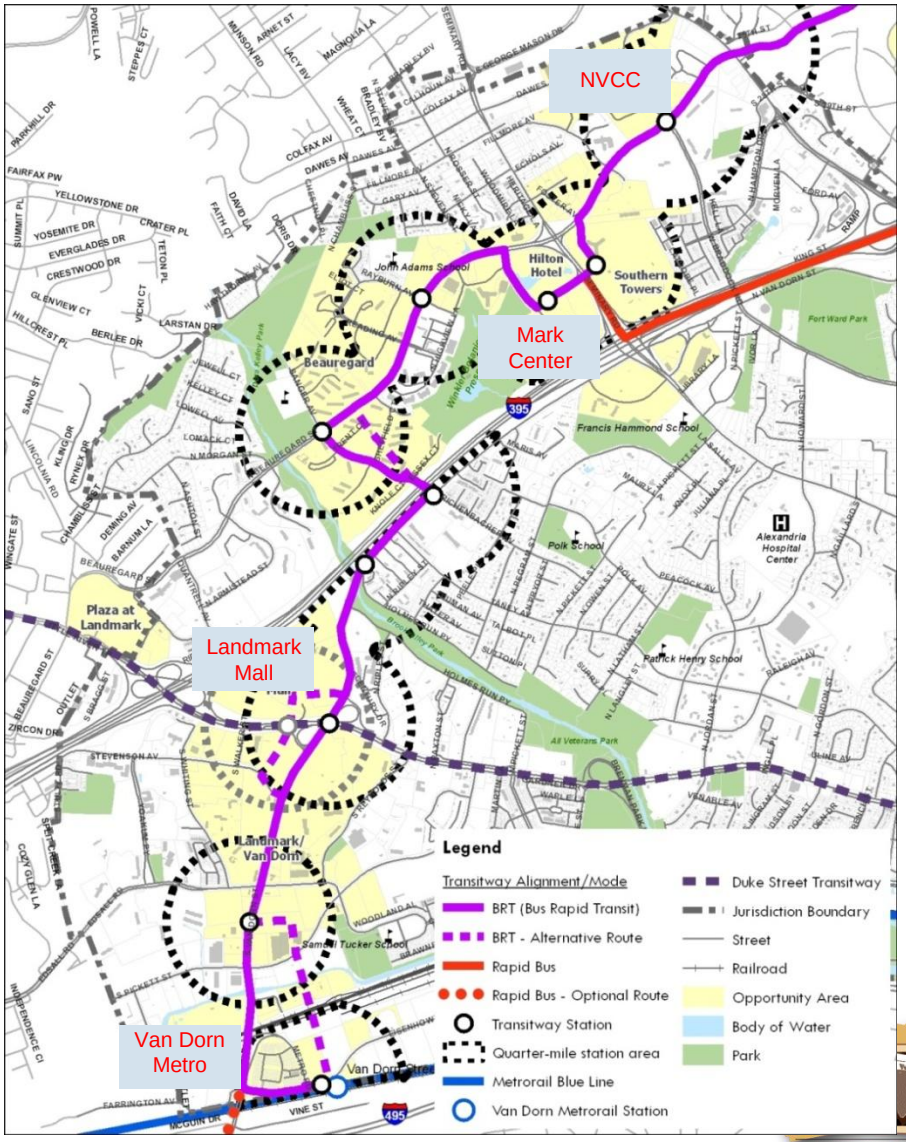
- Capital: $48 million
- Fleet (25-year): $20 million
- ROW: $33 million
- Operating (25-year): $60 million

Physical Characteristics

- Low-floor BRT vehicles
- Dedicated lanes (~80% to 90% of corridor)
- Off-board fare collection
- Service specific branding and identity
- Substantial transit stations

Operational Characteristics

- Transit signal priority at intersections
- Real-time service information
- 7.5-minute peak period headways
- 15-minute off-peak headways
- 18 hours of service (Monday through Saturday)
- 12 hours of service on Sunday
- 2035 Weekday Ridership estimate of 12,500 to 17,500 riders per day



Corridor C Transitway – Recommended Operation

Alternative G (Long Term)

Streetcar in Dedicated Lanes from Van Dorn Metro to Pentagon via Columbia Pike

Planning-Level Cost Estimate

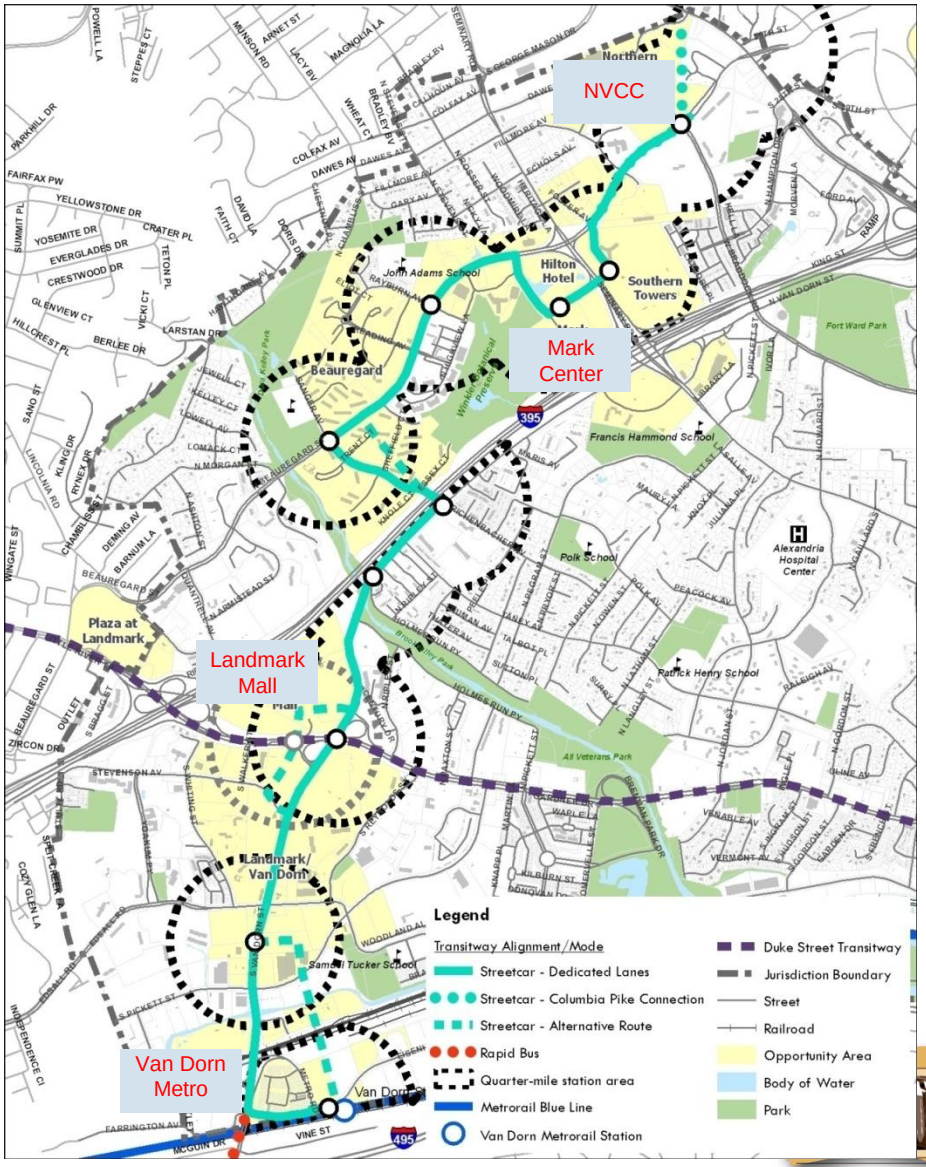
- Capital: $185 million
- Fleet (25-year): $29 million
- ROW: $50 million
- Operating (25-year): $59 million

Physical Characteristics

- Streetcar vehicles
- Dedicated lanes (~80% to 90% of corridor)
- Off-board fare collection
- Service specific branding and identity
- Substantial transit stations
- Connection to Columbia Pike Streetcar

Operational Characteristics

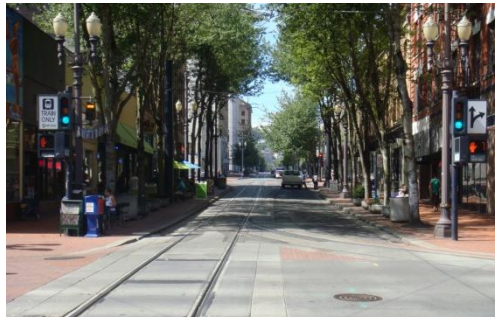
- Similar to Alternative D
- 2035 Weekday Ridership estimate of 15,000 to 20,000 riders per day



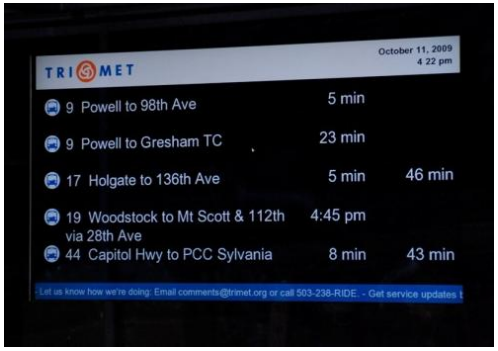
Corridor C Transitway – Recommended Operation

BRT Characteristics

Streetcar Characteristics



Station Characteristics



City Council – September 17, 2011

The following motion was passed by the Council on September 17, 2011, regarding transit in Corridor C:

The City Council endorses the recommendation of the transit Corridors Work Group, and also directs that staff should work with Northern Virginia Community College to improve service to the Alexandria campus of the college with this service.

Next Steps for Corridor C

- Alternatives Analysis / Environmental Analysis – 2012-2013
- Preliminary Design – 2014
- Briefings to Transportation / Planning Commissions / Council regarding design elements
- Final Design and Right-of-way Acquisition – 2015
- Construction – 2016 - 2017

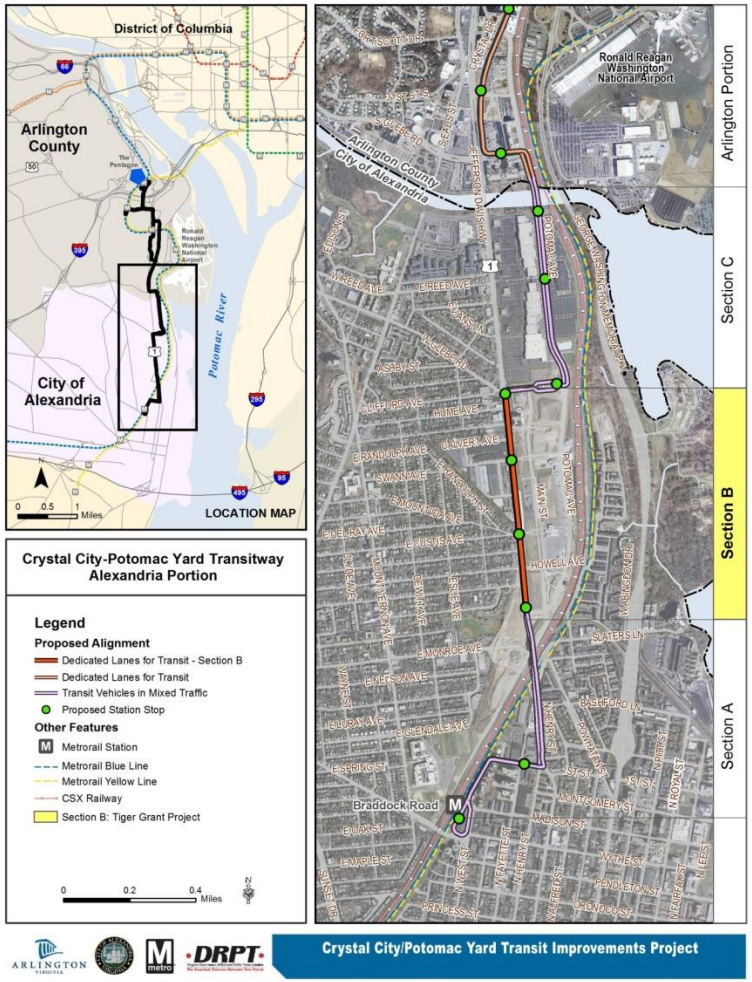
TRANSIT CORRIDOR A

Transit Corridor A

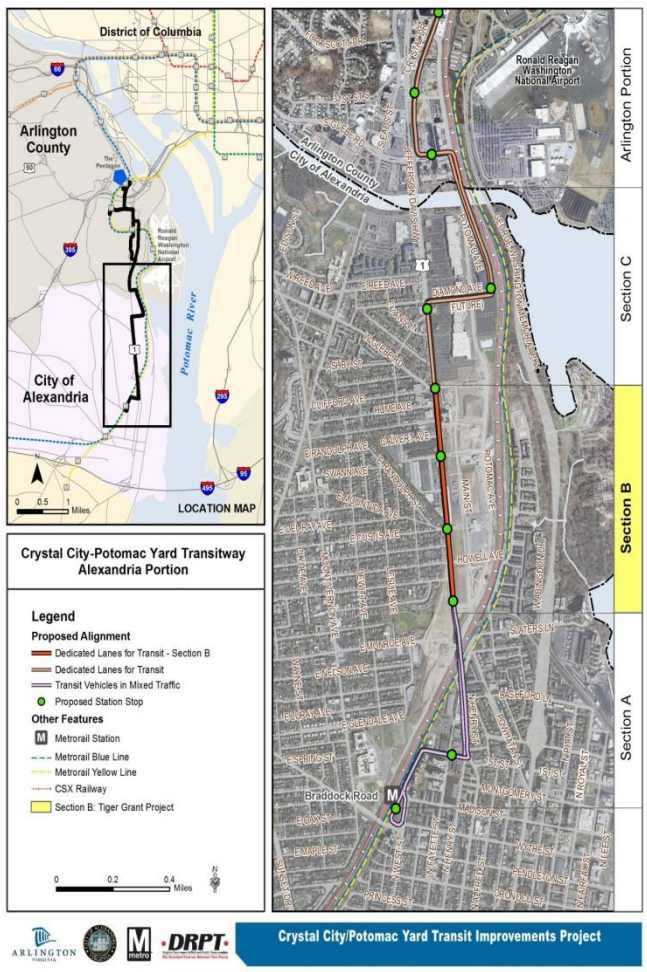
- General Location- North-South Corridor generally following Route 1 from the Arlington County Line to the Fairfax County line.
- An extensive amount of work has been accomplished by both Alexandria and Arlington County to build a high-capacity transitway from the Braddock Road Metro to the Crystal City and Pentagon City Metro stops in Arlington.
- An alignment was developed through several planning efforts in Alexandria and Arlington County. It was decided that this service would initially be BRT but could be converted to streetcar in the future

Transit Corridor A Study Area

Transit Corridor A



Current CCPY Alignment



Ultimate CCPY Alignment

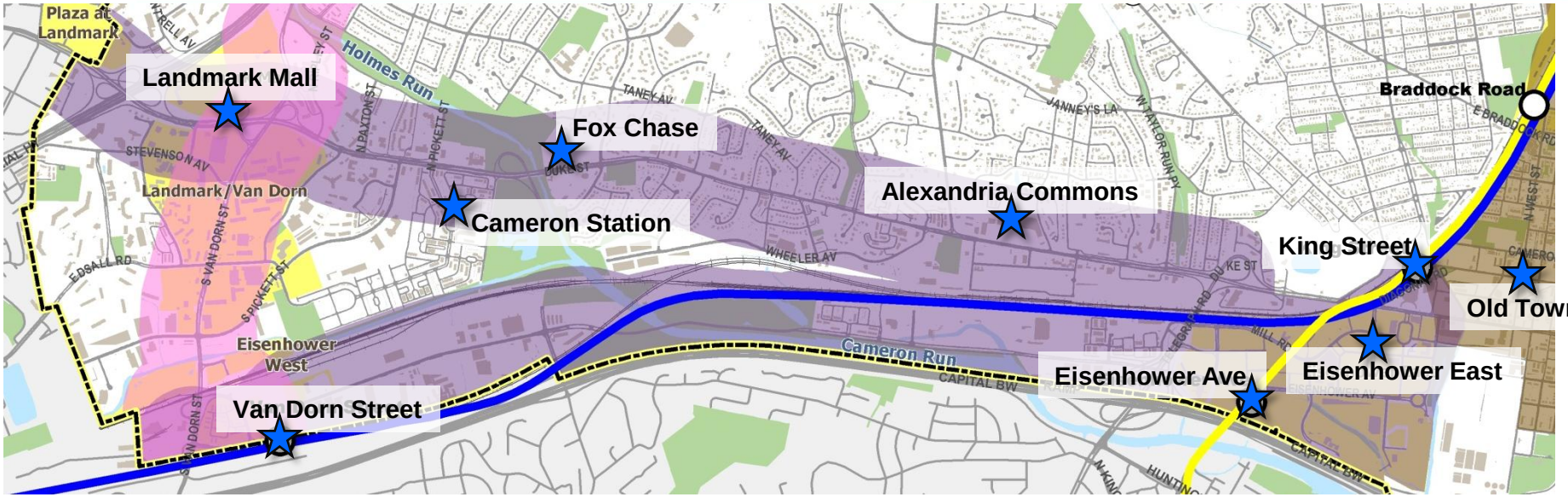
Transitway A-CCPY Implementation

- Funding has been assembled to build the CCPY
  - Sources
    - FTA Section 5309 Funds
    - FTA Exempt New Start Funds
    - Federal DOT TIGER Funds
    - CMAQ Funds
    - RSTP Funds
    - City of Alexandria Funds
    - Private Funding
- Implementation
  - The City is using a design-build method to build the transitway itself- This contract was signed in November, 2011.
  - The City will use a conventional design-bid-build process to build the transitway station- This will begin in early 2012.
  - Service in Alexandria is scheduled to start by the end of 2013.

Transitway A-Southern Portion of Corridor

- The City initially desired to create a high-capacity transit service that would link up high-capacity transit in Fairfax County with the CCPY transitway.
- After a series of contentious meetings, the general population felt that this connection was already being made by Metrorail and did not want this connection to be made with another transit service.
- Therefore, the recommendation of the CWG was to improve existing bus services in Old Town, to provide better service into areas not close to Metrorail stations.

TRANSIT CORRIDOR B

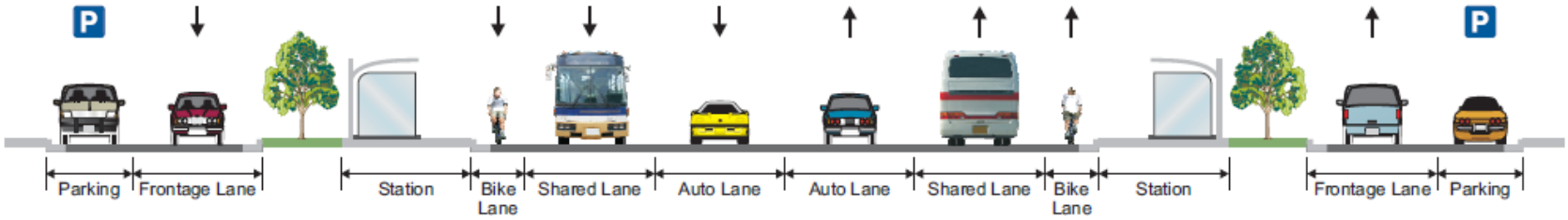


Corridor B: Duke/Eisenhower

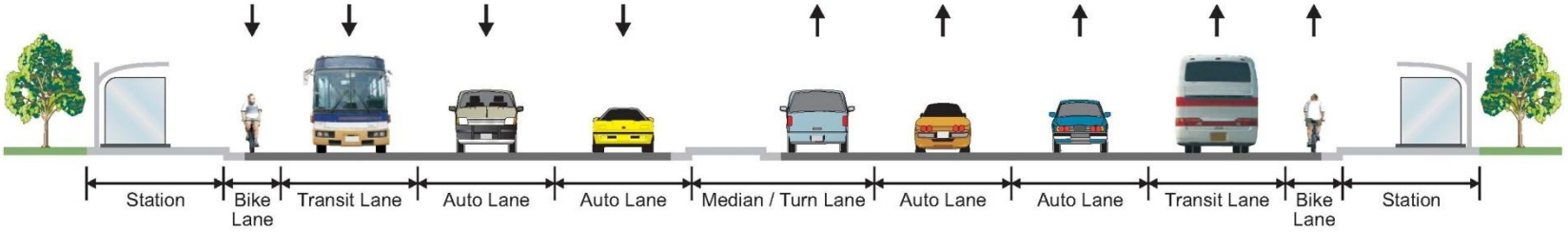
- Major destinations
  - Eisenhower East
  - Landmark Mall Area
  - Cameron Station
  - Fox Chase
  - Alexandria Commons
  - Old Town
  - Van Dorn Metro
  - King Street Metro
  - Eisenhower Avenue Metro

TRANSITWAY CORRIDOR FEASIBILITY STUDY

Alternative 1 – Use Existing Lanes for Transit



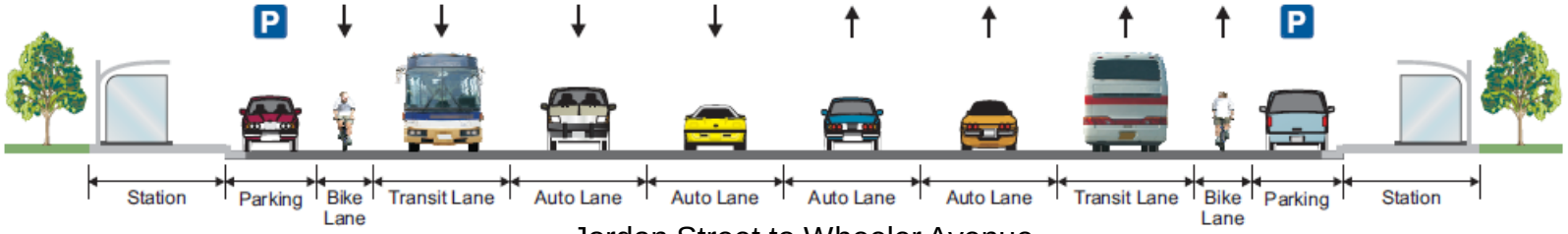
Jordan Street to Wheeler Avenue



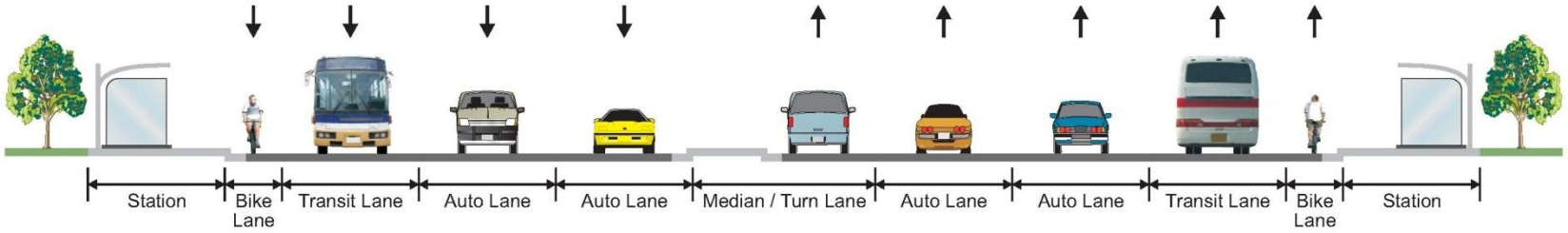
Landmark Mall to Jordan Street / Roth Street to King Street Metro

Advantages	Disadvantages
•Fewest negative impacts (including property) •Maintains service roads •Lowest capital cost •Easy to phase	•Worst transit operation due to shared lanes •Highest operating cost •Highest fleet cost •May be impacted by congestion on Duke Street •Longest transit travel time •Lowest ridership potential

Alternative 2 – Uses Service Road Right-of-Way



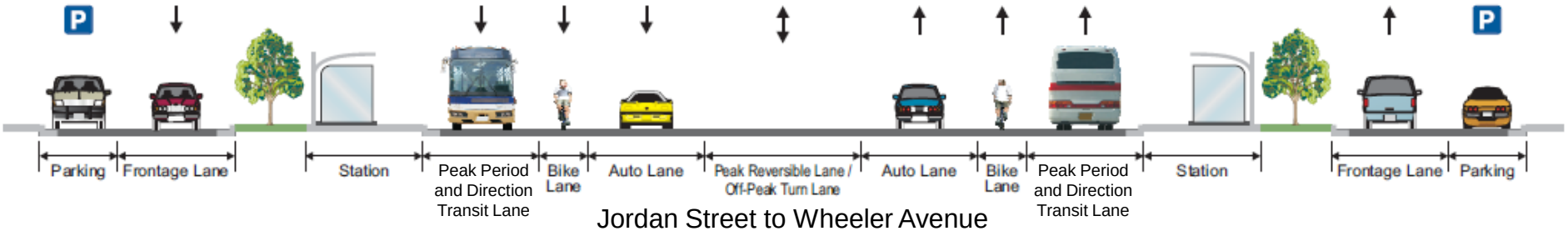
Jordan Street to Wheeler Avenue



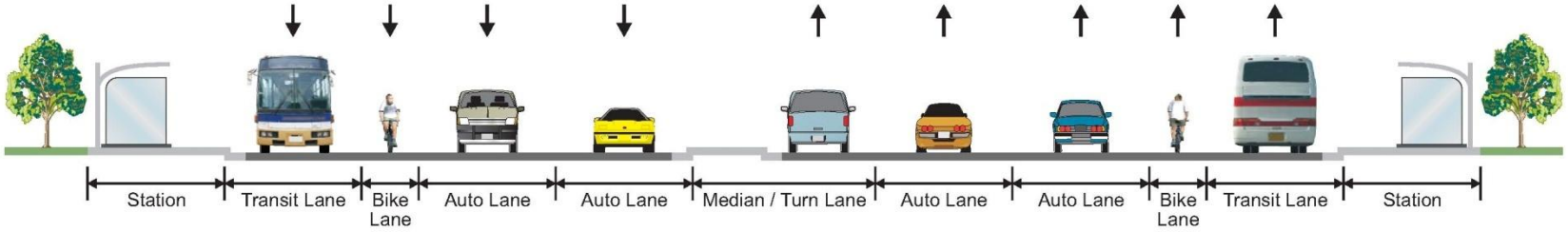
Landmark Mall to Jordan Street / Roth Street to King Street Metro

Advantages	Disadvantages
•Minimal impact to traffic flow •High-quality transit operation •Moderate capital, fleet, and operating cost •Some avoidance of congestion for transit	•Curvilinear alignment •On-street parking could disrupt transit operations •Impacts service roads and streetscape as a result

Alternative 3 – Reversible Lane



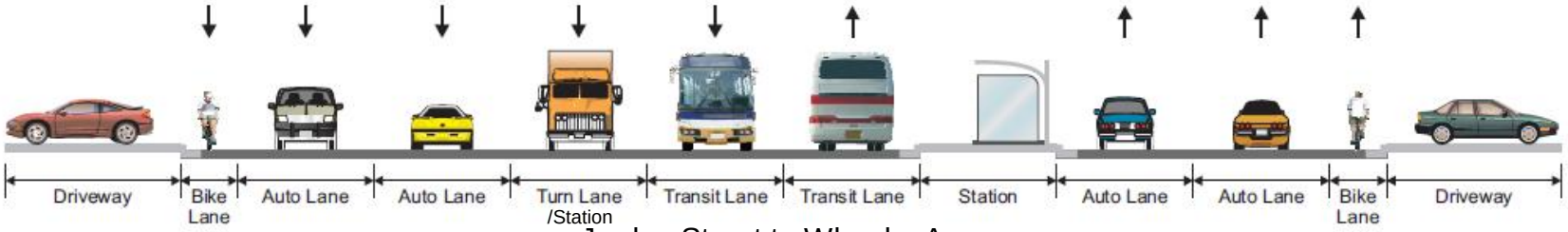
Jordan Street to Wheeler Avenue



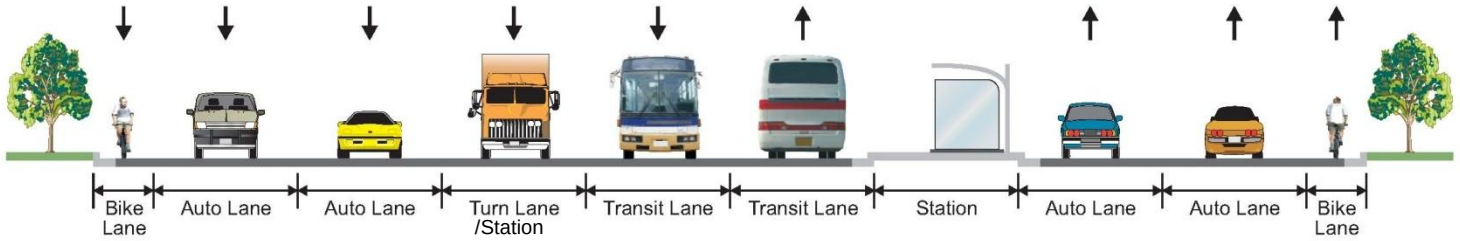
Landmark Mall to Jordan Street / Roth Street to King Street Metro

	Advantages	Disadvantages
Reversible Lane	•High-quality transit operation •Maintains most service roads •Moderate capital, operating, and fleet cost •Provides turn lanes at some new locations to help traffic flow	•Off-peak direction traffic impact OR off-peak direction transit impact •Property impacts •Requires overhead gantries to control reversible condition •May be confusing to drivers
Reversible Lane Variation	•Maintains most service roads •Less property impact than Alternative 3 •Provides peak direction, peak period transit lane •Lower capital cost than Alternative 3	•No dedicated lanes off-peak time and direction •Property impacts •Requires overhead gantries to control reversible condition •Could be very confusing to drivers due to changing lane use condition

Alternative 4 – Median Running



Jordan Street to Wheeler Avenue



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

Advantages	Disadvantages
•Best transit operation by eliminating conflicts with driveways and traffic •Lowest fleet and operating cost •Avoids impacts from traffic congestion •Highest ridership potential	•Largest property impact •Eliminates service roads and parking (in front of 28 homes) •Highest capital cost •Highest right-of-way cost and impacts

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"